Attachment B: Appendices to the Dublin Boulevard - North Canyons Parkway Extension Project Draft EIR

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Appendix A: NOP and Scoping Comments

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Notice of Preparation and Notice of Public Scoping Meeting
Dublin Boulevard-North Canyons Parkway Extension Project

Date: **Thursday, May 18, 2017**

To: **Public Agencies and Interested Parties**

From: **Obaid Khan, Transportation & Operations Manager, City of Dublin**

Subject: **Notice of Preparation of an Environmental Impact Report and Notice of Public Scoping Meeting for the Dublin Boulevard-North Canyons Parkway Extension Project**

The City of Dublin is the Lead Agency and will prepare an Environmental Impact Report (EIR) for the project identified herein. The project description, location, and probable environmental effects of the Dublin Boulevard-North Canyons Parkway Extension Project are described in the attached materials.

Per CEQA Guidelines Section 15082, the City of Dublin is soliciting comments from public agencies, organizations, and members of the public regarding the scope and content of the EIR, and the environmental issues and alternatives to be addressed in the EIR. Public agencies may need to use the EIR when considering permitting or other approvals that are germane to the agencies' responsibilities in connection with the projects.

Public scoping comments must be submitted no later than **Monday June 19, 2017**. Accordingly, please provide your written response to either the email or the address shown below by **5:00 p.m., Monday, June 19, 2017**. If you wish to be placed on the notification list for this project, or if you have any questions or need additional information, please contact:

City of Dublin
100 Civic Plaza
Dublin, CA, 94568
Attn: Marissa Clevenger, Office Assistant II
Phone: 925-833-6630; Fax: (925) 829-9248; email: marissa.clevenger@dublin.ca.gov

Public Scoping Meeting

A public scoping meeting will be held at **6:00 p.m. on Wednesday, May 31, 2017,** at Dublin City Hall, Regional Meeting Room, 100 Civic Plaza, Dublin, CA 94568. At this meeting, public agencies, organizations, and members of the public will be able to review the proposed project and provide comments on the scope of the environmental review process. A comment station will be available at the meeting to collect written comments and feedback on the scope of the EIR.

Project Location

The study area is located within the cities of Dublin, Livermore, and unincorporated portions of Alameda County. While the proposed alignment is conceptual, the general study area is located north of US Interstate 580 (I-580), between the existing Dublin Boulevard to the west and North Canyons Parkway to the east (**Figure 1**), within the Livermore U.S. Geological Survey (USGS) 7.5-minute quadrangle (Township 3 South, Range 1 East; 37° 42'14.18 N, 121° 50' 15.55 W; Mt. Diablo Meridian) in Alameda County.

Existing Conditions

Land Use Activities

The study area is predominantly characterized by undeveloped grazed ranchland in eastern Alameda County, with several rural residential developments within the vicinity of the study area. The surrounding lands north of I-580 include residential, industrial, commercial, and agricultural parcels. The surrounding lands south of I-580 are primarily developed with commercial and industrial land uses.

Land Use Designations

Previous environmental documents, such as the Eastern Dublin EIR (2002) and the Fallon Village Supplemental EIR (2005), considered and cleared future development within the immediate vicinity of the study area, within the City of Dublin. The Dublin Boulevard – North Canyons Parkway extension project was considered in these documents. According to the City of Dublin General Plan (2015), the land use designations within the general area include general commercial, campus office, and industrial park, residential, and open space. The portion of the study area within Alameda County is within the East County Area Plan (ECAP) and is designated as Resource Management land. The portion of the study area within Alameda County is also considered to be within the City of Dublin's sphere of influence and subject to the Dublin Open Space Initiative of 2014. The purpose of the initiative is to maintain natural resource land use designations and prevent development beyond the urban limit line. However, the initiative continues to allow provisions for an arterial roadway between Dublin Boulevard and North Canyons Parkway. The eastern portion of the study area is within the boundaries of the City of Livermore. According to the City of Livermore General Plan (2014), land uses near the study area are designated as Business, Commercial Park, and Resource Management. **Figure 2** depicts existing land use designations within the study area.

Project Description

The City of Dublin, in coordination with the City of Livermore and Alameda County, proposes to extend Dublin Boulevard to North Canyons Parkway. The project is considered in their respective planning documents, as well as identified in *Plan Bay Area* and *Alameda Countywide Transportation Plan* (Regional Transportation Plan ID# 21473). The project would:

- Establish a precise alignment for a roadway extension that would connect several Association of Bay Area Government's (ABAG) Priority Development Areas (PDA) within Dublin and Livermore (**Figure 3**)
- Analyze the footprint and recommend the number of travel lanes for the roadway to accommodate the long-range planning efforts identified in the Dublin, Livermore, and Alameda County General Plans, and the Plan Bay Area
- Improve mobility, multimodal access, connectivity, safety, and efficiency for all users
- As a byproduct, relieve vehicular congestion in the region

The project is proposed to complete the roadway connection along the north side of I-580 to facilitate the needs of the growing jobs and housing associated with ABAG Priority Development Areas (PDA) in the project vicinity.

Dublin Boulevard is a major arterial facility connecting Dublin's downtown area to the west and partially developed sections to the east. Dublin Boulevard provides direct connectivity to Camp Parks Army Base, regional Iron Horse Trail, and various residential/office/commercial land uses. Within approximately 0.5-mile of the Dublin Boulevard corridor, there are approximately 8,000 existing housing units and

approximately 1,000 approved housing units. North Canyons Parkway is a four-lane arterial facility in Livermore that provides access to commercial, industrial, residential development, and educational facilities. There are nearly 800 existing and approximately 500 approved multi-family units located adjacent to North Canyons Parkway. Additionally, two schools are accessed directly from North Canyons Parkway, including Las Positas Community College and Livermore Valley Charter Kindergarten-8th grade (K-8).

Potential Environmental Effects

Because the Lead Agency has determined that an EIR will be required, no Initial Study has been prepared for the proposed project. The EIR will identify significant and potentially significant environmental effects anticipated to result from development of the project. Other environmental topics (i.e., agriculture, mineral resources, etc.) will be evaluated at a lesser level of detail.

Each of the following environmental topic areas in the EIR will include a discussion of the existing conditions for each environmental issue and identify short-term and long-term environmental impacts associated with the project, and their levels of significance. Mitigation measures will be identified to reduce any potentially significant or significant impacts. The level of analysis for these subject areas may be refined or additional subject areas may be analyzed based on responses to this NOP and/or any refinements to the proposed project that may occur subsequent to the publication of this NOP.

Potential environmental effects and the analysis methodology for each of the following topic areas are described below:

- Aesthetics
- Air Quality/ Greenhouse Gas/Energy
- Biological Resources
- Cultural Resources
- Geology and Soils
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Noise and Vibration
- Population and Housing
- Public Services
- Transportation and Traffic
- Utilities and Service Systems

Aesthetics

The study area is undeveloped and used predominantly for grazing land, but is located adjacent to developed areas and is north of I-580. Implementation of the project would construct an approximately 1.5-mile roadway within a relatively undeveloped area potentially resulting in a change to the character and visual quality of the study area. The aesthetics section of the draft EIR will identify the visual characteristics of the study area and surrounding area. The section will describe the existing aesthetics and visual resources, including a discussion of views within the study area and views from surrounding areas. The draft EIR will discuss potential construction and operational visual impacts that may result from the project. Mitigation measures will be provided where necessary to reduce impacts associated with the project.

Air Quality/Greenhouse Gas/Energy

The study area is located within the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). Air quality modeling will be performed in accordance with BAAQMD standards. The project could change traffic patterns leading to a change in air pollutant emissions, primarily those that have an

effect on regional air quality. Additionally, an assessment of changed carbon monoxide concentrations will be conducted to evaluate local air quality. Impacts from construction period and toxic air contaminants (TACs) as it relates to sensitive receptors will be evaluated as well. Greenhouse gas (GHG) emissions will be modeled and compared to the BAAQMD standards. The analysis will include an assessment of travel-related emissions. In accordance with Appendix F of the CEQA Guidelines, projected electricity and natural gas usage during construction and operation will be analyzed.

Overall, the air quality/GHG/energy sections of the draft EIR will discuss the air quality setting (including climate and topography), environmental health effects of criteria pollutants, existing air quality in the project vicinity, the regulatory setting, and potential short-term and long-term air quality impacts. Mitigation measures will be provided where necessary to reduce impacts associated with the project.

Biological Resources

Large portions of the study area are currently undeveloped open space lands, which have the potential to host plants and animals that could be impacted by the project. A Biological Resources Assessment Report will be prepared to evaluate potential significant impacts within the study area and provide recommended mitigation measures as appropriate. The biological resources section of the draft EIR will identify the existing biological resources and potential for the site to support special-status plant and animal species. A wildlife ecologist and a botanist/wetlands ecologist will conduct reconnaissance-level field surveys of the project area to document the biological conditions. This information will be gathered for the purpose of characterizing the botanical resources and wildlife habitat values of the project site and surrounding vicinity.

Cultural Resources

Based on a literature search and existing documentation within the study area, sensitive archaeological resources could possibly be encountered during project construction. A Cultural Resources Assessment Report will be prepared to evaluate potential significant impacts to sensitive resources within the study area and provide recommended mitigation measures as appropriate.
Consultation will be conducted with existing databases of cultural resources, specifically the California Historical Resources Information System (CHRIS), and the Northwest Information Center (NWIC) at Sonoma State University, to identify known cultural resource sites and previous surveys in the project area. The Native American Heritage Commission (NAHC) will also be contacted and consulted with about potential traditional lands or cultural places within the City's jurisdiction.

Geology and Soils

The study area is located within a seismically active region of California and could be subject to various geological hazards. The Geology and Soils section of the draft EIR will discuss the possible geological impacts and future risks associated with exposure to seismic activity and the existing soil conditions within the study area. Mitigation measures will be identified for significant impacts, as warranted.

Hazards and Hazardous Materials

The hazards and hazardous materials section will summarize known hazardous materials conditions on and adjacent to the study area. This section will address potential impacts associated with the transport of hazardous materials, and other potentially hazardous conditions from project construction and operation. The draft EIR will identify whether or not the proposed project would emit hazardous materials and/or interfere with any emergency response plans. Mitigation measures will be identified for significant impacts, as warranted.

Hydrology and Water Quality
Cottonwood Creek bisects the eastern portion of the project area in a southwesterly direction, and seasonal wetlands are present in the project area. The hydrology and water quality section of the draft EIR will document existing conditions within the study area, and determine potential water quality impacts and flooding. The section will also address short-term construction-related effects on hydrology and water quality, and potential long-term project-related water quality changes to stormwater drainage and/or flooding. Mitigation measures will address any potentially significant impacts to surface water and groundwater quality and hydrology resulting from the project.

Land Use Planning
The study area is mostly undeveloped and currently used predominantly for grazing land, but is located adjacent to developed areas and is north of I-580. Part of the study area is planned for future development under local planning documents. Part of the study area also is within the Airport Protection Area and as such must comply with its policies and laws. The draft EIR will describe the existing land uses and land use designations adjacent to and within the study area. Land use impacts that would occur as a result of the project will be analyzed, including consistency of the project with local planning documents. Measures will be identified for significant impacts, as warranted.

Noise and Vibration
It is anticipated that existing noise levels in the vicinity of the project alignment are dominated by traffic traveling along I-580. Potential noise impacts will be analyzed through a Noise Monitoring Survey and Traffic Noise Modeling. Future traffic noise levels will be predicted taking into account future traffic volumes, lane configurations, and speeds along both I-580 and the proposed roadway extension. Measures to reduce noise levels would be recommended where significant noise impacts resulting from the project are identified. A technical noise and vibration report will be prepared which addresses noise and vibration impacts.

Population and Housing
The draft EIR will describe existing housing, population, and employment conditions using the local planning documents, US Census, and ABAG statistics to the extent feasible. The study area is undeveloped and used predominantly for grazing land, and project does not propose any development. However, the draft EIR will consider potential indirect growth as a result of the project. The Eastern Dublin EIR (2002) and the Fallon Village Supplemental EIR (2005), considered and cleared future development and growth within the general vicinity of the study area.

Public Services and Recreation
The draft EIR will draw upon the local planning documents and other available existing information to describe existing public services that serve the study area. An evaluation of the potential for the project to impact public services will be provided. Measures will be identified for significant impacts, as warranted.

Transportation and Traffic
A traffic study will be conducted for the project. The draft EIR will use the traffic study and information to describe existing conditions and evaluate potential impacts of the project. The study will consider the existing and proposed roadway system, existing and proposed bikeway network, transit systems (bus and commuter rail), and pedestrians. Corridor levels of service shall be determined for regional/arterial streets. Measures will be identified for significant impacts, as warranted.

Utilities and Service Systems
The study area is undeveloped and used predominantly for grazing land, and project does not propose any development. Although unlikely to increase demand in municipal services, the draft EIR will consider any potential increase in demand and evaluate the impacts of the project on public services, including utilities such as storm drains, water supply, and solid waste management. Mitigation measures will be identified for significant impacts, as warranted.

Cumulative Impacts
Consistent with CEQA Guidelines, the draft EIR will discuss cumulative impacts of the proposed project, addressing each topic covered in the environmental analysis.

Other CEQA Considerations

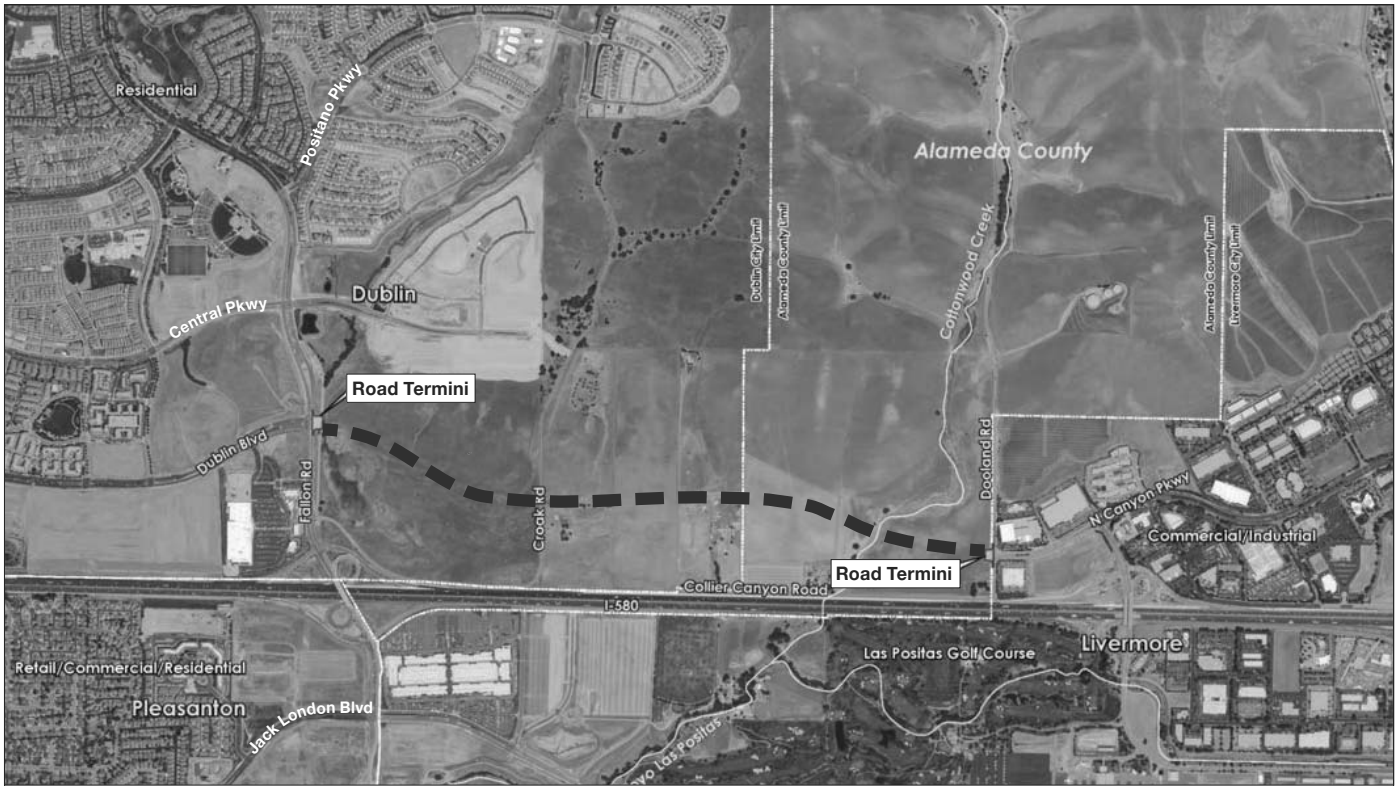
Effects Not Found to be Significant
This section will discuss those environmental issues found not to have an impact as a result of the proposed project.

Significant and Unavoidable Environmental Effects
This section of the draft EIR will describe any significant and unavoidable impacts on the environment that cannot be avoided or reduced to a less than significant level with the application of mitigation measures.

Significant Irreversible Environmental Changes Which Would be Caused by the Project Should it be Implemented
This section will summarize the major changes to the environment that would result with implementation of the proposed project. It will focus on the physical environmental changes in the project setting such as those caused by grading and paving, the level of commitments to use of non-renewable resources represented by the project, and potential for secondary impacts that may place additional burdens on non-renewable resources.

Growth Inducing Effects
As a required discussion according to CEQA Section 15126.2(d), the draft EIR will include a discussion of growth inducing effects. The planned growth in the project area will be identified. The section will evaluate the potential for the project to generate additional growth in the area using standard growth analysis criteria, such as the project's potential to foster economic or population growth or its potential to remove obstacles to population growth through extension of infrastructure.

Project Alternatives
Under CEQA, environmental documentation must include an analysis of a reasonable range of alternatives to the project. The alternatives will be evaluated in less detail than the proposed project, within the same environmental topic areas listed above. Each alternative will be contrasted with the project in terms of the extent to which project objectives and reduction in adverse impacts are achieved. The environmentally superior alternative will be identified.



Legend

Conceptual Alignment*

** Note: Conceptual alignment is based on previous planning documents and will be finalized during project design.*

N

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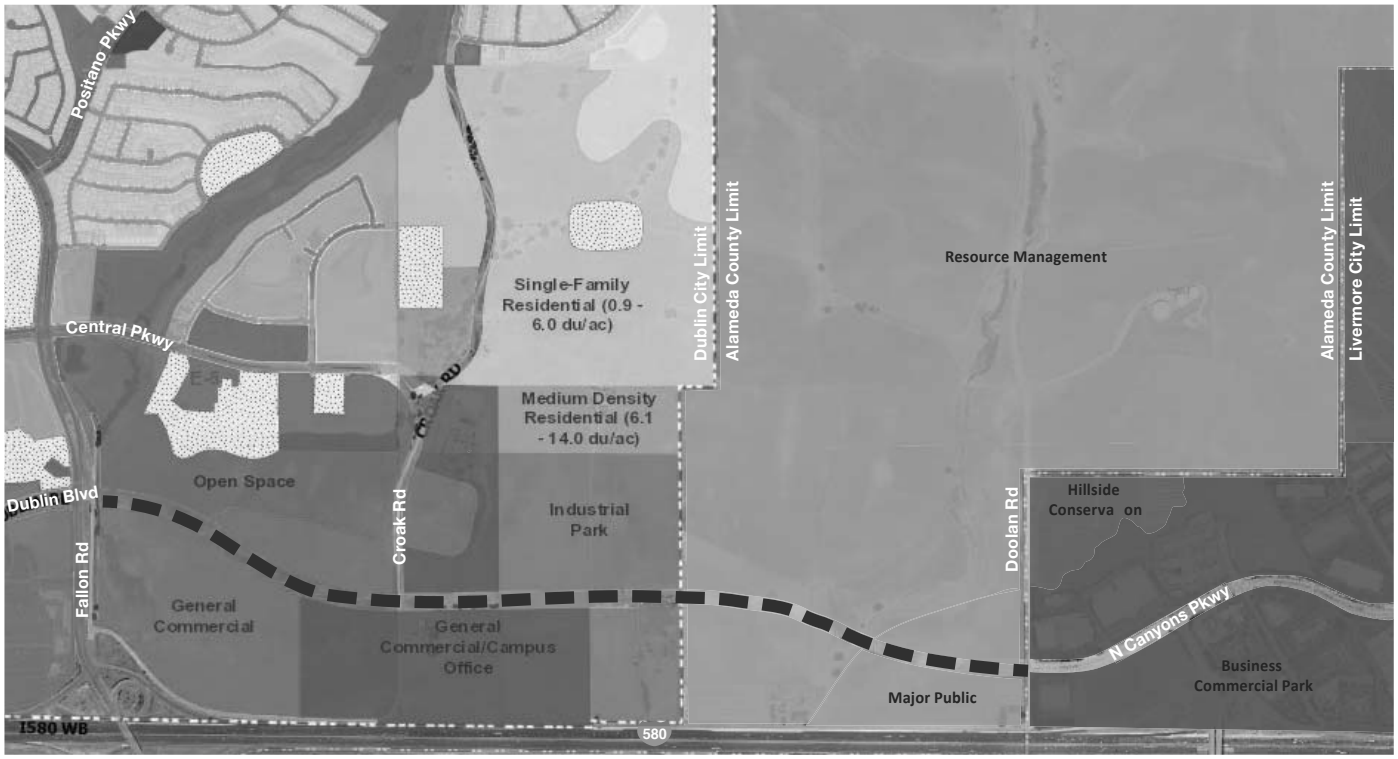
FEET

Study Area

Figure 1

Source: Circlepoint, 2017



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Conceptual Alignment*

Single-Family Residential
Medium Density Residential
Medium/High-Density Residential
General Commercial
General Commerical/Campus Office
Industrial Park
Business Commercial Park
Open Space
Resource Management
Hillside Conservation
Parks/Public Recreation
Semi-Public
Public/Semi-Public
Major Public

N

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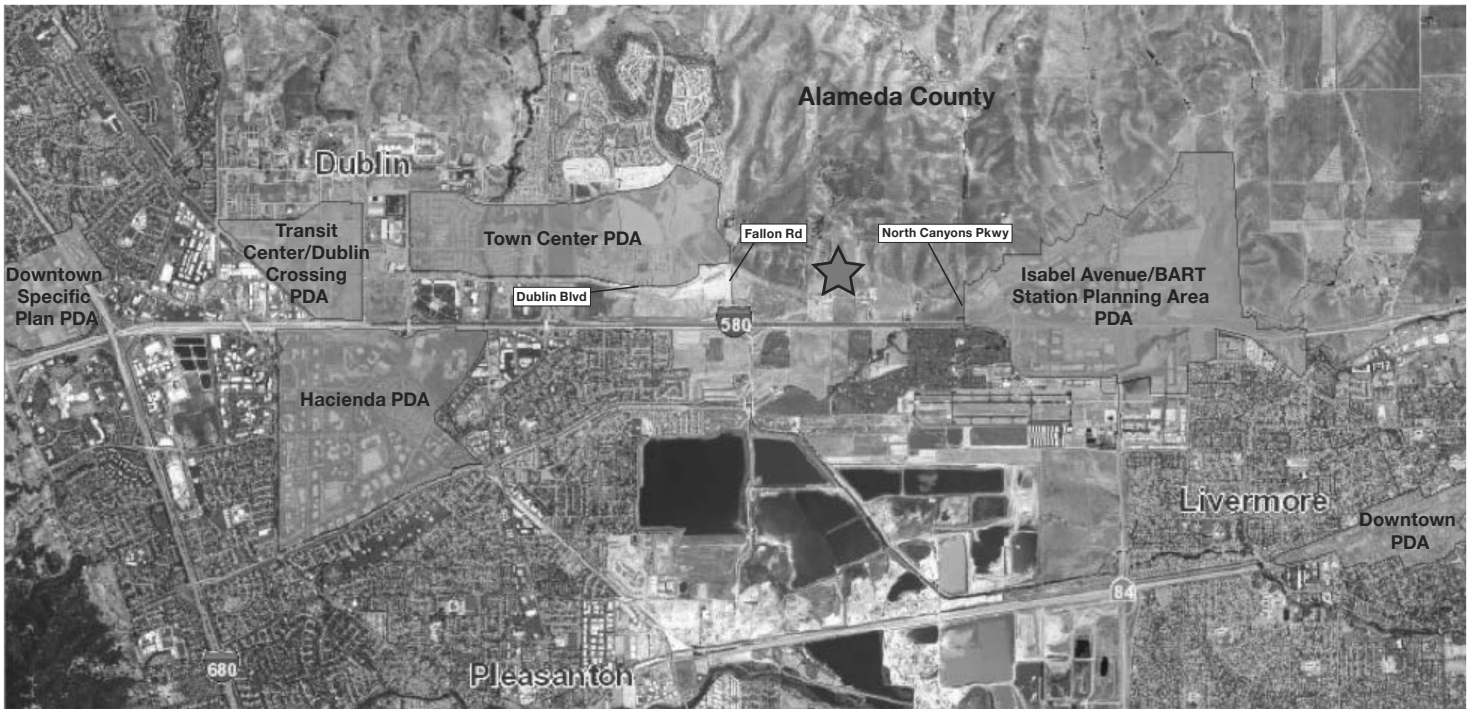
** Note: Conceptual alignment is based on previous planning documents and will be finalized during project design.*

Exis ng Land Use Designa ons

Figure 2

Source: City of Dublin, 2015; City of Livermore, 2014; Alameda County, 2000



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Study Area

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Nearby Priority Development Areas

Figure 3

Source: Association of Bay Area Governments, 2017

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Public Comments Received in Response to the Notice of Preperation

Letter 1

From: joseph ledbetter
To: Marissa Clevenger
Cc:
Subject: North Canyon to Dublin Blvd connector
Date: Monday, May 22, 2017 10:21:43 PM

As a bicycle commuter from Livermore to Bart, I am excited about this connection which would shorten my route and make my commute safer. You may want to consider staging the connection by first creating a bike path and later paving for auto convenience. In any event, pedestrians and bikes should be allowed along this route once easement is acquired and the current blocking fences have been removed. Unfortunately, autos will likely use the route when 580 is crowded. You may want to install frequent speed bumps and consider other road calming measures to keep speeds down. Lower speeds will decrease wildlife road kills as well. The alternative measures of underground tunnels for wildlife crossing do not work well if road speeds exceed 25 mph.

Thanks for your consideration
[redacted]

Sent from my iPad

From: Peta Grimes
To: Marissa Clevenger
Subject: Dublin Blvd Extension
Date: Monday, May 22, 2017 5:15:53 PM

Great idea. I have always been worried that in the event of a major catastrophe in Livermore, there were only 580 and Vasco road as exit routes. Now we have a thru road to Pleasanton on the south side of 580 and adding another on the North side will improve accessability even more.

From: Andrew Haupt
To: Marissa Clevenger
Subject: comment on connection between Dublin Boulevard and North Canyons Parkway
Date: Tuesday, May 23, 2017 8:13:37 AM

Hello there, thanks for your article on nextdoor telling us about this potential connection. I wanted to give you my input on the idea, which is that I am excited for it, but I want limitations in place to keep Dublin's development at bay. The city of Dublin has shown a track record of developing too fast and with little regard to good zoning, or care for their residents (Like when they closed Tassajara road for most of a year!) So I do not trust them to keep our border nice. If we could at least promise to keep a bit of space between us and them on that side after building the road for twenty years or so, I think that would be ideal. Thank you for asking for our input!

Sent from Mail for Windows 10

From: Srecko Bartl
To: Marissa Clevenger
Subject: Connection between Dublin Boulevard and North Canyons Parkway on the north side of I-580
Date: Tuesday, May 23, 2017 2:17:13 PM

Great idea! The more routes we have between Dublin/Pleasanton and Livermore, the lesser the congestion will be on each of them.

Steve Bartl,
Livermore

Letter 5

From: Juan Pablo Galvan
To: Marissa Clevenger
Subject: public notice - Dublin Blvd extension
Date: Wednesday, May 24, 2017 3:05:06 PM
Attachments: image001.jpg
image002.jpg
image003.png
image004.jpg

Hello Ms. Clevenger,

My name is Juan Pablo Galvan, Land Use Manager for Save Mount Diablo.

We were notified that a public notice was sent out regarding the possible extension of Dublin Blvd to N Canyon Pkwy.

Please email me the relevant documents for this project.

In addition, if there is any project related to Croak Rd and potential wetlands impacts, please forward that information along as well.

Thank you,

Juan Pablo Galván
Land Use Manager
Save Mount Diablo
P (925) 947-3535 ext. 34
F (925) 947-0642
jpgalvan@SaveMountDiablo.org
1901 Olympic Blvd., Suite 320
Walnut Creek, CA 94596
www.SaveMountDiablo.org

Letter 6

STATE OF CALIFORNIA
NATIVE AMERICAN HERITAGE COMMISSION
Environmental and Cultural Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691
Phone (916) 373-3710

Edmund G. Brown Jr., Governor

May 25, 2017

Obaid Khan
City of Dublin
100 Civic Plaza
Dublin, CA 94568

Sent via e-mail: marissa.clevenger@dublin.ca.gov

RE: SCH# 2017052047; Dublin Boulevard-North Canyons Parkway Extension Project, Alameda County, California

Dear Mr. Khan:

The Native American Heritage Commission has received the Notice of Preparation (NOP) for Draft Environmental Impact Report for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code § 21000 et seq.), specifically Public Resources Code section 21084.1, states that a project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, § 15064.5 (b) (CEQA Guidelines Section 15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an environmental impact report (EIR) shall be prepared. (Pub. Resources Code § 21080 (d); Cal. Code Regs., tit. 14, § 15064 subd. (a)(1) (CEQA Guidelines § 15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources with the area of project effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a **separate category of cultural resources**, "tribal cultural resources" (Pub. Resources Code § 21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment (Pub. Resources Code § 21084.2). Please reference California Natural Resources Agency (2016) "Final Text for tribal cultural resources update to Appendix G: Environmental Checklist Form," http://resources.ca.gov/ceqa/docs/ab52/Clean-final-AB-52-App-G-text-Submitted.pdf. Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code § 21084.3 (a)). **AB 52 applies to any project for which a notice of preparation or a notice of negative declaration or mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements**. If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. § 800 et seq.) may also apply.

The NAHC recommends **lead agencies consult with all California Native American tribes** that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments. **Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws**.

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a **lead agency** shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:
    - **a.** A brief description of the project.
    - **b.** The lead agency contact information.
    - **c.** Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code § 21080.3.1 (d)).
    - **d.** A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code § 21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A **lead agency** shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code § 21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or environmental impact report. (Pub. Resources Code § 21080.3.1(b)).
    - **a.** For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code § 65352.4 (SB 18). (Pub. Resources Code § 21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:
    - **a.** Alternatives to the project.
    - **b.** Recommended mitigation measures.
    - **c.** Significant effects. (Pub. Resources Code § 21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:
    - **a.** Type of environmental review necessary.
    - **b.** Significance of the tribal cultural resources.
    - **c.** Significance of the project's impacts on tribal cultural resources.
    - **d.** If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code § 21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code sections 6254 (r) and 6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code § 21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:
    - **a.** Whether the proposed project has a significant impact on an identified tribal cultural resource.
    - **b.** Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code section 21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code § 21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:
    a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or
    b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code § 21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code section 21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code section 21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code § 21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code section 21084.3 (b). (Pub. Resources Code § 21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:
    a. Avoidance and preservation of the resources in place, including, but not limited to:
        i. Planning and construction to avoid the resources and protect the cultural and natural context.
        ii. Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.
    b. Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:
        i. Protecting the cultural character and integrity of the resource.
        ii. Protecting the traditional use of the resource.
        iii. Protecting the confidentiality of the resource.
    c. Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.
    d. Protecting the resource. (Pub. Resource Code § 21084.3 (b)).
    e. Please note that a federally recognized California Native American tribe or a nonfederally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code § 815.3 (c)).
    f. Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code § 5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An environmental impact report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:
    a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code sections 21080.3.1 and 21080.3.2 and concluded pursuant to Public Resources Code section 21080.3.2.
    b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.
    c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code section 21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code § 21082.3 (d)).

    This process should be documented in the Cultural Resources section of your environmental document.

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires **local governments** to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code § 65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.** (Gov. Code § 65352.3 (a)(2)).
2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code section 65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code sections 5097.9 and 5097.993 that are within the city's or county's jurisdiction. (Gov. Code § 65352.3 (b)).
4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
    a. The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
    b. Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (http://ohp.parks.ca.gov/?page_id=1068) for an archaeological records search. The records search will determine:
    a. If part or all of the APE has been previously surveyed for cultural resources.
    b. If any known cultural resources have been already been recorded on or adjacent to the APE.
    c. If the probability is low, moderate, or high that cultural resources are located in the APE.
    d. If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
    a. The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.

b. The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:
   a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.
   b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.
   a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, section 15064.5(f) (CEQA Guidelines section 15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.
   b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.
   c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code section 7050.5, Public Resources Code section 5097.98, and Cal. Code Regs., tit. 14, section 15064.5, subdivisions (d) and (e) (CEQA Guidelines section 15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

Please contact me if you need any additional information at gayle.totton@nahc.ca.gov.

Sincerely,

Gayle Totton, M.A., PhD.
Associate Governmental Program Analyst

cc: State Clearinghouse

Letter 7

CHAMBERLIN
ASSOCIATES

May 25, 2017

City of Dublin City Council, Planning Commission and Staff
C/O: Marissa Clevenger, Office Assistant II
City of Dublin
100 Civic Plaza
Dublin, CA, 94568

RE: EIR Scoping Comments for Dublin Extension Project

Dear City of Dublin City Council, Planning Commission, and Staff,

Thank you for providing the opportunity to comment on the scope of the EIR for the Dublin Blvd. extension. Chamberlin Associates owns the approximately 11-acre parcel at the southwest intersection of Airway Blvd. and North Canyons Pkwy. in Livermore. I request the following be studied and addressed in the EIR:

- LOS at the intersection of Airway Blvd. and North Canyons Pkwy.
- Queuing near the intersection of Airway Blvd. and North Canyons Pkwy. in general, queuing for eastbound traffic on North Canyons Pkwy. before Airway Blvd., and queuing at the I-580 on and off ramps at Airway Blvd.
- All needed roadway and intersection improvements (e.g., needed lane additions, widening, etc.) near the intersection of Airway Blvd., North Canyons Pkwy., and the I-580 on and off ramps.
- Funding of needed roadway and intersections improvements for the project, including those near the intersection of Airway Blvd., North Canyons Pkwy., and the I-580 on and off ramps at Airway Blvd.

Regarding EIR alternatives, Collier Canyon Road is an existing partial freeway frontage road along the north side of I-580 in the vicinity of proposed Dublin Blvd. extension. As an alternative, please study a connection of Collier Canyon Road to Croak Road with and without the extension of Dublin Blvd.

Sincerely,

Doug Giffin

Doug Giffin
Vice President
Chamberlin Associates

Real Estate: Development, Management & Consultation

5860 West Las Positas Boulevard Suite 21 Pleasanton, CA 94588-8552 925/227-0707 FAX 925/227-0277

From: Obaid Khan
To: Marissa Clevenger
Cc: FW: Dublin Blvd Ext - Interested Party
Subject: Friday, May 26, 2017 11:13:06 AM
Date: image001.png
Attachments:

Hi Marissa, please add this communication to the NOP folder in the Project CIP folder where you are tracking all other comments. Also please add her to the master mailing list, under a separate tab so we know who we are adding.

Thanks, Obaid.

From: Jeff Baker
Sent: Friday, May 26, 2017 11:09 AM
To: Obaid Khan
Subject: Dublin Blvd Ext - Interested Party

Obaid,

The following person addressed the Planning Commission on May 23 under oral communication. She spoke against the Dublin Boulevard extension citing concerns about too much traffic, creating a freeway bypass, and encouraging more homes and businesses. She would like to be notified of future meetings and hearings about the project. Here is her contact information:

Elaine Bagwell
11718 Solana

925-895-6058

[redacted]

Jeff Baker
Assistant Community Development Director
City of Dublin
100 Civic Plaza, Dublin, CA 94568
(925) 833-6610 | (925) 833-6628 FAX
jeff.baker@dublin.ca.gov | www.dublin.ca.gov

Mission Statement: *The City of Dublin promotes and supports a high quality of life, ensures a safe and secure environment, and fosters new opportunities.*

From: Johan Rydell
To: Marissa Clevenger
Subject: Dublin Boulevard-North Canyons Parkway Extension Project
Date: Friday, May 26, 2017 5:18:58 PM

Hi,

I think this is a bad idea. Just ask one simple question: Do we need extra traffic from 580 to our back streets?
We now live in Dublin but lived in Pleasanton before close to both West Las Positas and Stoneridge. They connected Stoneridge to Livermore and extra traffic was the result directly.
Unless the 580 is fixed, extra traffic will find it's way to any back street. Google map might just tell you directly: "We found a new route, you can save 5 minutes to use Dublin Blvd".

Thanks,

Johan

From: vic avila
To: dzpontau; Marissa Clevenger
Cc: "vic avila"
Subject: Objection to Dublin Blvd. Extension to Livermore
Date: Saturday, May 27, 2017 2:03:33 PM

As a citizen of Livermore, I want to register my opposition to this roadway extension. In my opinion, this does not offer benefits to the residents of Livermore, but puts more traffic on City streets and unfortunately fosters the development of open space, a commodity that exists in Livermore to some extent, but does not exist in good measure in neighboring cities as development has become their cash cow.

From: ken masterman
To: Marissa Clevenger
Subject: NO DUBLIN BLVD EXTENSION
Date: Sunday, May 28, 2017 8:18:03 AM

NO EXTENSION OF DUBLIN BLVD TO LIVERMORE!
We don't want your traffic being dumped into our part of the city and the homes that the city will try to build along the road to us.
This is a ploy to get a toehold to the land so a developer/home builder will put on the ballot a measure to undue the growth boundaries Dublin residents voted for.
Your city should be ashamed of being a whore to the builders over the last 25 years and spreading the ugly blight across this valley.
Kenneth Masterman
Livermore resident Collier canyon area.

From: Minh Thai
To: Marissa Clevenger
Subject: Re: Notice of Preparation of an Environmental Impact Report and Notice of Public Scoping Meeting for the Dublin Boulevard-North Canyons Parkway Extension Project
Date: Saturday, May 27, 2017 2:11:25 AM

(Sorry, I have to resend this)

Hi

I am a resident of East Dublin. My address is 1780 S Terracina Dr Dublin, CA 94568. My family support the extension project of Dublin Boulevard to North Canyon Parkway for the following reasons:

1) Dublin has trouble finding a suitable lot for the school right now. Chen property would become a more viable option for the second high School if we build this extension since this lot is large enough for a comprehensive High school.

2) It will be very convenient for Las Positas College students who live in east Dublin. They can simply ride bikes or ebikes from E Dublin to the College without having to take the long Jack London Boulevard route on Livermore side of 580.

3) better public buses service between East Dublin and the College and its surrounding business

Regards

Minh Thai

From: Steve Wright
To: Marissa Clevenger
Subject: Dublin Boulevard Extension
Date: Tuesday, May 30, 2017 4:33:27 PM

Ms. Clevenger:

I am adamantly OPPOSED to the extension of Dublin Boulevard any further east than what it currently is at Fallon Road. If you think the traffic that we permanent residents have to experience, all day-every day, is atrocious, it will only be much worse if the extension is permitted to go through.

Everybody, and their brother-in-law, now use Dublin Boulevard to by-pass I-580 between San Ramon Road and Fallon Road. And, it is even worse especially during the peak commute hours. Adding another four to six lanes will only make matter worse.

The completion of the commuter Express Lanes have done nothing to alleviate the congestion either on I-580 or surface streets. I believe that they have made things worse as there are no exit lanes out of the Express lanes to the various exits between Greenville Road and San Ramon Road and everyone just jumps, willy-nilly, in and out whenever they feel like it with little regard for any other vehicles that happen to be utilizing any of the other lanes.

Steve Wright
Resident since 1976

I Speak My Mind Because It Hurts To Bite My Tongue All The Time.

Letter 14

From: Dave Campbell
To: Marissa Clevenger
Cc: Kristi Marleau
Subject: Dublin Boulevard - North Canyons Parkway Extension Project
Date: Thursday, June 01, 2017 4:35:27 PM

Marissa

On behalf of Bike East Bay, we want to see protected bike lanes studied on the Dublin Boulevard - North Canyons Parkway Extension Project. For more information on protected bike lanes, otherwise known as cycle tracks and separated bikeways, please see:

https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/separated_bikelane_pdg/index.cfm

This new propose roadway will connect to many important destinations and for this reason will see significant bike traffic, if properly designed. In addition, most arterial streets in Dublin are high-speed, multi-lane roadways, which require "separation" and "protection" of residents bicycling from moving cars. As part of this request, please also consider protected intersections per Caltrans' standard, which are detailed here.

Please let me know if you have any questions regarding this input on your scoping process for the project.

--
Dave Campbell
Advocacy Director
Bike East Bay
****
Office: 466 Water Street at Jack London Square in Oakland
Mail: PO Box 1736, Oakland, CA 94604
Office: (510) 845-RIDE
Cell: (510) 701-5971
BikeEastBay.org

Pledge to ride on Bike to Work Day! By riding together on Thursday, May 11, you will show East Bay cities and counties how bikes count.

From: Ray Y Chang
To: Marissa Clevenger
Subject: Comments for Dublin Blvd extension project after 5/31/17 public hearing
Date: Friday, June 02, 2017 9:44:26 AM

Marissa,

Here are my comments.

Thanks,

Ray

1. Recommend to add the bike route to this project. Bike route is expected to separate from traveled ways. If it can be located behind the sidewalk, it benefits pedestrians' safety, especially children and seniors. I hope it can be like the Iron horse trail.

2. Recommend to add a retention/detention pond in a park to this project. The uphill land is over-developed and cover with concrete or asphalt pavement. Sooner or later downhill side will get flooded. To build a park with a retention/detention pond next to the road will ease the flooding issue.

3. Recommend to add a utility joint trench for Electricity, Water, sewer, Gas, Cable TV, recycle water and so on. It helps the street aesthetic.

4. Recommend the street width can be 120' wide or more to accommendate three 12' travled lanes with 8' shoulder, 10' sidewalk for each directions. Plus, 5' landscape behind the sidewalk, 5' bike route behind the landscape and 6' median.

5. When choosing the street trees, please consider sycamore as your last choice. Sycamore grows fast but it also causes allergy to people.

6. Can City select a more beautiful style and ecomomic street light instead of typical galvinized one? This kind street light can repsent the City of Dublin and let residents and tourists remember Dublin when they see the street light.

7. Recommend the flash beacons for crosswalks which are not located at intersections to protect pedestrians

8. Recommend to include bus stops in this project.

9. Do you consider roundabout in the intersection?

10. Recommend a Park & Ride nearby Fallon Road.

Letter 16

From: K Barker
To: Marissa Clevenger
Subject: N Canyons Pkwy
Date: Monday, June 05, 2017 9:09:12 PM

Please include a protected bike lane. This road has the potential to be a great east-west route for cyclists and runners. However, cars will travel quickly no matter the posted speed because of the openness of that area (lack of houses, businesses, and people). Because of this, a protected bike lane is necessary.

-Katheryn Barker

Letter 17

From: Areana Flores
To: Marissa Clevenger
Subject: Follow-up question
Date: Tuesday, June 06, 2017 2:43:46 PM
Attachments: image003.jpg

Hi Marissa,

I was seeking clarification for the following statement found in the NOP under Land Use Designations.

"Previous environmental documents, such as the Eastern Dublin EIR (2002) and the Fallon Village Supplemental EIR (2005), considered and cleared future development within the immediate vicinity of the study area, within the City of Dublin. The Dublin Boulevard – North Canyons Parkway extension project was considered in these documents."

How was this Project considered in the two previous EIR's and what was the result of that consideration?

Thank you,

Areana Flores
Planning & Climate Protection Division
Bay Area Air Quality Management District
375 Beale St, Suite 600 | San Francisco, CA 94105

Dublin San Ramon Services District
Water, wastewater, recycled water

7051 Dublin Boulevard
Dublin, CA 94568-3018

phone (925) 828-0515
fax (925) 829-1180
www.dsrsd.com

Letter 18

June 6, 2017

Obaid Khan, Transportation and Operations Manager
City of Dublin
100 Civic Plaza
Dublin, CA 94568
Attn: Marissa Clevenger, Office Assistant II

Subject: **Comments on Notice of Preparation of an Environmental Impact Report and Notice of Public Scoping Meeting for the Dublin Boulevard-North Canyons Parkway Extension Project**

Dear Mr. Khan:

Thank you for providing Dublin San Ramon Services District (DSRSD) the opportunity to review and comment on the Dublin Boulevard-North Canyons Parkway Extension Project. DSRSD had a representative at the scoping meeting held on May 31, 2017, who reviewed the information presented at the meeting and has reviewed the information in the Notice of Preparation.

DSRSD will be directly concerned with the Utilities and Service Systems details of this project. The proposed right-of-way for Dublin Boulevard to the City of Dublin's boundary will be used for the extension of DSRSD's potable water, recycled water and wastewater service mains. DSRSD will provide potable water, recycled water and wastewater collection services to those properties served by the extension of Dublin Boulevard. DSRSD's service area extends to the city limit for the City of Dublin.

DSRSD's primary concern will be with the layout of Dublin Boulevard and placement of DSRSD's facilities. DSRSD strongly recommends that the layout of Dublin Boulevard be adequately planned and that there would be no significant modification of the route of Dublin Boulevard once the plan is finalized. To minimize construction conflict and cutting into pavement, DSRSD anticipates its pipelines will be installed within the public right-of-way prior road construction and final paving. DSRSD will coordinate with the City regarding this effort.

The road and utilities extension provides an opportunity for an emergency intertie between DSRSD's potable water system and the City of Livermore's potable water system at the boundary between Dublin and Livermore. An emergency intertie of the potable water systems at this location would improve the reliability of DSRSD's and Livermore's potable water systems.

DSRSD looks forward to continuing our rewarding collaboration with the City of Dublin through this project. If you have any questions, please contact Stan Kolodzie at (925)8875-2253 or kolodzie@dsrsd.com.

Sincerely,

RHODORA N. BIAGTAN
Principal Engineer

SK/ST

cc: Stan Kolodzie, Associate Engineer
Ryan Pendergraft, Junior Engineer
Bonifacio Duenas, Engineering Tech/GIS Specialist II

H:\ENGDEPT\CEQA\DSRSD Response to CEQA Documents\City of Dublin\2017\Comments on NOP of EIR - Dublin Blvd N Cyns Pkwy Ext - Scoping Mtg 05-31-17.docx

Letter 19

From: Brian Holt
To: Marissa Clevenger
Cc: Bob Nisbet; Neoma Lavalle
Subject: North Canyons Parkway Extension Project Scoping Comments
Date: Thursday, June 08, 2017 3:42:15 PM
Attachments: image001.png
EBRPD_SCoping Comments North Canyons Parkway Ext 060817.pdf

Attached are the East Bay Regional Park District's scoping comments on the North Canyons Parkway Extension Project.

Thank you -

Brian Holt
Principal Planner | Advance Planning Unit
East Bay Regional Park District
2950 Peralta Oaks Court, Oakland, CA 94605
T: 510-544-2623| F: 510-569-1417
BHolt@ebparks.org | www.ebparks.org

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East Bay Regional Park District

2950 PERALTA OAKS COURT P.O. BOX 5381 OAKLAND CALIFORNIA 94605-0381 T: 1-888-EBPARKS F: 510-569-4319 TRS RELAY: 711 WWW.EBPARKS.ORG

June 8, 2017

City of Dublin
100 Civic Plaza
Dublin, CA 94568
Attn: Marissa Clevenger, Office Assistant II

Sent via email to marissa.clevenger@dublin.ca.gov

RE: Scoping Comments – Dublin Boulevard – North Canyons Parkway Extension Project

To Whom It May Concern –

The East Bay Regional Park District (EBRPD) appreciates the opportunity to provide initial scoping comments on the North Canyons Parkway Extension Project. The District owns and manages over 120,000 acres of parkland and open space and 29 regional inter-park trails within Alameda and Contra Costa Counties. EBPRD works in partnership with the cities, counties, and other agencies to implement the District's Master Plan and the plans of other agencies.

The Draft Environmental Impact Report (DEIR) will need to be comprehensive in its analysis of the extension of Dublin Boulevard to North Canyons Parkway. The roadway will be extended through an unincorporated area between the cities of Dublin and Livermore that is currently designated primarily as Resource Management. The western portion of the project area is bound by the Eastern Dublin Urban Limit Line established in January of 2014 through the Dublin Open Space Initiative of 2014 and establishes the eastern city limits of Dublin as the urban limit line. The North Livermore Urban Growth Boundary bounds the eastern portion of the project area at Doolan Road.

The project area contains a number of sensitive species and protected habitats including a known highly functioning vernal pool at the eastern extent of the project site. Local botanists and scientists have identified an array of rare species in this vernal pool that grow in mass and size that exceeds other locations of protected populations including at the Springtown preserve located to the east of the project site.

The DEIR will need to fully evaluate the projects potential impacts on protected species and habitats in the area from project construction, long-term operation, and growth inducement. The project should be designed in a manner to avoid impacts to protected species and habitats and sufficient mitigation will need to be identified to mitigate for any remaining impacts. The function of vernal pools are highly dependent on the function of the larger watershed which is currently designated as Resource Management and located outside of the urban growth boundaries of both Livermore and Dublin. The DEIR should provide

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additional assurances that this project will not result in direct or indirect impacts to the project area or the broader watershed that support protected species and habitats. The District would welcome the opportunity to work with the cities of Dublin and Livermore and Alameda County to ensure the long-term protection of this unique habitat.

Additionally, the project is primarily intended to improve automobile mobility. The project should be designed to facilitate non-motorized mobility as well through construction of separated bicycle and pedestrian facilities. The Dublin Bicycle and Pedestrian Master Plan does identify both a Class I shared-use pathway and a Class IIA bicycle lane along the alignment of the North Canyons Parkway Extension project.

Thank you for the opportunity to provide these initial scoping comments. We look forward to reviewing the environmental analysis and proposed plans. Please ensure the District is included on any future notifications regarding this project.

Respectfully,

Brian W. Holt
Principal Planner

Cc: Bob Nisbet, AGM

From: Orduna, Rodrigo, CDA
Sent: Friday, June 09, 2017 9:31 AM
To: Obaid.Khan
Cc: ; Horvath, Cindy, CDA
Subject: FW: Public Scoping Meeting PP

Greetings, Obaid.

In addition to Alameda County general plan policies in the East County Area Plan that I sent out months earlier about limiting growth as a result of the Dublin Blvd-North Canyons Parkway Extension, my colleague Liz McElligott, copied herein, reminded me of the additional policies that she lists below.

Can these be included in the EIR analysis as well?

Regards,

Rodrigo

Rodrigo Orduña, *AICP*
Assistant Planning Director
Alameda County Planning Department
Community Development Agency

rodrigo.orduna@acgov.org
telephone 510-670-6503
facsimile 510-785-8793

224 West Winton Avenue, Suite 111
Hayward, CA 94544
http://www.acgov.org/cda

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From: McElligott, Elizabeth, CDA
Sent: Wednesday, June 07, 2017 9:22 AM
To: Orduna, Rodrigo, CDA <rodrigo.orduna@acgov.org>; Horvath, Cindy, CDA <cindy.horvath@acgov.org>
Subject: RE: Public Scoping Meeting PP

Rodrigo – Thank you for forwarding your previous emails. I agree that there's nothing in ECAP that would preclude building the road, but here are some additional policies that I think should be taken into consideration. Also, please note that the area the road will pass through is designated Resource Management.

Policy 51: The County shall work with East County cities to preserve a **continuous open space system** outside the Urban Growth Boundary with priority given to the permanent protection of the Resource Management area between Dublin and North Livermore and the area north of the Urban Growth Boundary in North Livermore, as established through Program 19.

Policy 52: The County shall preserve **open space areas** for the protection of public health and safety, provision of recreational opportunities, production of natural resources (e.g., agriculture, windpower, and mineral extraction), protection of sensitive viewsheds *(see definition in Table 1)*, preservation of biological resources, and the physical separation between neighboring communities *(see Figure 4)*.

Policy 109: The County shall preserve **community separators** largely in open space in the following locations:
1. The Resource Management area of approximately 7,400 acres separating East Dublin and North Livermore;

Policy 112: The County shall require development to maximize views of the following prominent **visual features**:
1. The major ridgelines listed in Policy 105; *[which include ridgelines above Doolan Canyon east of Dublin]*

Policy 114: The County shall require the use of **landscaping** in both rural and urban areas to enhance the scenic quality of the area and to screen undesirable views. Choice of plants should be based on compatibility with surrounding vegetation, drought-tolerance, and suitability to site conditions; and in rural areas, habitat value and fire retardance.

*Policy 115: In all cases appropriate building materials, landscaping and screening shall be required to minimize the visual impact of development. Development shall blend with and be subordinate to the environment and character of the area where located, so as to be as unobtrusive as possible and not detract from the natural, open space or visual qualities of the area. To the maximum extent practicable, all exterior lighting must be located, designed and shielded so as to confine direct rays to the parcel where the lighting is located.

*Policy 116: To the maximum extent possible, development shall be located and designed to conform with rather than change natural landforms. The alteration of natural topography, vegetation, and other characteristics by grading, excavating, filling or other development activity shall be minimized. To the extent feasible, access roads shall be consolidated and located where they are least visible from public view points.

Policy 117: The County shall require that where grading is necessary, the off-site visibility of **cut and fill slopes** and drainage improvements is minimized. Graded slopes shall be designed to simulate natural contours and support vegetation to blend with surrounding undisturbed slopes.

Policy 123: Where site-specific impacts on biological resources resulting from a proposed land use outside the Urban Growth Boundary are identified, the County shall encourage that

mitigation is complementary to the goals and objectives of the ECAP. To that end, the County shall recommend that mitigation efforts occur in areas designated as "**Resource Management**" or on lands adjacent to or otherwise contiguous with these lands in order to establish a continuous open space system in East County and to provide for long term protection of biological resources.

Policy 131: The County shall require that **roadways** be designed to minimize impacts to wildlife corridor and regional trails. Where appropriate, grade-separated crossings and/or other features shall be used to maintain the viability of the affected corridor.

Liz McElligott

Letter 21

From:
To: Marissa Clevenger
Subject: NOP for Dublin Blvd - No. Canyon Parkways Extension Project
Date: Wednesday, June 14, 2017 10:46:13 AM

Dear Dublin planners,
There are two errors in the Notice of Preparation referenced in the subject line.

(1) Alameda County does not consider Dublin's Sphere of Influence to extend across the unincorporated area between the Dublin and Livermore city limit lines. East County Area Plan (ECAP) Figure 1 clearly shows the Dublin SOI to stop at the Dublin city limits.

(2) In Figure 2 of the NOP, the southeast corner of the unincorporated portion of the Study Area is incorrectly shown to be Major Public. It is in fact designated Large Parcel Agriculture. There is an error in the currently available ECAP Land Use Diagram. Elizabeth McElligott of the County's Planning Department confirmed this error in her email to me copied below. You should contact her for confirmation if necessary.

Please acknowledge receipt of this message. Thank you.

Sincerely,
Dick Schneider, Sierra Club Tri-Valley Group

Hi Dick,

The redesignation of that parcel was an error. It should be Large Parcel Agriculture. The designation of some slivers of parcels along I-580 that are owned by Caltrans was changed to Major Public to reflect their ownership and the property you asked about was inadvertently included. The map will be corrected.

The designation changes were made about six months ago. At the same time, land that had been acquired by one of the park districts since the last map update was done was changed to the Parklands designation. Also, the designation of the Vargas Plateau and the area between the SFPUC land and the EBRPD land between Calaveras Road and Lake del Valle were changed from Large Parcel Ag to Resource Management to correct an error that was made when the plan was revised after Measure D passed.

Liz McElligott

From:
Sent: Friday, June 09, 2017 11:33 AM
To: McElligott, Elizabeth, CDA <elizabeth.mcelligott@acgov.org>
Subject: ECAP land use diagram question

Hi Liz,

Dublin is starting a process for extending Dublin Blvd to N. Canyons Parkway in Livermore. Part of that road would cross unincorporated area. The NOP shows the southeast corner of the unincorporated

parcel to be designated Major Public, and indeed the current version of the ECAP land use diagram shows it that way as well. The version of the land use diagram that I have on my computer, downloaded from the county's website some time ago, as well as the hardcopy of the ECAP that I have shows that corner to be designated Large Parcel Agriculture.

Was there a redesignation of that area that I'm not aware of? If so, when did it take place and why? Or is the diagram now on the county's site inaccurate for that area? If that area was indeed redesignated, are there any other redesignations that have taken place?

Thanks for filling me in.
Dick

Board of Directors
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Proud Member of
Land Trust Alliance
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Bay Area Open Space Council

June 15th, 2017

Letter 22

Marissa Clevenger
Office Assistant II
City of Dublin
100 Civic Plaza
Dublin, CA 94568

RE: Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the Dublin Boulevard-North Canyons Parkway Extension Project (Project)

Dear Ms. Clevenger,

Save Mount Diablo (SMD) is a non-profit conservation organization founded in 1971 which acquires land for addition to parks on and around Mount Diablo and monitors land use planning which might affect protected lands. We build trails, restore habitat, and are involved in environmental education. In 1971 there was just one park on Mount Diablo totaling 6,778 acres; today there are almost 50 parks and preserves around Mount Diablo totaling 110,000 acres. We include more than 8,000 donors and supporters.

We appreciate the opportunity to comment on the NOP for the Project. As one of the lead organizations of the Dublin Open Space Initiative and subsequent No On T campaigns of 2014, focused on protecting Doolan Canyon with a new east-side Dublin Urban Limit Line (ULL) and defeating a developer-backed threat to the new ULL, we have a special interest in ensuring the protection of Doolan Canyon and wetland habitat that may be affected by the Project.

Below we point out corrections that should be made in the NOP and provide more detail on the wetlands area near Croak Rd. that should be considered and analyzed in the EIR for the Project.

Small Errors in NOP

The NOP does a fine job of pointing out that the portion of the study area within Alameda County between the cities of Dublin and Livermore (the Doolan Canyon portion) is subject to the Dublin Open Space Initiative of 2014, and that its purpose is to maintain natural resource land use desginations and prevent development beyond the ULL.

However, the NOP incorrectly states that Dublin's Sphere of Influence (SOI) encompasses the Alameda County portion of the study area. In fact, Dublin's SOI overlaps with the city limits and east-side ULL, and therefore excludes the Alameda County portion of the study area (see Dublin General Plan Figure 3-1 dated October 6th 2015). We suggest that the City correct this error in the EIR.

In addition, Alameda County staff have confirmed that the 'Major Public' designation that the NOP shows in the southeast corner of the Doolan Canyon area is an error. Apparently, the designation of some slivers of parcels along I-580 that are owned by Caltrans was changed to 'Major Public' to reflect their ownership. The portion of land in question was inadvertently included, with the correct designation being 'Large Parcel Agriculture.' We suggest that the City contact Alameda County Planning staff for further clarification, and that this error be corrected in the EIR.

Potential Wetlands Impacts

Just south of the proposed conceptual alignment for the Project (see NOP Figure 1), to the east and north of Croak Rd., lie an area of vernal pool wetlands (see Figure 1 below).

Figure 1. Satellite image of wetlands east and north of Croak Rd., just east of Fallon Rd. The wetlands lie just south of the Project conceptual alignment.

These wetlands are a special feature of the Livermore Valley. As the East Alameda County and numerous peer-reviewed scientific publications make clear, vernal pools are an extremely important habitat for rare and endangered plant and animal species. However, most of this habitat (perhaps as much as 90% or greater) has disappeared in California, and losses continue.

The EIR should provide a full and detailed explanation of Project impacts to these wetlands, as well as details about the wetlands themselves in the Biological Resources section of the EIR. Other sections such as Hydrology and Water Quality may also be relevant. In addition, if the Project alignment is found to impact the wetlands, an alternative alignment should be considered and potentially adopted. This could be part of the EIR alternatives analysis.

We note that the parcel of these wetlands is designated as General Commercial. If and when proposals for development of this area are considered, we strongly encourage the City to consider proposals that avoid this rare and extremely biodiverse habitat.

Regards,

Juan Pablo Galván
Land Use Manager

Letter 23

From: william G. Hoppes
To: Marissa Clevenger
Subject: Comments On Dublin Blvd. extension scoping
Date: Thursday, June 15, 2017 11:02:20 AM

Thank you for the opportunity to comment on the Dublin Blvd scoping on the planned EIR. The Ohlone Audubon Society serves southern and eastern Alameda County and provides conservation and environmental advocacy towards the protection of valuable habitat for birds and other native species throughout the county. Our main comment regarding scoping of the EIS revolves around the list of "key issues". As outlined at the scoping meeting, these included:

Air quality and greenhouse gases
Biological and cultural resources
Transportation and traffic.

While we agree that these are important issues and should be considered, we do not view it as complete. As I am sure you are aware, the completion of the Dublin extension and the zoning changes and general plan amendments it will require will have important implications on development north of I580 and the efforts to protect a permanent barrier of open space between Dublin and Livermore. We do not see how the EIS came be certified as complete by Dublin, Livermore and Alameda County agencies unless it discusses the impact of this project on development and open space protection north of I580. We urge you to include this issue in the list of key topics and evaluate it fully in the EIS.

Thank you

William G. Hoppes
President, Ohlone Audubon Society

Letter 24

From: Ramirez, Jannette P@DOT
To: Marissa Clevenger
Cc: Maurice, Patricia@DOT; State.Clearinghouse@opr.ca.gov
Subject: Caltrans Comment Letter for the Dublin Boulevard-North Canyons Parkway Extension Project– NOP
Date: Friday, June 16, 2017 11:31:19 AM
Attachments: ALA580GTS-NOP-Dublin_Boulevard-North_Canyons_Parkway_Extension_Project-20170616.pdf

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Good morning Mr. Khan:

Please find attached a soft copy of the Caltrans comment letter regarding the Dublin Boulevard-North Canyons Parkway Extension Project Notice of Preparation. The original letter has been faxed to you at (925) 829-9248.

Thank you for including Caltrans in the environmental review process. Should you have any questions regarding this letter or require any additional information, please feel free to contact me at (510) 286-5535 or jannette.ramirez@dot.ca.gov.

Sincerely,

Jannette Ramirez
Associate Transportation Planner
Local Development – Intergovernmental Review
California Department of Transportation, District 4
111 Grand Avenue, MS 10D
Oakland, CA 94612
(510) 286-5535 office (510) 286-5559 fax

STATE OF CALIFORNIA—CALIFORNIA STATE TRANSPORTATION AGENCY EDMUND G. BROWN Jr., Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 4
OFFICE OF TRANSIT AND COMMUNITY PLANNING
P.O. BOX 23660, MS-10D
OAKLAND, CA 94623-0660
PHONE (510) 286-5528
FAX (510) 286-5559
TTY 711
www.dot.ca.gov

Making Conservation a California Way of Life

June 16, 2017

SCH # 2017052047
GTS # 04-ALA-2017-00151
ALA580GTS

Obaid Khan
Planning Department
City of Dublin
100 Civic Plaza
Dublin, CA 94568

Dublin Boulevard-North Canyons Parkway Extension Project– Notice of Preparation

Dear Mr. Khan:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the above referenced project. In tandem with the Metropolitan Transportation Commission's (MTC) Sustainable Communities Strategy (SCS), the Caltrans *Strategic Management Plan 2015-2020* includes targets to reduce Vehicle Miles Travelled (VMT), in part, by tripling bicycle and doubling both pedestrian and transit travel by 2020. Our comments are based on the Notice of Preparation (NOP). Additional comments may be forthcoming pending final review.

Project Understanding
The City of Dublin (City), in coordination with the City of Livermore and Alameda County, proposes the extension of Dublin Blvd to North Canyons Parkway. The project is considered in their respective planning documents, as well as identified in the Plan Bay Area and Alameda Countywide Transportation Plan (Regional Transportation Plan ID# 21473).

Lead Agency
As the Lead Agency, the City of Dublin is responsible for all project mitigation, including any needed improvements to the State Transportation Network (STN). The project's fair share contribution, financing, scheduling, implementation responsibilities and lead agency monitoring should be fully discussed for all proposed mitigation measures.

Multimodal Planning
From Caltrans' *Smart Mobility 2010: A Call to Action for the New Decade*, the project site is identified as **Place Type 4: Suburban Communities** (Neighborhoods) where location efficiency factors, such as community design, are weak or moderate and regional accessibility varies. Given the project is an important road connection between the Town Center Priority Development Area (PDA) and the Isabel Avenue/BART Station Planning Area PDA, the project should ensure the

necessary pedestrian, bicycle, and transit improvements are made across the extension of Dublin Boulevard. The dedicated bike lane on Dublin Boulevard should continue to North Canyons Parkway with the extension.

Travel Demand Analysis

Please submit a travel demand analysis that provides VMT analysis resulting from the proposed project. With the enactment of Senate Bill (SB) 743, Caltrans is focusing on transportation infrastructure that supports smart growth and efficient development to ensure alignment with State policies through the use of efficient development patterns, innovative travel demand reduction strategies, multimodal improvements, and VMT as the primary transportation impact metric. Please ensure that the travel demand analysis includes:

- A vicinity map, regional location map, and site plan clearly showing project access in relation to the STN. Ingress and egress for all project components should be clearly identified. Clearly identify the State right-of-way (ROW). Project driveways, local roads and intersections, car/bike parking, and transit facilities should be mapped.

- A VMT analysis pursuant to the City's guidelines or, if the City has no guidelines, the Office of Planning and Research's Draft Guidelines. Projects that result in automobile VMT per capita greater than 15% below existing (i.e. baseline) city-wide or regional values for similar land use types may indicate a significant impact. If necessary, mitigation for increasing VMT should be identified. Mitigation should support the use of transit and active transportation modes. Potential mitigation measures that include the requirements of other agencies such as Caltrans are fully enforceable through permit conditions, agreements, or other legally-binding instruments under the control of the City.

- A schematic illustration of walking, biking and auto conditions along the proposed roadway segment and nearby study area roadways. Potential issues for all road users should be identified and fully mitigated.

- The project's primary and secondary effects on pedestrians, bicycles, disabled travelers and transit performance should be evaluated, including countermeasures and trade-offs resulting from mitigating VMT increases. Access to pedestrians, bicycle, and transit facilities must be maintained.

Encroachment Permit

Please be advised that any work or traffic control that encroaches onto the State right-of-way (ROW) requires an Encroachment Permit that is issued by Caltrans. Traffic-related mitigation measures should be incorporated into the construction plans prior to the encroachment permit process. To apply, a completed Encroachment Permit application, the adopted environmental document, and five (5) sets of plans clearly indicating State ROW must be submitted to the address below. Traffic-related mitigation measures should be incorporated into the construction plans prior to the encroachment permit process.

David Salladay, District Office Chief
Office of Permits, MS 5E
California Department of Transportation, District 4
P.O. Box 23660
Oakland, CA 94623-0660

See the following website for more information:

http://www.dot.ca.gov/trafficops/ep/index.html

Thank you again for including Caltrans in the environmental review process. Should you have any questions regarding this letter, please contact Jannette Ramirez at 510-286-5535 or jannette.ramirez@dot.ca.gov.

Sincerely,

PATRICIA MAURICE
District Branch Chief
Local Development - Intergovernmental Review

c: State Clearinghouse

Letter 25

From: Kristi Marleau
To: Marissa Clevenger
Subject: Dublin Blvd/North Canyons Parkway Extension Project
Date: Monday, June 19, 2017 1:36:35 PM

Hello Marissa,

I would like to be added to the project's email list. I am particularly interested in the planned bike connection from Dublin to Livermore. I am hoping to see Dublin and Livermore add protected bike lanes on this connection.

Thank you,
Kristi Marleau

Letter 26

STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse and Planning Unit

Edmund G. Brown Jr.
Governor

Ken Alex
Director

Notice of Preparation

RECEIVED

MAY 24 2017

PUBLIC WORKS

May 18, 2017

To: Reviewing Agencies

Re: Dublin Boulevard-North Canyons Parkway Extension Project
SCH# 2017052047

Attached for your review and comment is the Notice of Preparation (NOP) for the Dublin Boulevard-North Canyons Parkway Extension Project draft Environmental Impact Report (EIR).

Responsible agencies must transmit their comments on the scope and content of the NOP, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of the NOP from the Lead Agency. This is a courtesy notice provided by the State Clearinghouse with a reminder for you to comment in a timely manner. We encourage other agencies to also respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

Obaid Khan
City of Dublin
100 Civic Plaza
Dublin, CA 94568

with a copy to the State Clearinghouse in the Office of Planning and Research. Please refer to the SCH number noted above in all correspondence concerning this project.

If you have any questions about the environmental document review process, please call the State Clearinghouse at (916) 445-0613.

Sincerely,

Scott Morgan
Director, State Clearinghouse

Attachments
cc: Lead Agency

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
TEL (916) 445-0613 FAX (916) 323-3018 www.opr.ca.gov

Document Details Report
State Clearinghouse Data Base

SCH# 2017052047
Project Title Dublin Boulevard-North Canyons Parkway Extension Project
Lead Agency Dublin, City of

Type NOP Notice of Preparation

Description The city, in coordination with the city of Livermore and Alameda county, proposes to extend Dublin Blvd to North Canyons Pkwy. The project is considered in their respective planning documents, as well as identified in the Plan Bay Area and Alameda Countywide Transportation Plan (Regional Transportation Plan ID# 21473).

Lead Agency Contact

Name Obaid Khan
Agency City of Dublin
Phone 925-833-6630 **Fax**
email
Address 100 Civic Plaza
City Dublin **State** CA **Zip** 94568

Project Location

County Alameda
City Dublin
Region
Cross Streets existing Dublin Blvd and North Canyons Pkwy
Lat / Long 37° 42' 14.18" N / 121° 50' 15.55" W
Parcel No.
Township 3S **Range** 1E **Section** **Base**

Proximity to:

Highways
Airports Livermore Municipal
Railways
Waterways
Schools
Land Use LU: Surrounding general area include commercial, business park, resource management, and open space

Project Issues Agricultural Land; Air Quality; Archaeologic-Historic; Biological Resources; Cumulative Effects; Flood Plain/Flooding; Geologic/Seismic; Growth Inducing; Landuse; Noise; Population/Housing Balance; Public Services; Recreation/Parks; Soil Erosion/Compaction/Grading; Solid Waste; Toxic/Hazardous; Traffic/Circulation; Vegetation; Water Quality; Water Supply; Wetland/Riparian; Aesthetic/Visual

Reviewing Agencies Resources Agency; Department of Parks and Recreation; Department of Water Resources; Department of Fish and Wildlife, Region 3; Native American Heritage Commission; Caltrans, Division of Aeronautics; California Highway Patrol; Caltrans, District 4; Air Resources Board, Transportation Projects; Regional Water Quality Control Board, Region 2

Date Received 05/18/2017 **Start of Review** 05/18/2017 **End of Review** 06/16/2017

Note: Blanks in data fields result from insufficient information provided by lead agency.

Print Form

Appendix C

Notice of Completion & Environmental Document Transmittal

Mail to: State Clearinghouse, P.O. Box 3044, Sacramento, CA 95812-3044 (916) 445-0613 SCH# 2017052047
For Hand Delivery/Street Address: 1400 Tenth Street, Sacramento, CA 95814

Project Title: Dublin Boulevard-North Canyons Parkway Extension Project

Lead Agency: City of Dublin — Contact Person: Obaid Khan

Mailing Address: 100 Civic Plaza — Phone: 925-833-6630

City: Dublin — Zip: 94568 — County: Alameda

Project Location: County: Alameda — City/Nearest Community: Dublin

Cross Streets: existing Dublin Blvd and North Canyons Parkway — Zip Code: 94568

Longitude/Latitude (degrees, minutes and seconds): 37 ° 42 ′ 14.19″ N / 121 ° 50 ′ 15.55″ W Total Acres: ____

Assessor's Parcel No.: ____ Section: ____ Twp.: 3 South Range: 1 East Base: ____

Within 2 Miles: State Hwy #: ____ Waterways: ____

Airports: Livermore Municipal Airport Railways: ____ Schools: ____

Document Type:

CEQA: ☒ NOP ☐ Early Cons ☐ Neg Dec ☐ Mit Neg Dec
☐ Draft EIR ☐ Supplement/Subsequent EIR (Prior SCH No.) ____ Other: ____

NEPA: ☐ NOI ☐ EA ☐ Draft EIS ☐ FONSI

Other: ☐ Joint Document ☐ Final Document ☐ Other: ____

Governor's Office of Planning & Research
MAY 18 2017
STATE CLEARINGHOUSE

Local Action Type:

☐ General Plan Update ☐ General Plan Amendment ☐ General Plan Element ☐ Community Plan
☐ Specific Plan ☐ Master Plan ☐ Planned Unit Development ☐ Site Plan
☐ Rezone ☐ Prezone ☐ Use Permit ☐ Land Division (Subdivision, etc.)
☐ Annexation ☐ Redevelopment ☐ Coastal Permit ☒ Other: Roadway extens

Development Type:

☐ Residential: Units ____ Acres ____
☐ Office: Sq.ft. ____ Acres ____ Employees ____
☐ Commercial: Sq.ft. ____ Acres ____ Employees ____
☐ Industrial: Sq.ft. ____ Acres ____ Employees ____
☐ Educational: ____
☐ Recreational: ____
☐ Water Facilities: Type ____ MGD ____

☒ Transportation: Type Roadway extension
☐ Mining: Mineral ____
☐ Power: Type ____ MW ____
☐ Waste Treatment: Type ____ MGD ____
☐ Hazardous Waste: Type ____
☐ Other: ____

Project Issues Discussed in Document:

☒ Aesthetic/Visual
☒ Agricultural Land
☒ Air Quality
☒ Archeological/Historical
☒ Biological Resources
☐ Coastal Zone
☐ Drainage/Absorption
☐ Economic/Jobs
☐ Fiscal
☒ Flood Plain/Flooding
☐ Forest Land/Fire Hazard
☒ Geologic/Seismic
☐ Minerals
☒ Noise
☒ Population/Housing Balance
☒ Public Services/Facilities
☒ Recreation/Parks
☐ Schools/Universities
☐ Septic Systems
☐ Sewer Capacity
☒ Soil Erosion/Compaction/Grading
☒ Solid Waste
☒ Toxic/Hazardous
☒ Traffic/Circulation
☒ Vegetation
☒ Water Quality
☒ Water Supply/Groundwater
☒ Wetland/Riparian
☒ Growth Inducement
☒ Land Use
☒ Cumulative Effects
☐ Other: ____

Present Land Use/Zoning/General Plan Designation:

Land use designations surrounding general area include commercial, business park, resource management, and open space

Project Description: *(please use a separate page if necessary)*

The City of Dublin, in coordination with the City of Livermore and Alameda County, proposes to extend Dublin Blvd to North Canyons Parkway. The project is considered in their respective planning documents, as well as identified in the Plan Bay Area and Alameda Countywide Transportation Plan (Regional Transportation Plan ID# 21473).

Note: The State Clearinghouse will assign identification numbers for all new projects. If a SCH number already exists for a project (e.g. Notice of Preparation or previous draft document) please fill in.

Revised 2010

NOP Distribution List

GG

County: Alameda

SCH# 2017052047

esources Agency

Resources Agency
Nadell Gayou

- ☐ Dept. of Boating & Waterways
  Denise Peterson
- ☐ California Coastal Commission
  Elizabeth A. Fuchs
- ☐ Colorado River Board
  Lisa Johansen
- ☐ Dept. of Conservation
  Crina Chan
- ☐ Cal Fire
  Dan Foster
- ☐ Central Valley Flood Protection Board
  James Herota
- ☐ Office of Historic Preservation
  Ron Parsons

Dept of Parks & Recreation
Environmental Stewardship Section

- ☐ S.F. Bay Conservation & Dev't. Comm.
  Steve Goldbeck
- ■ Dept. of Water Resources
  Resources Agency
  Nadell Gayou

Fish and Game

- ☐ Depart. of Fish & Wildlife
  Scott Flint
  Environmental Services Division
- ☐ Fish & Wildlife Region 1
  Curt Babcock
- ☐ Fish & Wildlife Region 1E
  Laurie Harnsberger
- ☐ Fish & Wildlife Region 2
  Jeff Drongesen
- ■ Fish & Wildlife Region 3
  Craig Weightman
- ☐ Fish & Wildlife Region 4
  Julie Vance
- ☐ Fish & Wildlife Region 5
  Leslie Newton-Reed
  Habitat Conservation Program
- ☐ Fish & Wildlife Region 6
  Tiffany Ellis
  Habitat Conservation Program
- ☐ Fish & Wildlife Region 6 I/M
  Heidi Calvert
  Inyo/Mono, Habitat Conservation Program
- ☐ Dept. of Fish & Wildlife M
  William Paznokas
  Marine Region

Other Departments

- ☐ California Department of Education
  Lesley Taylor
- ☐ OES (Office of Emergency Services)
  Monique Wilber
- ☐ Food & Agriculture
  Sandra Schubert
  Dept. of Food and Agriculture
- ☐ Dept. of General Services
  Cathy Buck
  Environmental Services Section
- ☐ Housing & Comm. Dev.
  CEQA Coordinator
  Housing Policy Division

Independent Commissions,Boards

- ☐ Delta Protection Commission
  Erik Vink
- ☐ Delta Stewardship Council
  Kevan Samsam
- ☐ California Energy Commission
  Eric Knight
- ■ Native American Heritage Comm.
  Debbie Treadway
- ☐ Public Utilities Commission
  Supervisor
- ☐ Santa Monica Bay Restoration
  Guangyu Wang
- ☐ State Lands Commission
  Jennifer Deleong
- ☐ Tahoe Regional Planning Agency (TRPA)
  Cherry Jacques

Cal State Transportation Agency CalSTA

- ■ Caltrans - Division of Aeronautics
  Philip Crimmins
- ☐ Caltrans – Planning HQ LD-IGR
  Christian Bushong
- ■ California Highway Patrol
  Suzann Ikeuchi
  Office of Special Projects

Dept. of Transportation

- ☐ Caltrans, District 1
  Rex Jackman
- ☐ Caltrans, District 2
  Marcelino Gonzalez
- ☐ Caltrans, District 3
  Eric Federicks – South
  Susan Zanchi - North
- ■ Caltrans, District 4
  Patricia Maurice
- ☐ Caltrans, District 5
  Larry Newland
- ☐ Caltrans, District 6
  Michael Navarro
- ☐ Caltrans, District 7
  Dianna Watson
- ☐ Caltrans, District 8
  Mark Roberts
- ☐ Caltrans, District 9
  Gayle Rosander
- ☐ Caltrans, District 10
  Tom Dumas
- ☐ Caltrans, District 11
  Jacob Armstrong
- ☐ Caltrans, District 12
  Maureen El Harake

Cal EPA

Air Resources Board

- ☐ Airport & Freight
  Jack Wursten
  - ■ Transportation Projects
    Nesamani Kalandiyur
  - ☐ Industrial/Energy Projects
    Mike Tollstrup
- ☐ California Department of Resources, Recycling & Recovery
  Sue O'Leary
- ☐ State Water Resources Control Board
  Regional Programs Unit
  Division of Financial Assistance
- ☐ State Water Resources Control Board
  Cindy Forbes – Asst Deputy
  Division of Drinking Water
- ☐ State Water Resources Control Board
  Div. Drinking Water #_____
- ☐ State Water Resources Control Board
  Student Intern, 401 Water Quality Certification Unit
  Division of Water Quality
- ☐ State Water Resouces Control Board
  Phil Crader
  Division of Water Rights
- ☐ Dept. of Toxic Substances Control
  CEQA Tracking Center
- ☐ Department of Pesticide Regulation
  CEQA Coordinator

Regional Water Quality Control Board (RWQCB)

- ☐ RWQCB 1
  Cathleen Hudson
  North Coast Region (1)
- ■ RWQCB 2
  Environmental Document Coordinator
  San Francisco Bay Region (2)
- ☐ RWQCB 3
  Central Coast Region (3)
- ☐ RWQCB 4
  Teresa Rodgers
  Los Angeles Region (4)
- ☐ RWQCB 5S
  Central Valley Region (5)
  - ☐ RWQCB 5F
    Central Valley Region (5)
    Fresno Branch Office
  - ☐ RWQCB 5R
    Central Valley Region (5)
    Redding Branch Office
- ☐ RWQCB 6
  Lahontan Region (6)
  - ☐ RWQCB 6V
    Lahontan Region (6)
    Victorville Branch Office
- ☐ RWQCB 7
  Colorado River Basin Region (7)
- ☐ RWQCB 8
  Santa Ana Region (8)
- ☐ RWQCB 9
  San Diego Region (9)

- ☐ Other _____
  _____
  _____
- ☐ _____
  Conservancy

Last Updated 4/28/17

Letter 27

Public Scoping Meeting

Wednesday, May 31, 2017 – 6:00 PM

Dublin City Hall Regional Meeting Room
100 Civic Plaza, Dublin, CA 94568

DUBLIN BOULEVARD - NORTH CANYONS PARKWAY EXTENSION PROJECT

COMMENT CARD

Comments must be submitted no later than Monday June 19, 2017 by 5:00 p.m.
Comment forms may be deposited in the comment box tonight or mailed to:

Dublin Boulevard - North Canyons Parkway Extension Project

City of Dublin
100 Civic Plaza
Dublin, CA, 94568
Attn: Marissa Clevenger, Office Assistant II
Phone: 925-833-6630; Fax: (925) 829-9248
Email: marissa.clevenger@dublin.ca.gov

Name: JOE WASIK Date: 5-31-2017

Affiliation (if applicable): SELF

Address: [illegible]

Comment/Question: Please explain the impact of BART on the Dublin Blvd project, particularly on traffic impact, parking impact (PARKING @ STATIONS IS ALWAYS TOO SMALL) and corridor (now that I-580 median is used up for carpools).

Please continue on back if necessary.

Letter 28

Public Scoping Meeting

Wednesday, May 31, 2017 – 6:00 PM

Dublin City Hall Regional Meeting Room
100 Civic Plaza, Dublin, CA 94568

DUBLIN BOULEVARD - NORTH CANYONS PARKWAY EXTENSION PROJECT

COMMENT CARD

Comments must be submitted no later than Monday June 19, 2017 by 5:00 p.m.
Comment forms may be deposited in the comment box tonight or mailed to:

Dublin Boulevard - North Canyons Parkway Extension Project

City of Dublin
100 Civic Plaza
Dublin, CA, 94568
Attn: Marissa Clevenger, Office Assistant II
Phone: 925-833-6630; Fax: (925) 829-9248
Email: marissa.clevenger@dublin.ca.gov

Name: Richard Guarienti Date: 5-31-17

Affiliation (if applicable): Resident

Address: [redacted]

Comment/Question:

1. Any issues with current property owners for right of way? Easements?
2. Conduct EIR to widest footprint (e.g. 6 lanes + bike/ped path) even though original construction may be only 4 lanes +, Saves redo of EIR
3. Suggest separate bike/ped pathway so that pedestrians not walking in lane next to traffic.

Please continue on back if necessary.

Letter 29

Public Scoping Meeting

Wednesday, May 31, 2017 – 6:00 PM

Dublin City Hall Regional Meeting Room
100 Civic Plaza, Dublin, CA 94568

DUBLIN BOULEVARD - NORTH CANYONS PARKWAY EXTENSION PROJECT

COMMENT CARD

Comments must be submitted no later than Monday June 19, 2017 by 5:00 p.m.
Comment forms may be deposited in the comment box tonight or mailed to:

Dublin Boulevard - North Canyons Parkway Extension Project

City of Dublin
100 Civic Plaza
Dublin, CA, 94568
Attn: Marissa Clevenger, Office Assistant II
Phone: 925-833-6630; Fax: (925) 829-9248
Email: marissa.clevenger@dublin.ca.gov

Name: STEPHEN A. REYNOLDS Date: 5/31/17

Affiliation (if applicable): KIER & WRIGHT CIVIL ENGINEERS, INC.

Address:

Comment/Question:

WE SUPPORT THE ROAD CONNECTION AND CONCUR WITH THE INFORMATION PRESENTED AT THE SCOPING MEETING. GOOD WORK!

Please continue on back if necessary.

Letter 30

Public Scoping Meeting

Wednesday, May 31, 2017 – 6:00 PM

Dublin City Hall Regional Meeting Room
100 Civic Plaza, Dublin, CA 94568

DUBLIN BOULEVARD - NORTH CANYONS PARKWAY EXTENSION PROJECT

COMMENT CARD

Comments must be submitted no later than Monday June 19, 2017 by 5:00 p.m.
Comment forms may be deposited in the comment box tonight or mailed to:

Dublin Boulevard - North Canyons Parkway Extension Project

City of Dublin
100 Civic Plaza
Dublin, CA, 94568
Attn: Marissa Clevenger, Office Assistant II
Phone: 925-833-6630; Fax: (925) 829-9248
Email: marissa.clevenger@dublin.ca.gov

Name: Betsy Key Date: 5/31/17

Affiliation (if applicable):

Address: Dublin

Comment/Question:

This roadway is necessary. It is my hope that when they get to the construction phase a six lane roadway is built.

Please continue on back if necessary.

Letter 31

Public Scoping Meeting

Wednesday, May 31, 2017 – 6:00 PM

Dublin City Hall Regional Meeting Room
100 Civic Plaza, Dublin, CA 94568

DUBLIN BOULEVARD - NORTH CANYONS PARKWAY EXTENSION PROJECT

COMMENT CARD

Comments must be submitted no later than Monday June 19, 2017 by 5:00 p.m.
Comment forms may be deposited in the comment box tonight or mailed to:

Dublin Boulevard - North Canyons Parkway Extension Project

City of Dublin
100 Civic Plaza
Dublin, CA, 94568
Attn: Marissa Clevenger, Office Assistant II
Phone: 925-833-6630; Fax: (925) 829-9248
Email: marissa.clevenger@dublin.ca.gov

Name: Sblend Sblendorio Date: 5-31-17

Affiliation (if applicable): Innovation Tri-Valley Leadership Group (ITV)

Address:

Comment/Question: ITV is a business leadership group representing businesses throughout the Tri-Valley. We represent dozens of major employers such as Chevron, GE, Lawrence Livermore Nat'l Lab and Sandia Nat'l Lab. ITV strongly supports the extension of Dublin Blvd to N. Canyon Pkwy. Circulation infrastructure is vital to the economic vitality of the Tri-Valley. An east-west arterial north of I-580 in the Livermore Valley is long overdue. Secondary east-west access north of the freeway is required, especially in the event of public emergencies.

Please continue on back if necessary.

Letter 32

From: Deanna Taylor
To: Marissa Clevenger
Subject: Dublin Boulevard-North Canyons Parkway Extension Project - Comments
Date: Friday, June 16, 2017 4:48:39 PM
Attachments: image001.png

Hi Marissa,

I attended the Environmental Scoping Meeting on May 31, 2017 and I would like to submit comments regarding the 1) proposed new road, 2) bus transportation and 3)bike/walking/recreation routes.

1) I am very pleased that Dublin and Livermore are working together to close the gap, off the freeway, between the north side of 580.

2) I think more people would use the excellent rapid ride transit system if park and ride areas were spaced throughout the route area so people would have an easy access entry point into the bus system.

The primary concern I have is that there are no park and ride areas for people using the bus system Rapid Transit. The planning of the bus system does not allow entry point parking close to bus stops. Most people live too far to walk to the nearest bus stop. I think if park and ride areas were available to allow easy access to bus stations through the transit area more people would consider using the buses.

Highlighted in yellow is where my home is located near Ranier and the larger yellow area near East Stanley Blvd in Livermore where the closest available parking is located, as you can see it would be quite a long walk to my nearest bus station and the only available parking is within a residential area, parking here seems unfair to the local residents. Many people do park here to take the bus.

3) It would be safer to make a walk/bike/run area separate from the primary road. I like the way the planning was designed on the south side of the freeway from the Livermore Airport over to the outlet

mall and would like to see this on both sides of the freeway.

Thank you for considering my views.

Regards,

Deanna Taylor

From:
To: Marissa Clevenger
Cc: elizabeth.mcelligott@acgov.org
Subject: Extended Scoping Comment Period, Dublin Blvd Extension
Date: Sunday, June 18, 2017 8:47:00 AM

Re: Dublin Blvd- North Canyon Parkway Extension

Thank you for the opportunity to comment regarding the proposed extension of Dublin Blvd to join with North Canyon Parkway. I learned of this project recently through an article published in the Independent Newspaper.

I am writing in my capacity as Chair of the Alameda County Agricultural Advisory Committee (AAC). The role of the committee is described in County Administrative Ordinance:

"Chapter 2.122 - AGRICULTURAL ADVISORY COMMITTEE

2.122.020 - Purposes.
The purpose of the committee is to act as a technical advisory panel of experts to the board of supervisors and to other public agencies, including cities and districts, on matters involving the economic enhancement of agriculture and environmental conservation on applicable agricultural lands in Alameda County, and to implement the requirement of Measure D adopted by the electorate of Alameda County in 2000 calling for the periodic convening of an advisory panel of experts to make recommendations to enhance the economic viability of agriculture and ranching, and to minimize environmental impacts."

The county wide Measure that created the AAC was widely supported by the citizens of Dublin. The citizens of Dublin subsequently affirmed their commitment to County agricultural enhancement in 2014 when the City adopted an urban limit line to protect County lands from urban encroachment and development. The City of Livermore did the same in 2002 when the North Livermore Urban Growth Boundary Initiative was adopted by the City Council.

The proposed extension of Dublin Blvd to join with North Canyon Parkway may have significant impacts that are contrary to the agricultural enhancement and environmental conservation called for by Measure D. The proposed extension may also be contrary to the intent of urban limit lines established by the cities of Dublin and Livermore. I believe the AAC would have interest in participating in the scoping process to provide advice regarding these impacts and potential mitigation.

Our Committee does not have a meeting scheduled prior to the scoping comment deadline of June 19. However, we do have a special meeting planned for June 27. I request that you extend the scoping deadline to allow comment by the AAC at one of our public meetings. Please contact Assistant Planning Director Liz McElligot to arrange a presentation to the AAC.

Thank you,

Larry Gosselin DVM
Chair
Alameda County Agricultural Advisory Committee

From:
To: ~~Marissa Clevenger~~
Subject: Scoping Comments re: Dublin Blvd Extension
Date: Sunday, June 18, 2017 12:25:04 PM

Good Day,

Thank you for the opportunity to provide scoping comments regarding the extension of Dublin Blvd to North Canyon Parkway. The following are my personal comments. They reflect my concerns as a working ranch owner and conservationist owning 142 acres directly affected by the environmental impacts of this project.

Comments
1) Problem: Scoping for this project was inadequate. There was no presentation to the Alameda County Agricultural Advisory Committee, or no notification to agricultural property owners in the area.
Solution: Extend the scoping period. Notify all property owners in the “A” District North of 580. Notify all agricultural organizations active in Alameda County.
2) Problem: This road extension is an urban development encroachment intended to benefit local and regional transportation serving the cities in the area as well as commuters travelling to destinations outside the county. In all ways it violates the intent of the urban limit lines established by Alameda County, the City of Livermore, and the city of Dublin.
Solution: The DEIR should list and summarize the intent and substance of Measures, Initiatives, and Ordinances that arose from efforts to establish a greenbelt between the cities of Livermore and Dublin.
3) Problem: The project invites local impacts from regional sources. Models for these types of impacts are already seen on and around rural roads in eastern and northern Alameda County.
Solution: The DEIR should address the impacts of regional growth on agricultural land use in Alameda County as well as a comprehensive mitigation strategy.
4) Problem: Many impacts are cumulative. This extension adds to the impacts of existing and future Dublin Blvd and N. Canyon Parkway projects improvements.
Solution: The DEIR should comprehensively address the cumulative impacts of prior, present and future extensions of urban roads into surrounding agricultural lands.
5) Agriculture in Alameda County has declined despite the establishment of Urban Limit Lines. The DEIR for projects typically uses a standardized Impacts Checklist that fails to recognize the culture of farming and ranching.
Solution: The Impacts Checklist should be modified to include the causes of the declining agricultural economy in Alameda County as well as mitigations that could enhance the agricultural economy. For example, despite extensive urban development at the fringes of the City of Livermore the wine industry has flourished and expanded. Mitigation that will do the same in the area north of 580 should be considered. Zoning restrictions alone do not enhance agriculture.

The fact that development has occured in Dublin and N. Livermore without consideration of the cumulative impact on agriculture does not mean that future development should continue without mitigation. I encourage the DEIR for this project to be innovative and lay the foundation for a regional agricultural land use strategy that results in agricultural policies that support the agricultural economy.

Sincerely,
Larry Gosselin DVM

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, California 95825-1846

Letter 35

In Reply Refer to:
08ESMF00-
2017-TA-2126

JUN 14 2017

RECEIVED
JUN 19 2017
PUBLIC WORKS

City of Dublin
Attn: Obaid Khan, P.E.
Transportation and Operations Manager
100 Civic Plaza
Dublin, California, 94568

Subject: Comments on the Notice of Preparation for the Dublin Boulevard-North Canyons Parkway Extension Project in Alameda County, California

Dear Mr. Khan:

This letter is in response to the Notice of Preparation for the Dublin Boulevard-North Canyons Parkway Extension Project in Alameda County, California. At issue are effects to the federally threatened California red-legged frog (*Rana draytonii*) and its critical habitat, the threatened Central California Distinct Population Segment of the California tiger salamander (*Ambystoma californiense*) (Central California tiger salamander), and the endangered Calliope silverspot butterfly (*Speyeria callippe callippe*). These comments are provided under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act), and in accordance with the implementing regulations pertaining to interagency cooperation (50 CFR 402).

Project Description

The City of Dublin, in coordination with the City of Livermore and Alameda County, proposes to extend Dublin Boulevard to North Canyons Parkway. The project is considered in the two cities' respective planning documents, as well as identified in Plan Bay Area and Alameda Countywide Transportation Plan (Regional Transportation Plan ID# 21473). The project would establish a precise alignment for a roadway extension that would connect several Association of Bay Area Government's (ABAG) Priority Development Areas (PDA) within Dublin and Livermore. The project is proposed to complete the roadway connection along the north side of I-580 to facilitate the needs of the growing jobs and housing associated with ABAG PDA in the project vicinity.

Listed Species in the Planning Area

The planning area contains annual grasslands interspersed with perennial and seasonal wetlands and contains suitable habitat for some of the listed species named above. There are documented occurrences of California red-legged frogs and California tiger salamanders in the project area and any seasonal waterbodies or upland habitat could be used by these species. Designated critical habitat unit CCS-2B for the California red-legged frog is part of the planning area and project activities will likely impact this unit. The planning area also contains a known population of Congdon's tarplant (one of seven known populations in east Alameda County). This plant is associated with alkaline or saline soils and take of individuals of this population may occur through construction activities. San Joaquin spearscale is another plant that is considered endangered by the California Native Plant Society and protected by the state. It is associated with alkaline or saline soils as well and may be present in the project area.

Comments

Specific to federally listed species, the implementation of the proposed road extension is likely to result in take of the federally listed species and result in the loss and/or degradation of their habitat.

The project area falls within the boundary of the East Alameda County Conservation Strategy (EACCS) on which the City of Dublin and Alameda County were authors and are participants. On May 31, 2012 the U.S. Fish and Wildlife Service (Service) issued a programmatic biological opinion for all activities within the EACCS boundary (*Programmatic Biological Opinion for the U.S. Army Corps of Engineers (Corps) Permitted Projects Utilizing the East Alameda County Conservation Strategy that May Affect Federally Listed Species in East Alameda County, California (Service File No. 08ESMF00-2012-F-0092-1)*). As per our discussion at a meeting between the Service, the City of Dublin, and the California Department of Fish and Wildlife on April 28, 2017, the City agreed to use the EACCS to minimize and mitigate for any adverse effects to listed species and their habitats. According to the EACCS, covered species with potential habitat within the planning area include: Calliope silverspot butterfly, California red-legged frog, California tiger salamander, Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*) and San Joaquin spearscale (*Extriplex joaquinana*). The Calliope silverspot butterfly could use the grassland area in the planning area for foraging, egg-laying, and larval development, if its host-plant is present, but since this species prefers hillside slopes and hill tops, it is unlikely they would be present in the area since it is located so far into the Livermore Valley. Please consider adverse effects to these species and their habitat in your analysis.

Of primary concern is that the project will essentially isolate the land between the new road and I-580 from California tiger salamander and California red-legged frog breeding sites to the north. However, because the lands between the new road and I-580 are slated to be developed in the future, incorporating wildlife crossings and directional fencing in the new road would not benefit listed species or mitigate for adverse effects to species movement. Culverts for drainages crossing under the road may serve as interim movement pathways to some extent, but the road would not need to incorporate crossings specifically for wildlife because it would likely be unnecessary once the area is developed. However, the Service would like to see the Cottonwood Creek crossing be a free-span bridge that would allow for wildlife to move freely between Alameda County areas north and south of the proposed roadway along the creek.

The Service requests that future impacts resulting from projects that would be served by the extension should be addressed in a cumulative impact statement and analysis in the Dublin Boulevard Extension Environmental Impact Report (EIR). The Service is concerned that the developments that occur along the proposed road expansion will degrade quality habitat of the aforementioned listed species and then, future projects would mitigate for habitat that has lost value as a result of this project. Because this habitat quality loss is an indirect effect of the roadway construction, the City agreed (at the April 28, 2017 meeting) that the Biological Assessment submitted to the Service and any CEQA documents written for this project would provide a requirement in the mitigation measures that any developments facilitated by or surrounding the road expansion will mitigate based on EACCS scores of pre-road construction habitat quality. Mitigation measures in the EIR should state clearly that such future developments shall comply with the EACCS and be consistent with the mitigation measures (most importantly, the pre-road construction habitat quality mitigation requirement) adopted by the City of Dublin, as approved in the Final EIR for the proposed project.

Please address any questions or concerns regarding these comments and recommendations to Claudia Funari or Ryan Olah, Coast Bay Division Chief, at the letterhead address, telephone (916) 414-6646, or electronic mail at Claudia_Funari@fws.gov or Ryan_Olah@fws.gov.

Sincerely,

Ryan Olah,
Coast Bay Division Chief

cc:
Marcia Grefsrud, California Department of Fish and Wildlife, Napa, CA

Comment 36

From: Karen Whitestone
To: Marissa Clevenger
Cc: conservation-chair@ebcnps.org
Subject: Comments on Dublin Boulevard-North Canyons Parkway Extension Project
Date: Monday, June 19, 2017 12:35:07 PM
Attachments: DublinBlvdNOP-comments-20170619.pdf

Hello Ms. Melissa Clevenger and Mr. Obaid Kahn,

Please accept the attached comments for the Dublin Boulevard extension project, submitted by the East Bay Chapter of the California Native Plant Society. Please contact me to confirm receipt of our comments at your earliest convenience. Thank you.

Sincerely,

Karen Whitestone

--
Karen Whitestone
Conservation Analyst

California Native Plant Society, East Bay Chapter
PO Box 5597 Elmwood Station
Berkeley CA 94705
510-734-0335
www.ebcnps.org
http://ebcnps.wordpress.com

“dedicated to the conservation of native flora”

CALIFORNIA
NATIVE PLANT SOCIETY

East Bay Chapter, www.ebcnps.org
PO Box 5597, Elmwood Station, Berkeley, CA 94705

June 19, 2017

City of Dublin
100 Civic Plaza
Dublin CA 94568
Attn: Marissa Clevenger, Office Assistant II
Attn: Obaid Khan, Transportation & Operations Manager

Submitted by email to: marissa.clevenger@dublin.ca.gov

RE: Notice of Preparation of an Environmental Impact Report and Notice of Public Scoping Meeting for the Dublin Boulevard-North Canyons Parkway Extension Project

Dear Mr. Obaid Khan:

The following are the comments of the California Native Plant Society, East Bay Chapter (EBCNPS) in regard to the Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the proposed Dublin Boulevard-North Canyons Parkway Extension Project.

The California Native Plant Society (CNPS) is a non-profit organization of more than 10,000 laypersons and professional botanists organized into 34 chapters throughout California. The Society's mission is to increase the understanding and appreciation of California's native plants and to preserve them in their natural habitat through scientific activities, education, and conservation. Pursuant to the mission of protecting California's native flora and vegetation, EBCNPS submits the following comments:

The "currently undeveloped open space lands" located in the study area likely contain high biodiversity, including rare plants (special-status plants) and rare plant communities (sensitive natural communities). The proposed project would have significant impacts on these resources.

The NOP states that "ecologists will conduct reconnaissance-level field surveys of the project area to document the biological conditions." A reconnaissance-level survey is an inappropriately low survey standard, given known high biodiversity in the region.

We recommend performing full, protocol-level surveys of the study area, which is the preferred approach for survey and assessment for special-status plants and animals in California, according to the Department of Fish and Wildlife (2009): "Surveys should be comprehensive over the entire site, including areas that will be directly or indirectly impacted by the project." Plant surveys must be seasonally appropriate and floristic in nature.

The California Environmental Quality Act (CEQA) requires assessment of all CNPS Rank 1 and 2 plants, which are considered rare, threatened or endangered, or even presumed extirpated, within California. Impacts on these special-status plants are potentially significant [CEQA Guidelines §15125 (c) and §15380)]. In addition, unusual and significant plants may have local or regional significance, which is another potential impact requiring evaluation (CEQA Appendix G, Environmental Checklist). All special-status plants as well as locally rare plants, are likely indicative of sensitive natural communities protected by California Department of Fish and Wildlife (CDFW).

We recommend consultation with existing databases of special-status plant species and sensitive natural communities, including:

- California Department of Fish and Wildlife
  - California Natural Diversity Database (CNDDB)
  - Biogeographic Information and Observation System (BIOS)
  - Vegetation Classification and Mapping Program (VegCAMP) for Natural Communities
  - *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (Dept. of Fish and Game, 11/2009)

- California Native Plant Society
  - Inventory of Rare and Endangered Plants of California
  - *Manual of California Vegetation, 2nd ed.* (Sawyer et al., 2009)

- California Native Plant Society, East Bay Chapter
  - *Guidebook to Botanical Priority Protection Areas of the East Bay* (Bartosh et al., 2010)
  - *Database of Rare, Unusual and Significant Plants of Alameda and Contra Costa Counties* (Lake, 2016)

The study area is in close proximity to regions conserved due to their high biodiversity and rich natural resource values. The planners should consult conservation plans and resource publications from Contra Costa Local Agency Formation Commission, Eastern Alameda County Conservation Strategy, Tri-Valley Conservancy, and the East Bay Regional Park District. In addition, the study area should be investigated for natural resources that occur in common with the following conserved areas:

- Springtown Preserve (Garaventa Wetlands) in Livermore
- Brushy Peak Regional Park in Livermore
- Doolan Canyon Regional Preserve in Dublin

An incomplete list of protected sensitive natural communities which may exist in the study area include: wetlands, vernal pools, alkali sink ecosystems, sandstone rock outcrops, and Northern claypan vernal pools. Vernal pools are an especially sensitive type of wetland and critical habitat for many special-status vernal pool plants and crustaceans. Vernal pools in the study area may have unique attributes specific to the Livermore Valley area. Also, note that vernal pools may or may not contain a large number of special-status species, so their overall floristic composition may be a helpful measure because they are still a valuable and protected ecosystem.

The study area is located in a region that our organization recognizes as a Botanical Priority Protection Area (BPPA), one of fifteen areas in the East Bay with high probability for containing rare and locally rare native plants. BPPAs are defined as areas that are not yet conserved but do contain unusual soil types that are disappearing in the East Bay, and have many historic or current occurrence records for native plants that are rare, locally rare, or unusual. The East Dublin & Tassajara BPPA is characterized by sensitive natural communities such as alkaline habitats (grasslands, scrubs, wetlands, swales) and Northern claypan vernal pools; as well as rare and distinctive plants such as Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*, 1B.1), San Joaquin spearscale (*Extriplex joaquinana*, 1B.2), white-headed navarretia (*Navarretia leucocephala* ssp. *leucocephala*, A2), Semaphore grass (*Pleuropogon californicus* var. *californicus*, B), saline clover (*Trifolium hydrophilum*, 1B.2), and yellow owl's clover (*Triphysaria versicolor* ssp. *faucibarbata*, A2).

As an organization, we recommend avoidance of impacts to valuable natural resources on (or near) the project site, followed by robust mitigation proposals for any potential impacts. A new road or highway alignment means that the EIR should also consider the growth-inducing impacts of this project on special-status plants and sensitive natural communities.

We were involved with successful passage of the 2014 Dublin Open Space Initiative and looks forward to continued involvement as an interested local stakeholder organization.

If you have any questions, please contact me at conservation@ebcnps.org or at 510-734-0335.

Sincerely,

Karen Whitestone
Conservation Analyst
East Bay California Native Plant Society

Appendix B: Detailed Project Alignment

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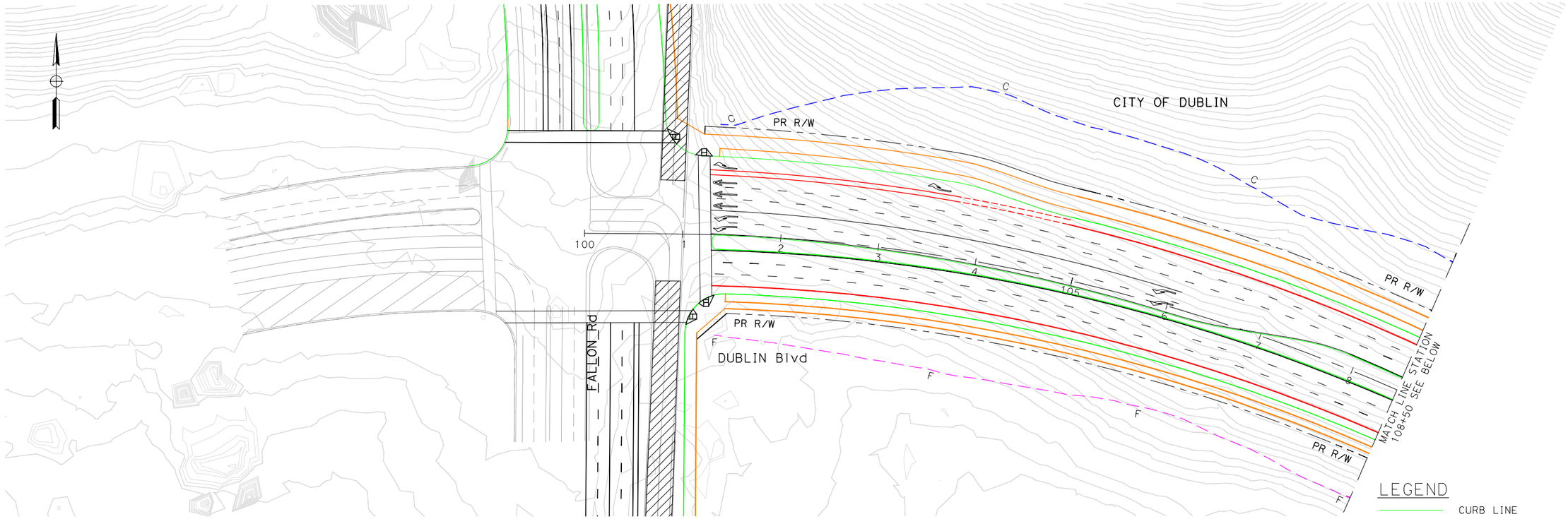
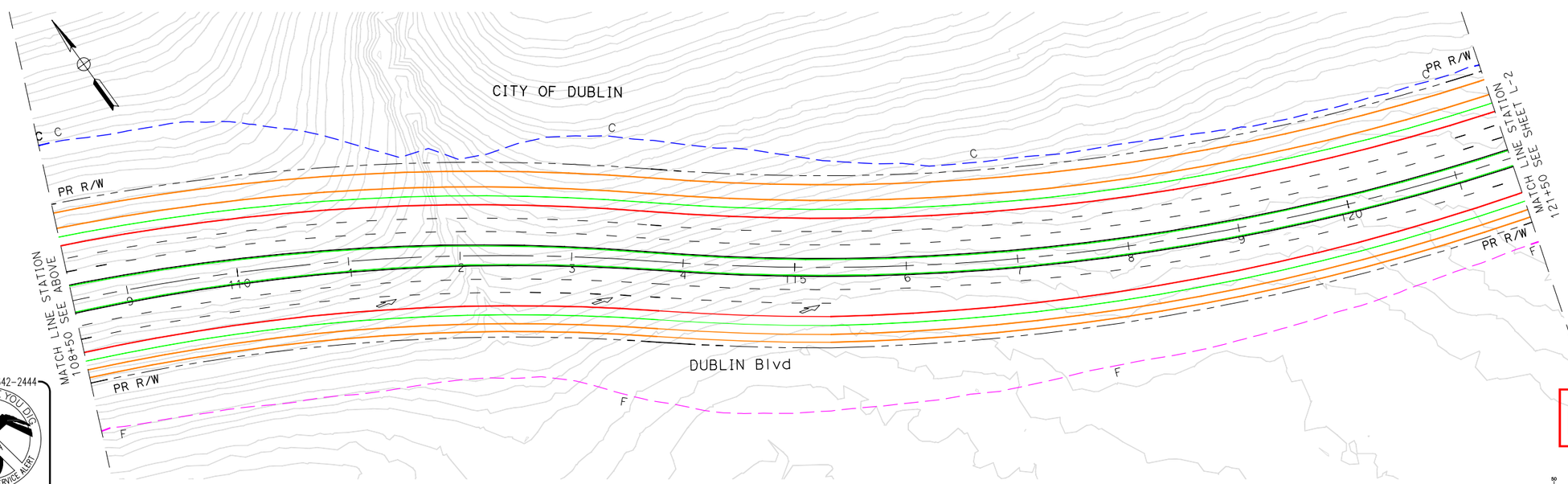




LEGEND

- CURB LINE
- BIKE LANE
- SIDEWALK
- F — FILL LINE
- C — CUT LINE
- RIGHT-OF-WAY
- ABANDON ROAD
- LAYDOWN AREA
- BRIDGE PIERS

CA: 1-800-642-2444
CALL BEFORE YOU DIG
USA
UNDERGROUND SERVICE ALERT
CA: 1-800-642-2444
CALL TWO WORKING DAYS BEFORE YOU DIG

DRAFT

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

CONSTRUCTION RECORD				
CONTRACTOR:				
INSPECTOR:				
DATE COMPLETED:				
SCALE: 1"=50'	3/5		DEIR	
	No.	DATE	APVD.	REVISION

BKF
ENGINEERS / SURVEYORS / PLANNERS
4670 WILLOW RD
SUITE 205
PLEASANTON, CA 94588
925-396-7700
925-396-7799 (FAX)

DESIGNED BY	DRAWN BY	CHECKED BY

PLANS PREPARED UNDER SUPERVISION OF:
N.V. BERNARDI
REGISTERED CIVIL ENGINEER
9-30-20 — DATE
45407 — RCE NO

CITY OF DUBLIN 1982 CALIFORNIA

CITY OF DUBLIN
PUBLIC WORKS DEPARTMENT
City Offices, 100 Civic Plaza, Dublin, California 94568
Public Works Department – Engineering, (925) 833-6630

REVIEWED BY:

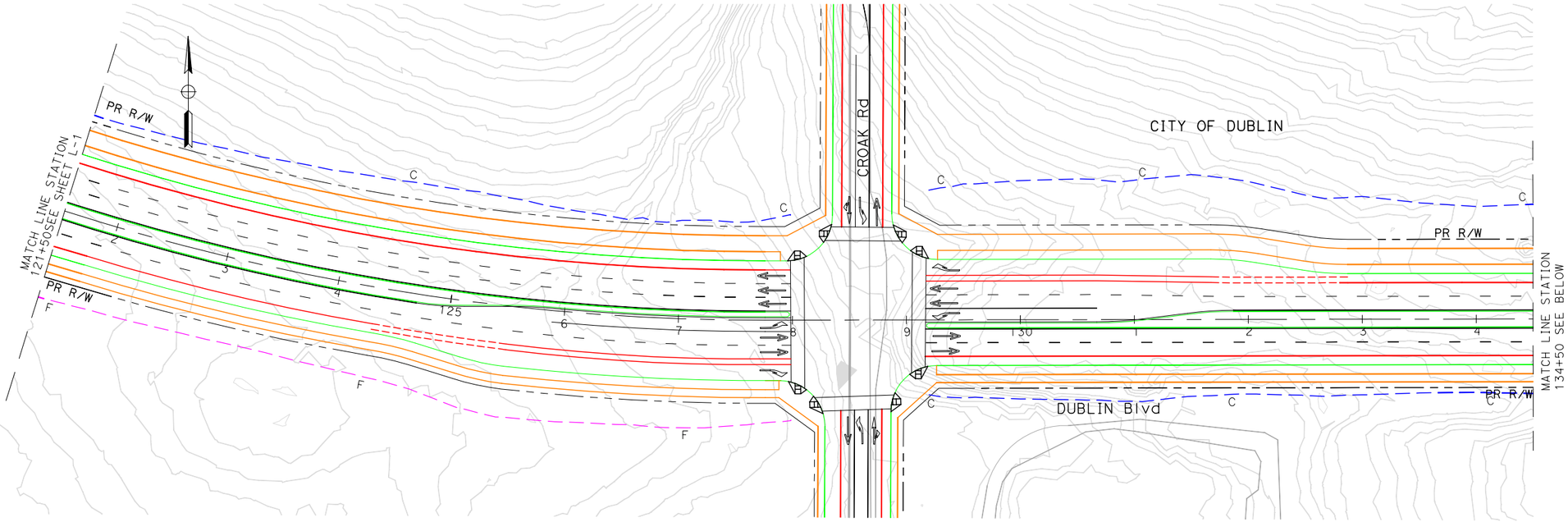
PUBLIC WORKS DIRECTOR/CITY ENGINEER

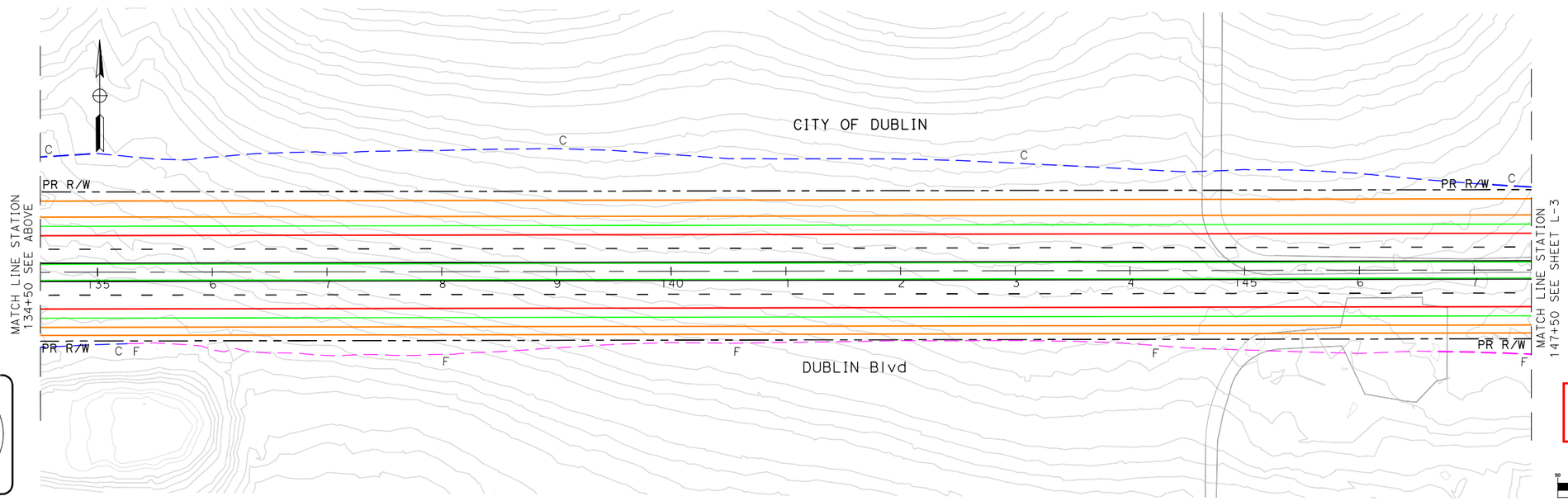
DATE

DUBLIN BLVD EXTENSION IMPROVEMENT PROJECT

STATION 100+00 TO 121+50

DRAWING No.
L-1
SHEET 1 OF 5 SHEETS
CONTRACT NO. –
FILE No.





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USA
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CA: 1-800-642-2444
CALL TWO WORKING DAYS BEFORE YOU DIG

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GRAPHIC SCALE
50 0 25 50 100 200
(IN FEET)
1 inch = 50 ft.

CONSTRUCTION RECORD				
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SCALE: 1"=50'	3/5			DEIR
	No.	DATE	APVD.	REVISION

BKF
ENGINEERS / SURVEYORS / PLANNERS
4670 WILLOW RD
SUITE 205
PLEASANTON, CA 94588
925-396-7700
925-396-7799 (FAX)

DESIGNED BY	DRAWN BY	CHECKED BY

PLANS PREPARED UNDER SUPERVISION OF:
N.V. BERNARDI
REGISTERED CIVIL ENGINEER
9-30-20 — 45407
DATE — RCE NO

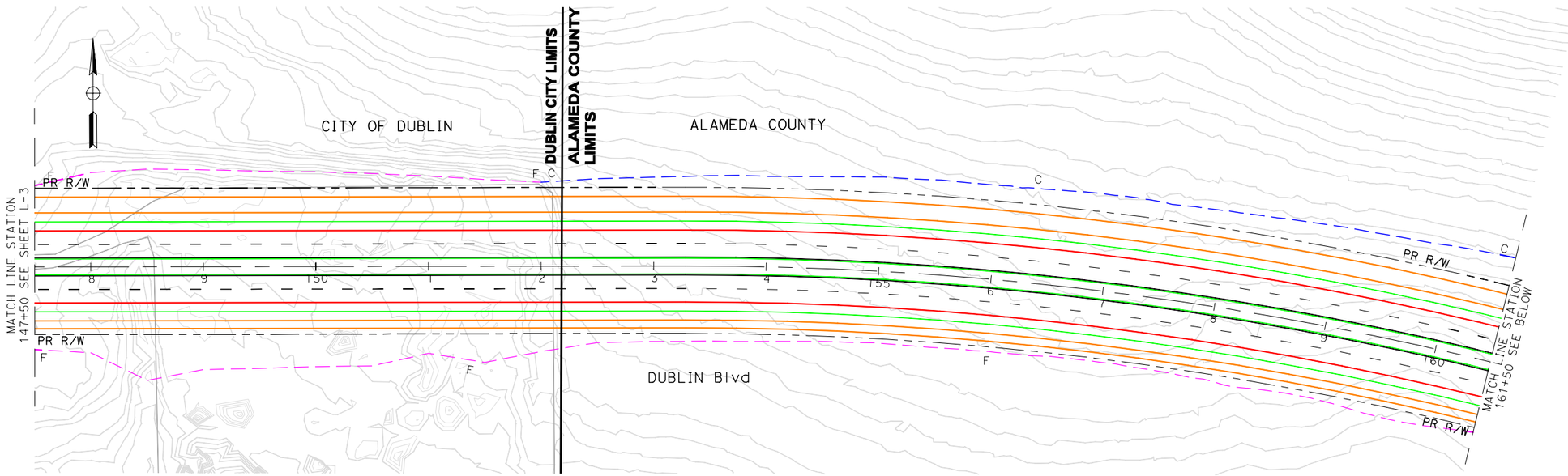
CITY OF DUBLIN
PUBLIC WORKS DEPARTMENT
City Offices, 100 Civic Plaza, Dublin, California 94568
Public Works Department - Engineering, (925) 833-6630

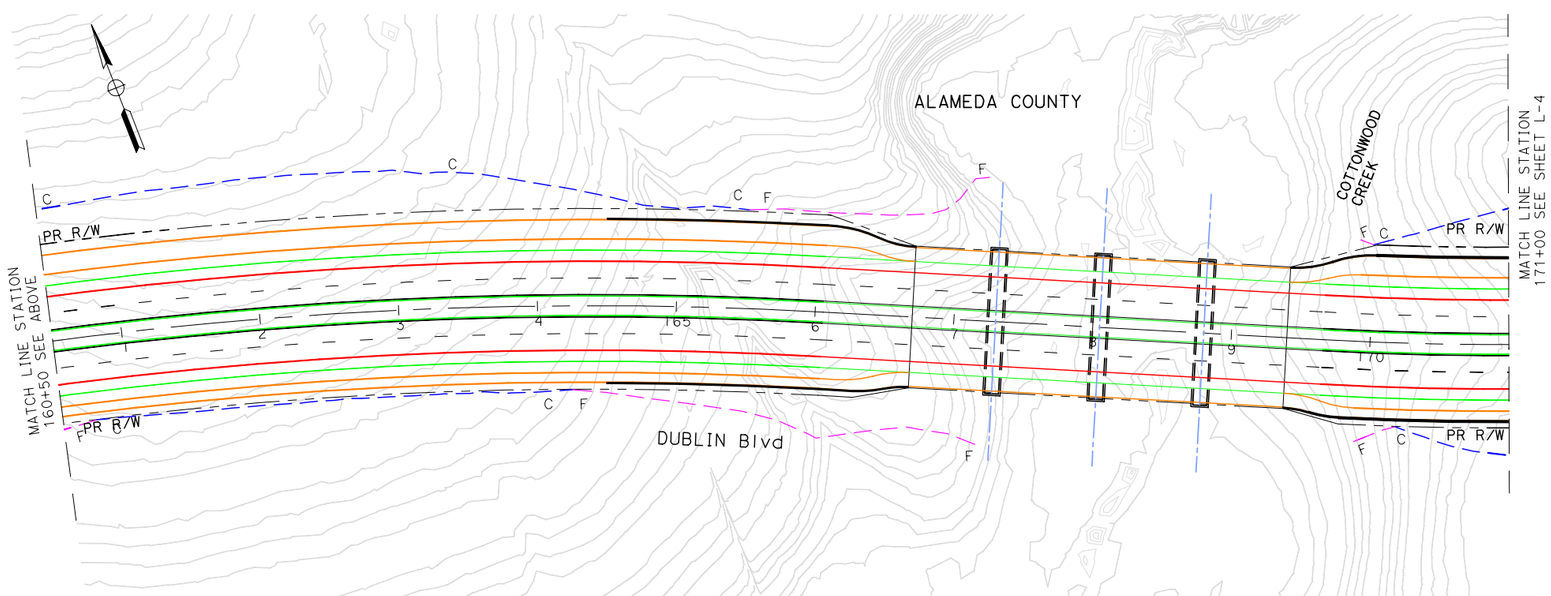
REVIEWED BY:
PUBLIC WORKS DIRECTOR/CITY ENGINEER
DATE

DUBLIN BLVD EXTENSION IMPROVEMENT PROJECT

STATION 121+50 TO 147+50

DRAWING No. L-2
SHEET 2 OF 5 SHEETS
CONTRACT NO. -
FILE No.





DRAFT

GRAPHIC SCALE

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(IN FEET)
1 inch = 50 ft.

CA: 1-800-642-2444
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CA: 1-800-642-2444
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CONSTRUCTION RECORD				
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BKF
ENGINEERS / SURVEYORS / PLANNERS
4670 WILLOW RD
SUITE 205
PLEASANTON, CA 94588
925-396-7700
925-396-7799 (FAX)

DESIGNED BY	DRAWN BY	CHECKED BY

PLANS PREPARED UNDER SUPERVISION OF:
N.V. BERNARDI
REGISTERED CIVIL ENGINEER
9-30-20 — DATE
45407 — RCE NO

CITY OF DUBLIN
PUBLIC WORKS DEPARTMENT
City Offices, 100 Civic Plaza, Dublin, California 94568
Public Works Department – Engineering, (925) 833-6630

REVIEWED BY:

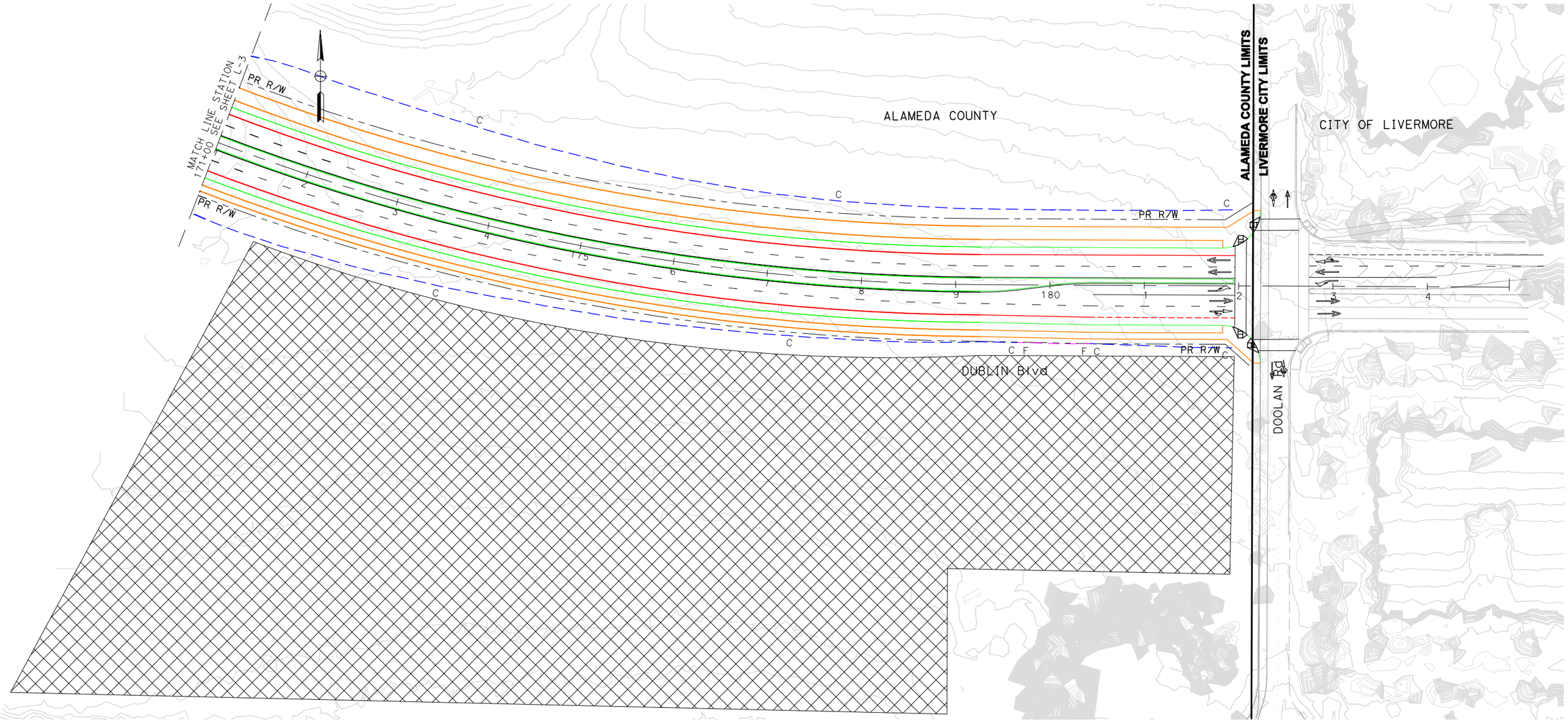
PUBLIC WORKS DIRECTOR/CITY ENGINEER

DATE

DUBLIN BLVD EXTENSION IMPROVEMENT PROJECT

STATION 147+50 TO 171+00

DRAWING No. L-3
SHEET 3 OF 5 SHEETS
CONTRACT NO. –
FILE No.



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GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.

CONSTRUCTION RECORD				
CONTRACTOR:				
INSPECTOR:				
DATE COMPLETED:				
SCALE: 1"=50'		3/5		DEIR
	No.	DATE	APVD.	REVISION

BKF
ENGINEERS / SURVEYORS / PLANNERS
4670 WILLOW RD
SUITE 205
PLEASANTON, CA 94588
925-396-7700
925-396-7799 (FAX)

DESIGNED BY	DRAWN BY	CHECKED BY

PLANS PREPARED UNDER SUPERVISION OF:
N.V. BERNARDI
REGISTERED CIVIL ENGINEER
9-30-20 — DATE
45407 — RCE NO

CITY OF DUBLIN
PUBLIC WORKS DEPARTMENT
City Offices, 100 Civic Plaza, Dublin, California 94568
Public Works Department – Engineering, (925) 833-6630

REVIEWED BY:

PUBLIC WORKS DIRECTOR/CITY ENGINEER

DATE

DUBLIN BLVD EXTENSION IMPROVEMENT PROJECT

STATION 171+00 TO 184+87

DRAWING No.
L-4
SHEET
4 OF 5 SHEETS
CONTRACT NO.
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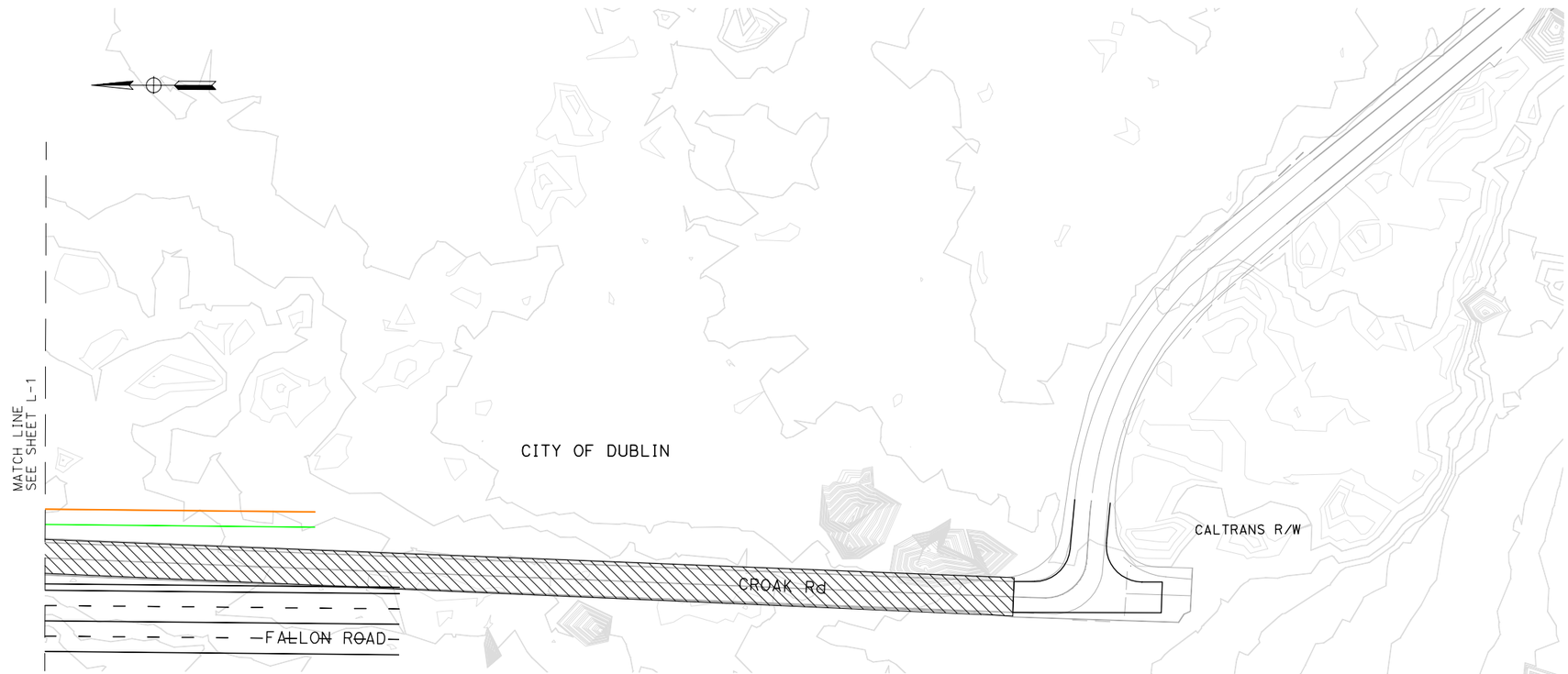
FILE No.



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GRAPHIC SCALE
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(IN FEET)
1 inch = 50 ft.

CONSTRUCTION RECORD				
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	No.	DATE	APVD.	REVISION

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REVIEWED BY:

PUBLIC WORKS DIRECTOR/CITY ENGINEER

DATE

DUBLIN BLVD EXTENSION IMPROVEMENT PROJECT

FALLON ROAD

DRAWING No. L-5
SHEET 5 OF 5 SHEETS
CONTRACT NO. –
FILE No.

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Appendix C: Air Quality and Greenhouse Gas Assessment

DUBLIN BOULEVARD NORTH CANYONS PARKWAY EXTENSION AIR QUALITY and GREENHOUSE GAS ASSESSMENT

Dublin, California

January 22, 2019
Prepared for:
City of Dublin
100 Civic Plaza
Dublin, CA 94568

Prepared By:

Keith Pommerenck

423 4th Street, Suite S1W
Marysville, CA 95901
(530) 777-9269

I&R Project: 17-029

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality

Introduction

The City of Dublin, in coordination with the City of Livermore, Alameda County Transportation Commission, and Alameda County, proposes to construct an extension of Dublin Boulevard in Dublin, across an unincorporated area in Alameda County, to North Canyons Parkway in Livermore. The purpose of the project is to improve east-west local roadway connectivity between the City of Dublin and the City of Livermore and to improve mobility, multimodal access, and efficiency for all roadway users. The purpose of the project is also to support an integrated corridor management strategy. The total length of the project is approximately 1.5 miles (2.4 km). The City of Dublin is the lead agency under the California Environmental Quality Act (CEQA).

Project Description

The project would include the extension of Dublin Boulevard approximately 1.5 miles (2.4 km) eastward through eastern Dublin and an unincorporated portion of the County. The roadway extension would start from the current terminus of Dublin Boulevard at the Dublin Boulevard/Fallon Road intersection in Dublin and would end at the Doolan Road/North Canyons Parkway intersection along the boundary of the County and Livermore. This roadway extension would provide four to six travel lanes and bicycle and pedestrian facilities (i.e., sidewalks and bike lanes). Beginning at Fallon Road, the roadway extension would have six travel lanes (three in each direction). Continuing eastward, the roadway extension would narrow to four travel lanes (two in each direction) at the intersection of Croak Road. From Croak Road to Doolan Road, the roadway extension would remain in the four-lane configuration. The permanent area needed for the project, including the roadway, sidewalks, intersections, and land acquired for right-of-way, is estimated at approximately 29 acres.

Project design features and components include (from west to east):

- Intersection improvements at Fallon Road (including the modification of the signalized intersection) and the elimination of the existing intersection of Croak Road and Fallon Road
- Grading and earthwork northeast of the Dublin Boulevard/Fallon Road intersection, including grading at the base of the hills to the north, to allow for the roadway extension, and more minor grading throughout the road alignment to meet engineering and safety requirements
- Abandonment of a north-south (frontage road) portion of Croak Road parallel to Fallon Road

- The addition of a ”T” shaped hammerhead turnaround at the new terminus of Croak Road adjacent to Fallon Road
- Removal of overhead utility lines between Fallon Road and Croak Road
- Creation of a new signalized intersection at the Dublin Boulevard extension and Croak Road
- Construction of a new bridge over Cottonwood Creek
- Construction staging and laydown between the extension and Collier Canyon Road, along Doolan Road
- Intersection improvements at Doolan Road and North/Canyons parkway, including the creation of a new signalized intersection
- The extension of underground utility lines into the Project site, within the operational footprint (Figure Ref)
- Construction of the new roadway, which would include a median, inside shoulder at few locations, vehicle travel lanes, street bicycle facilities, a parkway strip and separated sidewalk or a separated Class I bike path/MUP, lighting, and cut/fill embankments
- Retaining walls may be use in addition to, or as an alternative to, cut/fill embankments associated with roadway and hillside grading. If used, retaining walls would be placed outside of the sidewalk and path areas on either side of the roadway cross section, within the construction footprint and within the permanent right-of-way. Retaining walls would measure 3 feet to 10 feet in height and would generally require a smaller area of grading or ground disturbance in comparison to cut/fill slopes.
-

Setting

Climate and Topography

Meteorology (weather) and terrain can influence air quality. Certain weather parameters are highly correlated to air quality, including temperature, the amount of sunlight, and the type of winds at the surface and above the surface. Winds can transport O_3 and O_3 precursors from one region to another, contributing to air quality problems downwind of source regions. Furthermore, mountains can act as a barrier that prevents O_3 from dispersing.

The project site is in the San Francisco Bay Area Air Basin and is under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). The project site is situated in the Livermore Valley which is a valley in eastern Alameda County in the San Francisco Bay Area Air Basin. The

valley is located about 30 miles (48 km) east of the first coastal range of foothills that surround the San Francisco Bay Area. The Livermore Valley has an east-west orientation with mountain passes on the west and east connecting the Bay Area and the Central Valley. The passes are used by railroads and highways to connect the two regions. Livermore Valley is about 15 miles (24 km) long (east to west), 10 miles (16 km) wide (north to south) and surrounded by California coastal range mountains and foothills.

Livermore Valley has a Mediterranean climate, although it is close to a semi-arid climate because of its relatively low annual precipitation. It features warm to hot, dry summers and mild to cool, wet winters. Summer (June–October) daytime temperatures average in the 75 to 85°F (24 to 29°C) range, but sometimes reach 100°F (38°C) and can occasionally approach 110°F (43°C). Summer nights, however, are normally much cooler, with lows in the 50 to 60°F (10 to 16°C) range. The valley's passes direct the normal west to east flow of air through the valley. Usually there is a strong evening wind in the summer that brings cool air off the Pacific Ocean into the Livermore valley as it heads towards the much hotter Central Valley. This wind is strong enough with an average summer wind speed of about 9 miles per hour (14 km/h) and predictable enough to make the Livermore hills covered with wind turbines mounted in Altamont Pass. The period from June to September is extremely dry and is characterized by clear skies, but in late summer, subtropical moisture occasionally surges into the Livermore Valley, bringing high humidity, monsoon clouds, and, much less commonly, thunderstorms.

Nearly all the 14.6 inches (370 mm) of annual Livermore rainfall comes between September and May, but about 50 percent of the days are sunny during this period with no appreciable cloud cover. The peak rainy months are December to March. Most rainstorms are classified as 50 percent light rain, 32 percent moderate rain, 11 percent heavy rain, and less than 6 percent thunder showers. The coldest months are December and January, with a mean high of about 56°F (13°C) and a low of about 38°F (3°C) with some occasional frost possible on clear mornings. The temperature can drop to as low as the 20 to 25°F (−7 to −4°C) range on an exceptionally cold night. Snow is very rare, but light dustings do occur on the surrounding hills and occasionally in the valley.

The record high temperature is 115°F (46 °C), recorded on September 3, 1950, and the record low temperature is 18°F (−8°C), recorded on January 5, 1961, and December 9, 1972.

The Lawrence Livermore National Laboratory climatological station, maintained by Lawrence Livermore National Laboratory, is located near the project site and is representative of meteorological conditions near the project

Air Pollutants of Primary Concern

The project is in the northern central portion of Alameda County, which is in the San Francisco Bay Area Air Basin. Ambient air quality standards have been established at both the State and federal level. The Bay Area meets all ambient air quality standards apart from ground-level ozone,

respirable particulate matter (PM10), and fine particulate matter (PM2.5). Health effects of criteria pollutants and their potential sources are described below and summarized in Table 1.

Ozone

Ozone is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving reactive organic gases (ROG) and oxides of nitrogen (NO_X). The main sources of ROG and NO_X, often referred to as ozone precursors, are combustion processes (including combustion in motor vehicle engines) and the evaporation of solvents, paints, and fuels. In the Bay Area, automobiles are the single largest source of ozone precursors. Ozone is referred to as a regional air pollutant because its precursors are transported and diffused by wind concurrently with ozone production through the photochemical reaction process. Ozone causes eye irritation, airway constriction, shortness of breath, and can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema.

Table 1 - Health Effects of Air Pollutants

Pollutants	Sources	Primary Effects
Carbon Monoxide (CO)	• Incomplete combustion of fuels and other carbon-containing substances, such as motor exhaust. • Natural events, such as decomposition of organic matter.	• Reduced tolerance for exercise. • Impairment of mental function. • Impairment of fetal development. • Death at high levels of exposure. • Aggravation of some heart diseases (angina).
Nitrogen Dioxide (NO_2)	• Motor vehicle exhaust. • High temperature stationary combustion. • Atmospheric reactions.	• Aggravation of respiratory illness. • Reduced visibility. • Reduced plant growth. • Formation of acid rain.
Ozone (O_3)	• Atmospheric reaction of organic gases with nitrogen oxides in sunlight.	• Aggravation of respiratory and cardiovascular diseases. • Irritation of eyes. • Impairment of cardiopulmonary function. • Plant leaf injury.
Lead (Pb)	• Contaminated soil.	• Impairment of blood functions and nerve construction. • Behavioral and hearing problems in children.
Suspended Particulate Matter (PM2.5 and PM10)	• Stationary combustion of solid fuels. • Construction activities. • Industrial processes. • Atmospheric chemical reactions.	• Reduced lung function. • Aggravation of the effects of gaseous pollutants. • Aggravation of respiratory and cardiorespiratory diseases. • Increased cough and chest discomfort. • Soiling. • Reduced visibility.
Sulfur Dioxide (SO_2)	• Combustion of sulfur-containing fossil fuels. • Smelting of sulfur-bearing metal ores. • Industrial processes.	• Aggravation of respiratory diseases (asthma, emphysema). • Reduced lung function. • Irritation of eyes. • Reduced visibility.

		• Plant injury. • Deterioration of metals, textiles, leather, finishes, coatings, etc.
Toxic Air Contaminants	• Cars and trucks, especially diesels. • Industrial sources such as chrome platers. • Neighborhood businesses such as dry cleaners and service stations. • Building materials and product.	• Cancer. • Chronic eye, lung, or skin irritation. • Neurological and reproductive disorders.

Source: CARB, 2008

Carbon Monoxide

Carbon monoxide (CO) is an odorless, colorless gas usually formed as the result of the incomplete combustion of fuels. The single largest source of CO is motor vehicles. While CO transport is limited, it disperses with distance from the source under normal meteorological conditions. However, under certain extreme meteorological conditions, CO concentrations near congested roadways or intersections may reach unhealthful levels that adversely affect local sensitive receptors (e.g., residents, schoolchildren, the elderly, hospital patients, etc.). Typically, high CO concentrations are associated with roadways or intersections operating at unacceptable levels of service (LOS) or with extremely high traffic volumes. Exposure to high concentrations of CO reduces the oxygen-carrying capacity of the blood and can cause headaches, nausea, dizziness, fatigue, impair central nervous system function, and induce angina (chest pain) in persons with serious heart disease. Very high levels of CO can be fatal.

Nitrogen Dioxide

Nitrogen dioxide (NO_2) is a reddish-brown gas that is a byproduct of combustion processes. Automobiles and industrial operations are the main sources of NO_2. Aside from its contribution to ozone formation, NO_2 also contribute to other pollution problems, including a high concentration of fine particulate matter, poor visibility, and acid deposition. NO_2 may be visible as a coloring component on high pollution days, especially in conjunction with high ozone levels. NO_2 decreases lung function and may reduce resistance to infection. On January 22, 2010 the Environmental Protection Agency (EPA) strengthened the health-based the National Ambient Air Quality Standards (NAAQS) for NO_2.

Sulfur Dioxide

Sulfur dioxide (SO_2) is a colorless, irritating gas formed primarily from incomplete combustion of fuels containing sulfur. Industrial facilities also contribute to gaseous SO_2 levels in the region. SO_2

irritates the respiratory tract, can injure lung tissue when combined with fine particulate matter, and reduces visibility and the level of sunlight.

Particulate Matter

Particulate matter is the term used for a mixture of solid particles and liquid droplets found in the air. Coarse particles are those that are larger than 2.5 microns but smaller than 10 microns or PM10. PM2.5 refers to finer suspended particulate matter with an aerodynamic diameter of 2.5 microns or less that is not readily filtered out by the lungs. Nitrates, sulfates, dust, and combustion particulates are major components of PM10 and PM2.5. These small particles can be directly emitted into the atmosphere as by-products of fuel combustion, through abrasion, such as tire or brake lining wear, or through fugitive dust (wind or mechanical erosion of soil). They can also be formed in the atmosphere through chemical reactions. Particulates may transport carcinogens and other toxic compounds that adhere to the particle surfaces and can enter the human body through the lungs.

Lead

Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been mobile and industrial sources. As a result of the phase-out of leaded gasoline, metal processing is currently the primary source of lead emissions. The highest levels of lead in air are generally found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufactures.

Twenty years ago, mobile sources were the main contributor to ambient lead concentrations in the air. In the early 1970s, the U.S. EPA established national regulations to gradually reduce the lead content in gasoline. In 1975, unleaded gasoline was introduced for motor vehicles equipped with catalytic converters. The EPA banned the use of leaded gasoline in highway vehicles in December 1995. As a result of the EPA's regulatory efforts to remove lead from gasoline, emissions of lead from the transportation sector and levels of lead in the air decreased dramatically.

Toxic Air Contaminants

In addition to the criteria pollutants discussed above, Toxic Air Contaminants (TACs) are another group of pollutants of concern. TACs are injurious in small quantities and are regulated by the EPA and the California Air Resources Board (CARB). Some examples of TACs include: benzene, butadiene, formaldehyde, and hydrogen sulfide. The identification, regulation, and monitoring of TACs is relatively recent compared to that for criteria pollutants.

High volume freeways, stationary diesel engines, and facilities attracting heavy and constant diesel vehicle traffic (distribution centers, truck stops) were identified as posing the highest risk to adjacent receptors. Other facilities associated with increased risk include warehouse distribution

centers, large retail or industrial facilities, high volume transit centers, or schools with a high volume of bus traffic. Health risks from TACs are a function of both concentration and duration of exposure.

Sensitive Receptors

Some groups of people are more affected by air pollution than others. The State has identified the following people who are most likely to be affected by air pollution: children under 16, the elderly over 65, people conducting athletic activities, and people with cardiovascular and chronic respiratory diseases. These groups are classified as sensitive receptors. Locations that may contain a high concentration of these sensitive population groups include residential areas, hospitals, daycare facilities, elder care facilities, outdoor athletic fields, and elementary schools. Air quality studies evaluate impacts to sensitive receptors that are within 1,000 feet of a project that emits TACs. Sensitive receptors for this project were identified as residences along the north side of Dublin Boulevard, west of the project and residences 550 to 1,000 feet to the north of the proposed Dublin Boulevard extension between Fallon Road and Croak Road. There is a private school along North Canyons Parkway, west of the project that is now unoccupied. This analysis considered this as a sensitive receptor since the infrastructure for a school remains and it could be reoccupied in the future with the project present.

Current Ambient Air Quality

Table 2 lists the State and federal attainment status for all regulated pollutants. The current designation of the Basin shows that the area is nonattainment for the State O_3, PM10, and PM2.5 standards, nonattainment for the federal O_3 and PM2.5 standards, and unclassified for the national PM10. The closest air monitoring station to the project site is in the City of Livermore approximately 4 miles to the east of the project site; however, it does not collect data for CO or PM10. The nearest PM10 and carbon monoxide monitoring site is in San Jose, approximately 24 miles southwest of the project site. The data show that during the past few years, the project area has exceeded the State and/or federal O_3, PM10, and PM2.5 ambient air quality standards. Table 3 lists air quality trends in data collected at the Livermore station and the San Jose Station for the past 5 years (2013 through 2017) and published by the BAAQMD, which is the most recent time-period available. _____

Table 2 - State and Federal Attainment Status

Pollutant	State Attainment Status	Federal Attainment Status
Ozone (O_3)	Nonattainment	Nonattainment (Moderate)
Respirable Particulate Matter (PM10)	Nonattainment	Unclassified[1]
Fine Particulate Matter (PM2.5)	Nonattainment	Nonattainment
Carbon Monoxide (CO)	Attainment	Attainment
Nitrogen Dioxide (NO_2)	Attainment	Unclassified (EPA Attainment designation expected) [2]
Sulfur Dioxide (SO_2)	Attainment	Unclassified (EPA Attainment designation expected) [2]
Lead (Pb)	Attainment	Attainment
Visibility-Reducing Particles	Unclassified	N/A
Sulfates	Attainment	N/A
Hydrogen Sulfide	Unclassified	N/A
Vinyl Chloride	No Information Available	N/A

Source: Bay Area Air Quality Management District, 2018; WWW.ARB.ca.gov/desig/adm/adm.htm

1 U.S. EPA designates the region as unclassified, recognizing that monitoring data indicate the area likely attains the standard.

2 U.S. EPA was expected to make an attainment designation by the end of 2017; however, these designations have not yet been made. Monitoring data indicate the region meets the standard (attainment)

Table 3 - Air Quality Concentrations for the Past 5 Years

Pollutant	Standard	2013	2014	2015	2016	2017
Ozone – From the Livermore Station						
Max 1-hr concentration		0.096 ppm	0.093 ppm	0.105 ppm	0.102 ppm	0.109 ppm
No. days exceeded: State	0.09 ppm	3	0	1	2	5
Max 8-hr concentration		0.077 ppm	0.080 ppm	0.081 ppm	0.085 ppm	0.086 ppm
No. days exceeded: State	0.070 ppm	2	4	7	4	6
Federal	0.070 ppm	1	7	7	6	6
Carbon Monoxide – From the San Jose Station						
Max 1-hr concentration		3.1 ppm	2.4 ppm	2.4 ppm	2.0 ppm	2.1 ppm
No. days exceeded: State	20 ppm	0	0	0	0	0
Federal	35 ppm	0	0	0	0	0
Max 8-hr concentration		2.5 ppm	1.9 ppm	1.8 ppm	1.4 ppm	1.8 ppm
No. days exceeded: State	9.0 ppm	0	0	0	0	0
Federal	9 ppm	0	0	0	0	0
PM10 – San Jose Monitoring Data						
Max 24-hr concentration		58 $\mu g/m^3$	55 $\mu g/m^3$	58 $\mu g/m^3$	41 $\mu g/m^3$	70 $\mu g/m^3$
No. days exceeded: State	50 $\mu g/m^3$	5	1	1	0	6
Federal	150 $\mu g/m^3$	0	0	0	0	0
Max annual concentration		22.3 $\mu g/m^3$	19.9 $\mu g/m^3$	22.0 $\mu g/m^3$	18.5 $\mu g/m^3$	21.6 $\mu g/m^3$
No. days exceeded: State	20 $\mu g/m^3$					
PM2.5 – From the Livermore Station						
Max 24-hr concentration		40.1 $\mu g/m^3$	42.9 $\mu g/m^3$	31.1 $\mu g/m^3$	22.3 $\mu g/m^3$	41.5 $\mu g/m^3$
No. days exceeded: Federal	35 $\mu g/m^3$	4	1	0	0	2
Max annual concentration		8.4 $\mu g/m^3$	7.6$\mu g/m^3$	8.8 $\mu g/m^3$	7.5 $\mu g/m^3$	8.5 $\mu g/m^3$
No. days exceeded: State	12 $\mu g/m^3$	0	0	0	0	0
Federal	12.0 $\mu g/m^3$	0	0	0	0	0
Nitrogen Dioxide – From the Livermore Station						
Max 1-hr concentration		51 ppb	49 ppb	50 ppb	41 ppb	45 ppb
No. days exceeded: State	0.18 ppm	0	0	0	0	0
Federal	100 ppb	0	0	0	0	0
Max annual concentration		12 ppb	10 ppb	10ppb	9ppb	9 ppb
No. days exceeded: State	0.030 ppm	0	0	0	0	0
Federal	53 ppb	0	0	0	0	0

Source: Bay Area Air Quality Management District, 2018

Regulatory Agencies

The BAAQMD is the regional agency tasked with managing air quality in the region. At the State level, the CARB (a part of the California EPA) oversees regional air district activities and regulates air quality at the State level. The BAAQMD has recently published CEQA Air Quality Guidelines that are used in this assessment to evaluate air quality impacts of projects. The principal air quality regulatory mechanisms include the following:

- Federal Clean Air Act (FCAA);
- California Clean Air Act (CCAA);
- California Health and Safety Code (H&SC), Chapter 3.5 (Toxic Air Contaminants) (H&SC Section 39650 et. seq.) and Part 6 (Air Toxics "Hot Spots" Information and Assessment) (H&SC Section 44300 et. seq.).
- BAAQMD's Rules and Regulations and air quality planning documents

Regulatory Setting

Federal Regulations

The United States EPA sets nationwide emission standards for mobile sources, which include on-road (highway) motor vehicles such as trucks, buses, and automobiles, and non-road (off-road) vehicles and equipment used in construction, agricultural, industrial, and mining activities (such as bulldozers and loaders). The EPA also sets nationwide fuel standards. California also has the ability to set motor vehicle emission standards and standards for fuel used in California, as long as they are the same or more stringent than the federal standards.

In the past decade the EPA has established a number of emission standards for on- and non-road heavy-duty diesel engines used in trucks and other equipment. This was done in part because diesel engines are a significant source of NO_X and particulate matter (PM10 and PM2.5) and because the EPA has identified diesel particulate matter (DPM) as a probable carcinogen. Implementation of the heavy-duty diesel on-road vehicle standards and the non-road diesel engine standards are estimated to reduce particulate matter and NO_X emissions from diesel engines up to 95 percent in 2030 when the heavy-duty vehicle fleet is completely replaced with newer heavy-duty vehicles that comply with these emission standards.[1]

In concert with the diesel engine emission standards, the EPA has also substantially reduced the amount of sulfur allowed in diesel fuels. The sulfur contained in diesel fuel is a significant contributor to the formation of particulate matter in diesel-fueled engine exhaust. The new standards reduced the amount of sulfur allowed by 97 percent for highway diesel fuel (from 500 parts per million by weight [ppmw] to 15 ppmw), and by 99 percent for off-highway diesel fuel

[1] USEPA, 2000. *Regulatory Announcement, Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements*. EPA420-F-00-057. December.

(from about 3,000 ppmw to 15 ppmw). The low sulfur highway fuel (15 ppmw sulfur), also called ultra-low sulfur diesel (ULSD), is currently required for use by all vehicles in the U.S.

All the above federal diesel engine and diesel fuel requirements have been adopted by California, in some cases with modifications making the requirements more stringent or the implementation dates sooner.

State Regulations

To address the issue of diesel emissions in the state, CARB developed the Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles.[2] In addition to requiring more stringent emission standards for new on-road and off-road mobile sources and stationary diesel-fueled engines to reduce particulate matter emissions by 90 percent, a significant component of the plan involves application of emission control strategies to existing diesel vehicles and equipment. Many of the measures of the Diesel Risk Reduction Plan have been approved and adopted, including the federal on-road and non-road diesel engine emission standards for new engines, as well as adoption of regulations for low sulfur fuel in California.

CARB has adopted and implemented several regulations for stationary and mobile sources to reduce emissions of DPM. Several of these regulatory programs affect medium and heavy-duty diesel trucks that represent the bulk of DPM emissions from California highways. CARB regulations require on-road diesel trucks to be retrofitted with particulate matter controls or replaced to meet 2010 or later engine standards that have much lower DPM and PM2.5 emissions. This regulation will substantially reduce these emissions between 2013 and 2023. While new trucks and buses will meet strict federal standards, this measure is intended to accelerate the rate at which the fleet either turns over so there are more cleaner vehicles on the road or is retrofitted to meet similar standards. With this regulation, older, more polluting trucks would be removed from the roads sooner.

CARB has also adopted and implemented regulations to reduce DPM and NO_X emissions from in-use (existing) and new off-road heavy-duty diesel vehicles (e.g., loaders, tractors, bulldozers, backhoes, off-highway trucks, etc.). The regulations apply to diesel-powered off-road vehicles with engines 25 horsepower (hp) or greater. The regulations are intended to reduce particulate matter and NO_X exhaust emissions by requiring owners to turn over their fleet (replace older equipment with newer equipment) or retrofit existing equipment in order to achieve specified fleet-averaged emission rates. Implementation of this regulation, in conjunction with stringent federal off-road equipment engine emission limits for new vehicles, will significantly reduce emissions of DPM and NO_X.

[2] California Air Resources Board, 2000. *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles*. October.

Bay Area Air Quality Management District

BAAQMD has jurisdiction over an approximately 5,600-square mile area, commonly referred to as the San Francisco Bay Area (Bay Area). The District's boundary encompasses the nine San Francisco Bay Area counties, including Alameda County, Contra Costa County, Marin County, San Francisco County, San Mateo County, Santa Clara County, Napa County, southwestern Solano County, and southern Sonoma County.

BAAQMD is the lead agency in developing plans to address attainment and maintenance of the National Ambient Air Quality Standards and California Ambient Air Quality Standards in the nine-county Bay Area. The District also has permit authority over most types of stationary equipment that would be utilized for the proposed project. The BAAQMD is responsible for permitting and inspection of stationary sources; enforcement of regulations, including setting fees, levying fines, and enforcement actions; and ensuring that public nuisances are minimized.

The BAAQMD 2017 *CEQA Air Quality Guidelines*[3] were prepared to assist in the evaluation of air quality impacts of projects and plans proposed within the Bay Area. The guidelines provide recommended procedures for evaluating potential air impacts during the environmental review process consistent with CEQA requirements including thresholds of significance, mitigation measures, and background air quality information. They also include assessment methodologies for air toxics, odors, and greenhouse gas emissions.

Air Quality Attainment Status

Air quality conditions in the Bay Area are compared against ambient air quality standards set at the Federal level (i.e., NAAQS) and at the State level (CAAQS). The attainment status is classified for each pollutant.

Under the NAAQS, the Bay Area is classified as nonattainment for ozone and PM2.5. Note that in 2013, EPA issued a final rule to determine that the Bay Area attains the 24-hour PM2.5 national standard. Despite this EPA action, the Bay Area continues to be designated as "nonattainment" for the 24-hour PM2.5 NAAQS standard until such time as BAAQMD submits a "redesignation request" and a "maintenance plan" to EPA, and EPA approves the proposed redesignation. For the pollutants NO_2, CO and SO_2, the area is designated as attainment. Note that the region was designated Attainment for CO beginning on June 1, 2018. While monitoring data shows the region meets the PM10 NAAQS, the area is technically designated "unclassified."

At the State level, the area is considered nonattainment for ozone, PM2.5 and PM10 and considered "attainment" for all other criteria air pollutants.

[3] Bay Area Air Quality Management District, 2017. *CEQA Air Quality Guidelines*. May.

State Implementation Plan (SIP) Conformity

Transportation projects are typically evaluated for their effects on regional air quality as a whole, in response to Federal requirements. The Dublin Boulevard/North Canyons Parkway Extension project is listed in the 2019 Transportation Improvement Program (TIP), as Project TIP ID ALA150003. The 2019 TIP was evaluated to demonstrate air quality conformity with the State Implementation Plan or SIP.[4]

The Federal Clean Air Act, as amended in 1990, outlines the requirements for ensuring that federal transportation plans, programs and projects are consistent with or conform to the purpose of the SIP in reducing transportation-related emissions for non-attainment or maintenance air pollutants. Conformity to the purpose of the SIP means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant national ambient air quality standards. A conformity finding demonstrates that the total emissions projected for the TIP are within the emissions budgets established by the SIP, and that transportation control measures (TCMs) are implemented in a timely fashion. The conformity analysis for the 2019 TIP addresses the pollutants ozone (through ROG and NO_x modeling), carbon monoxide or CO (through modeling of CO emissions) and PM2.5 (through directly emitted PM2.5 and emissions of NOx). The Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) approved the 2019 TIP (and air quality conformity analysis) in December 2018.

Bay Area 2017 Clean Air Plan

The Bay Area 2017 Clean Air Plan (CAP) is a multi-pollutant plan prepared by the BAAQMD that addresses GHG emissions along with other air emissions in the San Francisco Bay Area Air Basin. One of the key objectives in the CAP is climate protection. The 2017 CAP includes emission control measures in five categories: Stationary Source Measures, Mobile Source Measures, Transportation Control Measures, Land Use and Local Impact Measures, and Energy and Climate Measures. Consistency of a project with current emissions control measures is one measure of its consistency with the CAP. The current CAP also includes performance objectives, consistent with the State's climate protection goals under SB 32, designed to reduce emissions of GHGs to 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.

Greenhouse Gas Emissions

This section provides a general discussion of global climate change and focuses on emissions from human activities that alter the chemical composition of the atmosphere. The discussion on global climate change and greenhouse gas (GHG) emissions is based in part upon the California Global

[4] MTC. 2016. *Final Transportation-Air Quality Conformity Analysis for the Amended Plan Bay Area and the 2017 Transportation Improvement Program*. Final: September 28, 2016

Warming Solutions Act of 2006 (Assembly Bill (AB) 32) and research, information and analysis completed by the International Panel on Climate Change (IPCC), the U.S. EPA, and the CARB.

Global climate change refers to changes in weather including temperatures, precipitation, and wind patterns. Global temperatures are modulated by naturally occurring and anthropogenic (generated by mankind) atmospheric gases such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (NO_x).[5] These gases allow sunlight into the earth's atmosphere but prevent heat from radiating back out into outer space and escaping from the earth's atmosphere, thus altering the earth's energy balance. This phenomenon is known as the greenhouse effect.

Naturally occurring GHGs include water vapor,[6] CO_2, CH_4, NO_x, and O_3. Several classes of halogenated substances that contain fluorine, chlorine, or bromine are also GHGs, but are for the most part solely a product of industrial activities.

Unlike emissions of criteria and toxic air pollutants, which have local or regional impacts, emissions of GHGs have a broader, global impact. Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the transportation, industrial/manufacturing, utility, residential, commercial, and agricultural sectors.

Impacts to California from climate change include shifting precipitation patterns, increasing temperatures, increasing severity and duration of wildfires, earlier melting of snow pack and effects on habitats and biodiversity. Sea levels along the California coast have risen up to seven inches over the last century, and average annual temperatures have been increasing. These and other effects will likely intensify in the coming decades and significantly impact the State's public health, natural and manmade infrastructure, and ecosystems.[7]

Agencies at the international, national, State, and local levels are considering strategies to control emissions of gases that contribute to global warming. There is no comprehensive strategy that is being implemented on a global scale that addresses climate change; however, in California a multi-agency "Climate Action Team," has identified a range of strategies and the CARB, under AB 32, has approved the *Climate Change Scoping Plan* (Scoping Plan), which was updated in 2017. AB 32 requires achievement by 2020 of a Statewide greenhouse gas emissions limit equivalent to 1990

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[5] 19 IPCC, 2007: Summary for Policymakers. In: Climate Change 2007: The Physical Science Bases. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor, and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Available at: <http://ipcc.ch/ >. Accessed March 25, 2013

[6] Concentrations of water are highly variable in the atmosphere over time, with water occurring as vapor, cloud droplets and ice crystals. Changes in its concentration are also considered to be a result of climate feedbacks rather than a direct result of industrialization or other human activities. For this reason, water vapor is not discussed further as a greenhouse gas

[7] State of California Energy Commission. *2009 California Climate Adaptation Strategy Discussion Draft. Frequently Asked Questions.* August 3, 2009. <www.climatechange.ca.gov/adaptation/documents/2009-07-31_Discussion_Draft-Adaptation_FAQs.pdf>. Accessed March 25, 2013.

emission levels, and the adoption of rules and regulations to achieve the maximum technologically feasible and cost-effective greenhouse gas emissions reductions. The CARB and other State agencies are currently working on regulations and other initiatives to implement the Scoping Plan. By 2050, the State plans to reduce emissions to 80 percent below 1990 levels.

In April 2015, Governor Brown signed Executive Order B-30-15 which extended the goals of AB 32, setting a greenhouse gas emissions target at 40 percent of 1990 levels by 2030. On September 8, 2016, Governor Brown signed Senate Bill 32 (SB 32), which legislatively established the GHG reduction target of 40 percent of 1990 levels by 2030. In November 2017, CARB issued *California's 2017 Climate Change Scoping Plan*. While the State is on track to exceed the AB 32 scoping plan 2020 targets, this plan is an update to reflect the enacted SB 32 reduction target for 2030.

The 2017 Scoping Plan establishes a strategy that will reduce GHG emissions in California to meet the 2030 target (note that the AB 32 Scoping Plan only addressed 2020 targets and a long-term goal). Key features of this plan are:

- Cap and Trade program places a firm limit on 80 percent of the State's emissions;
- Achieving a 50-percent Renewable Portfolio Standard by 2030 (currently at about 29 percent statewide);
- Increase energy efficiency in existing buildings;
- Develop fuels with an 18-percent reduction in carbon intensity;
- Develop more high-density, transit oriented housing;
- Develop walkable and bikeable communities;
- Greatly increase the number of electric vehicles on the road and reduce oil demand in half;
- Increase zero-emissions transit so that 100 percent of new buses are zero emissions;
- Reduce freight-related emissions by transitioning to zero emissions where feasible and near-zero emissions with renewable fuels everywhere else; and
- Reduce "super pollutants" by reducing methane and hydrofluorocarbons or HFCs by 40 percent.

In the updated Scoping Plan, CARB recommends statewide targets of no more than 6 metric tons CO_2e per capita (statewide) by 2030 and no more than 2 metric tons CO_2e per capita by 2050. The statewide per capita targets account for all emissions sectors in the State, statewide population forecasts, and the statewide reductions necessary to achieve the 2030 statewide target under SB 32 and the longer-term State emissions reduction goal of 80 percent below 1990 levels by 2050.

Plan Bay Area

Senate Bill 375 (SB 375) requires the Bay Area regional planning agencies to include a Sustainable Communities Strategy (SCS) in their regional transportation plan (RTP) updates to describe how the GHG emissions reductions set by CARB would be met through land-use and transportation planning. In 2010, the Metropolitan Transportation Commission (MTC) approved a set of "*Bay Area Principles for Establishing Regional Greenhouse Gas Reduction Targets*" (Resolution 3970) that proposed per-capita GHG emission reductions of 7 percent from 1990 by 2020 and 15 percent by 2035. Subsequently, MTC, along with the Association of Bay Area Governments (ABAG), developed the SCS plans to meet state targets for reducing greenhouse gas emissions from light-duty vehicles. Plan Bay Area 2040 is the update to this plan, which includes implementation of transportation projects and Climate Initiatives Program that, together, would result in emissions from light-duty vehicles that meet the region's GHG reduction targets, per SB 375.[8] The proposed project, being part of the 2019 TIP is part of the Plan Bay Area 2040 transportation network.

Significance Thresholds

In June 2010, BAAQMD adopted thresholds of significance to assist in the review of projects under CEQA. These thresholds were designed to establish the level at which BAAQMD believed air pollution emissions would cause significant environmental impacts under CEQA and were posted on BAAQMD's website and included in their updated CEQA Guidelines (updated 2011 and recently in May 2017). The significance thresholds identified by BAAQMD and used in this analysis are summarized in Table 4.

For GHG emissions, BAAQMD identified either an emissions-based threshold or considered a project that complied with a qualified GHG reduction plan to have less-than-significant emissions.

BAAQMD's approach to developing a threshold of significance for GHG emissions in their CEQA Air Quality Guidelines is to identify the emissions level for which a project would not be expected to substantially conflict with existing California legislation that was adopted to reduce statewide GHG emissions. If a project would generate GHG emissions above the threshold level, it would be considered to contribute substantially to a cumulative impact and would be considered significant at a project level. BAAQMD identified a bright-line threshold of 1,100 metric tons per year. Since the guidelines were developed, California has established more aggressive GHG emission reduction goals. Note that BAAQMD's recommended GHG threshold of 1,100 metric tons was developed based on meeting the 2020 GHG targets set in the AB 32 Scoping Plan. Operation of the project would occur beyond 2020, so a threshold that addresses a future target is appropriate. Although BAAQMD has not yet published a quantified threshold to meet the statewide 2030 GHG reduction target, this assessment uses a "Substantial Progress" adjustment. This adjustment assumes that 2020 statewide emissions will be equivalent to or lower than 1990

[8] MTC and ABAG. 2017. *Plan Bay Area 2040 Draft EIR SCH# 2016052041*. April.

levels and adjusts for the State's goal to reduce GHG emissions in 2030 by 40 percent. **Therefore, a protective threshold would be one that is 40 percent below the 1,100 metric tons per year, or 660 metric tons.** This is a threshold that addresses the GHG reduction goals of the new SB 32 Scoping Plan developed by CARB that takes into account the 1990 inventory and the projected 2030 statewide population and employment levels.[9]

Alternatively, the BAAQMD CEQA Guidelines consider projects that are in compliance with a qualified greenhouse gas reduction strategy, generally a local Climate Action Plan, to have less-than-significant GHG emissions. Both Dublin and Livermore have adopted Climate Action Plans that meet BAAQMD criteria to be considered "qualified" GHG reduction strategies. In addition, the project is included in the latest TIP and Plan Bay Area, which is the region's SCS plan to meet state targets for reducing GHG emissions from light-duty vehicles.

Table 4 - Air Quality Significance Thresholds

Criteria Air Pollutant	Construction Thresholds	Operational Thresholds	
	Average Daily Emissions (lbs./day)	**Average Daily Emissions (lbs./day)**	**Annual Average Emissions (tons/year)**
ROG	54	54	10
NO_x	54	54	10
PM10	82 (Exhaust)	82	15
PM2.5	54 (Exhaust)	54	10
CO	Not Applicable	9.0 ppm (8-hour average) or 20.0 ppm (1-hour average)	
Fugitive Dust	Construction Dust Ordinance or other Best Management Practices	Not Applicable	
Health Risks and Hazards	**Single Sources Within 1,000-foot Zone of Influence**	**Combined Sources (Cumulative from all sources within 1,000-foot zone of influence)**	
Excess Cancer Risk	>10.0 per one million	>100.0 per one million	
Hazard Index	>1.0	>10.0	
Incremental annual PM2.5	>0.3 µg/m^3	>0.8 µg/m^3	
Greenhouse Gas Emissions			
GHG Annual Emissions	None	Compliance with a Qualified GHG Reduction Strategy OR 660 metric tons annually or 2.8 metric tons per capita	
Note: ROG = reactive organic gases, NOx = nitrogen oxides, PM10 = course particulate matter or particulates with an aerodynamic diameter of 10 micrometers (µm) or less, PM2.5 = fine particulate matter or particulates with an aerodynamic diameter of 2.5µm or less, and GHG = greenhouse gases.			

Source: Bay Area Air Quality Management District, 2017

[9] Association of Environmental Professionals, 2016. *Beyond 2020 and Newhall: A Field Guide to New CEQA Greenhouse Gas Thresholds and Climate Action Plan Targets for California*. April.

CEQA Checklist – Air Quality and GHG

	Potentially Significant Impact	Less Than Significant with Mitigation	Less Than Significant Impact	No Impact
III. AIR QUALITY: Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☒	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non- attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☒	☐	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☒	☐	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☒	☐
VII. GREENHOUSE GAS EMISSIONS: Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

Impact a: Conflict with or obstruct implementation of the applicable air quality plan? ***Less-than-significant.***

The most recent Clean Air Plan is the *2017 Bay Area Clean Air Plan* that was adopted by BAAQMD on April 19, 2017. The proposed project would not conflict with the latest Clean Air Plan's efforts since the project would have emissions below the BAAQMD criteria pollutant thresholds (see Impact c). It should also be noted that, as described previously, the project is included in the 2019 TIP that was evaluated with respect to air pollutant emissions and conformity to the region's SIP[10]. In other words, the project is part of a plan that conforms with the region's air quality planning efforts. The project would not interfere with the control measures described in the 2017 CAP. Furthermore, the project would provide transportation benefits that reduce pollutant

[10] FHWA and FTA determined that the RTP conforms to the SIP on August 23, 2017. FHWA and FTA determined that the TIP conforms to the SIP on December 16, 2016.

emissions, by improving traffic operations and efficiency. Finally, it is important to note that the extension of Dublin Boulevard/North Canyons Parkway extension, as proposed, is included as part of the adopted *City of Dublin General Plan* roadway network and *City of Livermore General Plan* planned roadway network.

Impact b: Violate any air quality standard or contribute substantially to an existing or projected air quality violation? ***Less-than-significant.***

As discussed under Impact c, the project would have emissions less than the BAAQMD thresholds for ozone (i.e., ozone precursors) and particulate matter. Therefore, the project would not contribute substantially to existing or projected violations of those standards. CO emissions from traffic generated by the project would be the pollutant of greatest concern at the local level.

Congested intersections with a large volume of traffic have the greatest potential to cause high-localized concentrations of CO. Air pollutant monitoring data indicate that CO levels have been at healthy levels (i.e., below State and federal standards) in the Bay Area since the early 1990s. As a result, the region has been designated as attainment for the standard. The highest measured level over any 8-hour averaging period during the last three years in the Bay Area is less than 3.0 parts per million (ppm), compared to the ambient air quality standard of 9.0 ppm. Intersections affected by the project would have traffic volumes would have a maximum of 5,376 vehicles per hour, less than the BAAQMD screening criteria of 44,000 vehicles per hour and, thus, would not cause a violation of an ambient air quality standard or have a considerable contribution to cumulative violations of these standards.[11]

Impact c: Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable State or federal ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)? ***Less-than-significant with construction-period mitigation measures.***

The Bay Area is considered a non-attainment area for ground-level ozone and PM2.5 under both the Federal Clean Air Act and the California Clean Air Act. The area is also considered non-attainment for PM10 under the California Clean Air Act, but not the federal act. The area has attained both State and federal ambient air quality standards for carbon monoxide. As part of an effort to attain and maintain ambient air quality standards for ozone and PM10, the BAAQMD has established thresholds of significance for these air pollutants and their precursors. These thresholds are for ozone precursor pollutants (ROG and NO_x), PM10, and PM2.5 and apply to both construction period and operational period impacts. They are intended to assess whether or not a

[11] The BAAQMD CEQA Air Quality Guidelines state that a proposed project would result in a less-than-significant impact to localized carbon monoxide concentrations if the project would not increase traffic at affected intersections with more than 44,000 vehicles per hour.

project would cause a cumulatively considerable net increase in emissions that affect non-attainment pollutants.

Road Construction and Operational Modeling

Emissions of air pollutants that could affect both regional and local air quality were addressed by modeling emissions and comparing them to the significance thresholds identified in Table 4. This included emissions for both construction and operational periods.

Construction Period Emissions

Average daily construction exhaust emissions were predicted using the Sacramento Metropolitan Air Quality Management District Road Construction Emissions Model (RoadMod), version 8.1.0. The BAAQMD recommends the use of RoadMod to analyze construction emissions for transportation projects. Inputs to the model included the construction year, total expected duration and proposed equipment usage. Other model inputs such as soil import and export, concrete truck trips, and asphalt truck trips were input to the model. The model predicts emissions of ozone precursor pollutants (i.e., ROG and NO_x) and particulate matter (i.e., PM10 and PM2.5). The model also computes emissions of CO_2e. The project would be built out over a period of approximately 18 months where construction was assumed to begin in 2020, or an estimated 396 construction workdays (based on an average of 22 workdays per month). As the estimated opening year for the project is 2025, and construction is estimated to take 1.5 years, but the exact date for beginning construction is not known, 2020 was selected as the beginning construction year to ensure the maximum impacts are captured. Average daily emissions were computed by dividing the total construction emissions by the number of construction days. Table 5 shows average daily construction emissions of ROG, NO_x, PM10 exhaust, and PM2.5 exhaust during construction of the project. As indicated in Table 5, predicted project emissions would not exceed the BAAQMD significance thresholds. *Attachment 1* includes the construction assumptions (schedule and equipment) and RoadMod model output for construction emissions.

Construction activities, particularly during site preparation and grading, would temporarily generate fugitive dust in the form of PM10 and PM2.5. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could be an additional source of airborne dust after it dries. The BAAQMD CEQA Air Quality Guidelines consider these impacts to be less-than-significant if best management practices are implemented to reduce these emissions. *Mitigation Measure AQ-1 would implement BAAQMD-recommended best management practices*.

Project Operational Period Emissions

Operational air pollutant emissions from the project would be generated by changes in traffic patterns and traffic conditions (e.g., speed). Predicted traffic conditions along with vehicle emission rates were combined to predict the daily change in traffic emissions.

Table 5 - Construction Period Emissions

Scenario	ROG	NO_x	PM10 Exhaust	PM2.5 Exhaust
Construction emissions (tons)	0.90 tons	9.36 tons	0.48 tons	0.42 tons
Average daily emissions (pounds)[1]	4.6 lbs.	47.3 lbs.	2.4 lbs.	2.1 lbs.
BAAQMD Thresholds (pounds per day)	*54 lbs.*	*54 lbs.*	*82 lbs.*	*54 lbs.*
Exceed Threshold?	**No**	**No**	**No**	**No**

Source: Illingworth & Rodkin, Inc., 2018
Note: [1] Assumes 396 workdays

Traffic Modeling

Kittelson & Associates, Inc. used the Alameda County Transportation Commission countywide travel demand model (TDM) with Plan Bay Area Projections (BART Livermore Extension Version – No BART Scenario) and updated land uses from local general plans to predict the effects of the proposed Dublin Boulevard/North Canyons Parkway extension on the roadway system traffic conditions. The TDM model accounts for background traffic growth between existing conditions and 2040 and approved but not yet constructed and occupied changes to the land use in the area. The TDM model has the ability to project the diversion of traffic and change in travel patterns due to roadway network changes such as the proposed project. In addition to providing traffic volume projections, the model also provides information on vehicle-miles and vehicle-hours of travel as well as projected average speeds for the roadway network. The City of Dublin General Plan TDM model was updated to reflect land use development and roadway projects that have been completed since the completion of the City of Dublin's General Plan EIR.

The TDM model predicted the daily vehicle miles travelled (VMT), vehicle hours travelled (VHT), and computed travel speed for roadways in the study area without and with the Dublin Boulevard/North Canyons Parkway extension. The changes in VMT attributable to the project were negligible, from a regional standpoint (i.e., well below a fraction of 1 percent).

A focused VMT analysis was conducted by *Kittelson & Associates, Inc.* that used select links with the Alameda CTC model to identify more localized changes in VMT. The changes shown were based on modeling of localized traffic with origins and destinations north of the I-580 freeway.

Emissions Modeling

Caltrans developed the Caltrans Emission Factor 2014 (CT-EMFAC2014) model to analyze transportation projects. The CT-EMFAC2014 Version 6.0 model was used to predict vehicle emission rates. CT-EMFAC2014 models on-road vehicle emissions for criteria pollutants, mobile source air toxics (MSATs), and CO_2. The tool's underlying data are based on CARB's Motor Vehicle Emissions Model (EMFAC2014) on-road emissions model and CARB-supplied/EPA-supplied MSAT speciation factors. Inputs to the model include region (i.e., Alameda County), default traffic mix assigned by CT-EMFAC2014 for that county, year of analysis and season.

Emissions associated with vehicle travel depend on the year of analysis because emission control technology requirements are phased-in over time. Therefore, the earlier the year analyzed in the model, the higher the emission rates utilized by CT-EMFAC. This analysis was based on the baseline year (2017), near-term conditions (2025), and long-term conditions (2040). Emission rates were predicted for annual conditions.

Emission processes modeled include running exhaust for all pollutants, running losses for organic compounds (e.g., ROG), tire wear and brake wear for PM10 and PM2.5. CT-EMFAC2014 provides vehicles emissions for speeds in 5 mph increments, so emissions rates were interpolated to account for the predicted average speed.

Project Air Pollutant Emissions

The predicted daily traffic conditions were combined with CT-EMFAC2014 emissions factors to predict emission in pounds per day. Table 6 reports the predicted air pollutant emission in terms of average daily emissions for both the No-Project and Project scenarios for the three analysis years (i.e., 2017, 2025, and 2040). *Attachment 2* to this report includes the traffic and CT-EMFAC model output files for the proposed project emission factors and modeling calculations.

The BAAQMD CEQA Air Quality Guidelines provide recommended emission thresholds for projects. These are intended to be applied to land-use type projects but provide an informative comparison in determining the magnitude of roadway project emissions. For transportation projects, there is a process that air quality is considered looking at the entire transportation sector of emissions. This is done through the SIP conformity process, where transportation projects are evaluated at the regional level. Most public transportation projects are included in the TIP. The TIP is evaluated for conformance with the SIP that is intended to attain and maintain national ambient air quality standards. This is an emissions analysis conducted by MTC and approved by the U.S. Department of Transportation's FHWA. The purpose of this "conformity determination" is to ensure that transportation emissions associated with the transportation network do not exceed the emissions budget established by the region to obtain and maintain ambient quality standards. It can be concluded that the change in emissions caused by the project are less-than-significant since the project is included in the most recent TIP that has been determined by FHWA and FTP to conform with the SIP and the change in emissions from the project alone would be well below the emission thresholds recommended by the BAAQMD.

Table 6 - Daily Project Operational Emissions in pounds per day

Scenario	ROG	NO_x	CO	PM10 Total	PM2.5 Total
2017 Project	4.8	20.8	48.8	1.6	0.9
BAAQMD Thresholds	*54*	*54*	*n/a*	*82*	*54*
Exceed Threshold?	**No**	**No**	**n/a**	**No**	**No**
2025 No Project	2.8	8.0	26.3	1.9	0.8
2025 Project	6.2	17.4	57.5	4.1	1.7
BAAQMD Thresholds	*54*	*54*	*n/a*	*82*	*54*
Exceed Threshold?	**No**	**No**	**n/a**	**No**	**No**
2040 No Project	3.8	11.3	35.3	4.0	1.6
2040 Project	5.3	15.6	48.6	5.5	2.3
BAAQMD Thresholds	*54*	*54*	*n/a*	*82*	*54*
Exceed Threshold?	**No**	**No**	**n/a**	**No**	**No**

Source: Illingworth & Rodkin, Inc., 2018
Note: CO impacts, which are expressed in parts-per-million, were described previously in this report.

Applicable BAAQMD Construction Best Management Practices

Construction activities, particularly during site preparation and grading, would temporarily generate fugitive dust in the form of PM_{10} and $PM_{2.5}$. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could be an additional source of airborne dust after it dries. The BAAQMD CEQA Air Quality Guidelines consider these impacts to be less-than-significant if best management practices are implemented to reduce these emissions. *Mitigation Measure AQ-1 would implement BAAQMD-recommended best management practices*.

***Mitigation Measure AQ-1*: Include basic measures to control dust and exhaust during construction.**

During any construction period ground disturbance, the applicant shall ensure that the project contractor implement measures to control dust and exhaust. Implementation of the measures recommended by BAAQMD and listed below would reduce the air quality impacts associated with grading and new construction to a less-than-significant level. The contractor shall implement the following best management practices that are required of all projects:

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
4. All vehicle speeds on unpaved roads shall be limited to 15 miles per hour (mph).

5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
8. Post a publicly visible sign 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.

Effectiveness of Mitigation Measure AQ-1

Implementation of Mitigation Measure AQ-1 would be consistent with recommendations in the BAAQMD CEQA Air Quality Guidelines for controlling fugitive dust emissions that contribute to localized elevated concentrations of PM10 and PM2.5. The impact would be reduced to a less-than-significant level.

Impact d: Expose sensitive receptors to substantial pollutant concentrations? ***Less-than-significant with construction-period mitigation measures.***

Project impacts related to increased community risk can occur by introducing a source of TACs with the potential to adversely affect existing sensitive receptors in the project vicinity. The BAAQMD recommends using a 1,000-foot screening radius around a project site for purposes of identifying community health risk from siting a new sensitive receptor or a new source of TACs. There are thresholds that address both the impact of single and cumulative TAC sources upon sensitive receptors (see Table 4). Construction activity would generate dust and equipment exhaust on a temporary basis that could affect nearby sensitive receptors, while operation would expose these receptors to long-term emissions from traffic.

Sensitive receptors potentially affected by the proposed project include residences closest to the proposed road construction area, north of the project footprint along Central Parkway. This community risk assessment models concentrations of DPM and PM2.5, which are then used to evaluate potential cancer risk, non-cancer health hazards, and annual concentrations of PM2.5.

Community Risk from Project Operation

The project would be constructed within 1,000 feet of existing sensitive receptors including residences to the north along Central Parkway. Substantial sources of air pollution such as roadways can adversely affect nearby sensitive receptors as part of implementing new projects.

For local roadways, BAAQMD has provided the *Roadway Screening Analysis Calculator* to assess whether roadways with traffic volumes of over 10,000 vehicles per day may have a potentially significant effect on sensitive receptors. Two adjustments were made to the cancer risk predictions made by this calculator: (1) adjustment for latest vehicle emissions rates and (2) adjustment of cancer risk to reflect new Office of Environmental Health Hazard Assessment (OEHHA) guidance described in Attachment 3.

The *Roadway Screening Analysis Calculator* uses EMFAC2011 emission rates for the year 2014. Overall, emission rates will decrease by the time the project is constructed and operational. The project is not likely to be operational prior to 2020. In addition, a new version of the emissions factor model, EMFAC2014 is available. This version predicts much lower emission rates than EMFAC2011 and the rates for later years are lower than the rates for 2014. Using a fleet mix typical of local roadways operating at 30 mph, EMFAC2014 predicts diesel (DSL) PM2.5 aggregate emission rates in 2018 that are 46 percent of EMFAC2011 rates for 2014.[12] TOG for gasoline-powered vehicle rates are 56 percent of EMFAC2011 year 2014 rates. An adjustment factor of 0.5 was applied to the *Roadway Screening Analysis Calculator* results.

The adjusted predicted cancer risk was then adjusted again using a factor of 1.3744 to account for new OEHHA guidance (see discussion regarding cancer risk calculation methodology in Attachment 3). This factor was provided by BAAQMD for use with their CEQA screening tools that are used to predict cancer risk.[13]

Traffic for Dublin Boulevard/North Canyons Parkway extension was based on the traffic data prepared for this project. The study segment of Fallon Road and Doolan Road was used to describe traffic conditions, where the increase in average daily traffic (ADT) ranges from 11,525 vehicles for “2025 Project” and 19,145 vehicles for “2040 Project.” This assessment conservatively used the highest “2040 Project” condition. The edge of the travel way for this east-west roadway was entered based on the distance from the nearest receptor. The roadway orientation, distance and direction, and traffic volume were input to the BAAQMD *Roadway Screening Analysis Calculator* for Alameda County. Based on the BAAQMD screening calculator, potential excess cancer risk would range from one to 4 chances in one million at existing sensitive receptors, which is below the BAAQMD significance threshold of 10.0 in one million. Annual PM2.5 concentration would be 0.12$\mu g/m^3$, which would not exceed the BAAQMD significance threshold of greater than

[12] Comprised mostly of light- and medium-duty vehicles.
[13] Email from Virginia Lau, BAAQMD to Bill Popenuck of Illingworth & Rodkin, Inc, dated November 15, 2015.

0.3μg/m^3. The maximum community risks from project operation are summarized in Table 7. Note that these results are based on a screening calculation that assume current emission rates and poor dispersion characteristics. A refined modeling the scenario would likely predicted lower impacts.

Table 7 - Maximum Community Risks from Project Operation

Scenario	Fallon Rd. and Dublin Blvd.		Croak Rd & Dublin Blvd. Extension	Doolan Rd. & N. Canyons Parkway
	ADT west	ADT east	ADT east	ADT east
Existing 2017	7,565	0	0	895
No Build 2025	9,705	0	0	985
Build 2025	16,480	11,525	9,850	10,770
2025 ADT Increase	6,775	11,525	9,850	9,785
No Build 2040	11,835	0	0	895
Build 2040	18,555	19,145	15,780	16,460
2040 ADT Increase	6,720	19,145	15,780	15,565
Closest Sensitive Receptor	40ft North	>800ft North	>700ft South	>150ft North
Cancer Risk	**3.56**	**1.30**	**0.66**	**<4.15[3]**
PM2.5	**0.10**	**0.04**	**0.02**	**0.12**
BAAQMD Significance Threshold[2]	**Cancer Risk (per million)**		**Annual PM2.5 (μg/m^3)[1]**	
	Less than 10.0 ppm		less than 0.3 ppm	
Exceed Threshold	**No**		**No**	

Source: Illingworth & Rodkin, Inc., 2018

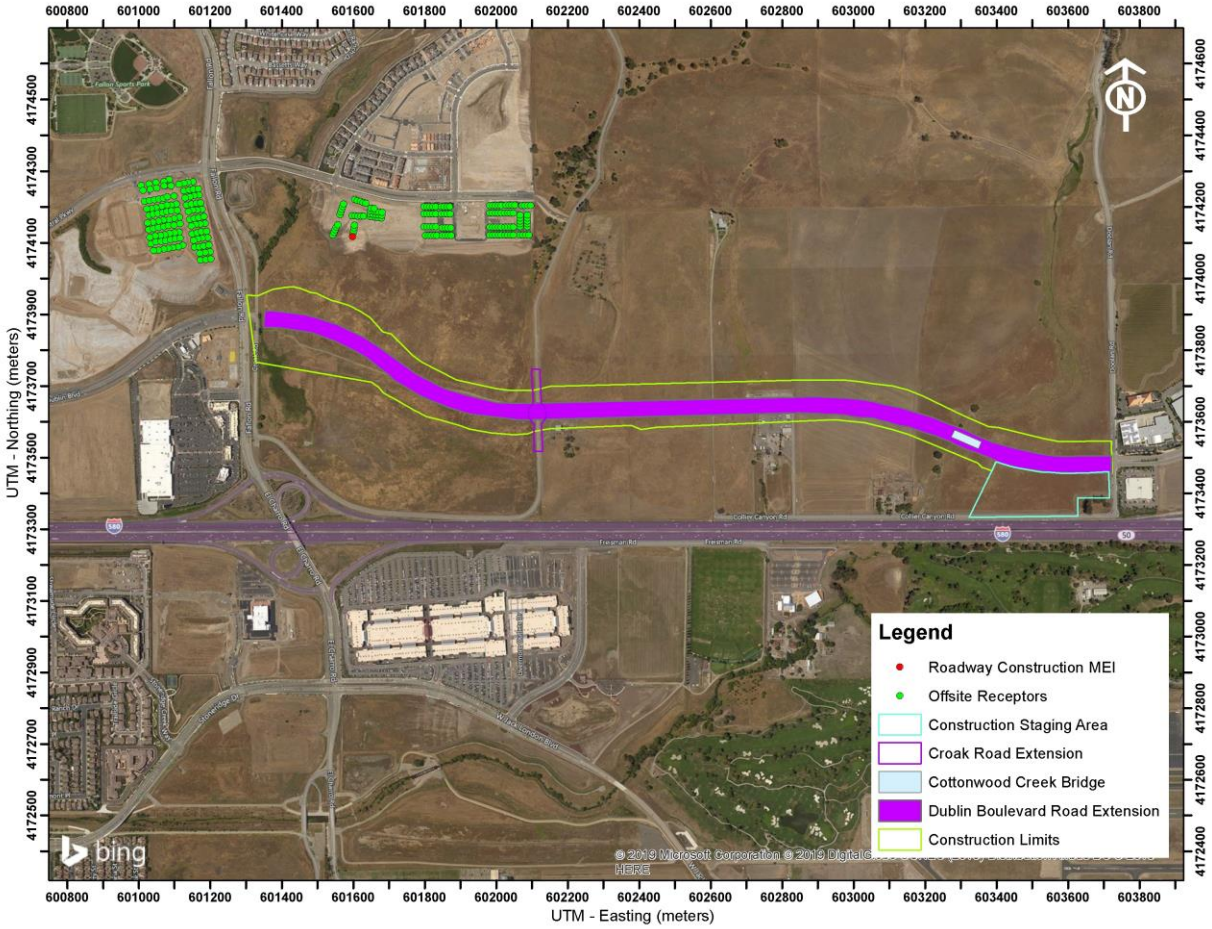
Note: [1]The annual PM2.5 concentration is the sum of the DPM and fugitive PM2.5 concentrations. BAAQMD [2]Roadway Screening Calculator does not consider roadways to be sources of substantial HI.

[3] Note screening cancer risk prediction based on residential exposure (i.e., infant, child and adult exposure over 30 years), where nearest receptor is a school and with less exposure duration (i.e., child exposure over 9 years).

Project Construction Activity

A community risk assessment of the project construction activities was conducted that evaluated potential health effects on sensitive receptors from construction emissions of DPM and PM2.5. Sensitive receptors potentially affected by the proposed road construction include residences near the proposed new road (north along North Canyons Parkway) or portions of the existing roadways affected by traffic from the project. A dispersion model was used to predict the off-site DPM concentrations resulting from project construction so that increased cancer risks could be predicted. Figure 1 shows the areas where project construction would occur, and the nearby sensitive receptor locations used in the air quality dispersion modeling analysis where potential community risk impacts were evaluated.

Figure 1 - Project Construction Sites, Locations of Modeled Sensitive Receptors, and Locations of Maximum Cancer Risk and PM2.5 Impacts



Construction Period Emissions

Construction period emissions were computed using the RoadMod emissions model along with projected construction activity, as described above. The RoadMod model provided total annual PM10 exhaust emissions (assumed to be DPM) from the off-road construction equipment and worker, vendor and hauling trucks used for the proposed road construction (both the bridge and roadwork) of 0.4600 tons (920 pounds) over the construction period. Fugitive dust PM2.5 emissions were also computed and included in this analysis. The model predicts emissions of 0.42 tons (840 pounds) of fugitive PM2.5 over the construction period. These emissions were used in modeling DPM and PM2.5 concentrations at residences and sensitive receptors near the construction areas.

Dispersion Modeling

The U.S. EPA AERMOD dispersion model was used to predict DPM and PM2.5 concentrations at residential and sensitive receptor locations near the project construction areas. The AERMOD dispersion model is a BAAQMD-recommended model for use in modeling these types of emission activities for CEQA projects.[14] Emission sources for the roadway construction were grouped into two categories, exhaust emissions of DPM and fugitive PM2.5 dust emissions.

The AERMOD modeling utilized area sources to represent all construction activities. For modeling both DPM and fugitive PM2.5 dust emissions from eight area sources were used for modeling the road expansion construction, and for the work to construct a new bridge over Cottonwood Creek. For exhaust emissions from construction equipment, an emission release height of 6 meters (20 feet) was used for the area sources. The elevated source height reflects the height of the equipment exhaust pipes plus an additional distance for the height of the exhaust plume above the exhaust pipes to account for plume rise of the exhaust gases. For modeling fugitive PM2.5 emissions, a near-ground level release height of 2 meters (6.6 feet) was used for the area sources. Construction emissions were modeled as occurring daily between 8 a.m. and 5 p.m., when most of the construction activity involving equipment usage would occur.

The modeling used a five-year data set (2009 to 2013) of hourly meteorological data from the Livermore Municipal Airport that was prepared for use with CARB's AERMOD model. Annual DPM and PM2.5 concentrations from construction activities during 2020 were calculated using the model. DPM and PM2.5 concentrations were calculated at sensitive receptors in the vicinity of the road construction work areas at a receptor height of 1.5 meters (4.9 feet)[15].

Predicted Cancer Risk and Hazards

The maximum modeled residential DPM concentrations, or maximally exposed individual (MEI) are shown on Figure 1, as are the residential maximum annual PM2.5 concentrations. The cancer risk calculations were based on using the maximum modeled DPM concentrations for each type of sensitive receptor and applying the methods described in *Attachment 3*. Results of this assessment are summarized in Table 8. As shown in Table 8, the maximum increased residential risk would be below the BAAQMD significance threshold of a cancer risk of 10 in one million or greater. The maximum annual $PM_{2.5}$ concentration and computed hazard index (HI) are also lower than the significance criterion. The maximum levels for each sensitive receptor type are reported in Table 8. *Attachment 3* includes the emission calculations used for the modeling and the cancer risk calculations.

[14] Bay Area Air Quality Management District, 2012. *Recommended Methods for Screening and Modeling Local Risks and Hazards, Version 3.0.* May.
[15] The earliest year of construction was assumed to be 2020.

Table 8 - Maximum Community Risks from Project Construction Activities

Location and Exposure Type	Cancer Risk (per million)	Annual PM2.5 ($\mu g/m^3$)[1]	Chronic Hazard Index
Maximum Residential Infant/Child Adult	 1.1 0.02	0.03	<0.01
BAAQMD Significance Threshold	*> 10.0*	*> 0.3*	*> 1.0*
Exceed Threshold	**No**	**No**	**No**

Source: Illingworth & Rodkin, Inc., 2018
Note: [1]The annual PM2.5 concentration is the sum of the DPM and fugitive PM2.5 concentrations.

Combined Construction and Operation Cancer Risk

The combination of construction activity and roadway operation were computed by adding the construction cancer risk for an infant (see Table 8) to the lifetime screening cancer risk for "2040 Project" project conditions for the roadway. This is a conservative assessment since both modeling scenarios assume infant exposure. Under this condition, the increased cancer risk would be 5.8 chances per million, which is less than the BAAQMD threshold. The annual PM2.5 concentration would be 0.13µg/m3 and the HI would be less than 0.1. These levels are compared to the significance thresholds for single sources (see Table 4) and are considered *less-than-significant*.

Cumulative Construction Risk

Cumulative TAC impacts associated with construction of the project were assessed by predicting the combined community risk impacts from the project (both construction and operation) and nearby sources at the sensitive receptor most affected by the project, or MEI. A review of the project area identified I-580 traffic and a gasoline fueling station (Plant #200043) as the only sources of TAC emissions within 1,000 feet of the project site that could affect the project construction MEI. TAC and PM2.5 impacts from I-580 were characterized using the BAAQMD *Highway Screening Tool*. This tool predicts cancer risk and PM2.5 concentrations at various distances both north and south of the freeway. The project MEI was estimated at 2,500 feet north of the nearest I-580 traffic lanes. BAAQMD's Stationary Source Screening Tool was used to identify source level risks from Plant 200043. These risk levels were adjusted for distance using the District's Gas Station Distance Multiplier. The combined maximum cancer risk, non-cancer HI, and annual PM2.5 concentration at this receptor are reported in Table 9. The predicted cumulative cancer risk, non-cancer hazard, and annual PM2.5 concentration from construction would be below the cumulative-source significance thresholds (see Table 4) and the project impact is considered *less-than-significant*.

Table 9 - Combined Community Risk Impacts at MEI (within 1,000 feet of project)

Source	Maximum Cancer Risk (per million)	Maximum Annual PM2.5 Concentration (µg/m^3)	Maximum Hazard Index
Unmitigated Project Construction	1.1 (Infant)	0.03	<0.01
Dublin Boulevard (Roadway Screening Calculator 700ft north)	1.3	0.02	<0.01
I-580 (Highway Screening Tool 2,500ft north)	16.1	0.08	0.01
Facility G200043 (CJC Fallon Gateway LLC (Gasoline Station using BAAQMD Stationary Source Tool, 1,800 feet)	2.6	0.00	0.01
Cumulative Total	21.1	0.12	0.04
BAAQMD Threshold – Cumulative Sources	***>100***	***>0.8***	***>10.0***
Significant	***No***	***No***	***No***

Source: Illingworth & Rodkin, Inc., 2018

Impact e: Create objectionable odors affecting a substantial number of people? ***Less-than-significant.***

The BAAQMD lists types of land uses typically associated with odor complaints these include wastewater treatment plants, landfills, confined animal facilities, composting stations, food manufacturing plants, refineries, and chemical plants. This is a new roadway and as such does not include any uses identified by the BAAQMD as being associated with odors. Since there are no substantial odorous emissions proposed as part of this project, this would be a less-than-significant impact.

Greenhouse Gases

For the purposes of this report, a greenhouse gas emissions impact is considered significant if the project would exceed or conflict with any of the following:

1. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment. A less-than-significant impact would occur if the project is consistent with a qualified GHG reduction strategy or has GHG emissions that are below 660 metric tons per year.

2. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases. In this case, the project is contained in the most recent TIP and Plan Bay Area 2040 that makes up the Bay Area's Sustainable Communities Strategy (or SCS). The project is also consistent with the City's Climate Action Plan.

The BAAQMD thresholds were developed specifically for the Bay Area after considering the latest Bay Area GHG inventory and the effects of AB 32 scoping plan measures that would reduce

regional emissions. BAAQMD intends to achieve GHG reductions from new land use developments to close the gap between projected regional emissions with AB 32 scoping plan measures and the AB 32 targets. This study uses a reduced threshold level to address recently enacted State legislation that identifies a GHG reduction goal of 40 percent below 1990 levels (assumed to be similar to 2020 levels). This reduced threshold was developed for this project specifically and is not intended to be a significance threshold that would be applied to development projects generally in the City of Dublin.

Impact a: Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment? ***Less-than-significant.***

GHG emissions associated with development of the proposed project would occur over the short-term from construction activities, consisting primarily of emissions from equipment exhaust and worker and vendor trips. There would also be long-term operational emissions associated with vehicular traffic on the new roadway. GHG emission impacts for the proposed project are discussed below and were analyzed using the methodology recommended in the BAAQMD CEQA Air Quality Guidelines.[16]

Existing Conditions

Under existing conditions, there is no extended roadway and the potential for a direct change in GHG emissions is nonexistent. Indirect emissions are generated from the burning of fuel required for site maintenance (e.g., infrequent disking and/or mowing to control fire hazards, etc.).

Construction Greenhouse Gas Emissions (Temporary Emissions)

GHG emissions for transportation projects can be divided into those produced during construction and those produced during operations. Currently, neither Dublin, Livermore, or the County of Alameda nor BAAQMD have adopted GHG significance thresholds that apply to construction projects. For informational purposes, GHG emissions from project roadway construction are estimated to be 989 metric tons of CO_2e and from the bridge construction the GHG emissions are estimated to be 406 metric tons of CO_2e over the course of the entire construction project based on RoadMod modeling described above. This would equate to an annual average emission of 930 metric tons of CO_2e, based on 18 months of construction. This is for information only as the BAAQMD does not recommend a threshold of significance for construction generated GHG emissions. Note that prorated over a 30-year period, construction GHG emissions would be 31 metric tons per year.

[16] BAAQMD, 2017. *Op cit.*

Operational Greenhouse Gas Emissions (Ongoing Emissions)

GHG (e.g., carbon dioxide, methane, and nitrogen dioxide) from operation of the project will include fuel burned while traveling on the new roadway, there will be a shift in traffic from other congested routes which will increase the overall effectiveness of the transportation system. There are no thresholds identified for evaluating the effect of roadway projects on GHG emissions since these types of projects do not generate emissions on their own.

As previously discussed for air quality, there is a process that air quality for transportation projects is considered looking at the entire transportation sector of emissions. This is done through the SIP conformity process, where transportation projects are evaluated at the regional level. Most public transportation projects are included in the TIP. The project is included in the TIP. Projects included in the TIP are also part of the Bay Area Plan 2040 plan that includes the region's SCS. MTC and ABAG identified GHG reduction targets that are included in the SCS. The proposed project, being part of the 2019 TIP is part of the Plan Bay Area 2040 transportation network, and therefore, is consistent with the SCS.

To analyze the effects of the project regarding GHG emissions, the emissions were measured in two ways: (1) using the VMT for the region and (2) a focused analysis using the VMT local to the project based on the traffic data provided by Kittelson & Associates, Inc.

The regional analysis showed that there would be a decrease in the GHG emissions due to lower emission rates of motor vehicles in future years when comparing the existing emissions with the 2025 and 2040 No Project scenarios. Table 10 shows the metric tons of GHG emissions from the roadway system with and without the project. In the year 2025 there will be a reduction in the VMT between the build and no-build scenarios, with the project GHG emissions will be 19 tons or 0.004 percent lower. In the horizon year of 2040 there will be an increase in the region's VMT with the project and the GHG emissions will increase by 123 metric tons or 0.029 percent when comparing the no-build and build scenarios.

The focused-VMT analysis indicates a slight reduction in VMT in 2040 with the project. The daily VMT would be reduced by 328 miles with the project. This would result in an annual reduction of approximately 35 metric tons per year of GHG emissions in the project area.

Project emissions are considered to be *less-than-significant* because the project would have annual emissions that are below the thresholds and the project is consistent with qualified GHG emission reduction strategies. GHG emissions associated with the project are predicted to change slightly and likely decrease. Regardless of the change, the project would not increase emissions above the significance threshold of 660 metric tons per year. Both Dublin and Livermore have Climate Action Plans that are considered qualified GHG reduction strategies. The project assumed in the General Plan that makes up the basis for transportation emissions forecasting. Both Climate Action Plans address 2020 conditions.

Table 10 – Annual Operational GHG Emissions - Regionally

Measure	Existing	2025 No-Build	2025 Build	2040 No-Build	2040 Build
Based on Regional VMT Analysis					
GHG emissions Metric Tons	505,694	438,115	438,096	424,796	424,919
Change Over Existing	--	-67,579	-67,598	-80,898	-80,775
Prorated Construction			31		31
Difference between Build and No Build	--	--	+19 metric tons	--	+123 metric tons
Based on Focused VMT Analysis (2040 only)					
Difference between Build and No Build (including prorated construction)	--	--	--	--	-4 metric tons
Does the project exceed the Bright-Line Threshold of Significance - 660 Metric tons per year			No	--	No

Source: Illingworth & Rodkin, Inc. and Kittelson & Associates, Inc., 2018

Impact b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases? ***Less-than-significant.***

On a regional scale the project was included in the MTC Regional Transportation Plan, Plan Bay Area 2040, the Alameda Countywide Transportation Plan. At the local level, the project would not conflict with the City of Dublin General Plan and Climate Action Plan, and the City of Livermore General Plan and Climate Action Plan. The extension of Dublin Boulevard/North Canyons Parkway extension, as proposed, is included as part of the adopted City of Dublin General Plan roadway network and City of Livermore General Plan planned roadway network. Project level emissions were computed and were found to be below significance thresholds and are consistent with and the supporting the goals of the Plan Bay Area 2040. The project is included in the 2019 TIP that was evaluated with respect to air pollutant emissions and conformity to the region's SIP. In other words, the project is part of a plan that conforms with the region's air quality planning efforts. These air quality planning efforts include SCS plan to meet region's targets for reducing greenhouse gas emissions from light-duty vehicles.

Dublin Climate Action Plan

The City's Climate Action Plan Update identifies transportation, energy and Solid Waste and Recycling Measures to reduce community-wide GHG emissions. GHG reduction features that apply to the project are described below.

A.1.5 Streetscape Master Plan. The City adopted a streetscape master plan that encourages the planting of trees along roadways to encourage the use of non-motorized transportation modes and capture and store CO_2. The project design includes a landscape plan that includes tree plantings consistent with the City's plan.

A.1.10 Bicycle and Pedestrian Master Plan. The City's *Bicycle and Pedestrian Master Plan* includes polices that include the continued development of successful bicycle and pedestrian trail corridors, improved bicycle access to parks and open space areas, improved bicycle lanes and/or routes on several key cross-city corridors, bikeways on key freeway crossings, the development of education and enforcement programs, and improvements to the City's Bicycle Parking Ordinance. The Project includes bicycle and pedestrian pathways along the entire length of the roadway.

A.1.12 City Design Strategy. The City's design strategy has been incorporated into the City's General Plan as part of the Community Design and Sustainability Element. The goals that relate to the project include promoting walking and cycling by providing safe, appealing, and comfortable street environments that support public health by reducing pedestrian injuries and encouraging daily physical activity. As previously mentioned, the project includes bicycle and pedestrian pathways along the entire length of the roadway.

A.2.5 LED Streetlight Specifications for New Projects. The project would be required to meet the City's LED streetlight specification that requires all future development projects to install LED streetlights.

Livermore Climate Action Plan

The City of Livermore's Climate Action Plan targets six sectors: Building Energy, Transportation and Land Use, Water Conveyance, Wastewater Treatment, Solid Waste Generation, and Urban Forestry and Conservation. The goal of the plan is to reduce GHG emissions by 15 percent below 2008 levels. The following GHG emissions reduction measures would apply to the project:

On-Road 4 - Traffic Signal Synchronization. Under this measure, the City will improve travel speed by enhanced signal synchronization. This measure would reduce idling time for vehicles traveling on City roads. Traffic signals with the proposed project would be synchronized to meet optimum traffic flow projections.

On-Road 5 - Bicycles and Pedestrian Improvements. This measure includes enhancements to the city's bike and pedestrian network that provides facilities for bicycle commuters, encouraging bicycling for short and medium-length trips. The project includes bicycle and pedestrian pathways along the entire length of the roadway.

<u>Summary</u>

The climate action plans serves as qualified GHG reductions plans for the City of Dublin and Livermore and can be used for programmatic tiering document for the purposes of CEQA for analysis of impacts of greenhouse gas emissions and climate change. The City has determined that the reduction target under the Plan will reduce the impact from activities under the Plan to less-than-significant under CEQA. Furthermore, the project would have GHG emissions below any

significance threshold. The proposed project is consistent with the applicable emission reduction measures identified in the CAP. Therefore, this would be considered a *less-than-significant* impact.

Attachment 1 –

Road Construction Emissions Model Version 8.1.0 Output

Road Construction Emissions Model, Version 8.1.0

Daily Emission Estimates for -> Dublin Road Extension - Road Work Only

Project Phases (Pounds)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	SOx (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)	N2O (lbs/day)	CO2e (lbs/day)
Grubbing/Land Clearing	9.70	77.54	97.27	44.96	4.96	40.00	12.90	4.58	8.32	0.11	10,586.50	2.96	0.10	10,689.75
Grading/Excavation	4.68	35.17	48.87	42.45	2.45	40.00	10.44	2.12	8.32	0.10	9,546.68	1.93	0.16	9,642.18
Drainage/Utilities/Sub-Grade	3.17	34.85	29.36	41.70	1.70	40.00	9.84	1.52	8.32	0.06	6,227.38	1.35	0.08	6,284.27
Paving	3.05	30.84	30.19	1.79	1.79	0.00	1.56	1.56	0.00	0.07	6,390.19	1.30	0.10	6,453.35
Maximum (pounds/day)	9.70	77.54	97.27	44.96	4.96	40.00	12.90	4.58	8.32	0.11	10,586.50	2.96	0.16	10,689.75
Total (tons/construction project)	0.59	5.10	5.95	4.80	0.31	4.49	1.21	0.28	0.93	0.01	1,079.94	0.23	0.02	1,090.48

Notes:

Project Start Year ->	2020
Project Length (months) ->	12
Total Project Area (acres) ->	23
Maximum Area Disturbed/Day (acres) ->	4
Water Truck Used? ->	Yes

	Total Material Imported/Exported Volume (yd^3/day)		Daily VMT (miles/day)			
Phase	Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck
Grubbing/Land Clearing	10	0	25	0	280	20
Grading/Excavation	650	0	825	0	760	20
Drainage/Utilities/Sub-Grade	180	0	225	0	680	20
Paving	0	400	0	500	520	20

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

Total Emission Estimates by Phase for -> Dublin Road Extension - Road Work Only

Project Phases (Tons for all except CO2e. Metric tonnes for CO2e)	ROG (tons/phase)	CO (tons/phase)	NOx (tons/phase)	Total PM10 (tons/phase)	Exhaust PM10 (tons/phase)	Fugitive Dust PM10 (tons/phase)	Total PM2.5 (tons/phase)	Exhaust PM2.5 (tons/phase)	Fugitive Dust PM2.5 (tons/phase)	SOx (tons/phase)	CO2 (tons/phase)	CH4 (tons/phase)	N2O (tons/phase)	CO2e (MT/phase)
Grubbing/Land Clearing	0.13	1.02	1.28	0.59	0.07	0.53	0.17	0.06	0.11	0.00	139.74	0.04	0.00	128.01
Grading/Excavation	0.28	2.09	2.90	2.52	0.15	2.38	0.62	0.13	0.49	0.01	567.07	0.11	0.01	519.59
Drainage/Utilities/Sub-Grade	0.13	1.38	1.16	1.65	0.07	1.58	0.39	0.06	0.33	0.00	246.60	0.05	0.00	225.76
Paving	0.06	0.61	0.60	0.04	0.04	0.00	0.03	0.03	0.00	0.00	126.53	0.03	0.00	115.92
Maximum (tons/phase)	0.28	2.09	2.90	2.52	0.15	2.38	0.62	0.13	0.49	0.01	567.07	0.11	0.01	519.59
Total (tons/construction project)	0.59	5.10	5.95	4.80	0.31	4.49	1.21	0.28	0.93	0.01	1079.94	0.23	0.02	989.28

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

The CO2e emissions are reported as metric tons per phase.

Road Construction Emissions Model **Version 8.1.0**

Data Entry Worksheet

Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells D10 through D24, E28 through G35, and D38 through D41 for all project types.
Please use "Clear Data Input & User Overrides" button first before changing the Project Type or begin a new project.

To begin a new project, click this button to clear data previously entered. This button will only work if you opted not to disable macros when loading this spreadsheet.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Input Type

Project Name	Dublin Road Extension - Road Work Only	
Construction Start Year	2020	Enter a Year between 2014 and 2025 (inclusive)
Project Type	1	1) New Road Construction : Project to build a roadway from bare ground, which generally requires more site preparation than widening an existing roadway 2) Road Widening : Project to add a new lane to an existing roadway 3) Bridge/Overpass Construction : Project to build an elevated roadway, which generally requires some different equipment than a new roadway, such as a crane 4) Other Linear Project Type: Non-roadway project such as a pipeline, transmission line, or levee construction
Project Construction Time	12.00	months
Working Days per Month	22.00	days (assume 22 if unknown)
Predominant Soil/Site Type: Enter 1, 2, or 3 (for project within "Sacramento County", follow soil type selection instructions in cells E18 to E20 otherwise see instructions provided in cells J18 to J22)	2	1) Sand Gravel : Use for quaternary deposits (Delta/West County) 2) Weathered Rock-Earth : Use for Laguna formation (Jackson Highway area) or the Ione formation (Scott Road, Rancho Murieta) 3) Blasted Rock : Use for Salt Springs Slate or Copper Hill Volcanics (Folsom South of Highway 50, Rancho Murieta)
Project Length	4.00	miles
Total Project Area	1.33	acres
Maximum Area Disturbed/Day	23.00	acres
Water Trucks Used?	1	1. Yes 2. No

Please note that the soil type instructions provided in cells ~~E18 to E20 are specific to Sacramento County. Maps~~ available from the California Geologic Survey (see weblink below) can be used to determine soil type outside Sacramento County.

http://www.conservation.ca.gov/cgs/information/geologic_mapping/Pages/googlemaps.aspx#regionalseries

Material Hauling Quantity Input

Material Type	Phase	Haul Truck Capacity (yd^3) (assume 20 if unknown)	Import Volume (yd^3/day)	Export Volume (yd^3/day)
Soil	Grubbing/Land Clearing	20.00		10.00
	Grading/Excavation	20.00		650.00
	Drainage/Utilities/Sub-Grade	20.00		180.00
	Paving	20.00		
Asphalt	Grubbing/Land Clearing	20.00		
	Grading/Excavation	20.00		
	Drainage/Utilities/Sub-Grade	20.00		
	Paving	20.00	400.00	

Mitigation Options

On-road Fleet Emissions Mitigation	2010 and Newer On-road Vehicles Fleet	Select "2010 and Newer On-road Vehicles Fleet" option when the on-road heavy-duty truck fleet for the project will be limited to vehicles of model year 2010 or newer
Off-road Equipment Emissions Mitigation	No Mitigation	Select "20% NOx and 45% Exhaust PM reduction" option if the project will be required to use a lower emitting off-road construction fleet. The SMAQMD Construction Mitigation Calculator can be used to confirm compliance with this mitigation measure (http://www.airquality.org/ceqa/mitigation.shtml). Select "Tier 4 Equipment" option if some or all off-road equipment used for the project meets CARB Tier 4 Standard

The remaining sections of this sheet contain areas that can be modified by the user, although those modifications are optional.

Note: The program's estimates of construction period phase length can be overridden in cells D50 through D53, and F50 through F53.

Construction Periods	User Override of Construction Months	Program Calculated Months	User Override of Phase Starting Date	Program Default Phase Starting Date
Grubbing/Land Clearing		1.20		1/1/2020
Grading/Excavation		5.40		2/7/2020
Drainage/Utilities/Sub-Grade		3.60		7/21/2020
Paving		1.80		11/8/2020
Totals (Months)	12			

Note: Soil Hauling emission default values can be overridden in cells D61 through D64, and F61 through F64.

Soil Hauling Emissions		Program Estimate of Miles/Round Trip		Default Values Round Trips/Day	Calculated Daily VMT
User Input					
Miles/round trip: Grubbing/Land Clearing	25.00	30.00		1	25.00
Miles/round trip: Grading/Excavation	25.00	30.00		0	0.00
Miles/round trip: Drainage/Utilities/Sub-Grade	25.00	30.00		0	0.00
Miles/round trip: Paving	25.00	30.00		0	0.00

2010+ Model Year Mitigation Option Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Grading/Excavation (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Draining/Utilities/Sub-Grade (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Paving (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,570.93	0.00	0.05	1,586.41
Hauling Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.00	0.02	0.08	0.01	0.00	0.00	86.60	0.00	0.00	87.46
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	1.14	0.00	0.00	1.15
Pounds per day - Grading/Excavation	0.12	0.67	2.66	0.19	0.07	0.03	2,857.91	0.01	0.09	2,886.07
Tons per const. Period - Grading/Excavation	0.01	0.04	0.16	0.01	0.00	0.00	169.76	0.00	0.01	171.43
Pounds per day - Drainage/Utilities/Sub-Grade	0.03	0.18	0.73	0.05	0.02	0.01	779.43	0.00	0.03	787.11
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.01	0.03	0.00	0.00	0.00	30.87	0.00	0.00	31.17
Pounds per day - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons per construction project	0.01	0.05	0.19	0.01	0.01	0.00	201.77	0.00	0.01	203.76

Note: Asphalt Hauling emission default values can be overridden in cells D87 through D90, and F87 through F90.

Asphalt Hauling Emissions		Program Estimate of Miles/Round Trip		Default Values Round Trips/Day	Calculated Daily VMT
User Input					
Miles/round trip: Grubbing/Land Clearing		30.00		0	0.00
Miles/round trip: Grading/Excavation		30.00		0	0.00
Miles/round trip: Drainage/Utilities/Sub-Grade		30.00		0	0.00
Miles/round trip: Paving	25.00	30.00		20	500.00

2010+ Model Year Mitigation Option Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Grading/Excavation (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Draining/Utilities/Sub-Grade (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Paving (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,570.93	0.00	0.05	1,586.41
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Paving	0.07	0.40	1.61	0.11	0.04	0.02	1,731.66	0.00	0.06	1,748.72
Tons per const. Period - Paving	0.00	0.01	0.03	0.00	0.00	0.00	34.29	0.00	0.00	34.62
Total tons per construction project	0.00	0.01	0.03	0.00	0.00	0.00	34.29	0.00	0.00	34.62

Note: Worker commute default values can be overridden in cells D113 through D118.

Worker Commute Emissions		20	Calculated	Calculated
		2	Daily Trips	Daily VMT
User Input		Default Values	14	280.00
Miles/ one-way trip		19	38	760.00
One-way trips/day		17	34	680.00
No. of employees: Grubbing/Land Clearing		13	26	520.00
No. of employees: Grading/Excavation				
No. of employees: Drainage/Utilities/Sub-Grade				
No. of employees: Paving				

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.02	1.08	0.11	0.05	0.02	0.00	371.46	0.01	0.00	373.08
Grading/Excavation (grams/mile)	0.02	1.08	0.11	0.05	0.02	0.00	371.46	0.01	0.00	373.08
Draining/Utilities/Sub-Grade (grams/mile)	0.02	1.08	0.11	0.05	0.02	0.00	371.46	0.01	0.00	373.08
Paving (grams/mile)	0.02	1.07	0.11	0.05	0.02	0.00	371.10	0.01	0.00	372.71
Grubbing/Land Clearing (grams/trip)	1.00	2.55	0.20	0.00	0.00	0.00	84.03	0.01	0.01	86.84
Grading/Excavation (grams/trip)	1.00	2.55	0.20	0.00	0.00	0.00	84.03	0.01	0.01	86.84
Draining/Utilities/Sub-Grade (grams/trip)	1.00	2.55	0.20	0.00	0.00	0.00	84.03	0.01	0.01	86.84
Paving (grams/trip)	0.99	2.54	0.20	0.00	0.00	0.00	83.97	0.01	0.01	86.76
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.04	0.74	0.08	0.03	0.01	0.00	231.90	0.01	0.00	232.98
Tons per const. Period - Grubbing/Land Clearing	0.00	0.01	0.00	0.00	0.00	0.00	3.06	0.00	0.00	3.08
Pounds per day - Grading/Excavation	0.12	2.02	0.21	0.08	0.03	0.01	629.43	0.02	0.01	632.37
Tons per const. Period - Grading/Excavation	0.01	0.12	0.01	0.00	0.00	0.00	37.39	0.00	0.00	37.56
Pounds per day - Drainage/Utilities/Sub-Grade	0.11	1.80	0.19	0.07	0.03	0.01	563.18	0.01	0.01	565.81
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.07	0.01	0.00	0.00	0.00	22.30	0.00	0.00	22.41
Pounds per day - Paving	0.08	1.38	0.14	0.05	0.02	0.00	430.24	0.01	0.01	432.25
Tons per const. Period - Paving	0.00	0.03	0.00	0.00	0.00	0.00	8.52	0.00	0.00	8.56
Total tons per construction project	0.01	0.23	0.02	0.01	0.00	0.00	71.27	0.00	0.00	71.60

Note: Water Truck default values can be overridden in cells D145 through D148, and F145 through F148.

Water Truck Emissions		Program Estimate of	20.00	40.00	20.00
User Input		Number of Water Trucks	20.00	Default Values	Calculated
Grubbing/Land Clearing - Exhaust		1	20.00	Miles Travelled/Vehicle/Day	Daily VMT
Grading/Excavation - Exhaust		1	20.00	40.00	20.00
Drainage/Utilities/Subgrade				40.00	20.00
Paving					

2010+ Model Year Mitigation Option Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Grubbing/Land Clearing (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Grading/Excavation (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Draining/Utilities/Sub-Grade (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Paving (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,570.93	0.00	0.05	1,586.41
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Grubbing/Land Clearing	0.00	0.02	0.06	0.00	0.00	0.00	69.28	0.00	0.00	69.97
Tons per const. Period - Grubbing/Land Clearing	0.00	0.00	0.00	0.00	0.00	0.00	0.91	0.00	0.00	0.92
Pounds per day - Grading/Excavation	0.00	0.02	0.06	0.00	0.00	0.00	69.28	0.00	0.00	69.97
Tons per const. Period - Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	4.12	0.00	0.00	4.16
Pounds per day - Drainage/Utilities/Sub-Grade	0.00	0.02	0.06	0.00	0.00	0.00	69.28	0.00	0.00	69.97
Tons per const. Period - Drainage/Utilities/Sub-Grade	0.00	0.00	0.00	0.00	0.00	0.00	2.74	0.00	0.00	2.77
Pounds per day - Paving	0.00	0.02	0.06	0.00	0.00	0.00	69.27	0.00	0.00	69.95
Tons per const. Period - Paving	0.00	0.00	0.00	0.00	0.00	0.00	1.37	0.00	0.00	1.38
Total tons per construction project	0.00	0.00	0.01	0.00	0.00	0.00	9.14	0.00	0.00	9.24

Note: Fugitive dust default values can be overridden in cells D171 through D173.

Fugitive Dust	User Override of Max Acreage Disturbed/Day	Default Maximum Acreage/Day	PM10 pounds/day	PM10 tons/per period	PM2.5 pounds/day	PM2.5 tons/per period
Fugitive Dust - Grubbing/Land Clearing		4.00	40.00	0.53	8.32	0.11
Fugitive Dust - Grading/Excavation		4.00	40.00	2.38	8.32	0.49
Fugitive Dust - Drainage/Utilities/Subgrade		4.00	40.00	1.58	8.32	0.33

Off-Road Equipment Emissions

Grubbing/Land Clearing	Default Number of Vehicles	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	Type	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Override of Default Number of Vehicles	*Program-estimate*				pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00			Model Default Tier	Concrete/Industrial Saws	0.84	7.37	6.60	0.40	0.40	0.01	1,185.33	0.08	0.01	1,189.86
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Crawler Tractors	0.57	2.45	7.31	0.28	0.25	0.01	746.04	0.24	0.01	754.08
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	1		Model Default Tier	Excavators	0.51	6.74	4.98	0.24	0.22	0.01	1,031.89	0.33	0.01	1,043.01
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00			Model Default Tier	Graders	2.87	18.33	27.99	1.56	1.44	0.02	2,419.75	0.78	0.02	2,445.76
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00			Model Default Tier	Rubber Tired Dozers	3.85	31.74	40.59	1.86	1.72	0.04	3,452.28	1.12	0.03	3,489.36
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3		Model Default Tier	Signal Boards	0.17	0.90	1.08	0.04	0.04	0.00	147.94	0.02	0.00	148.69
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00			Model Default Tier	Tractors/Loaders/Backhoes	0.85	9.21	8.51	0.54	0.49	0.01	1,215.48	0.39	0.01	1,228.57
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles	Equipment Tier	Type		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
				pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Grubbing/Land Clearing	pounds per day		9.65	76.76	97.05	4.92	4.56	0.11	10,198.71	2.96	0.09	10,299.35
	Grubbing/Land Clearing	tons per phase		0.13	1.01	1.28	0.06	0.06	0.00	134.62	0.04	0.00	135.95

Grading/Excavation	Default Number of Vehicles	Mitigation Option: Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	Type	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Override of Default Number of Vehicles	*Program-estimate*				pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0		Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	3		Model Default Tier	Excavators	0.51	6.74	4.98	0.24	0.22	0.01	1,031.89	0.33	0.01	1,043.01
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	1		Model Default Tier	Graders	1.43	9.16	14.00	0.78	0.72	0.01	1,209.88	0.39	0.01	1,222.88
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	2		Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00	1		Model Default Tier	Rubber Tired Loaders	1.47	6.45	17.38	0.58	0.53	0.02	2,384.87	0.77	0.02	2,410.61
0.00	2		Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3		Model Default Tier	Signal Boards	0.17	0.90	1.08	0.04	0.04	0.00	147.94	0.02	0.00	148.69
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.85	9.21	8.51	0.54	0.49	0.01	1,215.48	0.39	0.01	1,228.57
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment	If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab			ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Number of Vehicles		Equipment Tier	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Grading/Excavation		pounds per day	4.43	32.47	45.94	2.18	2.01	0.06	5,990.05	1.90	0.05	6,053.77
	Grading/Excavation		tons per phase	0.26	1.93	2.73	0.13	0.12	0.00	355.81	0.11	0.00	359.59

Drainage/Utilities/Subgrade	Default Number of Vehicles	Mitigation Option: Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Override of Default Number of Vehicles	*Program-estimate*		Equipment Tier		pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00			Model Default Tier	Cement and Mortar Mixers	0.12	0.62	0.74	0.03	0.03	0.00	101.03	0.01	0.00	101.55
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00			Model Default Tier	Excavators	1.01	13.48	9.96	0.48	0.44	0.02	2,063.78	0.67	0.02	2,086.03
2.00			Model Default Tier	Forklifts	0.29	2.36	2.60	0.19	0.18	0.00	296.06	0.10	0.00	299.26
0.00	1		Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Paving Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Plate Compactors	0.04	0.21	0.25	0.01	0.01	0.00	34.48	0.00	0.00	34.65
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Pumps	0.42	3.76	3.53	0.21	0.21	0.01	623.04	0.04	0.00	625.36
			Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Rough Terrain Forklifts	0.13	2.30	1.73	0.07	0.07	0.00	333.68	0.11	0.00	337.28
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	2		Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3		Model Default Tier	Signal Boards	0.17	0.90	1.08	0.04	0.04	0.00	147.94	0.02	0.00	148.69
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.85	9.21	8.51	0.54	0.49	0.01	1,215.48	0.39	0.01	1,228.57
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment	If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab			ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Number of Vehicles		Equipment Tier	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Drainage/Utilities/Sub-Grade		pounds per day	3.03	32.85	28.38	1.57	1.47	0.05	4,815.49	1.33	0.04	4,861.38
	Drainage/Utilities/Sub-Grade		tons per phase	0.12	1.30	1.12	0.06	0.06	0.00	190.69	0.05	0.00	192.51

Paving

Override of Default Number of Vehicles	Default Number of Vehicles	Mitigation Option: Override of Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Mitigation Option: Default Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
	Program-estimate		Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.12	0.62	0.74	0.03	0.03	0.00	101.03	0.01	0.00	101.55
2.00			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Excavators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.51	5.62	5.43	0.26	0.24	0.01	882.52	0.29	0.01	892.03
2.00	1		Model Default Tier	Paving Equipment	0.41	5.03	4.24	0.21	0.19	0.01	783.07	0.25	0.01	791.52
2.00	1		Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rollers	0.84	7.67	8.41	0.54	0.49	0.01	1,028.97	0.33	0.01	1,040.06
4.00	3		Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Signal Boards	0.17	0.90	1.08	0.04	0.04	0.00	147.94	0.02	0.00	148.69
	3		Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Tractors/Loaders/Backhoes	0.84	9.21	8.48	0.54	0.49	0.01	1,215.49	0.39	0.01	1,228.58
4.00	2		Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles	Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A											

		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Paving	pounds per day	2.89	29.05	28.38	1.62	1.49	0.04	4,159.03	1.29	0.04	4,202.43
Paving	tons per phase	0.06	0.58	0.56	0.03	0.03	0.00	82.35	0.03	0.00	83.21
Total Emissions all Phases (tons per construction period) =>		0.57	4.82	5.70	0.29	0.27	0.01	763.47	0.23	0.01	771.26

Equipment default values for horsepower and hours/day can be overridden in cells D391 through D424 and F391 through F424.

Equipment	User Override of Horsepower	Default Values Horsepower	User Override of Hours/day	Default Values Hours/day
Aerial Lifts		63		8
Air Compressors		78		8
Bore/Drill Rigs		206		8
Cement and Mortar Mixers		9		8
Concrete/Industrial Saws		81		8
Cranes		226		8
Crawler Tractors		208		8
Crushing/Proc. Equipment		85		8
Excavators		163		8
Forklifts		89		8
Generator Sets		84		8
Graders		175		8
Off-Highway Tractors		123		8
Off-Highway Trucks		400		8
Other Construction Equipment		172		8
Other General Industrial Equipment		88		8
Other Material Handling Equipment		167		8
Pavers		126		8
Paving Equipment		131		8
Plate Compactors		8		8
Pressure Washers		13		8
Pumps		84		8
Rollers		81		8
Rough Terrain Forklifts		100		8
Rubber Tired Dozers		255		8
Rubber Tired Loaders		200		8
Scrapers		362		8
Signal Boards		6		8
Skid Steer Loaders		65		8
Surfacing Equipment		254		8
Sweepers/Scrubbers		64		8
Tractors/Loaders/Backhoes		98		8
Trenchers		81		8
Welders		46		8

END OF DATA ENTRY SHEET

Road Construction Emissions Model, Version 8.1.0

Daily Emission Estimates for -> Dublin Road Extension - Bridge Work Only

Project Phases (Pounds)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	SOx (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)	N2O (lbs/day)	CO2e (lbs/day)
Bridge Foundations	9.57	76.72	96.52	14.92	4.92	10.00	6.62	4.54	2.08	0.11	10,404.29	2.95	0.10	10,506.57
Bridge Abutments and Piers	4.94	36.94	50.93	12.49	2.49	10.00	4.31	2.23	2.08	0.08	7,504.27	2.09	0.08	7,579.08
Bridge Superstructure/Barriers	3.04	34.19	27.99	11.63	1.63	10.00	3.56	1.48	2.08	0.06	5,451.73	1.34	0.05	5,501.28
Landscaping/Lighting	2.84	29.33	27.95	1.64	1.64	0.00	1.49	1.49	0.00	0.05	4,463.99	1.29	0.04	4,509.50
Maximum (pounds/day)	9.57	76.72	96.52	14.92	4.92	10.00	6.62	4.54	2.08	0.11	10,404.29	2.95	0.10	10,506.57
Total (tons/construction project)	0.30	2.57	2.98	0.72	0.15	0.56	0.26	0.14	0.12	0.00	443.68	0.12	0.00	448.01

Notes:

Project Start Year ->	2020
Project Length (months) ->	6
Total Project Area (acres) ->	2
Maximum Area Disturbed/Day (acres) ->	1
Water Truck Used? ->	Yes

	Total Material Imported/Exported Volume (yd^3/day)		Daily VMT (miles/day)			
Phase	Soil	Asphalt	Soil Hauling	Asphalt Hauling	Worker Commute	Water Truck
Bridge Foundations	0	0	0	0	200	40
Bridge Abutments and Piers	0	0	0	0	1,120	40
Bridge Superstructure/Barriers	0	0	0	0	720	40
Landscaping/Lighting	0	0	0	0	320	40

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

Total Emission Estimates by Phase for -> Dublin Road Extension - Bridge Work Only

Project Phases (Tons for all except CO2e. Metric tonnes for CO2e)	ROG (tons/phase)	CO (tons/phase)	NOx (tons/phase)	Total PM10 (tons/phase)	Exhaust PM10 (tons/phase)	Fugitive Dust PM10 (tons/phase)	Total PM2.5 (tons/phase)	Exhaust PM2.5 (tons/phase)	Fugitive Dust PM2.5 (tons/phase)	SOx (tons/phase)	CO2 (tons/phase)	CH4 (tons/phase)	N2O (tons/phase)	CO2e (MT/phase)
Bridge Foundations	0.06	0.51	0.64	0.10	0.03	0.07	0.04	0.03	0.01	0.00	68.67	0.02	0.00	62.91
Bridge Abutments and Piers	0.15	1.10	1.51	0.37	0.07	0.30	0.13	0.07	0.06	0.00	222.88	0.06	0.00	204.21
Bridge Superstructure/Barriers	0.06	0.68	0.55	0.23	0.03	0.20	0.07	0.03	0.04	0.00	107.94	0.03	0.00	98.82
Landscaping/Lighting	0.03	0.29	0.28	0.02	0.02	0.00	0.01	0.01	0.00	0.00	44.19	0.01	0.00	40.50
Maximum (tons/phase)	0.15	1.10	1.51	0.37	0.07	0.30	0.13	0.07	0.06	0.00	222.88	0.06	0.00	204.21
Total (tons/construction project)	0.30	2.57	2.98	0.72	0.15	0.56	0.26	0.14	0.12	0.00	443.68	0.12	0.00	406.43

PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.

Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns G and H. Total PM2.5 emissions shown in Column I are the sum of exhaust and fugitive dust emissions shown in columns J and K.

CO2e emissions are estimated by multiplying mass emissions for each GHG by its global warming potential (GWP), 1 , 25 and 298 for CO2, CH4 and N2O, respectively. Total CO2e is then estimated by summing CO2e estimates over all GHGs.

The CO2e emissions are reported as metric tons per phase.

Road Construction Emissions Model **Version 8.1.0**

Data Entry Worksheet

Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells D10 through D24, E28 through G35, and D38 through D41 for all project types.
Please use "Clear Data Input & User Overrides" button first before changing the Project Type or begin a new project.

To begin a new project, click this button to clear data previously entered. This button will only work if you opted not to disable macros when loading this spreadsheet.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Input Type

Project Name	Dublin Road Extension - Bridge	Work Only
Construction Start Year	2020	Enter a Year between 2014 and 2025 (inclusive)
Project Type	3	1) New Road Construction : Project to build a roadway from bare ground, which generally requires more site preparation than widening an existing roadway 2) Road Widening : Project to add a new lane to an existing roadway 3) Bridge/Overpass Construction : Project to build an elevated roadway, which generally requires some different equipment than a new roadway, such as a crane 4) Other Linear Project Type: Non-roadway project such as a pipeline, transmission line, or levee construction
Project Construction Time	6.00	months
Working Days per Month	22.00	days (assume 22 if unknown)
Predominant Soil/Site Type: Enter 1, 2, or 3 (for project within "Sacramento County", follow soil type selection instructions in cells E18 to E20 otherwise see instructions provided in cells J18 to J22)	2	1) Sand Gravel : Use for quaternary deposits (Delta/West County) 2) Weathered Rock-Earth : Use for Laguna formation (Jackson Highway area) or the Ione formation (Scott Road, Rancho Murieta) 3) Blasted Rock : Use for Salt Springs Slate or Copper Hill Volcanics (Folsom South of Highway 50, Rancho Murieta)
Project Length	0.20	miles
Total Project Area	2.00	acres
Maximum Area Disturbed/Day	1.00	acre
Water Trucks Used?	1	1. Yes 2. No

Please note that the soil type instructions provided in cells E18 to E20 are specific to Sacramento County. Maps available from the California Geologic Survey (see weblink below) can be used to determine soil type outside Sacramento County.

http://www.conservation.ca.gov/cgs/information/geologic_mapping/Pages/googlemaps.aspx#regionalseries

Material Hauling Quantity Input

Material Type	Phase	Haul Truck Capacity (yd^3) (assume 20 if unknown)	Import Volume (yd^3/day)	Export Volume (yd^3/day)
Soil	Bridge Foundations	20.00		
	Bridge Abutments and Piers	20.00		0.00
	Bridge Superstructure/Barriers	20.00		
	Landscaping/Lighting	20.00		0.00
Asphalt	Bridge Foundations	20.00		
	Bridge Abutments and Piers	20.00		
	Bridge Superstructure/Barriers	20.00		
	Landscaping/Lighting	20.00	0.00	

Mitigation Options

On-road Fleet Emissions Mitigation	2010 and Newer On-road Vehicles Fleet	Select "2010 and Newer On-road Vehicles Fleet" option when the on-road heavy-duty truck fleet for the project will be limited to vehicles of model year 2010 or newer
Off-road Equipment Emissions Mitigation	No Mitigation	Select "20% NOx and 45% Exhaust PM reduction" option if the project will be required to use a lower emitting off-road construction fleet. The SMAQMD Construction Mitigation Calculator can be used to confirm compliance with this mitigation measure (http://www.airquality.org/ceqa/mitigation.shtml). Select "Tier 4 Equipment" option if some or all off-road equipment used for the project meets CARB Tier 4 Standard

The remaining sections of this sheet contain areas that can be modified by the user, although those modifications are optional.

Note: The program's estimates of construction period phase length can be overridden in cells D50 through D53, and F50 through F53.

Construction Periods	User Override of Construction Months	Program Calculated Months	User Override of Phase Starting Date	Program Default Phase Starting Date
Bridge Foundations		0.60		1/1/2020
Bridge Abutments and Piers		2.70		1/20/2020
Bridge Superstructure/Barriers		1.80		4/12/2020
Landscaping/Lighting		0.90		6/6/2020
Totals (Months)	6			

Note: Soil Hauling emission default values can be overridden in cells D61 through D64, and F61 through F64.

Soil Hauling Emissions		Program Estimate of Miles/Round Trip		Default Values Round Trips/Day	Calculated Daily VMT
User Input					
Miles/round trip: Bridge Foundations		30.00		0	0.00
Miles/round trip: Bridge Abutments and Piers		30.00		0	0.00
Miles/round trip: Bridge Superstructure/Barriers		30.00		0	0.00
Miles/round trip: Landscaping/Lighting		30.00		0	0.00

2010+ Model Year Mitigation Option Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Bridge Foundations (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Bridge Abutments and Piers (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Draining/Utilities/Sub-Grade (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Landscaping/Lighting (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Hauling Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Bridge Foundations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Bridge Foundations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Bridge Abutments and Piers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Bridge Abutments and Piers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Bridge Superstructure/Barriers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Bridge Superstructure/Barriers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Landscaping/Lighting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Landscaping/Lighting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons per construction project	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Asphalt Hauling emission default values can be overridden in cells D87 through D90, and F87 through F90.

Asphalt Hauling Emissions		Program Estimate of Miles/Round Trip		Default Values Round Trips/Day	Calculated Daily VMT
User Input					
Miles/round trip: Bridge Foundations		30.00		0	0.00
Miles/round trip: Bridge Abutments and Piers		30.00		0	0.00
Miles/round trip: Bridge Superstructure/Barriers		30.00		0	0.00
Miles/round trip: Landscaping/Lighting		30.00	0	0	0.00

2010+ Model Year Mitigation Option Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Bridge Foundations (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Bridge Abutments and Piers (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Draining/Utilities/Sub-Grade (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Landscaping/Lighting (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Bridge Foundations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Bridge Foundations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Bridge Abutments and Piers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Bridge Abutments and Piers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Bridge Superstructure/Barriers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Bridge Superstructure/Barriers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pounds per day - Landscaping/Lighting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tons per const. Period - Landscaping/Lighting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total tons per construction project	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: Worker commute default values can be overridden in cells D113 through D118.

Worker Commute Emissions		20	Calculated	Calculated
		2	Daily Trips	Daily VMT
User Input		5 Default Values	10	200.00
Miles/ one-way trip		28	56	1,120.00
One-way trips/day		18	36	720.00
No. of employees: Bridge Foundations		8	16	320.00
No. of employees: Bridge Abutments and Piers				
No. of employees: Bridge Superstructure/Barriers				
No. of employees: Landscaping/Lighting				

Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Bridge Foundations (grams/mile)	0.02	1.08	0.11	0.05	0.02	0.00	371.46	0.01	0.00	373.08
Bridge Abutments and Piers (grams/mile)	0.02	1.08	0.11	0.05	0.02	0.00	371.46	0.01	0.00	373.08
Draining/Utilities/Sub-Grade (grams/mile)	0.02	1.08	0.11	0.05	0.02	0.00	371.46	0.01	0.00	373.08
Landscaping/Lighting (grams/mile)	0.02	1.08	0.11	0.05	0.02	0.00	371.46	0.01	0.00	373.08
Bridge Foundations (grams/trip)	1.00	2.55	0.20	0.00	0.00	0.00	84.03	0.01	0.01	86.84
Bridge Abutments and Piers (grams/trip)	1.00	2.55	0.20	0.00	0.00	0.00	84.03	0.01	0.01	86.84
Draining/Utilities/Sub-Grade (grams/trip)	1.00	2.55	0.20	0.00	0.00	0.00	84.03	0.01	0.01	86.84
Landscaping/Lighting (grams/trip)	1.00	2.55	0.20	0.00	0.00	0.00	84.03	0.01	0.01	86.84
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Bridge Foundations	0.03	0.53	0.05	0.02	0.01	0.00	165.64	0.00	0.00	166.41
Tons per const. Period - Bridge Foundations	0.00	0.00	0.00	0.00	0.00	0.00	1.09	0.00	0.00	1.10
Pounds per day - Bridge Abutments and Piers	0.17	2.97	0.30	0.12	0.05	0.01	927.59	0.02	0.01	931.92
Tons per const. Period - Bridge Abutments and Piers	0.01	0.09	0.01	0.00	0.00	0.00	27.55	0.00	0.00	27.68
Pounds per day - Bridge Superstructure/Barriers	0.11	1.91	0.20	0.07	0.03	0.01	596.30	0.01	0.01	599.09
Tons per const. Period - Bridge Superstructure/Barriers	0.00	0.04	0.00	0.00	0.00	0.00	11.81	0.00	0.00	11.86
Pounds per day - Landscaping/Lighting	0.05	0.85	0.09	0.03	0.01	0.00	265.02	0.01	0.00	266.26
Tons per const. Period - Landscaping/Lighting	0.00	0.01	0.00	0.00	0.00	0.00	2.62	0.00	0.00	2.64
Total tons per construction project	0.01	0.14	0.01	0.01	0.00	0.00	43.07	0.00	0.00	43.27

Note: Water Truck default values can be overridden in cells D145 through D148, and F145 through F148.

Water Truck Emissions		1		40.00	40.00
User Input		Program Estimate of Number of Water Trucks		Default Values Miles Travelled/Vehicle/Day	Calculated Daily VMT
Bridge Foundations - Exhaust		1		40.00	40.00
Bridge Abutments and Piers - Exhaust		1		40.00	40.00
Drainage/Utilities/Subgrade					
Landscaping/Lighting					

2010+ Model Year Mitigation Option Emission Rates	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Bridge Foundations (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Bridge Abutments and Piers (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Draining/Utilities/Sub-Grade (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Landscaping/Lighting (grams/mile)	0.07	0.37	1.46	0.10	0.04	0.01	1,571.31	0.00	0.05	1,586.79
Emissions	**ROG**	**CO**	**NOx**	**PM10**	**PM2.5**	**SOx**	**CO2**	**CH4**	**N2O**	**CO2e**
Pounds per day - Bridge Foundations	0.01	0.03	0.13	0.01	0.00	0.00	138.57	0.00	0.00	139.93
Tons per const. Period - Bridge Foundations	0.00	0.00	0.00	0.00	0.00	0.00	0.91	0.00	0.00	0.92
Pounds per day - Bridge Abutments and Piers	0.01	0.03	0.13	0.01	0.00	0.00	138.57	0.00	0.00	139.93
Tons per const. Period - Bridge Abutments and Piers	0.00	0.00	0.00	0.00	0.00	0.00	4.12	0.00	0.00	4.16
Pounds per day - Bridge Superstructure/Barriers	0.01	0.03	0.13	0.01	0.00	0.00	138.57	0.00	0.00	139.93
Tons per const. Period - Bridge Superstructure/Barriers	0.00	0.00	0.00	0.00	0.00	0.00	2.74	0.00	0.00	2.77
Pounds per day - Landscaping/Lighting	0.01	0.03	0.13	0.01	0.00	0.00	138.57	0.00	0.00	139.93
Tons per const. Period - Landscaping/Lighting	0.00	0.00	0.00	0.00	0.00	0.00	1.37	0.00	0.00	1.39
Total tons per construction project	0.00	0.00	0.01	0.00	0.00	0.00	9.15	0.00	0.00	9.24

Note: Fugitive dust default values can be overridden in cells D171 through D173.

Fugitive Dust	User Override of Max Acreage Disturbed/Day	Default Maximum Acreage/Day	PM10 pounds/day	PM10 tons/per period	PM2.5 pounds/day	PM2.5 tons/per period
Fugitive Dust - Bridge Foundations		1.00	10.00	0.07	2.08	0.01
Fugitive Dust - Bridge Abutments and Piers		1.00	10.00	0.30	2.08	0.06
Fugitive Dust - Drainage/Utilities/Subgrade		1.00	10.00	0.20	2.08	0.04

Off-Road Equipment Emissions

Bridge Foundations	Default Number of Vehicles	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier	Type	ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Override of Default Number of Vehicles	*Program-estimate*				pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00			Model Default Tier	Concrete/Industrial Saws	0.84	7.37	6.60	0.40	0.40	0.01	1,185.33	0.08	0.01	1,189.86
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Crawler Tractors	0.57	2.45	7.31	0.28	0.25	0.01	746.04	0.24	0.01	754.08
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	2		Model Default Tier	Excavators	0.51	6.74	4.98	0.24	0.22	0.01	1,031.89	0.33	0.01	1,043.01
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00			Model Default Tier	Graders	2.87	18.33	27.99	1.56	1.44	0.02	2,419.75	0.78	0.02	2,445.76
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Landscaping/Lighting Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00			Model Default Tier	Rubber Tired Dozers	3.85	31.74	40.59	1.86	1.72	0.04	3,452.28	1.12	0.03	3,489.36
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Signal Boards	0.06	0.30	0.36	0.01	0.01	0.00	49.31	0.01	0.00	49.56
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00			Model Default Tier	Tractors/Loaders/Backhoes	0.85	9.21	8.51	0.54	0.49	0.01	1,215.48	0.39	0.01	1,228.57
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab

Number of Vehicles	Equipment Tier	Type		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
				pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A		0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Bridge Foundations	pounds per day		9.53	76.15	96.33	4.89	4.53	0.10	10,100.09	2.95	0.09	10,200.22
	Bridge Foundations	tons per phase		0.06	0.50	0.64	0.03	0.03	0.00	66.66	0.02	0.00	67.32

Bridge Abutments and Piers	Default Number of Vehicles	Mitigation Option Override of	Default		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Override of Default Number of Vehicles	*Program-estimate*	Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Equipment Tier	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Cranes	0.44	2.07	5.27	0.22	0.20	0.01	546.70	0.18	0.00	552.59
0.00	2		Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	4		Model Default Tier	Excavators	0.51	6.74	4.98	0.24	0.22	0.01	1,031.89	0.33	0.01	1,043.01
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00	2		Model Default Tier	Graders	1.43	9.16	14.00	0.78	0.72	0.01	1,209.88	0.39	0.01	1,222.88
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Landscaping/Lighting Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Plate Compactors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	3		Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00	3		Model Default Tier	Rubber Tired Loaders	1.47	6.45	17.38	0.58	0.53	0.02	2,384.87	0.77	0.02	2,410.61
0.00	4		Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Signal Boards	0.06	0.30	0.36	0.01	0.01	0.00	49.31	0.01	0.00	49.56
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.85	9.21	8.51	0.54	0.49	0.01	1,215.48	0.39	0.01	1,228.57
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment	If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab			ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Number of Vehicles		Equipment Tier	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Bridge Abutments and Piers		pounds per day	4.76	33.94	50.49	2.37	2.18	0.07	6,438.12	2.07	0.06	6,507.23
	Bridge Abutments and Piers		tons per phase	0.14	1.01	1.50	0.07	0.06	0.00	191.21	0.06	0.00	193.26

Drainage/Utilities/Subgrade	Default Number of Vehicles	Mitigation Option Override of Default Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Default Equipment Tier		ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Override of Default Number of Vehicles	*Program-estimate*				pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
			Model Default Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	1		Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.00			Model Default Tier	Cement and Mortar Mixers	0.12	0.62	0.74	0.03	0.03	0.00	101.03	0.01	0.00	101.55
			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00			Model Default Tier	Excavators	1.01	13.48	9.96	0.48	0.44	0.02	2,063.78	0.67	0.02	2,086.03
2.00			Model Default Tier	Forklifts	0.29	2.36	2.60	0.19	0.18	0.00	296.06	0.10	0.00	299.26
0.00	1		Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	2		Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Landscaping/Lighting Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Plate Compactors	0.04	0.21	0.25	0.01	0.01	0.00	34.48	0.00	0.00	34.65
			Model Default Tier	Pressure Washers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Pumps	0.42	3.76	3.53	0.21	0.21	0.01	623.04	0.04	0.00	625.36
			Model Default Tier	Rollers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Rough Terrain Forklifts	0.13	2.30	1.73	0.07	0.07	0.00	333.68	0.11	0.00	337.28
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	4		Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1		Model Default Tier	Signal Boards	0.06	0.30	0.36	0.01	0.01	0.00	49.31	0.01	0.00	49.56
			Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4.00	2		Model Default Tier	Tractors/Loaders/Backhoes	0.85	9.21	8.51	0.54	0.49	0.01	1,215.48	0.39	0.01	1,228.57
			Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

User-Defined Off-road Equipment	If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab			ROG	CO	NOx	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
Number of Vehicles		Equipment Tier	Type	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day	pounds/day
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00		N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Bridge Superstructure/Barriers		pounds per day	2.92	32.25	27.66	1.55	1.44	0.05	4,716.86	1.32	0.04	4,762.26
	Bridge Superstructure/Barriers		tons per phase	0.06	0.64	0.55	0.03	0.03	0.00	93.39	0.03	0.00	94.29

Landscaping/Lighting	Default Number of Vehicles	Mitigation Option: Override of Equipment Tier (applicable only when "Tier 4 Mitigation" Option Selected)	Mitigation Option: Default Equipment Tier	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
Override of Default Number of Vehicles	*Program-estimate*		Equipment Tier	Aerial Lifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Air Compressors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Bore/Drill Rigs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cement and Mortar Mixers	0.12	0.62	0.74	0.03	0.03	0.00	101.03	0.01	0.00	101.55
2.00			Model Default Tier	Concrete/Industrial Saws	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Cranes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crawler Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Crushing/Proc. Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Excavators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Generator Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Graders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Tractors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Off-Highway Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Construction Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other General Industrial Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Other Material Handling Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Pavers	0.51	5.62	5.45	0.26	0.24	0.01	882.53	0.29	0.01	892.04
2.00	1		Model Default Tier	Landscaping/Lighting	0.41	5.03	4.25	0.21	0.20	0.01	783.08	0.25	0.01	791.53
2.00	1		Model Default Tier	Equipment Plate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Compactors Pressure	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Washers Pumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rollers	0.84	7.67	8.43	0.54	0.49	0.01	1,028.97	0.33	0.01	1,040.06
4.00	1		Model Default Tier	Rough Terrain Forklifts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Dozers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Rubber Tired Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Scrapers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Signal Boards	0.06	0.30	0.36	0.01	0.01	0.00	49.31	0.01	0.00	49.56
	1		Model Default Tier	Skid Steer Loaders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Surfacing Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Sweepers/Scrubbers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Tractors/Loaders/Backhoes	0.85	9.21	8.51	0.54	0.49	0.01	1,215.48	0.39	0.01	1,228.57
4.00	2		Model Default Tier	Trenchers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier	Welders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			Model Default Tier											

User-Defined Off-road Equipment	If non-default vehicles are used, please provide information in 'Non-default Off-road Equipment' tab	Type	ROG pounds/day	CO pounds/day	NOx pounds/day	PM10 pounds/day	PM2.5 pounds/day	SOx pounds/day	CO2 pounds/day	CH4 pounds/day	N2O pounds/day	CO2e pounds/day
Number of Vehicles	Equipment Tier	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	N/A											

Landsca	pounds per day	2.79	28.45	27.73	1.60	1.47	0.04	4,060.40	1.28	0.04	4,103.30
Landsca	tons per phase	0.03	0.28	0.27	0.02	0.01	0.00	40.20	0.01	0.00	40.62
		0.29	2.43	2.96	0.15	0.14	0.00	391.46	0.12	0.00	395.50

Total Emissions all Phases (tons per construction period) =>

Equipment default values for horsepower and hours/day can be overridden in cells D391 through D424 and F391 through F424.

Equipment	User Override of Horsepower	Default Values Horsepower	User Override of Hours/day	Default Values Hours/day
Aerial Lifts		63		8
Air Compressors		78		8
Bore/Drill Rigs		206		8
Cement and Mortar Mixers		9		8
Concrete/Industrial Saws		81		8
Cranes		226		8
Crawler Tractors		208		8
Crushing/Proc. Equipment		85		8
Excavators		163		8
Forklifts		89		8
Generator Sets		84		8
Graders		175		8
Off-Highway Tractors		123		8
Off-Highway Trucks		400		8
Other Construction Equipment		172		8
Other General Industrial Equipment		88		8
Other Material Handling Equipment		167		8
Pavers		126		8
Landscaping/Lighting Equipment		131		8
Plate Compactors		8		8
Pressure Washers		13		8
Pumps		84		8
Rollers		81		8
Rough Terrain Forklifts		100		8
Rubber Tired Dozers		255		8
Rubber Tired Loaders		200		8
Scrapers		362		8
Signal Boards		6		8
Skid Steer Loaders		65		8
Surfacing Equipment		254		8
Sweepers/Scrubbers		64		8
Tractors/Loaders/Backhoes		98		8
Trenchers		81		8
Welders		46		8

END OF DATA ENTRY SHEET

Attachment 2 –

EMFAC2014 and Traffic Data

2013

Fleet Average Running Exhaust Emission Factors (grams/veh-mile)

Pollutant Name	5 mph	10 mph	15 mph	20 mph	25 mph	30 mph	35 mph	40 mph	45 mph	50 mph	55 mph	60 mph	65 mph	70 mph	75 mph
HC	0.395832	0.269879	0.178157	0.122708	0.092408	0.073302	0.060657	0.052489	0.047649	0.045515	0.045845	0.048849	0.054741	0.059098	0.059098
ROG	0.354341	0.245502	0.160626	0.109264	0.082215	0.06519	0.053782	0.046314	0.041806	0.039718	0.039826	0.042328	0.0473	0.050997	0.050997
TOG	0.46088	0.31732	0.207902	0.141775	0.106575	0.084415	0.069623	0.059973	0.054165	0.051486	0.051643	0.054885	0.061347	0.066159	0.066159
CO	2.881601	2.441114	2.075955	1.806535	1.608079	1.453072	1.329244	1.230924	1.15489	1.099935	1.06691	1.060125	1.086181	1.115483	1.115483
NOx	1.495171	1.246539	0.934433	0.738628	0.6354	0.576353	0.536856	0.509897	0.49207	0.481562	0.477394	0.481413	0.491771	0.499515	0.499515
CO2	1274.458	983.3876	764.9698	621.2769	527.6522	464.1201	422.1933	395.1004	380.1992	377.154	385.3012	405.6262	440.8327	464.7993	464.7993
CH4	0.084665	0.056258	0.037359	0.025998	0.019504	0.015406	0.012736	0.011035	0.010041	0.009612	0.009696	0.01033	0.011589	0.012526	0.012526
PM10	0.026014	0.01957	0.013773	0.009975	0.008048	0.006887	0.006135	0.005713	0.005577	0.005705	0.006091	0.006497	0.006848	0.007181	0.007181
PM2.5	0.024496	0.018474	0.013009	0.009425	0.007612	0.00652	0.005812	0.005416	0.00529	0.005415	0.005783	0.006169	0.006498	0.006812	0.006812
Benzene	0.010819	0.007399	0.004884	0.003358	0.002533	0.002009	0.001663	0.001441	0.001306	0.00125	0.001258	0.001338	0.001493	0.001493	0.001493
Acrolein	0.000436	0.000284	0.000194	0.00014	0.000107	0.000085	0.000071	0.000063	0.000058	0.000057	0.000058	0.000063	0.000071	0.000071	0.000071
Acetaldehyde	0.011812	0.008991	0.005476	0.003357	0.002478	0.001933	0.001535	0.00125	0.001054	0.000933	0.000879	0.000888	0.000935	0.000935	0.000935
Formaldehyde	0.026662	0.01996	0.012307	0.007688	0.005696	0.004455	0.003565	0.002936	0.002512	0.002261	0.002163	0.00221	0.002359	0.002359	0.002359
Butadiene	0.002107	0.001406	0.000946	0.000667	0.000505	0.000402	0.000335	0.000294	0.000269	0.000261	0.000265	0.000284	0.000319	0.000319	0.000319
Naphthalene	0.000333	0.000233	0.000152	0.000102	0.000077	0.000061	0.00005	0.000043	0.000039	0.000037	0.000036	0.000039	0.000043	0.000043	0.000043
POM	0.000535	0.000382	0.000242	0.000157	0.000118	0.000094	0.000078	0.000067	0.00006	0.000057	0.000057	0.00006	0.000065	0.000065	0.000065
Diesel PM	0.015234	0.012712	0.009182	0.00674	0.005646	0.005008	0.004587	0.00437	0.004348	0.004519	0.004882	0.005178	0.005323	0.005323	0.005323
DEOG	0.141558	0.109795	0.065903	0.039469	0.028983	0.022512	0.017695	0.01418	0.011717	0.010127	0.009338	0.009245	0.009506	0.009506	0.009506

2025

Fleet Average Running Exhaust Emission Factors (grams/veh-mile)

Pollutant Name	5 mph	10 mph	15 mph	20 mph	25 mph	30 mph	35 mph	40 mph	45 mph	50 mph	55 mph	60 mph	65 mph	70 mph	75 mph
HC	0.211625	0.143105	0.096044	0.067341	0.050285	0.039381	0.032197	0.027544	0.024729	0.023369	0.023304	0.02475	0.027851	0.030135	0.030135
ROG	0.181651	0.124326	0.083456	0.058395	0.043556	0.034037	0.027712	0.023573	0.021027	0.019739	0.019561	0.020711	0.02328	0.025182	0.025182
TOG	0.242212	0.165348	0.110788	0.077413	0.057707	0.045079	0.036698	0.031219	0.02785	0.02615	0.025919	0.027437	0.030825	0.033333	0.033333
CO	1.545686	1.324905	1.120452	0.970352	0.860883	0.774565	0.704427	0.647293	0.601148	0.564883	0.538241	0.523309	0.521688	0.526744	0.526744
NOx	1.368577	1.068678	0.694853	0.449802	0.304677	0.234379	0.194514	0.170037	0.154444	0.144568	0.13874	0.13855	0.142596	0.145709	0.145709
CO2	1006.251	782.1453	611.2952	499.2885	427.2873	378.4869	346.0193	324.7563	312.6662	309.4284	314.6661	329.4139	355.639	373.5124	373.5124
CH4	0.049854	0.033456	0.022296	0.015544	0.01158	0.009055	0.007396	0.006324	0.005676	0.005363	0.005348	0.005673	0.006371	0.006886	0.006886
PM10	0.013296	0.009022	0.006218	0.004489	0.003478	0.002839	0.002418	0.002147	0.001989	0.001921	0.001939	0.002052	0.002275	0.002468	0.002468
PM2.5	0.012343	0.008394	0.005791	0.004184	0.003245	0.002652	0.002261	0.002009	0.001861	0.001798	0.001814	0.001919	0.002127	0.002307	0.002307
Benzene	0.005581	0.003787	0.002545	0.001784	0.001334	0.001045	0.000855	0.000732	0.000657	0.000622	0.000621	0.000659	0.00074	0.00074	0.00074
Acrolein	0.000227	0.000146	0.000099	0.000071	0.000054	0.000043	0.000036	0.000031	0.000029	0.000028	0.000029	0.000031	0.000035	0.000035	0.000035
Acetaldehyde	0.005493	0.004238	0.002777	0.001855	0.001356	0.001026	0.000789	0.000619	0.000498	0.000416	0.000369	0.000362	0.000384	0.000384	0.000384
Formaldehyde	0.012605	0.009518	0.006261	0.004215	0.003092	0.002354	0.00183	0.001459	0.001201	0.001031	0.000943	0.000944	0.001016	0.001016	0.001016
Butadiene	0.001105	0.000731	0.000494	0.00035	0.000263	0.000207	0.000172	0.000149	0.000136	0.000131	0.000133	0.000142	0.00016	0.00016	0.00016
Naphthalene	0.000169	0.000118	0.000079	0.000055	0.000041	0.000032	0.000026	0.000022	0.000019	0.000018	0.000018	0.000019	0.000021	0.000021	0.000021
POM	0.000248	0.000172	0.000113	0.000077	0.000057	0.000045	0.000036	0.000031	0.000027	0.000025	0.000025	0.000026	0.000029	0.000029	0.000029
Diesel PM	0.003144	0.002617	0.001956	0.001497	0.001263	0.00111	0.000995	0.000913	0.000859	0.000832	0.000831	0.000857	0.000909	0.000909	0.000909
DEOG	0.064493	0.051005	0.033245	0.021993	0.015984	0.012002	0.009092	0.006969	0.005431	0.004338	0.003677	0.003467	0.003563	0.003563	0.003563

2040

Fleet Average Running Exhaust Emission Factors (grams/veh-mile)

Pollutant Name	5 mph	10 mph	15 mph	20 mph	25 mph	30 mph	35 mph	40 mph	45 mph	50 mph	55 mph	60 mph	65 mph	70 mph	75 mph
HC	0.155851	0.107209	0.072049	0.050514	0.037542	0.029147	0.023544	0.01985	0.017538	0.016311	0.016026	0.016905	0.018994	0.020507	0.020507
ROG	0.137725	0.095825	0.064404	0.045084	0.033457	0.025894	0.020807	0.017418	0.015262	0.014067	0.013703	0.014384	0.016123	0.017384	0.017384
TOG	0.181003	0.125906	0.084522	0.059092	0.043824	0.0339	0.027222	0.022771	0.019937	0.018362	0.017872	0.01875	0.02101	0.022648	0.022648
CO	1.047369	0.884924	0.72399	0.610725	0.532873	0.473486	0.426295	0.388653	0.358877	0.33601	0.319755	0.312079	0.313841	0.318566	0.318566
NOx	1.453449	1.109039	0.677417	0.392937	0.227027	0.152078	0.111909	0.088221	0.073357	0.063686	0.057327	0.055453	0.056608	0.057408	0.057408
CO2	816.3367	642.6877	505.5261	415.7059	358.9012	320.7901	295.1651	277.8361	267.7899	264.227	266.7674	276.7834	296.0614	309.1992	309.1992
CH4	0.034984	0.024078	0.016105	0.011231	0.008325	0.006447	0.005192	0.004362	0.003839	0.003556	0.003481	0.003662	0.004108	0.004431	0.004431
PM10	0.005655	0.003867	0.002732	0.002038	0.001611	0.001337	0.001154	0.001033	0.000957	0.000915	0.000906	0.00094	0.00102	0.001084	0.001084
PM2.5	0.005246	0.003596	0.002545	0.001902	0.001506	0.001251	0.001081	0.000969	0.000897	0.000858	0.000849	0.00088	0.000954	0.001014	0.001014
Benzene	0.004231	0.002918	0.001963	0.001376	0.001025	0.000796	0.000644	0.000544	0.00048	0.000448	0.000442	0.000468	0.000525	0.000525	0.000525
Acrolein	0.000158	0.000102	0.000069	0.000049	0.000037	0.000029	0.000025	0.000022	0.00002	0.00002	0.00002	0.000022	0.000025	0.000025	0.000025
Acetaldehyde	0.005162	0.004028	0.002674	0.001818	0.001322	0.000986	0.000744	0.000569	0.000442	0.000352	0.000298	0.000283	0.000296	0.000296	0.000296
Formaldehyde	0.011419	0.008762	0.005827	0.003977	0.002901	0.002177	0.001659	0.001288	0.001023	0.000839	0.000734	0.000716	0.000762	0.000762	0.000762
Butadiene	0.000809	0.00054	0.000365	0.000258	0.000193	0.000152	0.000125	0.000108	0.000098	0.000094	0.000094	0.000101	0.000114	0.000114	0.000114
Naphthalene	0.000139	0.000098	0.000066	0.000046	0.000034	0.000026	0.000021	0.000018	0.000015	0.000014	0.000013	0.000014	0.000016	0.000016	0.000016
POM	0.000167	0.000118	0.000079	0.000055	0.000041	0.000031	0.000025	0.000021	0.000018	0.000016	0.000016	0.000016	0.000018	0.000018	0.000018
Diesel PM	0.001216	0.001072	0.000876	0.000738	0.000651	0.000588	0.000539	0.000499	0.000468	0.000444	0.000426	0.000424	0.000434	0.000434	0.000434
DEOG	0.062395	0.049723	0.032936	0.022268	0.016121	0.01194	0.008885	0.006644	0.004999	0.003792	0.003025	0.002742	0.002759	0.002759	0.002759

Regional Traffic (Annual VMT) and Emissions (Yearly)

Metric Tons per year

	Existing 2013	**2025**	**2040**	**2025 Build**	**2040 Build**
	1,197,741,358	1,349,057,818	1,528,944,016	1,348,999,732	1,529,387,024
HC	72.65	37.16	30.35	37.16	30.36
ROG	64.42	31.80	26.63	31.80	26.64
TOG	83.39	42.12	34.82	42.11	34.83
CO	1,754.98	962.58	655.02	962.53	655.21
NOx	708.80	252.86	148.69	252.85	148.73
CO2	505,678.34	438,115.01	424,795.87	438,096.14	424,918.96
CH4	15.25	8.53	6.67	8.53	6.67
PM10	8.10	3.19	1.74	3.19	1.74
PM2.5	7.67	2.99	1.63	2.99	1.63
Benzene	1.99	0.99	0.83	0.99	0.83
Acrolein	0.09	0.04	0.03	0.04	0.03
Acetaldehyde	1.84	0.84	0.87	0.84	0.87
Formaldehyde	4.27	1.97	1.97	1.97	1.97
Butadiene	0.40	0.20	0.17	0.20	0.17
Naphthalene	0.06	0.03	0.03	0.03	0.03
POM	0.09	0.04	0.03	0.04	0.03
Diesel PM	5.49	1.23	0.76	1.23	0.76
DEOG	21.19	9.40	10.16	9.40	10.16

Regional Traffic (Daily VMT) and Emissions (Daily)

Pounds per day

Pollutant	**Existing 2013**	**2025**	**2040**	**2025 Build**	**2040 Build**
	4,589,047	5,168,804	5,858,023	5,168,581	5,859,720
HC	613.67	313.87	256.35	313.85	256.43
ROG	544.11	268.62	224.95	268.61	225.01
TOG	704.38	355.75	294.08	355.73	294.16
CO	13,447.98	7,376.00	5,019.30	7,375.68	5,020.75
NOx	5,431.38	1,937.60	1,139.34	1,937.51	1,139.67
CO2	1,937.46	1,678.60	1,627.57	1,678.53	1,628.04
CH4	0.06	0.03	0.03	0.03	0.03
PM10	62.07	24.47	13.34	24.46	13.34
PM2.5	58.80	22.89	12.51	22.89	12.52
Benzene	16.82	8.34	7.03	8.34	7.03
Acrolein	0.72	0.35	0.28	0.35	0.28
Acetaldehyde	15.53	7.05	7.35	7.05	7.35
Formaldehyde	36.07	16.63	16.63	16.62	16.64
Butadiene	3.39	1.70	1.39	1.70	1.40
Naphthalene	0.51	0.25	0.23	0.25	0.23
POM	0.79	0.35	0.27	0.35	0.27
Diesel PM	46.41	10.40	6.44	10.40	6.45
DEOG	179.02	79.41	85.80	79.41	85.83

Attachment 3: Health Risk Calculations

Health Risk Calculation Methodology

A health risk assessment (HRA) for exposure to TACs requires the application of a risk characterization model to the results from the air dispersion model to estimate potential health risk at each sensitive receptor location. OEHHA and CARB recommend methods for conducting health risk assessments. The most recent OEHHA risk assessment guidelines were published in February of 2015.[17] These guidelines incorporate substantial changes designed to provide for enhanced protection of children, as required by State law, compared to previous published risk assessment guidelines. CARB has provided additional guidance on implementing OEHHA's recommended methods.[18] This HRA used the recent 2015 OEHHA risk assessment guidelines and CARB guidance. The BAAQMD has adopted recommended procedures for applying the newest OEHHA guidelines as part of Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants.[19] Exposure parameters from the OEHHA guidelines and the recent BAAQMD HRA Guidelines were used in this evaluation.

<u>Cancer Risk</u>

Potential increased cancer risk from inhalation of TACs are calculated based on the TAC concentration over the period of exposure, inhalation dose, the TAC cancer potency factor, and an age sensitivity factor to reflect the greater sensitivity of infants and children to cancer causing TACs. The inhalation dose depends on a person's breathing rate, exposure time and frequency of exposure, and the exposure duration. These parameters vary depending on the age, or age range, of the persons being exposed and whether the exposure is considered to occur at a residential location or other sensitive receptor location.

The current OEHHA guidance recommends that cancer risk be calculated by age groups to account for different breathing rates and sensitivity to TACs. Specifically, they recommend evaluating risks for the third trimester of pregnancy to age zero, ages zero to less than two (infant exposure), ages two to less than 16 (child exposure), and ages 16 to 70 (adult exposure). Age sensitivity factors (ASFs) associated with the different types of exposure are an ASF of 10 for the third trimester and infant exposures, an ASF of 3 for a child exposure, and an ASF of 1 for an adult exposure. Also associated with each exposure type are different breathing rates, expressed as liters per kilogram of body weight per day (L/kg-day). As recommended by the BAAQMD, 95th percentile breathing rates are used for the third trimester and infant exposures, and 80th percentile breathing rates for child and adult exposures. Additionally, CARB and the BAAQMD recommend the use of a residential exposure duration of 30 years for sources with long-term emissions (e.g., roadways).

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[17] OEHHA, 2015. *Air Toxics Hot Spots Program Risk Assessment Guidelines, The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*. Office of Environmental Health Hazard Assessment. February.

[18] CARB, 2015. *Risk Management Guidance for Stationary Sources of Air Toxics*. July 23.

[19] BAAQMD, 2016. *BAAQMD Air Toxics NSR Program Health Risk Assessment Guidelines*. December 2016.

Under previous OEHHA and BAAQMD HRA guidance, residential receptors are assumed to be at their home 24 hours a day, or 100 percent of the time. In the 2015 Risk Assessment Guidance, OEHHA includes adjustments to exposure duration to account for the fraction of time at home (FAH), which can be less than 100 percent of the time, based on updated population and activity statistics. The FAH factors are age-specific and are: 0.85 for third trimester of pregnancy to less than 2 years old, 0.72 for ages 2 to less than 16 years, and 0.73 for ages 16 to 70 years. Use of the FAH factors for children is allowed by the BAAQMD if there are no schools in the project vicinity that would have a cancer risk of one in a million or greater assuming 100 percent exposure (FAH = 1.0). An analysis to determine health risk at area schools has not been performed.

Functionally, cancer risk is calculated using the following parameters and formulas:

Cancer Risk (per million) = $CPF \times Inhalation\ Dose \times ASF \times ED/AT \times FAH \times 10^{6}$

Where:

CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = $C_{air} \times DBR \times A \times (EF/365) \times 10^{-6}$

Where:

C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

The health risk parameters used in this evaluation are summarized as follows:

Parameter	***Exposure Type →***	**Infant**		**Child**		**Adult**
	Age Range →	**3rd Trimester**	**0<2**	**2 < 9**	**2 < 16**	**16 - 30**
DPM Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$		1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
Daily Breathing Rate (L/kg-day)*		361	1,090	631	572	261
Inhalation Absorption Factor		1	1	1	1	1
Averaging Time (years)		70	70	70	70	70
Exposure Duration (years)		0.25	2	14	14	14
Exposure Frequency (days/year)		350	350	350	350	350
Age Sensitivity Factor		10	10	3	3	1
Fraction of Time at Home		1.0	1.0	1.0	1.0	0.73

* 95th percentile breathing rates for 3rd trimester and infants and 80th percentile for children and adults.

Non-Cancer Hazards

Potential non-cancer health hazards from TAC exposure are expressed in terms of HI, which is the ratio of the TAC concentration to a reference exposure level (REL). OEHHA has defined acceptable concentration levels for contaminants that pose non-cancer health hazards. TAC concentrations below the REL are not expected to cause adverse health impacts, even for sensitive individuals. The total HI is calculated as the sum of the HIs for each TAC evaluated and the total HI is compared to the BAAQMD significance thresholds to determine whether a significant non-cancer health impact from a project would occur.

Typically, for residential projects located near roadways with substantial TAC emissions, the primary TAC of concern with non-cancer health effects is DPM. For DPM, the chronic inhalation REL is 5 micrograms per cubic meter ($\mu g/m^3$).

Annual PM2.5 Concentrations

While not a TAC, fine particulate matter (PM2.5) has been identified by the BAAQMD as a pollutant with potential non-cancer health effects that should be included when evaluating potential community health impacts under CEQA. The thresholds of significance for PM2.5 (project level and cumulative) are in terms of an increase in the annual average concentration. When considering PM2.5 impacts, the contribution from all sources of PM2.5 emissions should be included. For projects with potential impacts from nearby local roadways, the PM2.5 impacts should include those from vehicle exhaust emissions, PM2.5 generated from vehicle tire and brake wear, and fugitive emissions from re-suspended dust on the roads.

Operational Screening Health Risk Assessment

Bay Area Air Quality Management District

Roadway Screening Analysis Calculator

County specific tables containing estimates of risk and hazard impacts from roadways in the Bay Area.

INSTRUCTIONS:

Input the site-specific characteristics of your project by using the drop down menu in the "Search Parameter" box. We recommend that this analysis be used for roadways with 10,000 AADT and above.

• County: Select the County where the project is located. The calculator is only applicable for projects within the nine Bay Area counties.

• Roadway Direction: Select the orientation that best matches the roadway. If the roadway orientation is neither clearly north-south nor east-west, use the highest values predicted from either orientation.

• Side of the Roadway: Identify on which side of the roadway the project is located.

• Distance from Roadway: Enter the distance in feet from the nearest edge of the roadway to the project site. The calculator estimates values for distances greater than 10 feet and less than 1000 feet. For distances greater than 1000 feet, the user can choose to extrapolate values using a distribution curve or apply 1000 feet values for greater distances.

• Annual Average Daily Traffic (ADT): Enter the annual average daily traffic on the roadway. These data may be collected from the city or the county (if the area is unincorporated).

When the user has completed the data entries, the screening level PM2.5 annual average concentration and the cancer risk results will appear in the Results Box on the right. Please note that the roadway tool is not applicable for California State Highways and the District refers the user to the Highway Screening Analysis Tool at: http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Tools-and-Methodology.aspx.

Notes and References listed below the Search Boxes

Search Parameters

County	Alameda
Roadway Direction	East-West
Side of the Roadway	North
Distance from Roadway	40 feet
Annual Average Daily Traffic (ADT)	6,775

Results

Alameda County

EAST-WEST DIRECTIONAL ROADWAY

PM2.5 annual average

0.102 ($\mu g/m^3$)

Cancer Risk

5.18 (per million)

Dublin Road Extension

Data for Alameda County based on meteorological data collected from Pleasanton in 2005

Adjusted for EMFAC2014 for 2018

3.56

(per million)

Note that EMFAC2014 predicts DSL PM2.5 aggragate rates in 2018 that are 46% of EMFAC2011 for 2014. TOG gasoline rates are 56% of EMFAC2011 year 2014 rates. This is for light- and medium-duty vehciles traveling at 30 mph for Bay Area

Notes and References:

1. Emissions were developed using EMFAC2011 for fleet mix in 2014 assuming 10,000 AADT and includes impacts from diesel and gasoline vehicle exhaust, brake and tire wear, and resuspended dust.
2. Roadways were modeled using ~~CALINE4~~ Cal3qhcr air dispersion model assuming a source length of one kilometer. Meteorological data used to estimate the screening values are noted at the bottom of the "Results" box.
3. Cancer risks were estimated for 70 year lifetime exposure starting in 2014 that includes sensitivity values for early life exposures and OEHHA toxicity values adopted in 2013.

Bay Area Air Quality Management District

Roadway Screening Analysis Calculator

County specific tables containing estimates of risk and hazard impacts from roadways in the Bay Area.

INSTRUCTIONS:

Input the site-specific characteristics of your project by using the drop down menu in the "Search Parameter" box. We recommend that this analysis be used for roadways with 10,000 AADT and above.

• County: Select the County where the project is located. The calculator is only applicable for projects within the nine Bay Area counties.

• Roadway Direction: Select the orientation that best matches the roadway. If the roadway orientation is neither clearly north-south nor east-west, use the highest values predicted from either orientation.

• Side of the Roadway: Identify on which side of the roadway the project is located.

• Distance from Roadway: Enter the distance in feet from the nearest edge of the roadway to the project site. The calculator estimates values for distances greater than 10 feet and less than 1000 feet. For distances greater than 1000 feet, the user can choose to extrapolate values using a distribution curve or apply 1000 feet values for greater distances.

• Annual Average Daily Traffic (ADT): Enter the annual average daily traffic on the roadway. These data may be collected from the city or the county (if the area is unincorporated).

When the user has completed the data entries, the screening level PM2.5 annual average concentration and the cancer risk results will appear in the Results Box on the right. Please note that the roadway tool is not applicable for California State Highways and the District refers the user to the Highway Screening Analysis Tool at: http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Tools-and-Methodology.aspx.

Notes and References listed below the Search Boxes

Search Parameters

County	Alameda
Roadway Direction	East-West
Side of the Roadway	North
Distance from Roadway	800 feet
Annual Average Daily Traffic (ADT)	19,145

Results

Alameda County

EAST-WEST DIRECTIONAL ROADWAY

PM2.5 annual average

0.034 ($\mu g/m^3$)

Cancer Risk

1.90 (per million)

Dublin Road Extension

Data for Alameda County based on meteorological data collected from Pleasanton in 2005

Adjusted to EMFAC2014 for 2018

1.30

(per million)

Note that EMFAC2014 predicts DSL PM2.5 aggragate rates in 2018 that are 46% of EMFAC2011 for 2014. TOG gasoline rates are 56% of EMFAC2011 year 2014 rates. This is for light- and medium-duty vehciles traveling at 30 mph for Bay Area

Notes and References:

1. Emissions were developed using EMFAC2011 for fleet mix in 2014 assuming 10,000 AADT and includes impacts from diesel and gasoline vehicle exhaust, brake and tire wear, and resuspended dust.
2. Roadways were modeled using ~~CALINE4~~ Cal3qhcr air dispersion model assuming a source length of one kilometer. Meteorological data used to estimate the screening values are noted at the bottom of the "Results" box.
3. Cancer risks were estimated for 70 year lifetime exposure starting in 2014 that includes sensitivity values for early life exposures and OEHHA toxicity values adopted in 2013.

Dublin Road Extension (Road Work), Dublin, CA

DPM Construction Emissions and Modeling Emission Rates - Unmitigated

Construction Year	Activity	DPM (ton/year)	Area Source	DPM Emissions (lb/yr)	DPM Emissions (lb/hr)	DPM Emissions (g/s)	Modeled Area (m^2)	DPM Emission Rate ($g/s/m^2$)
2020	Const-Area 1	0.0723	CON1_DPM	144.5	0.04399	5.54E-03	71,606	7.74E-08
2020	Const-Area 2	0.0454	CON2_DPM	90.8	0.02764	3.48E-03	44,995	7.74E-08
2020	Const-Area 3	0.0425	CON1_DPM	85.0	0.02586	3.26E-03	42,094	7.74E-08
2020	Const-Area 4	0.0354	CON2_DPM	70.9	0.02158	2.72E-03	35,124	7.74E-08
2020	Const-Area 5	0.0344	CON1_DPM	68.7	0.02092	2.64E-03	34,050	7.74E-08
2020	Const-Area 6	0.0350	CON2_DPM	69.9	0.02128	2.68E-03	34,636	7.74E-08
2020	Const-Area 7	0.0355	CON1_DPM	71.0	0.02161	2.72E-03	35,173	7.74E-08
2020	Const-Area 8	0.0196	CON2_DPM	39.2	0.01194	1.50E-03	19,429	7.74E-08
		0.3200					317,109	
Total		***0.3200***		***640***	***0.1948***	***0.0245***		

hr/day =	9	(8am - 5pm)
days/yr =	365	
hours/year =	3285	

Dublin Road Extension (Road Work), Dublin, CA

PM2.5 Fugitive Dust Construction Emissions for Modeling - Unmitigated

Construction Year	Activity	Area Source	PM2.5 Emissions (ton/year)	PM2.5 Emissions (lb/yr)	PM2.5 Emissions (lb/hr)	PM2.5 Emissions (g/s)	Modeled Area (m^2)	PM2.5 Emission Rate $g/s/m^2$
2020	Const-Area 1	CON1_FUG	0.2100	420.0	0.12786	1.61E-02	71,606	2.25E-07
2020	Const-Area 2	CON2_FUG	0.1320	263.9	0.08034	1.01E-02	44,995	2.25E-07
2020	Const-Area 3	CON1_FUG	0.1235	246.9	0.07516	9.47E-03	42,094	2.25E-07
2020	Const-Area 4	CON2_FUG	0.1030	206.0	0.06272	7.90E-03	35,124	2.25E-07
2020	Const-Area 5	CON1_FUG	0.0999	199.7	0.06080	7.66E-03	34,050	2.25E-07
2020	Const-Area 6	CON2_FUG	0.1016	203.2	0.06184	7.79E-03	34,636	2.25E-07
2020	Const-Area 7	CON1_FUG	0.1032	206.3	0.06280	7.91E-03	35,173	2.25E-07
2020	Const-Area 8	CON2_FUG	0.0570	114.0	0.03469	4.37E-03	19,429	2.25E-07
			0.9300				317,109	
Total			***0.9300***	***1860.0***	***0.5662***	***0.0713***		

hr/day =	9	(8am - 5pm)
days/yr =	365	
hours/year =	3285	

Dublin Road Extension (Bridge Work), Dublin, CA

DPM Emissions and Modeling Emission Rates

Construction Year	Activity	DPM (ton/year)	Area Source	DPM Emissions (lb/yr)	(lb/hr)	(g/s)	Modeled Area (m^2)	DPM Emission Rate ($g/s/m^2$)
2020	Construction	0.1600	CON_DPM	320.0	0.09741	1.23E-02	1,792	6.85E-06

Construction Hours

hr/day =	9	(8am - 5pm)
days/yr =	365	
hours/year =	3285	

Dublin Road Extension (Bridge Work), Dublin, CA

PM2.5 Fugitive Dust Emissions for Modeling

Construction Year	Activity	Area Source	PM2.5 Emissions (ton/year)	(lb/yr)	(lb/hr)	(g/s)	Modeled Area (m^2)	PM2.5 Emission Rate $g/s/m^2$
2020	Construction	CON_FUG	0.12000	240.0	0.07306	9.21E-03	1,792	5.14E-06

Construction Hours

hr/day =	9	(8am - 5pm)
days/yr =	365	
hours/year =	3285	

Dublin Road Extension, Dublin, CA - Construction Health Impact Summary

Maximum Impacts at MEI Location - Unmitigated

Emissions Year	Maximum Concentrations Exhaust PM10/DPM ($\mu g/m^3$)	Maximum Concentrations Fugitive PM2.5 ($\mu g/m^3$)	Cancer Risk (per million) Infant/Child	Cancer Risk (per million) Adult	Hazard Index (-)	Maximum Annual PM2.5 Concentration ($\mu g/m^3$)
2020	0.0069	0.0203	**1.1**	**0.02**	**0.001**	**0.03**

Dublin Road Extension, Dublin, CA - Construction Impacts - Without Mitigation
Maximum DPM Cancer Risk and PM2.5 Calculations From Construction
Impacts at Off-Site MEI Location - 1.5 meter receptor height

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor $(mg/kg\text{-}day)^{-1}$
ASF = Age sensitivity factor for specified age group
ED = Exposure duration (years)
AT = Averaging time for lifetime cancer risk (years)
FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10^{-6}

Where: C_{air} = concentration in air ($\mu g/m^3$)
DBR = daily breathing rate (L/kg body weight-day)
A = Inhalation absorption factor
EF = Exposure frequency (days/year)
10^{-6} = Conversion factor

Values

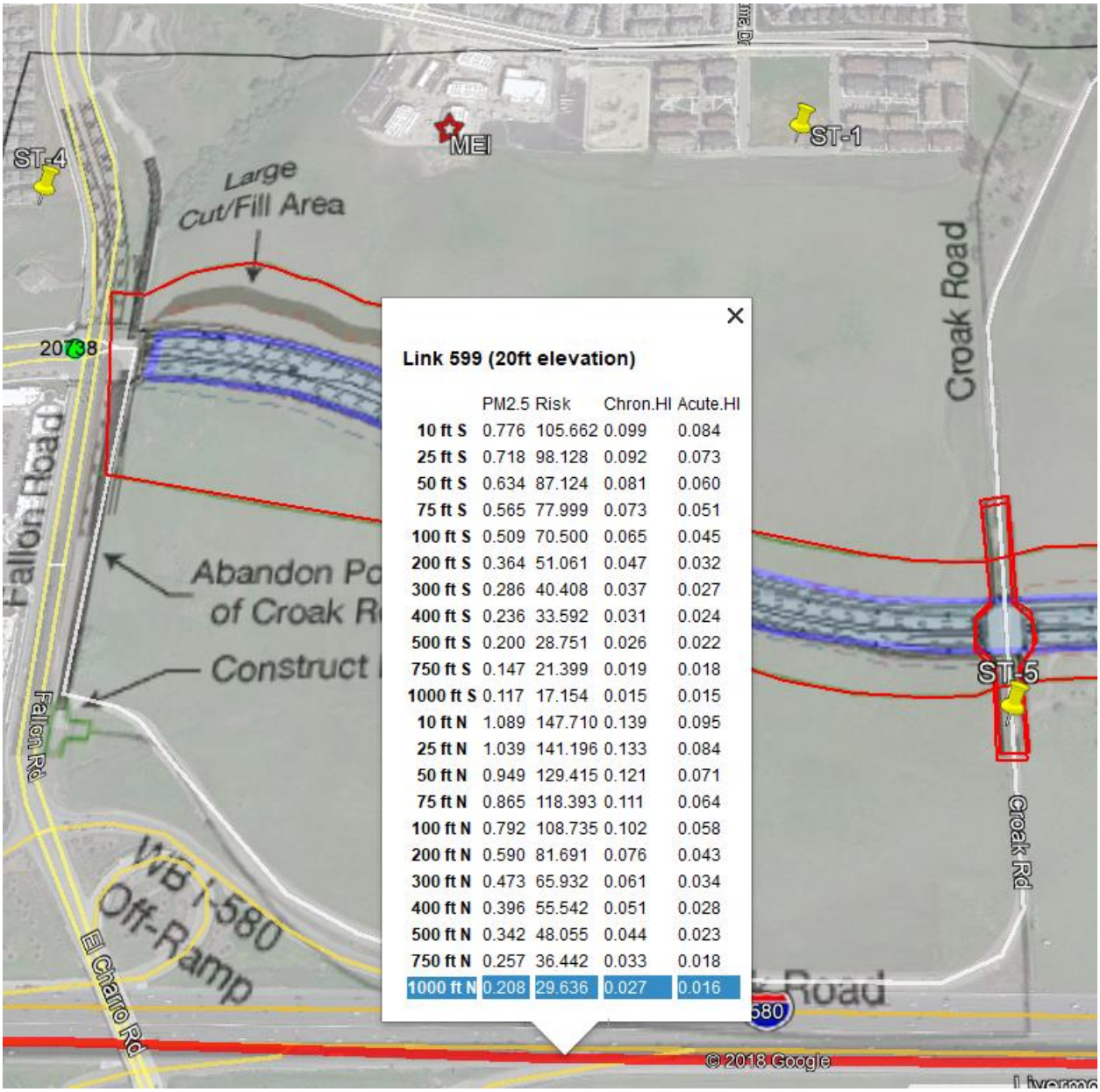
	Infant/Child				Adult
Age -->	**3rd Trimester**	**0 - 2**	**2 - 9**	**2 - 16**	**16 - 30**
Parameter					
ASF =	10	10	3	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	631	572	261
A =	1	1	1	1	1
EF =	350	350	350	350	350
AT =	70	70	70	70	70
FAH =	1.00	1.00	1.00	1.00	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

Construction Cancer Risk by Year - Maximum Impact Receptor Location

			Infant/Child - Exposure Information			Infant/Child	Adult - Exposure Information			Adult		
							Modeled				Maximum	
			DPM Conc (ug/m3)		Age	Cancer	DPM Conc (ug/m3)		Age	Cancer		
Exposure	Exposure Duration				Sensitivity	Risk			Sensitivity	Risk	Fugitive	Total
Year	(years)	Age	Year	Annual	Factor	(per million)	Year	Annual	Factor	(per million)	PM2.5	PM2.5
0	0.25	-0.25 - 0*	-	-	10	-	-	-	-	-		
1	1	0 - 1	2020	0.0069	10	1.13	2020	0.0069	1	0.02	0.0203	0.0272
2	1	1 - 2			10	0.00			1	0.00		
3	1	2 - 3			3	0.00			1	0.00		
4	1	3 - 4			3	0.00			1	0.00		
5	1	4 - 5			3	0.00			1	0.00		
6	1	5 - 6			3	0.00			1	0.00		
7	1	6 - 7			3	0.00			1	0.00		
8	1	7 - 8			3	0.00			1	0.00		
9	1	8 - 9			3	0.00			1	0.00		
10	1	9 - 10			3	0.00			1	0.00		
11	1	10 - 11			3	0.00			1	0.00		
12	1	11 - 12			3	0.00			1	0.00		
13	1	12 - 13			3	0.00			1	0.00		
14	1	13 - 14			3	0.00			1	0.00		
15	1	14 - 15			3	0.00			1	0.00		
16	1	15 - 16			3	0.00			1	0.00		
17	1	16-17			1	0.00			1	0.00		
18	1	17-18			1	0.00			1	0.00		
19	1	18-19			1	0.00			1	0.00		
20	1	19-20			1	0.00			1	0.00		
21	1	20-21			1	0.00			1	0.00		
22	1	21-22			1	0.00			1	0.00		
23	1	22-23			1	0.00			1	0.00		
24	1	23-24			1	0.00			1	0.00		
25	1	24-25			1	0.00			1	0.00		
26	1	25-26			1	0.00			1	0.00		
27	1	26-27			1	0.00			1	0.00		
28	1	27-28			1	0.00			1	0.00		
29	1	28-29			1	0.00			1	0.00		
30	1	29-30			1	0.00			1	0.00		
Total Increased Cancer Risk						**1.13**				**0.02**		

* Third trimester of pregnancy



	PM2.5	Risk	Chron.HI	Acute.HI
10 ft S	0.776	105.662	0.099	0.084
25 ft S	0.718	98.128	0.092	0.073
50 ft S	0.634	87.124	0.081	0.060
75 ft S	0.565	77.999	0.073	0.051
100 ft S	0.509	70.500	0.065	0.045
200 ft S	0.364	51.061	0.047	0.032
300 ft S	0.286	40.408	0.037	0.027
400 ft S	0.236	33.592	0.031	0.024
500 ft S	0.200	28.751	0.026	0.022
750 ft S	0.147	21.399	0.019	0.018
1000 ft S	0.117	17.154	0.015	0.015
10 ft N	1.089	147.710	0.139	0.095
25 ft N	1.039	141.196	0.133	0.084
50 ft N	0.949	129.415	0.121	0.071
75 ft N	0.865	118.393	0.111	0.064
100 ft N	0.792	108.735	0.102	0.058
200 ft N	0.590	81.691	0.076	0.043
300 ft N	0.473	65.932	0.061	0.034
400 ft N	0.396	55.542	0.051	0.028
500 ft N	0.342	48.055	0.044	0.023
750 ft N	0.257	36.442	0.033	0.018
1000 ft N	0.208	29.636	0.027	0.016

Adjusted for 2015 OEHHA *1.3744
Adjusted for 2,500 distance using 1,000ft level/2,500
3106165.1

Appendix D: Transportation Impact Assessment (TIA)

Transportation Impact Analysis

Dublin Boulevard – North Canyons Parkway Extension

Dublin, California

Final

August 2018

Transportation Impact Analysis

Dublin Boulevard– North Canyons Parkway Extension

Dublin, California

Prepared For:
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Project No. 20342

August 2018

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INTRODUCTION

PURPOSE OF REPORT

This study identifies the transportation impacts for the construction of the Dublin Boulevard-North Canyons Parkway Extension between Fallon Road in Dublin and Doolan Road in Livermore.

PROJECT DESCRIPTION

The City of Dublin, in coordination with the City of Livermore and County of Alameda, is seeking to obtain a Preliminary Engineering Study (Study) for the extension of Dublin Boulevard-North Canyons Parkway between Fallon Road in Dublin and Doolan Road in Livermore. The purpose of the study is to determine the needed number of lanes and surrounding roadway connectivity at the full build-out of the region, produce the roadway's Precise Alignment with street cross-sections, generate a right-of-way base map, conduct an appropriate level environmental review, provide planning level cost estimates, and produce a final package that could be used by staff for processing of a Precise Alignment Ordinance and to update General Plans of respective jurisdictions as per the new alignment and number of lanes.

REPORT ORGANIZATION

To address the transportation impacts of the proposed project, the report is organized based on the following sections:

- **Data Collection and Analysis Methodology** – Details the sources of the data used to perform the operations analysis and provides an overview of the analysis methodology used.
- **Existing Conditions** – Documents the existing transportation infrastructure for vehicles, pedestrians, bicyclists, and transit passengers. It also details the existing traffic operations at the study intersections.
- **Traffic Forecasts** – Provides a discussion on how traffic demand was estimated for the existing, near-term and 2040 conditions with and without the project
- **Transportation Impact Analysis** – Documents the project's impacts on traffic operations at the study locations in 2025 and 2040.
- **Multimodal Analysis** – Documents the project's impacts on pedestrians, bicyclists, and transit passengers qualitatively.
- **Transportation Operations Summary** – summarizes the findings of the report.

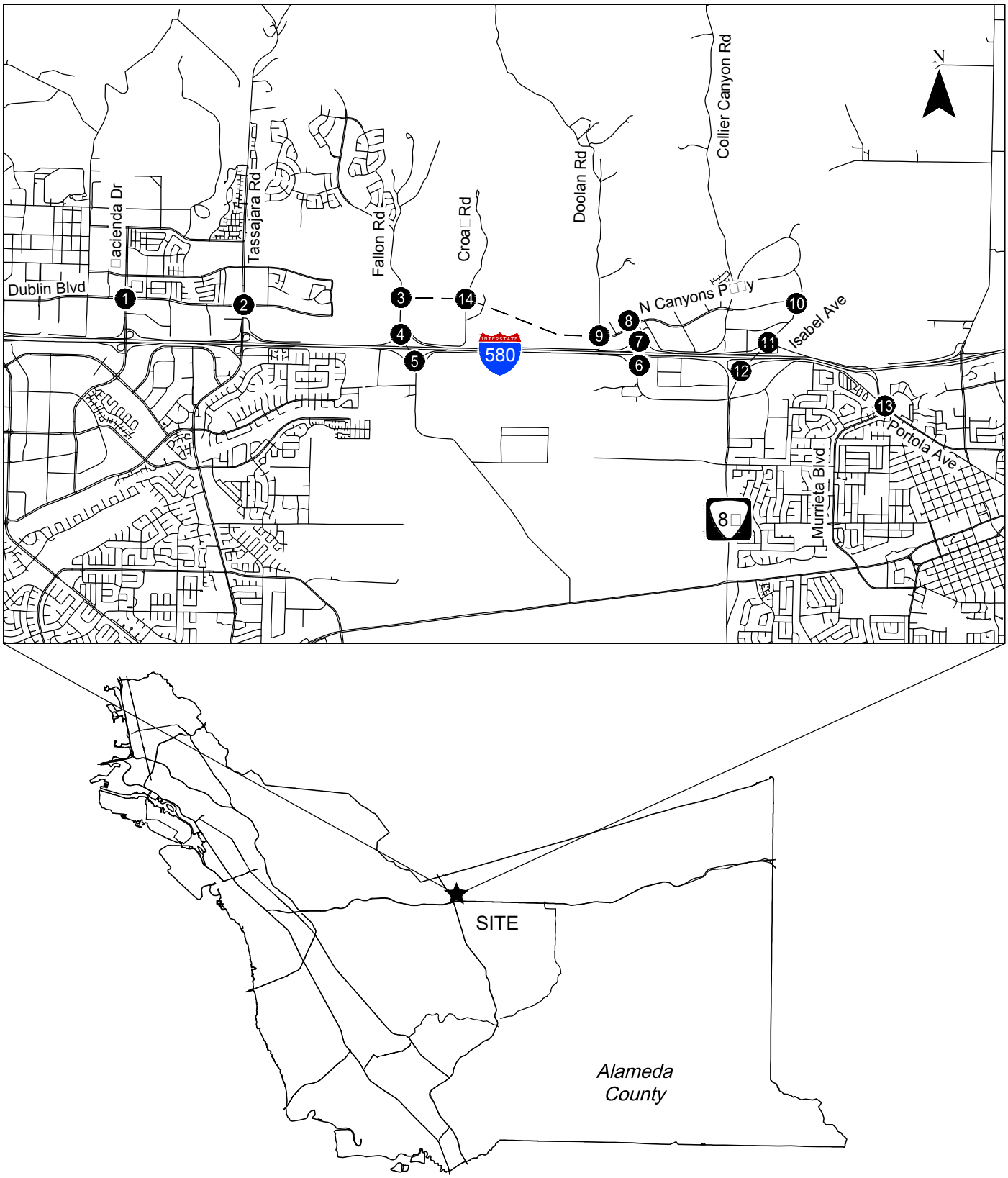
DATA COLLECTION AND ANALYSIS METHODOLOGY

STUDY AREA

The study area for this project was determined in consultation with the City of Dublin, City of Livermore and Alameda County and includes analysis at 13 intersections that exist today and one intersection that would exist once the project is implemented. The study does not include any freeway analyses since the project is a transportation improvement for arterial streets to accommodate planned land uses in the area rather than a change in land uses which may attract new trips. Similarly, this study does not include the analysis of any CMP facilities since the project would not generate more than 100 PM new peak hour trips. The fourteen intersections selected for the study area and the City in which they reside are listed below. Intersections noted with an asterisk (*) are within the Caltrans right-of-way.

1. Hacienda Drive and Dublin Boulevard (Dublin, CA)
2. Tassajara Road & Dublin Boulevard (Dublin, CA)
3. Fallon Road & Dublin Boulevard (Dublin, CA)
4. Fallon Road and I-580 WB Ramps* (Dublin, CA)
5. El Charro Road & I-580 EB Ramps* (Pleasanton, CA)
6. Airway Boulevard & I-580 EB Ramps* (Livermore, CA)
7. Airway Boulevard and I-580 WB Ramps* (Livermore, CA)
8. Airway Boulevard & N. Canyons Parkway (Livermore, CA)
9. Doolan Road & N. Canyons Parkway (Livermore, CA)
10. Isabel Avenue & Portola Avenue (Livermore, CA)
11. Isabel Avenue & I-580 WB Ramps* (Livermore, CA)
12. Isabel Avenue & I-580 EB Ramps* (Livermore, CA)
13. Murrieta Boulevard & Portola Avenue (Livermore, CA)
14. Croak Road & Dublin Boulevard Extension (Future) (Dublin, CA)

Exhibit 1 provides the location of these study intersections while Exhibit 2 shows the existing lane configurations and volumes.



- Study Intersections
- Proposed Project

Site Vicinity Map
Livermore, California

Exhibit
1

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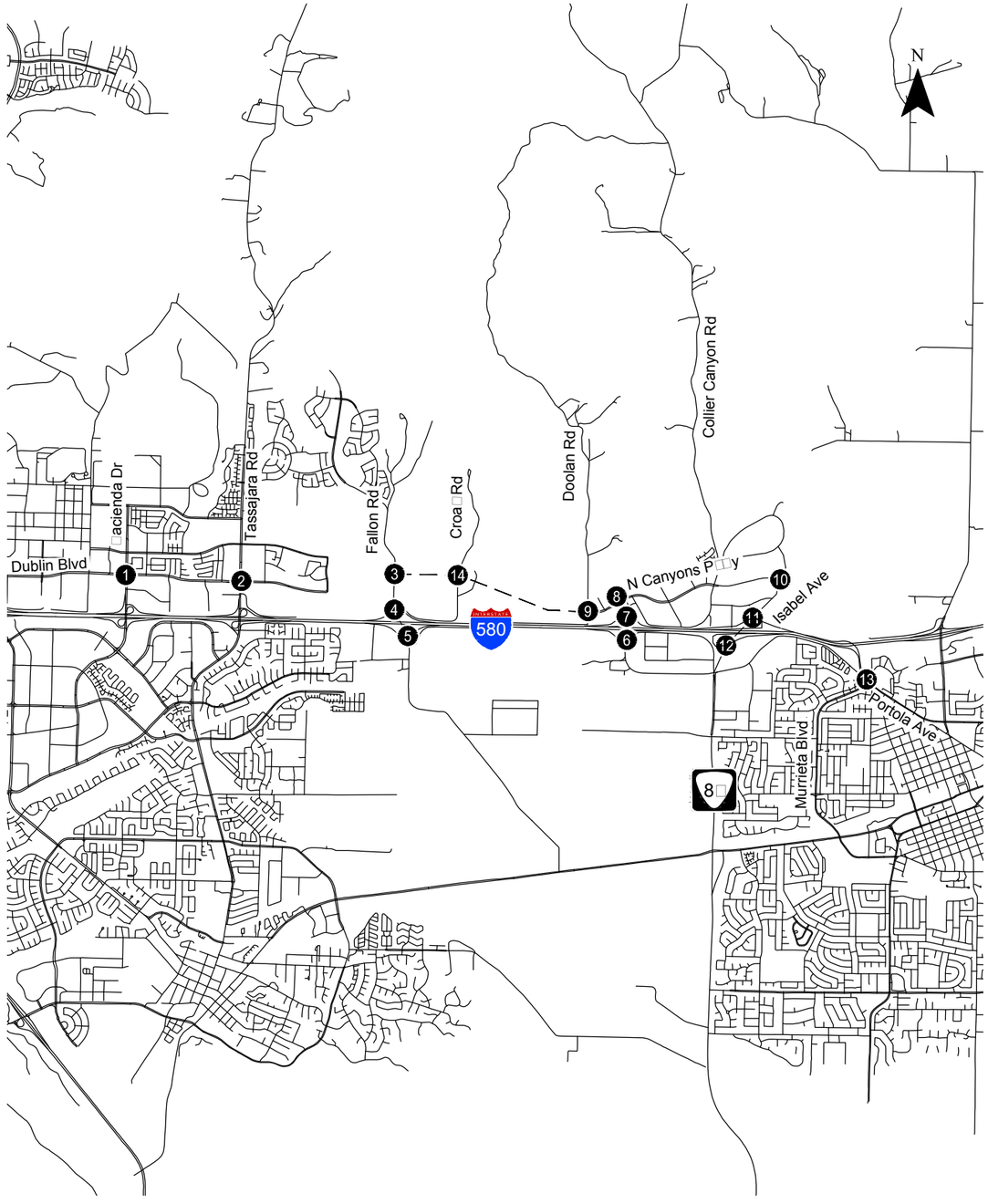

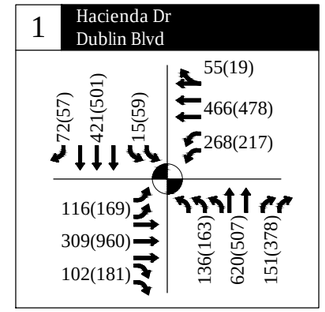

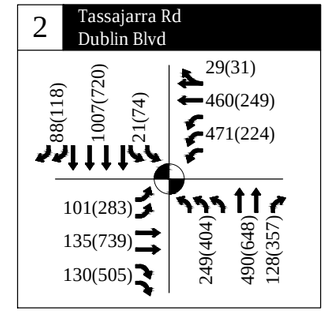

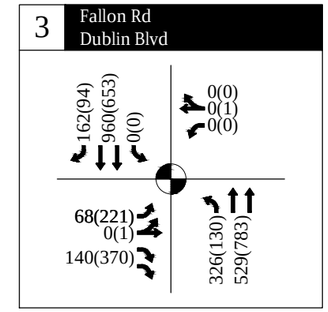

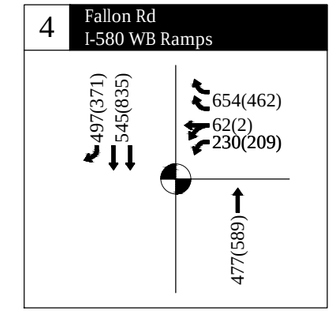

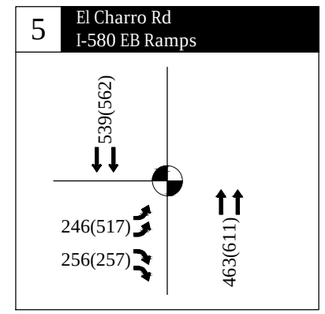

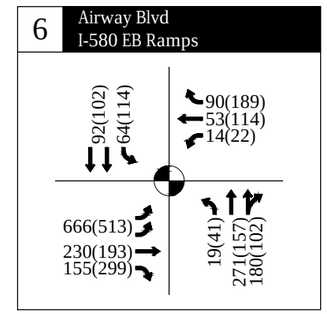

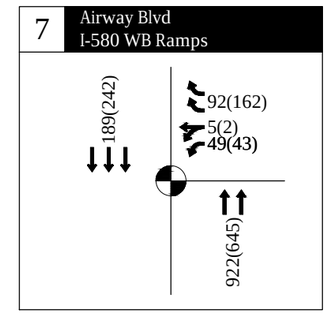

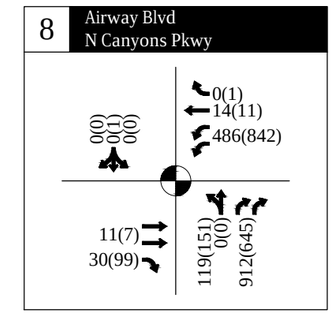

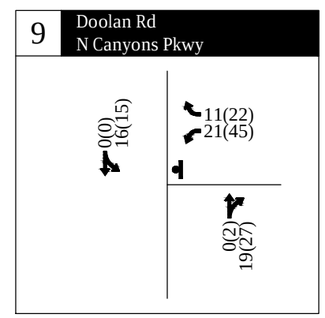

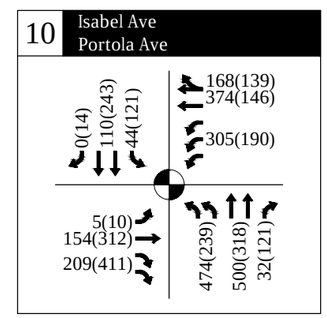

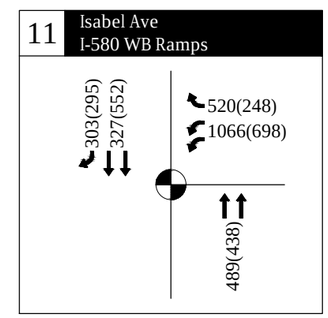

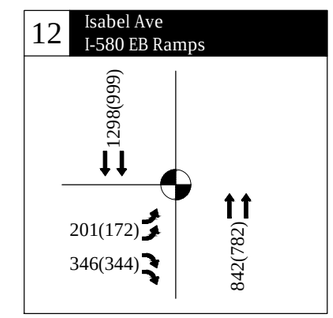

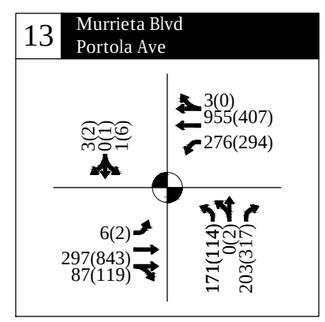

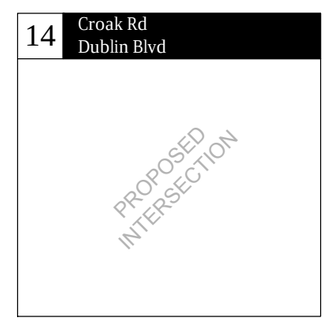

AM(PM) - Traffic Volume

- Traffic Signal

- - - Proposed Project

Existing Volumes
& Lane Configurations
Livermore, California

Exhibit
2

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DATA COLLECTION

Intersection turn movement counts for the study intersections were collected for a typical weekday during the AM (7:00 – 9:00 AM) and PM (4:00 – 6:00 PM) peak periods. The two dates used to collect data included Thursday, January 26, 2017 and Tuesday, February 14, 2017. The collected data is attached to this report as Appendix 1.

ANALYSIS METHODOLOGY AND LEVEL OF SERVICE DEFINITIONS

"Level of service" describes the operating conditions experienced by users of a facility. Level of service is a qualitative measure of the effect of many factors, including speed and travel time, traffic interruptions, freedom to maneuver, driving comfort and convenience. Levels of service are designated A through F from best to worst, which cover the entire range of traffic operations that might occur. Level of Service (LOS) A through E generally represents traffic volumes at less than roadway capacity, while LOS F represents over capacity and/or forced flow conditions.

Intersection analyses were conducted using the operational methodology outlined in the 2000 Highway Capacity Manual (HCM) (Transportation Research Board, Washington, D.C., 2000) as implemented by the Synchro software analysis tool. The following are the HCM methodologies for signalized and unsignalized intersections, respectively.

Signalized intersection. The HCM procedure calculates a weighted average control delay in seconds per vehicle at a signalized intersection and assigns a level of service designation based upon the delay.

Unsignalized intersection. The HCM methodology calculates a weighted average control delay in seconds per vehicle for each controlled intersection leg and for the intersection. A level of service designation for all-way stop-controlled intersections is based upon the weighted average control delay for all intersection legs, like the level of service designation for signalized intersections. For two-way stop-controlled intersections, the LOS for the worst approach is used as the LOS performance measure. Exhibit 3 presents the relationship of average delay to level of service for both signalized and unsignalized intersections.

Exhibit 3: Level of Service Definition for Intersections

Signalized Intersection			Unsignalized Intersection
Average Delay Per Vehicle (Seconds)	**LOS**	**Description of Traffic Conditions**	**Average Delay Per Vehicle (Seconds)**
≤10.0	A	Free flowing. Most vehicles do not have to stop.	≤10.0
>10.0 and ≤20.0	B	Minimal delays. Some vehicles must stop, although waits are not bothersome.	>10.0 and ≤15.0
>20.0 and ≤35.0	C	Acceptable delays. Significant numbers of vehicles must stop because of steady, high traffic volumes. Still, many pass without stopping.	>15.0 and ≤25.0
>35.0 and ≤55.0	D	Tolerable delays. Many vehicles must stop. Drivers are aware of heavier traffic. Cars may have to wait through more than one red light. Queues begin to form, often on more than one approach.	>25.0 and ≤35.0
>55.0 and ≤80.0	E	Significant delays. Cars may have to wait through more than one red light. Long queues form, sometimes on several approaches.	>35.0 and ≤50.0
>80.0	F	Excessive delays. Intersection is jammed. Many cars must wait through more than one red light, or more than 60 seconds. Traffic may back up into “up-stream” intersections.	>50.0

Source: HCM 2000

The City of Pleasanton and the City of Dublin general plans establish LOS D (delay <=55 seconds) as the LOS standard the cities endeavor to maintain. The City of Livermore has established a mid-level D (delay <= 45 seconds) threshold except in the Downtown Area or near freeway interchanges where the standard is LOS E (delay <=80 seconds).

EXISTING CONDITIONS

ROADWAY SYSTEM

The project area is located north of Interstate 580 (I-580) between Fallon Road and Airway Boulevard. The project would connect to the intersection of Dublin Boulevard and Fallon Road to the west and N. Canyons Parkway and Doolan Road to the east. Other roadway facilities of note in the area include:

I-580 is part of the interstate freeway system and extends in an east/west direction from San Rafael in the west to Tracy in the east. In Dublin, I-580 forms the southern city boundary with four to five lanes in each direction. Express Lanes are available in the project vicinity Monday through Friday 5:00 AM to 8:00 PM in both the eastbound and westbound directions. There are two eastbound express lanes and one westbound express lane between the I-580/I-680 interchange and Greenville Road. Carpools of two or more can use the lanes for free while solo-drivers are able to use them by paying a toll. All drivers, even carpools, motorcycles, and clean-air vehicles, must use a FasTrak Flex toll tag. I-580 is most directly accessible to the project via the Fallon Road and Airway Boulevard interchanges.

I-680 is a north/south designated scenic highway that is part of the interstate freeway system connecting San José to I-80 near Fairfield. This facility traverses the City of Dublin with an interchange at I-580 in western Dublin, as well as on- and off-ramps near Dublin Boulevard. South of I-580 it is a six-lane freeway, and north of I-580 it generally provides eight lanes, including Express Lanes which were completed in Fall 2017 (prior to Express Lane completion the lanes operated as carpool lanes), which adhere to the same hours and rules as those on I-580. The northbound express lane begins at Alcosta Boulevard and ends at Livorna Road near the SR-24 interchange. The southbound lane begins at Rudgear Road and ends at Alcosta Boulevard.

Dublin Boulevard is an east-west arterial roadway that extends from west of San Ramon Road to its current terminus at Fallon Road. The *City of Dublin General Plan* identifies the proposed project by extending Dublin Boulevard to North Canyons Parkway in Livermore. It is generally a four to six lane facility with a landscaped median. The posted speed limit near the project area is 45 mph. No on-street parking is permitted on this facility. Shared bicycle facilities (bike route), bicycle lanes and sidewalks are provided on portions of Dublin Boulevard.

Fallon Road/El Charro Road is a north-south arterial roadway that connects I-580 to Tassajara Road. It currently provides two travel lanes in each direction between I-580 and Central Parkway; this segment is ultimately planned to provide three and four lanes in each direction north and south of Dublin Boulevard, respectively. The posted speed limit near the project area is 45 mph. This roadway is being upgraded as development occurs on parcels fronting the roadway to enhance sidewalks and bicycle facilities along its length.

North Canyons Parkway is an east-west major street north of I-580. This arterial is primarily a four-lane divided roadway with left-turn pockets where applicable. The posted speed limit near the project area is

45 mph. The street currently terminates at Doolan Road to the west and becomes Portola Avenue to the east at Collier Canyon Road.

Portola Avenue is a major east-west street, located in northern Livermore that operates north of downtown. South of I-580, this arterial is primarily a four-lane divided roadway with left-turn pockets where applicable; north of I-580, this arterial varies from two lanes to six lanes. The roadway connects several neighborhoods and businesses and provides direct connection to other major arterials throughout northern Livermore. Portola Avenue previously terminated at ramps to/from I-580; in 2012, as the final component of the SR 84 (Isabel Avenue)/I-580 Interchange project, Portola Avenue was extended over I-580 to connect with North Canyons Parkway, near Las Positas College. The speed limit is 35 mph along the roadway.

Isabel Avenue is a north-south major street, a portion of which is also designated as State Route 84. Isabel Avenue typically carries heavy commuter traffic along western Livermore. The arterial traverses the entire length of the City of Livermore, provides direct access to I-580, and connects several neighborhoods and commercial areas in western Livermore. Isabel Avenue provides two travel lanes in each direction near I-580, three travel lanes in each direction between Airway Boulevard and Stanley Boulevard and reduces to one travel lane in each direction south of Stanley Boulevard, with left-turn pockets at key locations. However, at major intersection locations, the roadway is two lanes with a painted median. The State Route 84 Expressway Widening project, currently under construction and due for completion in 2018, will upgrade Isabel Avenue to expressway standards. The speed limit is primarily 50 mph along the entire roadway. Isabel Avenue would provide access to the proposed Isabel BART Station (Isabel Station) facilities north and south of I-580.

Murrieta Boulevard a north-south major street located in western Livermore. The arterial includes two lanes in each direction, with a raised median and left-turn pockets at most intersections. The street connects to Portola Avenue in the north and Fourth Street in the south. The speed limit is 35 mph along the entire roadway.

Airway Boulevard is a major street located in western Livermore that connects Isabel Avenue and E. Airway Boulevard to North Canyons Parkway through the I-580 interchange. Between Isabel Avenue and the I-580 Eastbound Ramps, Airway Boulevard is one lane in each direction with a two-lane center left turn lane. Through the I-580 Interchange to North Canyons Parkway, this roadway widens to three lanes in each direction. Bicycle lanes are provided south of the I-580 interchange to Isabel Boulevard. No bicycle facilities are provided through the I-580 interchange. Pedestrian facilities are sporadic along the facility mainly in areas with new development. Across the interchange, sidewalks are provided only on the east side.

Tassajara Road is a north-south arterial roadway that extends north from I-580 into San Ramon. South of I-580, Tassajara Road continues as ***Santa Rita Road***, a four- to six-lane arterial in Pleasanton that connects I-580 with Downtown Pleasanton. Tassajara Road is a four to six lane facility through Dublin with added capacity at intersections. Bicycle lanes are provided from Dublin Boulevard to north of N. Dublin Ranch Drive, where the roadway transitions to provide two travel lanes. Sidewalks are provided

adjacent to the developed areas along Tassajara Road. On-street parking is not permitted. Both Tassajara Road and Santa Rita Road are routes of regional significance.

BICYCLE FACILITIES

Bicycle facilities in Dublin include the following general types:

- Class I: Shared Use Path - These facilities provide a separate right-of-way and are designated for the exclusive use of bicycles and pedestrians with vehicle cross-flow minimized.
- Class II: Bicycle Lane - Bicycle lanes provide a restricted right-of-way and are designated for the use of bicycles for one-way travel with a striped lane on a street or highway. Bicycle lanes are generally a minimum of five feet wide. Vehicle parking and vehicle/pedestrian cross-flow are permitted.
- Class III: Bicycle Route with Sharrows - These bikeways provide right-of-way designated by signs or pavement markings for shared use with motor vehicles. These include sharrows or "shared-lane markings" to highlight the presence of bicyclists.

Near the project, bicycle facilities are generally not designated (signage and striping) on Fallon Road, Dublin Boulevard, or N. Canyons Parkway/Portola Avenue.

PEDESTRIAN FACILITIES

Pedestrian facilities include sidewalks, pathways, crosswalks, and pedestrian signals. Sidewalks are provided along most roadways in Dublin where land uses have been developed adjacent to the roadway. Since land use is not yet developed on many parcels near the Project, there are few sidewalks in the vicinity.

TRANSIT SERVICES

Transit service in the area is provided by Wheels (LAVTA), The County Connection, Bay Area Rapid Transit (BART), and Altamont Commuter Express (ACE).

Wheels (LAVTA) provides fixed-route and paratransit service throughout the Cities of Dublin, Pleasanton, and Livermore, and provides connections to other transit service providers. Wheels buses connect major destinations within the Cities of Dublin, Pleasanton and Livermore, including Downtown areas, employment centers and transit hubs, including BART and ACE stations. Wheels bus schedules are also coordinated with ACE and BART trains during peak commute hours. The Wheels Rapid system has one route (30R) that currently runs on I-580 between Airway Boulevard and Fallon Road. Upon construction of the proposed Project, this route is planned to be moved to the new Dublin Boulevard-North Canyons Parkway extension.

The County Connection provides transit service connecting destinations in Contra Costa County to the Tri-Valley area, including service from the Dublin/Pleasanton BART station to the San Ramon Transit Center and Bishop Ranch Business Park. There is also a route that connects the Walnut Creek BART station to the Downtown Pleasanton ACE station.

Bay Area Rapid Transit (BART) provides regional transportation connections to much of the Bay Area and the Dublin/Pleasanton line provides direct access to San Francisco, with several stops in Oakland where connections may be made to other lines. The closest BART station is the Dublin/Pleasanton Station located approximately 3.5 miles west of the intersection of Fallon Road and Dublin Boulevard. The West Dublin/Pleasanton BART station. BART train frequency ranges between 15-20 minutes from approximately 5:00 AM to 12:00 AM. Based on 2015 data from BART, approximately 8,000 passengers per day enter/exit the BART system at the Dublin/Pleasanton station.

BART recently released the Draft Environmental Impact Report for a proposed extension of the Dublin/Pleasanton BART line. The project would extend BART by 5.5 miles along I-580 from the existing Dublin/Pleasanton Station to a new facility near the Isabel Avenue interchange.

The ***Altamont Commuter Express*** (ACE) operates weekday train service between Stockton and San José with Tri-Valley stops in Downtown Pleasanton and Livermore. During the morning commute period, only westbound service from San Joaquin County to San José is provided, while only eastbound service is provided in the afternoon/evening commute period. There are four morning trains through Pleasanton between 5:33 AM and 8:18 AM, and four evening trains between 4:28 PM and 7:31 PM. Travel time from Stockton to Pleasanton is approximately one hour and fifteen minutes, while travel time from Pleasanton to San José is approximately one hour. Wheels provides shuttle services between the ACE stations and major employment/residential areas in Pleasanton and Livermore. ACE trains carry approximately 4,000 passengers on a typical weekday, with approximately 600 passengers boarding the ACE system at the downtown Pleasanton Station on a typical weekday.

TRAFFIC OPERATIONS

Intersection turning movement volumes (2017), lane configurations, and traffic control were used to calculate the levels of service at the study intersections for the AM and PM peak hours. Exhibit 4 shows a list of study intersections and the LOS results for existing conditions. As shown, none of the intersections were found to operate below the intersection LOS standard for the City in which the intersection is located. Detailed calculation worksheets for these findings are included in Appendix 2.

Exhibit 4: Existing Condition (2017) Intersection Level of Service

#	Location	LOS Standard	Existing AM			Existing PM		
			V/C	Delay	LOS	V/C	Delay	LOS
1	Hacienda Drive & Dublin Boulevard	D	0.52	24.3	C	0.58	29.0	C
2	Tassajara Road & Dublin Boulevard	D	0.58	28.7	C	0.68	32.5	C
3	Fallon Road & Dublin Boulevard	D	0.65	34.4	C	0.49	20.4	C
4	Fallon Road & I-580 WB Ramps	D	0.54	10.8	B	0.57	10.2	B
5	El Charro Road & I-580 EB Ramps	D	0.37	5.6	A	0.49	6.8	A
6	Airway Boulevard & I-580 EB Ramps	E	0.5	32.1	C	0.42	32.9	C
7	Airway Boulevard & I-580 WB Ramps	E	0.37	5.7	A	0.25	9.4	A
8	Airway Boulevard & N. Canyons Parkway	E	0.37	45.7	D	0.47	59.2	E
9	Doolan Road & N. Canyons Parkway	Mid-D*	0.03	8.8	A	0.06	9.0	A
10	Isabel Avenue & Portola Avenue	E	0.68	29.4	C	0.51	25.7	C
11	Isabel Avenue & I-580 WB Ramps	E	0.81	18.3	B	0.61	11.9	B
12	Isabel Avenue & I-580 EB Ramps	E	0.72	16.2	B	0.60	11.7	B
13	Murrieta Boulevard & Portola Avenue	Mid-D	0.53	23.0	C	0.58	30.2	C

Source: Kittelson & Associates, Inc. 2018
Intersections analyzed using HCM 2000 methodologies
LOS findings in grey represent intersections operating below the applicable LOS standard
*Mid-D is delay <= 45 seconds per vehicle

In addition to assessing the delay, volume to capacity (v/c) ratio, and LOS, Kittelson analyzed the 95th percentile queue for each movement of the study intersections. The findings of this analysis are shown in Exhibit 5 and Exhibit 6 for the AM and PM peak hours, respectively. Detailed queue worksheets for these findings are included in Appendix 3. As shown, queues were generally contained within the available storage except at the following locations:

- Fallon Road and Dublin Boulevard – the estimated 95th percentile queue for the northbound left-turn is anticipated to exceed the available storage by about 39 feet or approximately two vehicles.
- Murrieta Boulevard and Portola Avenue – the 95th percentile queue for the eastbound through movement is expected to exceed the available storage between Murrieta Boulevard and E. Airway Boulevard on Portola Avenue by 197 feet or about eight vehicles.

Exhibit 5: 95th Percentile Queue Length in Feet for Existing AM Conditions (2017)

#	Location		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
1	Hacienda Drive and Dublin Boulevard	Storage	270	515	240	260	670		250	460	240	280	720	215
		No Project	85	100	23	165	148		65	308	27	19	140	25
2	Tassajara Road & Dublin Boulevard	Storage	250	565	300	380	830		355	930	930	280	635	250
		No Project	70	74	27	168	217		99	213	43	22	244	18
3	Fallon Road & Dublin Boulevard	Storage	340	640	640	55	500		380	580	0	0	1,250	215
		No Project	44	44	15	0	0		#419	111	0	0	386	22
4	Fallon Road and I-580 WB Ramps	Storage				140	1,500	140		1,000			650	220
		No Project				107	109	80		247			78	32
5	El Charro Road & I-580 EB Ramps	Storage	275		275					825			1,050	
		No Project	28		13					34			40	
6	Airway Boulevard & I-580 EB Ramps	Storage	575	380	380	250	1,000	250	360	1,000	1,000	815	815	
		No Project	302	222	49	30	76	39	38	145	0	93	53	
7	Airway Boulevard and I-580 WB Ramps	Storage				115	1,350	475		780			530	
		No Project				49	50	23		27			0	
8	Airway Boulevard & N. Canyons Parkway	Storage		500	500	510	510	190		540	540		100	
		No Project		11	0	195	12	0		149	194		0	
9	Doolan Road & N. Canyons Parkway	Storage					650			250			250	
		No Project					2			0			1	
10	Isabel Avenue & Portola Avenue	Storage	850	850	350	420	1,000		300	1,850	300	195	400	
		No Project	17	146	12	115	197		#298	256	0	72	67	
11	Isabel Avenue & I-580 WB Ramps	Storage				1,500		460		1,315			1,830	320
		No Project				343		225		167			85	31
12	Isabel Avenue & I-580 EB Ramps	Storage	255		255					1,050			1,322	
		No Project	104		142					96			462	
13	Murrieta Boulevard & Portola Avenue	Storage	75	300		360	825		175	1,000	1,000		100	
		No Project	20	164		290	319		111	111	63		0	

Grey highlights indicate queue exceeds the turn pocket storage for turn movements or extends into an upstream signalized intersection for through movements
95th percentile volume exceeds capacity, queue may be longer.
Source: Kittelson & Associates, Inc. 2018

Exhibit 6: 95th Percentile Queue Length in Feet for Existing PM Conditions (2017)

#	Location		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
1	Hacienda Drive and Dublin Boulevard	Storage	270	515	240	260	670		250	460	240	280	720	215
		No Project	108	293	28	132	140		72	248	40	48	165	13
2	Tassajara Road & Dublin Boulevard	Storage	250	565	300	380	830		355	930	930	280	635	250
		No Project	168	342	40	95	131		155	322	73	58	194	27
3	Fallon Road & Dublin Boulevard	Storage	340	640	640	55	500		380	580	0	0	1,250	215
		No Project	134	136	24	0	6		146	181	0	0	244	0
4	Fallon Road and I-580 WB Ramps	Storage				1,500	1,500	1,500		1,000			650	220
		No Project				82	83	65		322			131	29
5	El Charro Road & I-580 EB Ramps	Storage	275		275					825			1,050	
		No Project	71		15					66			62	
6	Airway Boulevard & I-580 EB Ramps	Storage	575	380	380	250	1,000	250	360	1,000	1,000	815	815	
		No Project	221	182	66	37	133	51	62	75	0	147	68	
7	Airway Boulevard and I-580 WB Ramps	Storage				115	1,350	475		780			530	
		No Project				44	45	32		51			1	
8	Airway Boulevard & N. Canyons Parkway	Storage		500	500	510	510	190		540	540		100	
		No Project		8	38	#489	12	0		179	175		7	
9	Doolan Road & N. Canyons Parkway	Storage					650			250			250	
		No Project					5			0			1	
10	Isabel Avenue & Portola Avenue	Storage	850	850	350	420	1,000		300	1,850	300	195	400	
		No Project	24	261	35	69	66		121	151	49	138	114	
11	Isabel Avenue & I-580 WB Ramps	Storage				1,500		460		1,315			1,830	320
		No Project				147		44		102			93	34
12	Isabel Avenue & I-580 EB Ramps	Storage	255		255					1,050			1,322	
		No Project	59		82					73			225	
13	Murrieta Boulevard & Portola Avenue	Storage	75	1,500		360	825		175	1,000	1,000		100	
		No Project	11	497		334	117		90	90	86		25	

Grey highlights indicate queue exceeds the turn pocket storage for turn movements or extends into an upstream signalized intersection for through movements

95th percentile volume exceeds capacity, queue may be longer.

Source: Kittelson & Associates, Inc. 2018

TRAFFIC FORECASTS

MODEL BACKGROUND

As the project is anticipated to have regional significance, the Alameda County Transportation Commission (CTC) Countywide model was used instead of the Dublin Citywide model, after accounting for specific updates within the study area from the East Dublin Specific Plan. The most recent version of the countywide model is based on land use assumptions from ABAG Projections 2013 (Plan Bay Area) with a base year of 2013, an interim year of 2025 and a long-range year of 2040.

Demand Model

As described above, the model chosen to prepare forecasts for the Dublin Extension project was the Alameda CTC Countywide model. The specific version used was the one adapted for the recent BART to Livermore Extension (BLVX) EIR Study. This provided a reasonable model validation in the study area and conformed to any network and zone enhancements by the BART team. And based on the traffic forecasts from the BLVX Study, the most conservative volumes for the Dublin Boulevard Extension are for the No-BART extension scenario. Since BART is not an approved project and does not have funding for construction, to be conservative, the No-BART extension scenario was proposed for the Dublin Boulevard Extension Project. Also, the various BART scenarios analyzed under the BLVX EIR have different impacts and circulation associated with the BART stations and related park and ride vehicle trips, which are adequately addressed under their EIR.

Model Scenarios

The 2017[1], 2025 and 2040 cumulative no-project forecasts would need to address inclusion of assumptions for BLVX in the model. At a minimum, the team has proposed to include the most conservative assumption which is a no-BART extension scenario. Year 2017 represents the existing year for the land uses in the travel demand model and was derived by interpolating the land use projections between the 2013 base year model and the interim 2025 model. Interpolating the land use to 2017 makes the land use consistent with the existing conditions counts collected in 2017. Year 2025 represents opening year for the Dublin Boulevard extension, and 2040 represents the design year or cumulative year.

Network assumptions

Future networks assumptions were based on the Alameda Countywide Transportation Plan and MTC Plan Bay Area RTP as reflected in the Alameda CTC Countywide Model (BLVX version – No BART Scenario).

[1] 2017 forecasts were interpolated between the 2013 base year model and the 2025 model

Network assumptions were adjusted based on local general plan information provided by the Project team.

Local access to Dublin Boulevard extension was based on assumptions from the Dublin General Plan, County General Plan and Livermore General Plan. Primary access would be at the cross street of Croak Road to the Dublin Boulevard extension. Key network assumptions include:

- I-580 Express Lanes (opened in 2016)
- Phase 2 interchange improvements at Isabel Avenue Interchange (by 2040)
- Phase 2 interchange improvements at Fallon Road/El Charro Road Interchange (by 2040)
- Widening of Portola Avenue overpass (by 2040)

Land Use Assumptions

Regional land use assumptions were obtained from the Alameda CTC Countywide model, which are based on ABAG Plan Bay Area 2013. In addition, local land use assumptions for the study area were supplemented with information from the City of Dublin General Plan and City of Livermore General Plan. The City of Dublin general plan assumptions were obtained from the City of Dublin Citywide model and included land uses from prior studies, including the recently approved Kaiser Medical Center EIR and the East Dublin Specific Plan and Fallon Village Specific Plan. The City of Livermore general plan assumptions were assumed for the Isabel Neighborhood area. These differ from the land uses proposed in the Isabel Neighborhood Plan (the Draft EIR is currently in circulation). Alameda County General Plan assumptions were based directly on ABAG Plan Bay Area 2013 as reflected in the Alameda CTC Countywide model.

2017

Land uses for 2017 are based on an interpolation of the land uses found in the 2013 model representing ABAG Plan Bay Area and the 2025 interim year model land uses described below. There is minimal land uses in the immediate study corridor, reflective of existing rural conditions.

2025

Land uses for the 2025 modeling include ABAG Plan Bay Area up to 2025 for all regional areas. City of Dublin planned development for 2025 was confirmed with the City of Dublin and is consistent with ABAG Plan Bay Area in the study corridor. In addition, Phase 1 of the recently approved Kaiser Medical Center adjacent to Dublin Boulevard was assumed to be developed by 2025. City of Livermore assumptions were consistent with General Plan land uses for the Isabel Neighborhood area (phased to 2025 level) and ABAG assumptions elsewhere in Livermore. Alameda County land uses were consistent with ABAG Plan Bay Area 2013 for 2025 and assumed no growth in the immediate study area by 2025.

2040

Land uses for the 2040 modeling include ABAG Plan Bay Area for all regional areas. City of Dublin planned development for 2040 was confirmed with the City of Dublin. City of Dublin General Plan buildout

development was assumed for the immediate study corridor and ABAG Plan Bay Area elsewhere in the city. For the recently approved Kaiser Medical Center, full buildout of all phases was assumed to be developed by 2040. City of Livermore General Plan buildout land uses were assumed for the Isabel Neighborhood area. Alameda County land uses were consistent with ABAG Plan Bay Area 2013 for 2040 and assumed no growth in the immediate study area by 2040.

Land use assumptions by study area traffic analysis zones are shown in Appendix 14.

MODEL VALIDATION

The Alameda CTC model was validated using recent 2017 counts at the key study intersections for AM and PM peak hours. Exhibit 7 summarizes the aggregate model validation for the AM and PM peak hours. In both AM and PM peaks, the model was lower than the counts in aggregate. This is partly due to the difference between the model base year of 2013 and the count year of 2017. Some of this difference was removed using the industry standard method of interpolating the model volumes up to 2017. Further correlation to remove the remaining model differences was achieved using the incremental intersection adjustment method based on NCHRP-255 (methodology relies on adding the model growth to the counts and resolving any negative volumes). Detailed model validation results for all intersections is provided in Appendix 14.

Exhibit 7: Aggregate Model Validation

Peak Hour	Count	Model	Difference	Percent Difference
AM Peak	29,342	27,023	-2,319	-8%
PM Peak	32,367	25,707	-6,660	-21%

Source: Alameda CTC Model and Kittelson and Associates, Inc., 2017

FORECAST DEVELOPMENT

Traffic forecasts were developed using the Alameda CTC model. Forecasts were prepared for the following scenarios:

- 2017 No-Project - base year
- 2017 Plus Project
- 2025 No-Project – near term
- 2025 Plus Project
- 2040 No-Project – cumulative
- 2040 Plus Project

No-Project model runs were consistent with the Alameda CTC model. The Plus Project runs included the addition of the Extension project coded as a 4 or 6 lane residential arterial with posted speeds of 45mph.

Model runs were conducted for all analysis scenarios and results were extracted at roadway segments and intersections. Year 2017 results were interpolated between the 2013 base year model and 2025 interim year model to match the count year. The forecast results were compared between no-project and plus project conditions to check for reasonableness. Given that travel demand models are not sufficiently detailed enough to accurately forecast turn volumes at intersections, therefore only the growth from the forecasts (2025 minus 2017 and 2040 minus 2017) was applied to the counts to develop more accurate adjusted forecast intersection turn volumes necessary for design and operational analysis. High demand locations associated with diversion off the freeway were identified during the operational analysis using model select link and difference plots and further adjustments were applied to minimize excessive diversion.

Given that the I-580 Express lanes that opened in 2016 were not represented in the year 2013 model, the year 2013 plus project forecasts were derived from applying the project increment from the 2025 scenarios and adding that to the 2017 counts.

Detailed 2017, 2025 and 2040 traffic forecasts for no-project and plus project conditions are provided in the Appendix 15.

FOUR LANES VERSUS SIX LANES

As part of the early forecasting tasks, Kittelson explored whether the Dublin Boulevard extension should be four lanes or six. To determine the number of lanes that would be required in 2040, Kittelson used the model with updated land uses from local general plans to estimate the traffic demand during the AM and PM peak 1-hour periods for the Project. Demand in vehicles-per-hour (vph) was estimated using the travel demand model for both a four and six-lane facility. The comparison of the four-lane versus six-lane demand is shown in Exhibit 8. As shown, the six-lane facility is similar to the four-lane facility indicating that a four-lane facility would not significantly constrain the number of vehicles using the Project. Average travel speeds along the corridor also showed little change as discussed in the transit section of this report and shown tabularly in Exhibit 26.

Exhibit 8: Four-Lane Versus Six-Lane Demand for the Project

Traffic Volumes (vph)	AM Peak Hour	PM Peak Hour
Four-Lane Extension	2,057 vph	1,433 vph
Six-Lane Extension	2,224 vph	1,463 vph
Difference	167 vph (8%)	30 vph (2%)

Source: Alameda CTC Model and Kittelson and Associates, Inc., 2017

Note: vph = vehicles per hour

The final comparison Kittelson used for determining whether the new facility should be four or six lanes is comparing the estimated demand with the planning level capacity estimates found in the Highway Capacity Manual (HCM). Exhibit 16-16 in the HCM 6th Edition shows generalized service volume tables based on the HCM methodologies and default inputs for arterials. Assuming a 45-mph posted speed limit and typical values for K-Factor (0.10) and D-Factor (0.60), the estimated capacity of a four–lane arterial versus a six-lane arterial is 3,030 vph and 4,560 vph, respectively. As shown in Exhibit 8, demand is less than 2,250 vph indicating a four-lane arterial is operating at about 74% of capacity indicating little congestion during peak periods.

DEDICATED TRANSIT LANE

Given that the proposed extension could be utilized to provide new transit route access north of I-580, the potential for including a dedicated transit lane was explored. Travel demand forecasts for cumulative conditions found that travel speeds remain at close to free flow for the proposed cross section with four lanes east of Croak Road and six lanes west of Croak Road. Since the corridor is forecasted to operate at close to free flow conditions in the future, a dedicated transit lane would not provide substantial additional benefit since the transit vehicle would be traveling at approximately the same speed as regular vehicles.

While transit vehicles will travel at similar speeds with or without the dedicated transit lane, there is some advantage to providing queue jump lanes at the intersections where most of the delay due to congestion usually occurs. To allow for this possibility, the project design has incorporated long right turn lanes at the signalized intersections that can function as queue jump lanes in the future. With transit vehicles able to run at free flow speeds in the general purpose lanes between intersections and access to queue jump lanes at the intersections, transit travel times are anticipated to improve as routes shift from I-580 onto the project corridor.

TRANSPORTATION IMPACT ANALYSIS

SIGNIFICANCE CRITERIA

The determination of significance for project impacts is based on applicable policies, regulations, goals, and guidelines defined by the City of Dublin, City of Pleasanton, City of Livermore, and Caltrans. The impacts of the project were evaluated by comparing the findings of the delay and level of service under Near-term with Project, and Cumulative with Project conditions to the no project conditions (base year). The following criteria were used to identify significant off-site intersection impacts of the proposed project under the various criteria. The impact criteria used at each location depended on the location in which the facility resides.

City of Dublin

Impacts to intersections residing within the City of Dublin were considered significant if the project would result in the following:

- If a signalized intersection is projected to operate within motor vehicle delay ranges associated with LOS D or better (average control delay equal to or less than 55 seconds per vehicle) without the project and the project is expected to cause the facility to operate at a LOS E or F;
- If at a study, signalized intersection where the motor vehicle level of service is E, the project would cause an increase in the average delay for any of the critical movements of six (6) seconds or more.
- If at a study, signalized intersection where the motor vehicle level of service is LOS F, the project would cause (a) the overall volume-to-capacity ("V/C") ratio to increase 0.03 or more or (b) the critical movement V/C ratio to increase 0.05 or more.
- If the operations of an unsignalized study intersection is projected to decline with the addition of project traffic, and if the installation of a traffic signal based on the Manual on Uniform Traffic Control Devices (MUTCD) Peak Hour Signal Warrant (Warrant 3) would be warranted.

- A queuing impact would be identified if:
    - project traffic causes the 95th percentile queue in a turn pocket to extend beyond the turn pocket by more than 25 feet (i.e., the length of one vehicle) into adjacent traffic lanes that operate (i.e., move) separately from the turn lane; or
    - If the 95th percentile queue already exceeds that turn pocket length under no project conditions, the project traffic lengthens the queue by more than 25 feet.

City of Pleasanton

Impacts to intersections residing within the City of Pleasanton were considered significant if the project would result in the following:

- An impact would be assessed if the addition of project traffic results in the deterioration of a signalized intersection from LOS D (or better) to LOS E or LOS F. There are a few exceptions to the LOS standard that includes the City of Pleasanton Gateway intersections. Gateway intersections include all ramp terminal intersections on I-580. For the Gateway intersections, the LOS standard could be below LOS D when no reasonable mitigation exists, or the necessary mitigation is contrary to other goals and policies of the City.
- For signalized intersections located in Pleasanton, an impact would be assessed at an intersection projected to operate at LOS E or F prior to the addition of project traffic, if the project adds 10 or more peak hour trips.
- A queuing impact would be identified if:
    - project traffic causes the 95th percentile queue in a turn pocket to extend beyond the turn pocket by more than 25 feet (i.e., the length of one vehicle) into adjacent traffic lanes that operate (i.e., move) separately from the turn lane; or
    - If the 95th percentile queue already exceeds that turn pocket length under no project conditions, the project traffic lengthens the queue by more than 25 feet.

City of Livermore

Impacts to intersections residing within the City of Livermore were considered significant if the project would result in the following:

- If a signalized intersection is projected to operate within motor vehicle delay ranges associated with a mid-level LOS D or better (average control delay equal to or less than or equal to 45 seconds per vehicle) without the project and the project is expected to increase the delay for intersections outside of the Downtown Area or near freeway interchanges.
- If a signalized intersection located in the Downtown Area or near freeway interchanges is projected to operate within auto vehicle delay ranges associated with a LOS E or better (average control delay equal to or less than or equal to 80 seconds per vehicle) without the project and the project is expected to cause the facility to operate at LOS F. For this project, the following City of Livermore intersections have a LOS E standard while the other City of Livermore locations are the mid-level LOS D standard:
    - Airway Boulevard & I-580 EB Ramps
    - Airway Boulevard & I-580 WB Ramps
    - Airway Boulevard & N. Canyons Parkway
    - Isabel Avenue & Portola Avenue
    - Isabel Avenue & I-580 WB Ramps

  - Isabel Avenue & I-580 EB Ramps
- If a signalized intersection is operating below the LOS standard under the No Project Conditions, the Project would increase the average vehicle delay by more than 5 seconds per vehicle.
- A queuing impact would be identified if:
  - project traffic causes the 95th percentile queue in a turn pocket to extend beyond the turn pocket by more than 25 feet (i.e., the length of one vehicle) into adjacent traffic lanes that operate (i.e., move) separately from the turn lane; or
  - If the 95th percentile queue already exceeds that turn pocket length under no project conditions, the project traffic lengthens the queue by more than 25 feet.

Caltrans

Caltrans endeavors to maintain a target LOS at the transition between LOS C and LOS D on State Highway facilities (Guide for the Preparation of Traffic Studies, Caltrans, December 2002); however, Caltrans recognizes that achieving LOS C/LOS D may not always be feasible. Therefore, the ramp terminal intersections operated by Caltrans will be assessed for significant impacts based on the criteria for the City in which they reside.

There are no significance criteria related to freeway mainline segment performance. Since the Project is the construction of an arterial route that provides a parallel route, the Project would either only maintain or improve freeway performance. Therefore, freeway mainline segments were not studied after a discussion with Caltrans.

Transit

The primary policy goals of the transit agencies in the study area emphasize increasing ridership, improving access to BART, and reducing system inefficiencies. A significant impact would result if the proposed Plan were to directly impede any of the relevant transit agencies from implementing planned improvements and/or their ability to meet these goals. Therefore, a significant impact would occur if the proposed Plan resulted in the following:

- Impeded connecting transit services from increasing ridership
- Impeded connecting transit services from improving their access to BART
- Impeded connecting transit services from reducing system inefficiencies

Bicyclists

There are no established qualitative criteria for the assessment of bicycle impacts. For this transportation analysis, an impact on bicycles would occur if the proposed Project substantially impedes bicycle circulation, access, and safety or conflicts with a bicycle plan.

Pedestrians

There are no established qualitative criteria for the assessment of pedestrian impacts. For this transportation analysis, an impact on pedestrians would occur if the proposed Project substantially impedes pedestrian circulation, access, and safety or conflicts with a pedestrian plan.

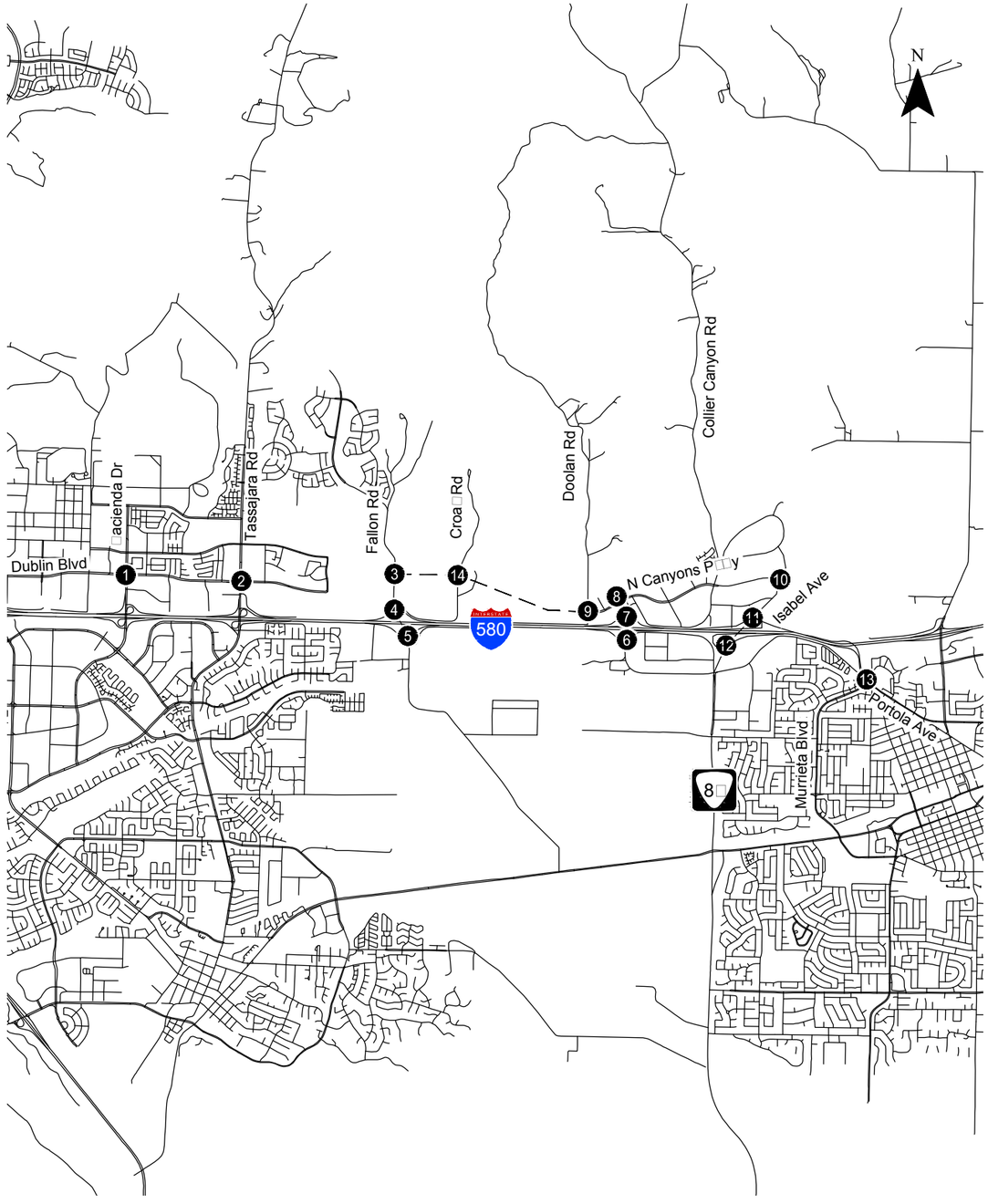
EXISTING PLUS PROJECT CONDITIONS

Existing plus project conditions were analyzed to provide an estimation of transportation conditions if the Project were opened at the time of the existing counts (2017). Traffic volumes for Existing with Project conditions were developed by applying the traffic diversion experienced with and without the project in the 2025 near-term condition to the existing traffic counts.

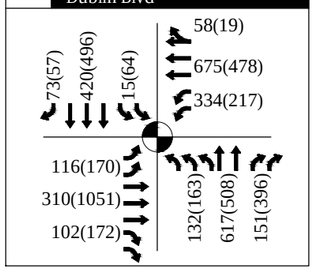
Network Assumptions

Heavy vehicle percentages, peak hour factors, traffic signal timings, and pedestrian and bicycle activity at the study intersections were left unchanged from existing conditions.

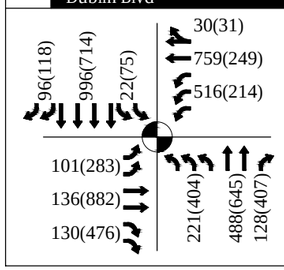
Exhibit 9 shows the estimated existing plus project traffic volumes and lane configurations. Traffic volumes for the existing without project conditions were shown in Exhibit 2



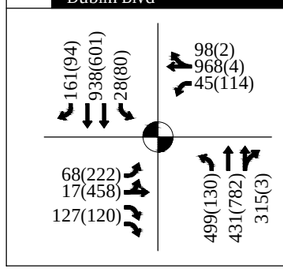
1 Hacienda Dr / Dublin Blvd



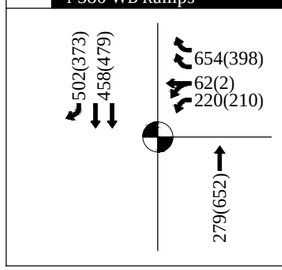
2 Tassajarra Rd / Dublin Blvd



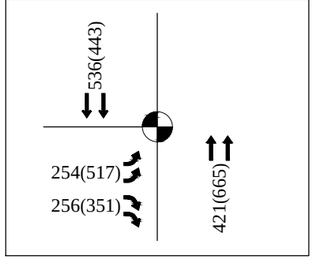
3 Fallon Rd / Dublin Blvd



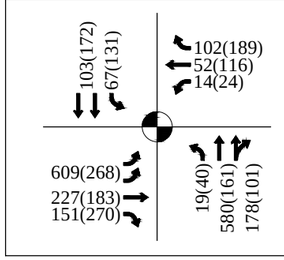
4 Fallon Rd / I-580 WB Ramps



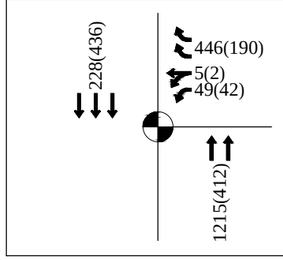
5 El Charro Rd / I-580 EB Ramps



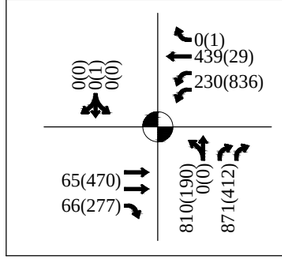
6 Airway Blvd / I-580 EB Ramps



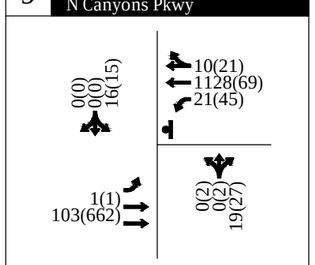
7 Airway Blvd / I-580 WB Ramps



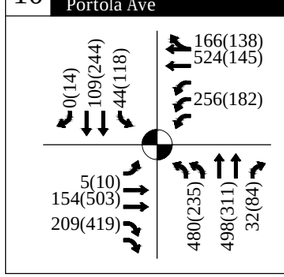
8 Airway Blvd / N Canyons Pkwy



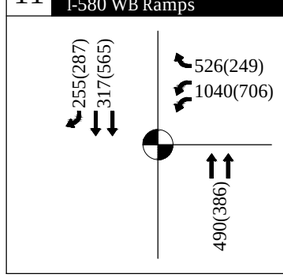
9 Doolan Rd / N Canyons Pkwy



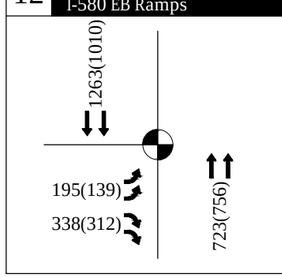
10 Isabel Ave / Portola Ave



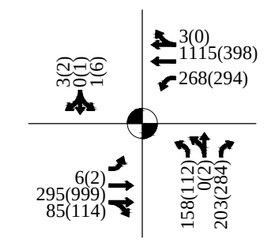
11 Isabel Ave / I-580 WB Ramps



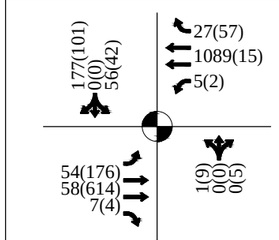
12 Isabel Ave / I-580 EB Ramps



13 Murrieta Blvd / Portola Ave



14 Croak Rd / Dublin Blvd



AM(PM) - Traffic Volume

- Traffic Signal

- Proposed Project

Existing Plus Project
Volumes and Lane Configurations
Livermore, California

Exhibit
9

H:\20\20342 - Dublin Boulevard Extension Prelim Eng\dwgs\figs\20342 Figures.dwg Apr 13, 2018 - 10:21am - bcullimore Layout Tab: Exst Plus Proj

Existing Conditions Intersection Levels of Service

Levels of service calculations were conducted to evaluate intersection operations under existing conditions with the project. The corresponding LOS calculation sheets are included in Appendix 2. The delay, LOS, and V/C ratio findings from this analysis are summarized in Exhibit 10 and Exhibit 11 for the AM and PM peak hours, respectively. The findings of the analysis indicate that the following intersections would degrade below the LOS standard for the intersection because of the Project:

- **Fallon Road & Dublin Boulevard (#3)** – The Project causes the intersection to degrade from LOS C to LOS F in the AM peak hour. This is the result of increases in the number of vehicles using the eastern leg of the intersection to access the Project.
- **Airway Boulevard & N. Canyons Parkway (#8)** – The Project causes the LOS to degrade from LOS D to LOS F in the AM peak hour which is below the LOS E standard for this intersection. This degradation is caused by the increase in the northbound left turn traffic volumes as vehicles access the Project.

Existing Conditions 95th Percentile Queue Lengths

In addition to determining intersection delay, Kittelson also estimated 95th percentile queue lengths to determine if the Project causes queueing impacts. The findings for the 95th percentile queue length in the AM and PM peak hours are shown in Exhibit 12 and Exhibit 13, respectively. Detailed queue worksheets for these findings are included in Appendix 3. Intersection movements where the Project causes a turn pocket to exceed its available storage by more than 25 feet or increase a queue already exceeding the available turn pocket storage by more than 25 feet include:

- Fallon Road and Dublin Boulevard (#3) - During the AM peak hour, the Project causes the queue for the northbound left turn movement to increase from 419 feet to 808 feet resulting in the queue exceeding the available storage of 380 feet.

Impacts and Mitigation Measures

This section documents the intersections impacted by the project under existing conditions and proposes mitigation measures. The analysis files for the mitigation measures are in Appendix 8 and Appendix 9 for the LOS and queue worksheets, respectively.

Impact TRAF-1: The change in travel patterns resulting from the proposed Project would result in unacceptable operations at the intersection of Fallon Road and Dublin Boulevard (#3) during the AM peak hour for existing conditions.

As one of the primary intersections to access the Project, this intersection experiences significant growth in vehicles coming from and going to the eastern leg of the intersection. The existing lane configurations do not provide enough capacity to handle the increased demand.

Mitigation Measure TRAF-1: The City of Dublin is to implement the following geometric and signal timing improvements at the intersection of Fallon Road and Dublin Boulevard prior to the opening of the Dublin Boulevard Extension in the near-term scenario:

- Implement the mitigation measures described in the Kaiser Environmental Impact Report (EIR) which includes the construction of an additional left turn lane for both the northbound and eastbound approaches. This improvement is the obligation of Kaiser and the City shall build and seek reimbursement from Kaiser if not built by the time the Dublin Boulevard – North Canyons Parkway Extension project is built.
- In addition to the mitigations proposed for the Kaiser EIR:
  - Northbound – construct at least one northbound right turn lane resulting in the following final lane configuration: 2 left turns, 2 through, and one right turn lane.
  - Eastbound – construct at least one more through lane resulting in the following final lane configuration: 2 left turns, 2 through, and 2 rights.
  - Westbound – construct at least two additional through lanes resulting in the following lane configuration: 1 left turn, 2 through, and a shared through/right.
  - Optimize the signal timing

Implementation of Mitigation Measure TRAF-1 would improve the operation of this intersection to LOS D during the AM peak hour and lessen the Project's impact to less than significant.

Significance After Mitigation: Less than significant.

Impact TRAF-2: The change in travel patterns resulting from the proposed Project would result in unacceptable operations at the intersection of Airway Boulevard and N. Canyons Parkway (#8) during the AM peak hour for existing conditions.

As one of the primary intersections to access the Project, this intersection experiences significant growth to the northbound left turn with the demand exceeding 800 vehicles per hour during the AM peak hour. The existing lane configuration of a single shared left and through lane for both left and through movements for the northbound approach is insufficient to handle this demand.

Mitigation Measure TRAF-2: The City of Livermore is to implement the following geometric and signal timing improvements at the intersection of Airway Boulevard and N. Canyons Parkway prior to the completion of the Project:

- Shift the median of Airway Boulevard one lane to the west reducing the southbound lanes from three to two and increasing the northbound lanes from three to four.
- With the extra northbound lane, convert the northbound approach to Airway Boulevard and N. Canyons Parkway to have an exclusive left, shared left/through, and two right turn lanes.
- Add an additional westbound through lane resulting in two left turns, one exclusive through, and a shared through/right.

- Optimize the signal timing

Implementation of Mitigation Measure TRAF-2 would improve the operation of this intersection to LOS D during the AM peak hour and lessen the Project impacts to less than significant. However, because the City of Dublin as the lead agency for this project cannot guarantee the implementation and timing of the mitigation measure as it is outside the control and jurisdiction of the City, this impact remains significant and unavoidable. The City of Livermore, City of Dublin, and Alameda County are coordinating on this project to meet their General Plan's objectives including the planned extension of this roadway. Dublin and Livermore currently have a funding agreement Memorandum of Understanding (MOU) and are exploring a separate 2 or 3-way MOU with Alameda County to continue to work together to identify the funding and timing for this mitigation.

Significance After Mitigation: Significant and unavoidable.

Impact TRAF-3: The change in travel patterns resulting from the proposed Project would result in the northbound left turn queue at the intersection of Fallon Road and Dublin Boulevard (#3) during the AM peak hour, which already exceeds the available turn lane storage, to increase in length by more than 25 feet (389 feet) for existing conditions.

As one of the primary intersections to access the Project, the vehicle demand for all approaches increases as a result of the Project. The existing lane configurations and signal timing do not provide enough capacity to serve the increased vehicle demand increasing the 95th percentile queue lengths for high demand movements.

Mitigation Measure TRAF-3: The City of Dublin is to implement mitigation measure TRAF-1 prior to the completion of the Project.

Implementation of Mitigation Measure TRAF-3 would reduce the queue to 330 feet during the AM peak hour allowing it to be contained within the available storage (380 feet) and reducing the Project's impact to less than significant.

Significance After Mitigation: Less than significant.

Exhibit 10: Existing AM Peak Hour Intersection Operation Findings

#	Location	LOS Standard	Existing AM			Existing AM + Project			Exist AM + Project Mitigated		
			V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
1	Hacienda Drive & Dublin Boulevard	D	0.52	24.3	C	0.59	26.0	C			
2	Tassajara Road & Dublin Boulevard	D	0.58	28.7	C	0.67	33.1	C			
3	Fallon Road & Dublin Boulevard	D	0.65	34.4	C	***1.49***	***261.5***	***F***	0.81	38.2	D
4	Fallon Road & I-580 WB Ramps	D	0.54	10.8	B	0.42	7.3	A			
5	El Charro Road & I-580 EB Ramps	D	0.37	5.6	A	0.37	5.6	A			
6	Airway Boulevard & I-580 EB Ramps	E	0.5	32.1	C	0.63	34.1	C			
7	Airway Boulevard & I-580 WB Ramps	E	0.37	5.7	A	0.64	19.0	B			
8	Airway Boulevard & N. Canyons Parkway	E	0.37	45.7	D	***1.01***	***88.9***	***F***	0.69	45.1	D
9	Doolan Road & N. Canyons Parkway	Mid-D	0.03	8.8	A	0.48	12.5	B			
10	Isabel Avenue & Portola Avenue	E	0.68	29.4	C	0.73	29.5	C			
11	Isabel Avenue & I-580 WB Ramps	E	0.81	18.3	B	0.80	18.3	B			
12	Isabel Avenue & I-580 EB Ramps	E	0.72	16.2	B	0.71	16.2	B			
13	Murrieta Boulevard & Portola Avenue	Mid-D	0.53	23.0	C	0.57	21.8	C			
14	Dublin Boulevard Extension & Croak Road	D				0.52	11.4	B			

Grey highlights indicate LOS below the LOS standard
Bold Italic text indicates a significant impact
Source: Kittelson & Associates, Inc. 2018

Exhibit 11: Existing PM Peak Hour Intersection Operation Findings

#	Location	LOS Standard	Existing PM			Existing PM + Project			Exist PM + Project Mitigated		
			V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
1	Hacienda Drive & Dublin Boulevard	D	0.58	29.0	C	0.60	29.6	C			
2	Tassajara Road & Dublin Boulevard	D	0.68	32.5	C	0.72	34.1	C			
3	Fallon Road & Dublin Boulevard	D	0.49	20.4	C	0.74	33.5	C	0.65	31.1	C
4	Fallon Road & I-580 WB Ramps	D	0.57	10.2	B	0.63	11.8	B			
5	El Charro Road & I-580 EB Ramps	D	0.49	6.8	A	0.50	7.0	A			
6	Airway Boulevard & I-580 EB Ramps	E	0.42	32.9	C	0.37	32.8	C			
7	Airway Boulevard & I-580 WB Ramps	E	0.25	9.4	A	0.17	9.8	A			
8	Airway Boulevard & N. Canyons Parkway	E	0.47	59.2	E	0.68	35.7	D	0.61	33.1	C
9	Doolan Road & N. Canyons Parkway	Mid-D	0.06	9.0	A	0.34	14.9	B			
10	Isabel Avenue & Portola Avenue	E	0.51	25.7	C	0.47	24.7	C			
11	Isabel Avenue & I-580 WB Ramps	E	0.61	11.9	B	0.61	11.9	B			
12	Isabel Avenue & I-580 EB Ramps	E	0.60	11.7	B	0.59	11.2	B			
13	Murrieta Boulevard & Portola Avenue	Mid-D	0.58	30.2	C	0.63	29.9	C			
14	Dublin Boulevard Extension & Croak Road	D				0.37	7.1	A			

Grey highlights indicate LOS below the LOS standard
Bold Italic text indicates a significant impact
Source: Kittelson & Associates, Inc. 2018

Exhibit 12: Existing 95th Percentile Queue Lengths in Feet during the AM Peak Hour

#	Location		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
1	Hacienda Drive and Dublin Boulevard	Storage	270	515	240	260	670		250	460	240	280	720	215
		No Project	85	100	23	165	148		65	308	27	19	140	25
		With Project	85	101	23	203	213		64	309	27	19	141	26
2	Tassajara Road & Dublin Boulevard	Storage	250	565	300	380	830		355	930	930	280	635	250
		No Project	70	74	27	168	217		99	213	43	22	244	18
		With Project	70	74	27	183	372		90	213	43	23	239	21
3	Fallon Road & Dublin Boulevard	Storage	340	640	0	0	500		380	580	0	130	1,250	215
		No Project	44	44	15	0	0		#419	111	0	0	386	22
		With Project	74	74	18	73	#1670		***#808***	231	0	52	452	21
		Mitigated	#69	16	19	78	349		#330	167	41	57	494	48
4	Fallon Road and I-580 WB Ramps	Storage				1,500	1,500	1,500		1,000			650	220
		No Project				107	109	80		247			78	32
		With Project				70	72	24		95			42	27
5	El Charro Road & I-580 EB Ramps	Storage	275		275					825			1,050	
		No Project	28		13					34			40	
		With Project	29		13					31			40	
6	Airway Boulevard & I-580 EB Ramps	Storage	575	380	380	250	1,000	250	360	1,000	1,000	815	815	
		No Project	302	222	49	30	76	39	38	145	0	93	53	
		With Project	272	219	49	30	75	71	38	338	0	96	68	
7	Airway Boulevard and I-580 WB Ramps	Storage				115	1,350	475		780			530	
		No Project				49	50	23		27			0	
		With Project				48	48	192		558			2	
8	Airway Boulevard & N. Canyons Parkway	Storage		500	500	510	510	190		540	Parking		100	
		No Project		11	0	195	12	0		149	194		0	
		With Project		38	12	109	291	0		#1039	199		0	
		Mitigated		38	12	109	291	0		441	118		0	
9	Doolan Road & N. Canyons Parkway	Storage	150	500		135	650			250			250	
		No Project	#N/A			2	2			0			1	

#	Location		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
		With Project	6	27		36	303			0			23	
10	Isabel Avenue & Portola Avenue	Storage	850	850	350	420	1,000		300	1,850	300	195	400	
		No Project	17	146	12	115	197		#298	256	0	72	67	
		With Project	17	69	12	98	271		#296	250	0	72	66	
11	Isabel Avenue & I-580 WB Ramps	Storage				1,500		460		1,315			1,830	320
		No Project				343		225		167			85	31
		With Project				337		233		168			82	30
12	Isabel Avenue & I-580 EB Ramps	Storage	255		255					1,050			1,322	
		No Project	104		142					96			462	
		With Project	101		139					78			435	
13	Murrieta Boulevard & Portola Avenue	Storage	75	1,500		360	825		175	1,000	1,000		100	
		No Project	20	164		290	319		111	111	63		0	
		With Project	20	161		284	397		104	104	63		0	
14	Croak Road & Dublin Boulevard Extension	Storage	210	500	250	150	500	250	150	150		150	150	
		No Project	N/A: intersection does not exist under no project conditions									N/A		
		With Project	#79	13	4	7	309	4	4	0		58	59	

Grey highlights indicate queue exceeds the turn pocket storage for turn movements or extends into an upstream signalized intersection for through movements

Bold Italic text indicates a significant impact

95th percentile volume exceeds capacity, queue may be longer.

Source: Kittelson & Associates, Inc. 2018

Exhibit 13: Existing 95th Percentile Queue Lengths in Feet during the PM Peak Hour

#	Location		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
1	Hacienda Drive and Dublin Boulevard	Storage	270	515	240	260	670		250	460	240	280	720	215
		No Project	108	293	28	132	140		72	248	40	48	165	13
		With Project	109	327	29	132	141		72	250	41	52	163	13
2	Tassajara Road & Dublin Boulevard	Storage	250	565	300	380	830		355	930	930	280	635	250
		No Project	168	342	40	95	131		155	322	73	58	194	27
		With Project	167	422	65	92	131		155	320	79	59	193	27
3	Fallon Road & Dublin Boulevard	Storage	340	640	0	0	500		380	580	0	130	1,250	215
		No Project	134	136	24	0	6		146	181	0	0	244	0
		With Project	#295	#869	18	#183	15		169	349	0	120	286	0
		Mitigated	#175	184	18	#221	0		#93	317	0	101	211	22
4	Fallon Road and I-580 WB Ramps	Storage				1,500	1,500	1,500		1,000			650	220
		No Project				82	83	65		322			131	29
		With Project				60	61	45		#358			53	27
5	El Charro Road & I-580 EB Ramps	Storage	275		275					825			1,050	
		No Project	71		15					66			62	
		With Project	79		20					77			51	
6	Airway Boulevard & I-580 EB Ramps	Storage	575	380	380	250	1,000	250	360	1,000	1,000	815	815	
		No Project	221	182	66	37	133	51	62	75	0	147	68	
		With Project	117	175	64	40	133	51	61	76	0	#169	97	
7	Airway Boulevard and I-580 WB Ramps	Storage				115	1,350	475		780			530	
		No Project				44	45	32		51			1	
		With Project				44	43	34		50			3	
8	Airway Boulevard & N. Canyons Parkway	Storage		500	500	510	510	190		540	540		100	
		No Project		8	38	#489	12	0		179	175		7	
		With Project		220	66	#492	23	0		213	88		7	
		Mitigated		220	66	#408	19	0		131	88		7	
9	Doolan Road & N. Canyons Parkway	Storage	150	500		135	650			250			250	
		No Project	#N/A			5	2			0			1	

#	Location		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
		With Project	5	160		#55	23			15			15	
10	Isabel Avenue & Portola Avenue	Storage	850	850	350	420	1,000		300	1,850	300	195	400	
		No Project	24	261	35	69	66		121	151	49	138	114	
		With Project	24	185	34	66	64		118	146	42	133	114	
11	Isabel Avenue & I-580 WB Ramps	Storage				1,500		460		1,315			1,830	320
		No Project				147		44		102			93	34
		With Project				143		34		89			93	33
12	Isabel Avenue & I-580 EB Ramps	Storage	255		255					1,050			1,322	
		No Project	59		82					73			225	
		With Project	48		73					64			216	
13	Murrieta Boulevard & Portola Avenue	Storage	75	1,500		360	825		175	1,000	1,000		100	
		No Project	11	497		334	117		90	90	86		25	
		With Project	11	#660		334	114		88	88	80		25	
14	Croak Road & Dublin Boulevard Extension	Storage	210	500	250	150	500	250	150	150		150	150	
		No Project	N/A: Intersection does not exist under no project conditions									N/A		
		With Project	#177	118	2	5	8	15	9	0		26	0	

Grey highlights indicate queue exceeds the turn pocket storage for turn movements or extends into an upstream signalized intersection for through movements

Bold Italic text indicates a significant impact

95th percentile volume exceeds capacity, queue may be longer.

Source: Kittelson & Associates, Inc. 2018

2025 NEAR-TERM CONDITIONS

Near-term 2025 conditions were analyzed to provide an estimation of anticipated conditions when the project is operational (opening day). Traffic volumes for 2025 near-term without Project conditions were developed using the Alameda County Travel Demand model which accounts for background traffic growth between existing conditions and 2025 and approved but not yet constructed and occupied changes to the land use in the area.

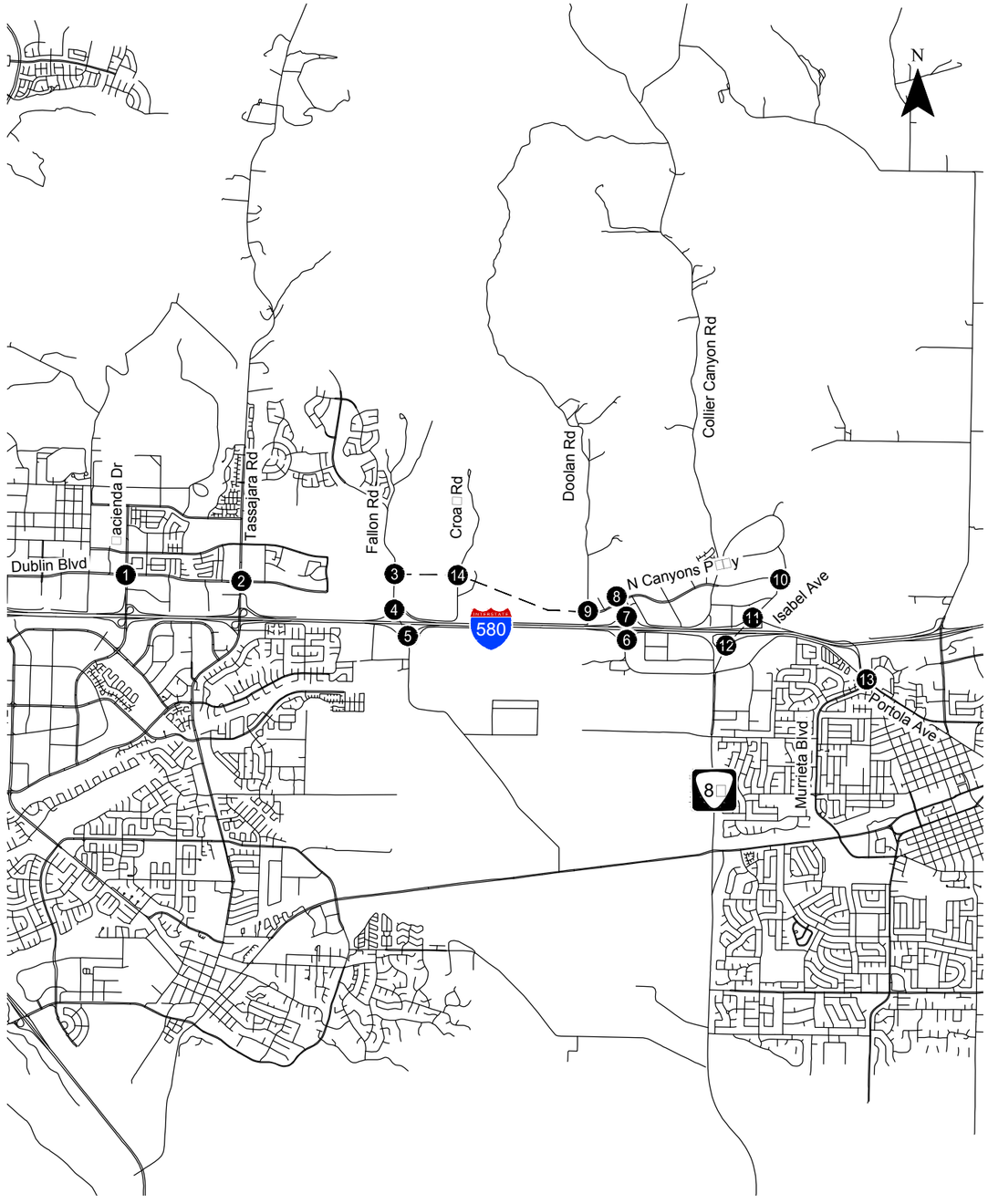
Network Assumptions

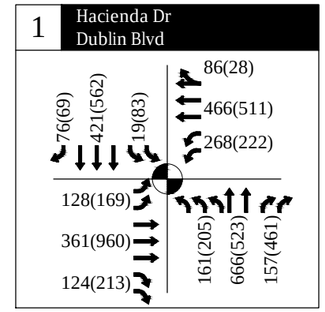
The following changes to the transportation network between existing and 2025 conditions were assumed to have been implemented prior to the Project:

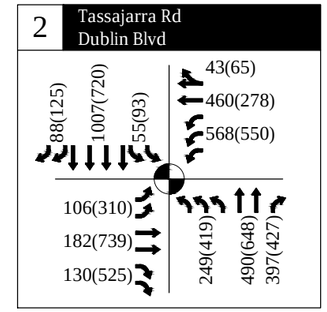
- **Dublin Boulevard & Fallon Road** - Construction of a second eastbound and a second northbound left turn lane consistent with the improvements being built by the Kaiser Dublin project. This improvement was also assumed to result in optimization of the signal timing plans to accommodate the new lanes.

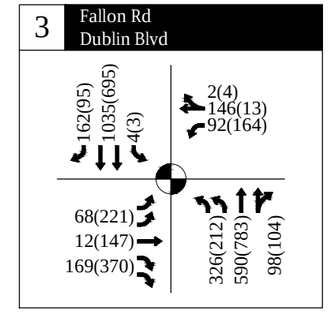
Heavy vehicle percentages, peak hour factors, traffic signal timings, and pedestrian and bicycle activity at the study intersections were left unchanged from existing conditions except as noted for Dublin Boulevard & Fallon Road.

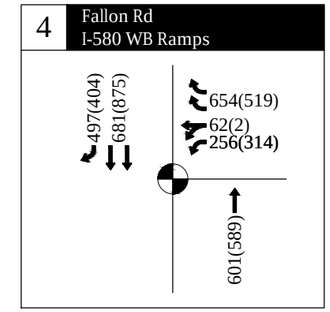
Exhibit 14 and Exhibit 15 show the estimated 2025 traffic volumes and lane configurations without and with the Project, respectively.

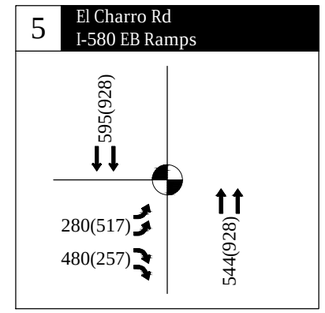


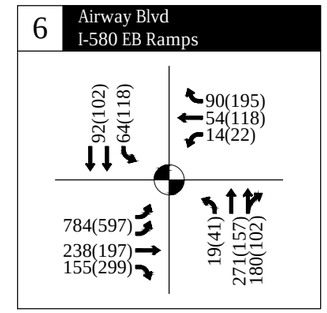


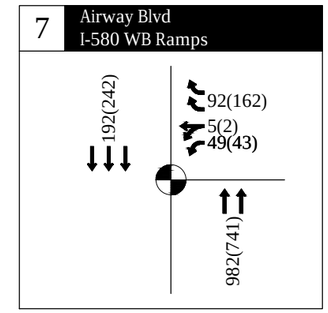


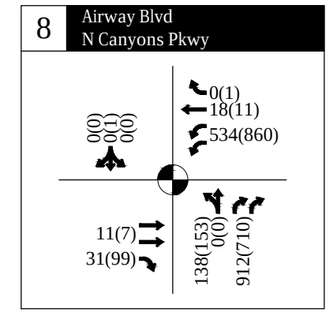


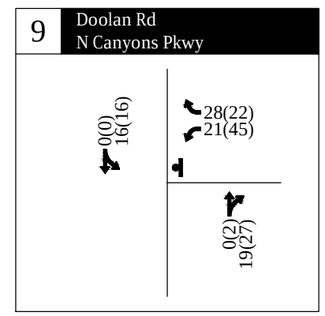


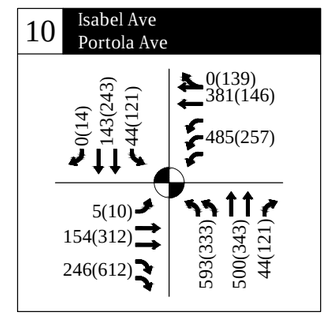


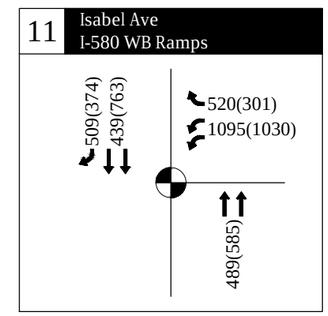


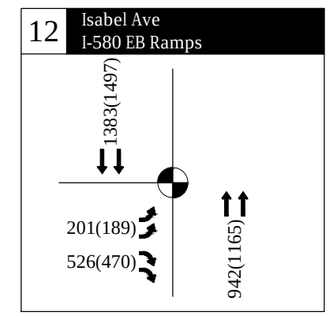


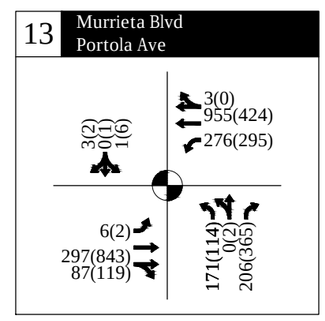


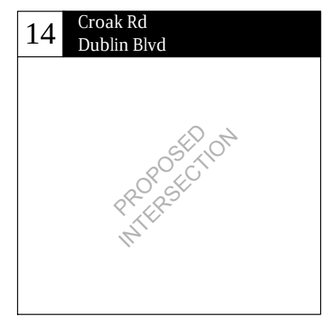












AM(PM) - Traffic Volume

- Traffic Signal

- Proposed Project

2025 Near-Term No Project
Volumes and Lane Configurations
Livermore, California

Exhibit
14

KITTELSON & ASSOCIATES

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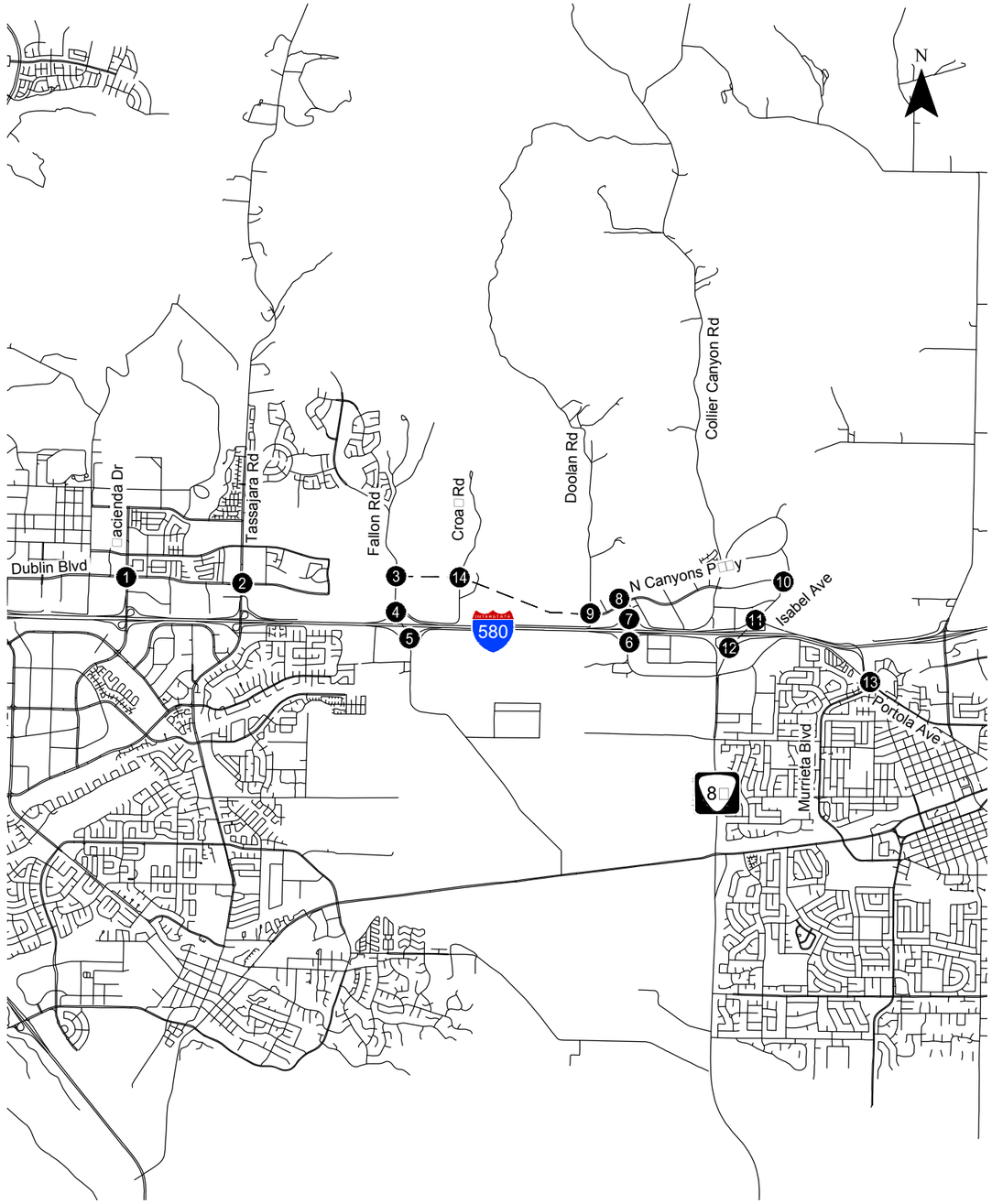
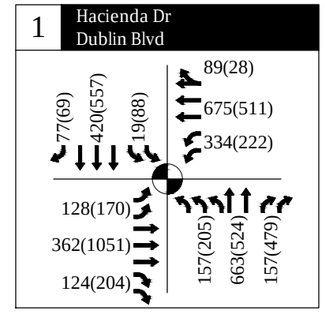
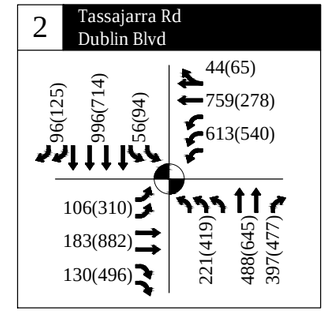
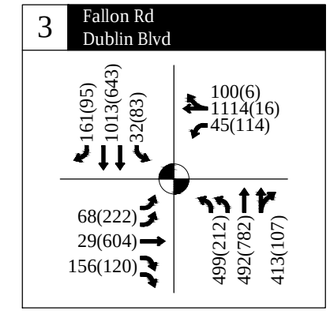
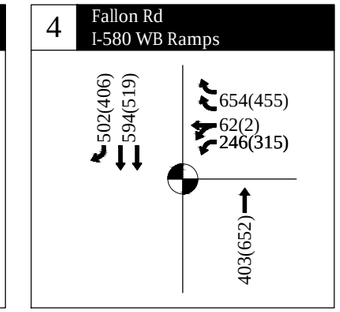
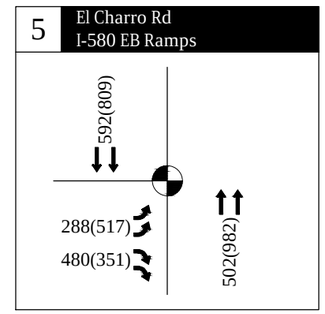


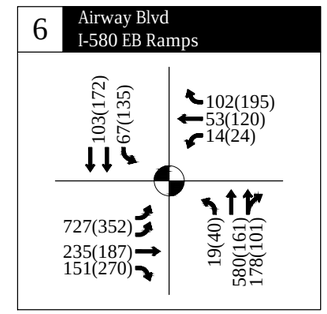


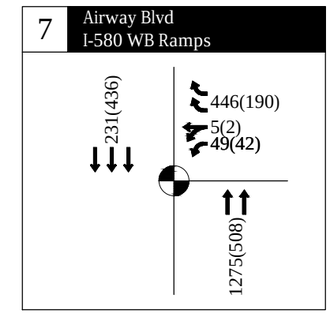


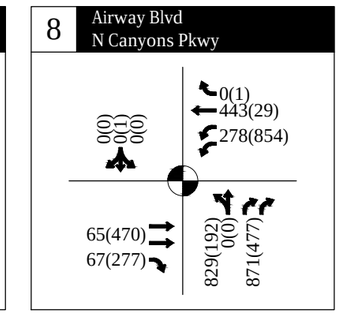


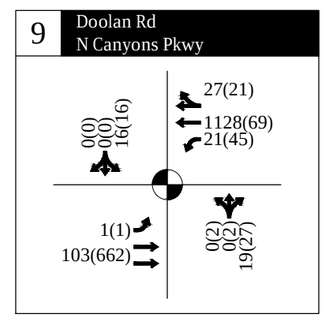


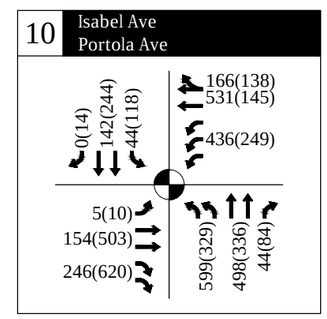


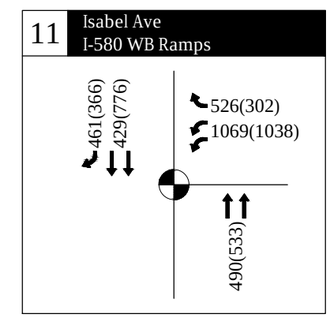


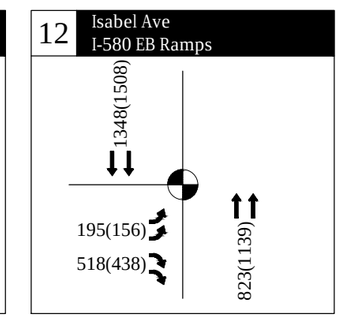


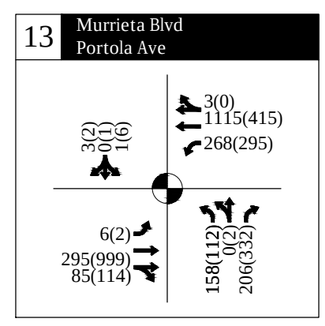


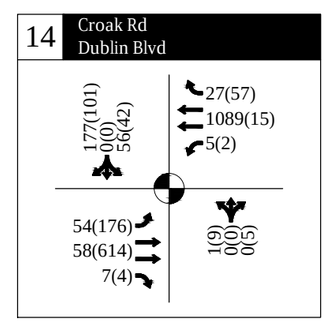












AM(PM) - Traffic Volume

- Traffic Signal

- Proposed Project

2025 Near-Term Plus Project
Volumes and Lane Configurations
Livermore, California

Exhibit
15

H:\20\20342 - Dublin Boulevard Extension Prelim Eng\dwgs\figs\20342 Figures.dwg Apr 13, 2018 - 9:52am - boullimore Layout Tab: 2025 Near-Term Plus Proj

2025 Near-Term Conditions Intersection Levels of Service

Levels of service calculations were conducted to evaluate intersection operations under 2025 near-term conditions both with and without the project. The corresponding LOS calculation sheets are included in Appendix 4. The delay, LOS, and V/C ratio findings from this analysis are summarized in Exhibit 16 and Exhibit 17 for the AM and PM peak hours, respectively. The findings of the analysis indicate that the following intersections would degrade below the LOS standard for the intersection because of the Project:

- **Fallon Road & Dublin Boulevard (#3)** – The Project causes the intersection to degrade from LOS C to LOS F in the AM peak hour and LOS C to LOS E in the PM peak hour. This is the result of increases in the number of vehicles using the eastern leg of the intersection to access the Project.
- **Airway Boulevard & N. Canyons Parkway (#8)** – The Project causes the LOS to degrade from LOS D to LOS F in the AM peak hour which is below the LOS E standard for this intersection. This degradation is caused by the increase in the northbound left turn traffic volumes as vehicles access the Project.

2025 Near-Term Conditions 95th Percentile Queue Lengths

In addition to determining intersection delay, Kittelson also estimated 95th percentile queue lengths to determine if the Project causes queueing impacts. The findings for the 95th percentile queue length in the AM and PM peak hours are shown in Exhibit 18 and Exhibit 19, respectively. Detailed queue worksheets for these findings are included in Appendix 5. Intersection movements where the Project causes a turn pocket to exceed its available storage by more than 25 feet or increase a queue already exceeding the available turn pocket storage by more than 25 feet include:

- Fallon Road and Dublin Boulevard (#3) - During the PM peak hour, the Project causes the queue for the southbound left turn movement to increase from 13 feet to 197 feet resulting in the queue exceeding the available storage of 130 feet.

Impacts and Mitigation Measures

This section documents the intersections impacted by the project under 2025 near-term conditions and proposes mitigation measures. The analysis files for the mitigation measures are in Appendix 10 and Appendix 11 for the LOS and queue worksheets, respectively.

Impact TRAF-4: The change in travel patterns resulting from the proposed Project would result in unacceptable operations at the intersection of Fallon Road and Dublin Boulevard (#3) during both the AM and PM peak hours for near-term conditions.

As one of the primary intersections to access the Project, this intersection experiences significant growth in vehicles coming from and going to the eastern leg of the intersection. The existing lane configurations do not provide enough capacity to handle the increased demand.

Mitigation Measure TRAF-4: The City of Dublin is to implement the following geometric and signal timing improvements at the intersection of Fallon Road and Dublin Boulevard prior to the opening of the Dublin Boulevard Extension in the near-term scenario:

- Northbound – construct at least one northbound right turn lane resulting in the following final lane configuration: 2 left turns, 2 through, and one right turn lane.
- Eastbound – construct at least one more through lane resulting in the following final lane configuration: 2 left turns, 2 through, and 2 rights.
- Westbound – construct at least two additional through lanes resulting in the following lane configuration: 1 left turn, 2 through, and a shared through/right.
- Optimize the signal timing

Implementation of Mitigation Measure TRAF-4 would improve the operation of this intersection to LOS D during both the AM and PM peak hours and lessen the Project's impact to less than significant.

Significance After Mitigation: Less than significant.

Impact TRAF-5: The change in travel patterns resulting from the proposed Project would result in unacceptable operations at the intersection of Airway Boulevard and N. Canyons Parkway (#8) during the AM peak hour for near-term conditions.

As one of the primary intersections to access the Project, this intersection experiences significant growth to the northbound left turn with the demand exceeding 800 vehicles per hour during the AM peak hour. The existing lane configuration of a single shared left and through lane for both left and through movements for the northbound approach is insufficient to handle this demand.

Mitigation Measure TRAF-5: The City of Livermore is to implement mitigation measure TRAF-2 prior to project completion.

Implementation of Mitigation Measure TRAF-5 would improve the operation of this intersection to LOS D during the AM peak hour and lessen the Project impacts to less than significant. However, because the City of Dublin as the lead agency for this project cannot guarantee the implementation and timing of the mitigation measure as it is outside the control and jurisdiction of the City, this impact remains significant and unavoidable. The City of Livermore, City of Dublin, and Alameda County are coordinating on this project to meet their General Plan's objectives including the planned extension of this roadway. Dublin and Livermore currently have a funding agreement Memorandum of Understanding (MOU) and are exploring a separate 2 or 3-way MOU with Alameda County to continue to work together to identify the funding and timing for this mitigation.

Significance After Mitigation: Significant and unavoidable.

Impact TRAF-6: The change in travel patterns resulting from the proposed Project would result in the southbound left turn queue at the intersection of Fallon Road and Dublin Boulevard (#3) during the PM peak hour to exceed the available turn pocket storage by more than 25 feet (67 feet) for near-term conditions.

As one of the primary intersections to access the Project, the southbound left turn demand to access the Project increases significantly. The existing lane configurations and signal timing do not provide enough capacity to keep the 95th percentile queue from exceeding the available storage.

> **Mitigation Measure TRAF-6:** The City of Dublin is to implement mitigation measure TRAF-4 prior to the completion of the Project.
>
> Implementation of Mitigation Measure TRAF-6 would reduce the queue to 105 feet allowing it to be contained within the available storage and reducing the Project's impact to less than significant.
>
> **Significance After Mitigation:** Less than significant.

Exhibit 16: 2025 Near-Term AM Peak Hour Intersection Operation Findings

#	Location	LOS Standard	2025 AM			2025 AM + Project			2025 AM + Project Mitigated		
			V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
1	Hacienda Drive & Dublin Boulevard	D	0.54	25.2	C	0.61	27.0	C			
2	Tassajara Road & Dublin Boulevard	D	0.60	29.0	C	0.68	33.3	C			
3	Fallon Road & Dublin Boulevard	D	0.68	26.5	C	***1.43***	***241.8***	***F***	0.86	42.5	D
4	Fallon Road & I-580 WB Ramps	D	0.66	10.0	A	0.51	8.2	A			
5	El Charro Road & I-580 EB Ramps	D	0.41	6.2	A	0.41	6.2	A			
6	Airway Boulevard & I-580 EB Ramps	E	0.54	32.2	C	0.67	36.1	D			
7	Airway Boulevard & I-580 WB Ramps	E	0.39	5.3	A	0.67	19.1	B			
8	Airway Boulevard & N. Canyons Parkway	E	0.37	48.6	D	***1.03***	***93.8***	***F***	0.70	46.2	D
9	Doolan Road & N. Canyons Parkway	Mid-D	0.03	8.7	A	0.49	12.4	B			
10	Isabel Avenue & Portola Avenue	E	0.77	37.9	D	0.81	38.1	D			
11	Isabel Avenue & I-580 WB Ramps	E	0.83	18.7	B	0.82	18.6	B			
12	Isabel Avenue & I-580 EB Ramps	E	0.83	21.7	C	0.81	21.2	C			
13	Murrieta Boulevard & Portola Avenue	Mid-D	0.53	23.1	C	0.57	21.9	C			
14	Dublin Boulevard Extension & Croak Road	D				0.52	11.4	B			

Grey highlights indicate LOS below the LOS standard
Bold Italic text indicates a significant impact
Source: Kittelson & Associates, Inc. 2018

Exhibit 17: 2025 Near-Term PM Peak Hour Intersection Operation Findings

#	Location	LOS Standard	2025 PM			2025 PM + Project			2025 PM + Project Mitigated		
			V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
1	Hacienda Drive & Dublin Boulevard	D	0.59	30.4	C	0.62	31.1	C			
2	Tassajara Road & Dublin Boulevard	D	0.72	37.7	D	0.76	39.7	D			
3	Fallon Road & Dublin Boulevard	D	0.62	28.1	C	***0.92***	***58.0***	***E***	0.72	38.2	D
4	Fallon Road & I-580 WB Ramps	D	0.64	10.6	B	0.67	12.4	B			
5	El Charro Road & I-580 EB Ramps	D	0.59	8.1	A	0.59	8.1	A			
6	Airway Boulevard & I-580 EB Ramps	E	0.46	32.8	C	0.39	32.8	C			
7	Airway Boulevard & I-580 WB Ramps	E	0.28	9.3	A	0.20	9.2	A			
8	Airway Boulevard & N. Canyons Parkway	E	0.48	73.6	E	0.69	38.0	D	0.62	35.3	D
9	Doolan Road & N. Canyons Parkway	Mid-D	0.06	9.0	A	0.34	14.9	B			
10	Isabel Avenue & Portola Avenue	E	0.47	25.2	C	0.53	26.1	C			
11	Isabel Avenue & I-580 WB Ramps	E	0.73	17.9	B	0.74	17.5	B			
12	Isabel Avenue & I-580 EB Ramps	E	0.75	16.4	B	0.75	15.3	B			
13	Murrieta Boulevard & Portola Avenue	Mid-D	0.58	30.7	C	0.63	30.3	C			
14	Dublin Boulevard Extension & Croak Road	D				0.37	7.1	A			

Grey highlights indicate LOS below the LOS standard
Bold Italic text indicates a significant impact
Source: Kittelson & Associates, Inc. 2018

Exhibit 18: 2025 Near-Term 95th Percentile Queue Lengths in Feet during the AM Peak Hour

#	Location		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
1	Hacienda Drive and Dublin Boulevard	Storage	270	515	240	260	670		250	460	240	280	720	215
		No Project	92	117	26	166	157		76	335	27	22	142	29
		With Project	92	118	25	205	227		74	336	28	23	143	30
2	Tassajara Road & Dublin Boulevard	Storage	250	565	300	380	830		355	930	930	280	635	250
		No Project	73	96	27	204	224		100	221	72	45	245	18
		With Project	73	96	27	219	382		90	221	73	45	240	21
3	Fallon Road & Dublin Boulevard	Storage	340	640	340	250	500		380	580	0	130	1,250	215
		No Project	48	22	45	#155	144		#193	237	0	14	456	58
		With Project	49	40	21	71	#1783		#349	290	0	55	449	56
		Mitigated	#74	23	20	84	407		#361	212	50	68	#644	50
4	Fallon Road and I-580 WB Ramps	Storage				1,500	1,500	1,500		1,000			650	220
		No Project				104	104	80		228			61	23
		With Project				89	90	28		136			53	24
5	El Charro Road & I-580 EB Ramps	Storage	275		275					825			1,050	
		No Project	35		28					46			51	
		With Project	36		28					43			50	
6	Airway Boulevard & I-580 EB Ramps	Storage	575	380	380	250	1,000	250	360	1,000	1,000	815	815	
		No Project	#397	229	49	30	78	39	38	145	0	93	54	
		With Project	336	226	49	30	76	71	38	338	0	95	69	
7	Airway Boulevard and I-580 WB Ramps	Storage				115	1,350	475		780			530	
		No Project				49	50	23		16			0	
		With Project				48	49	200		588			2	
8	Airway Boulevard & N. Canyons Parkway	Storage		500	500	510	510	190		540	540		100	
		No Project		11	0	223	14	0		167	228		0	
		With Project		38	12	130	293	0		#1068	185		0	
		Mitigated		38	12	130	293	0		449	102		0	
9	Doolan Road & N. Canyons Parkway	Storage	150	500		135	650			250			250	
		No Project	#N/A			2	2			0			1	

#	Location		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
		With Project	6	27		36	310			0			23	
10	Isabel Avenue & Portola Avenue	Storage	850	850	350	420	1,000		300	1,850	300	195	400	
		No Project	18	78	11	180	200		#455	278	3	77	90	
		With Project	18	76	11	162	274		#450	271	3	75	88	
11	Isabel Avenue & I-580 WB Ramps	Storage				1,500		460		1,315			1,830	320
		No Project				#362		225		167			114	33
		With Project				352		233		168			111	33
12	Isabel Avenue & I-580 EB Ramps	Storage	255		255					1,050			1,322	
		No Project	114		222					116			#685	
		With Project	110		218					95			#647	
13	Murrieta Boulevard & Portola Avenue	Storage	75	1,500		360	825		175	1,000	1,000		100	
		No Project	20	164		290	319		111	111	64		0	
		With Project	20	161		284	397		104	104	64		0	
14	Croak Road & Dublin Boulevard Extension	Storage	210	500	250	150	500	250	150	150		150	150	
		No Project	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	
		With Project	#79	13	4	7	309	4	4	0		58	59	

Grey highlights indicate queue exceeds the turn pocket storage for turn movements or extends into an upstream signalized intersection for through movements

Bold Italic text indicates a significant impact

95th percentile volume exceeds capacity, queue may be longer.

Source: Kittelson & Associates, Inc. 2018

Exhibit 19: 2025 Near-Term 95th Percentile Queue Lengths in Feet during the PM Peak Hour

#	Location		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
1	Hacienda Drive and Dublin Boulevard	Storage	270	515	240	260	670		250	460	240	280	720	215
		No Project	110	298	30	136	154		88	262	43	63	188	24
		With Project	110	333	32	136	154		88	263	44	66	186	24
2	Tassajara Road & Dublin Boulevard	Storage	250	565	300	380	830		355	930	930	280	635	250
		No Project	183	376	49	209	160		161	327	97	70	196	28
		With Project	183	466	75	205	160		161	326	166	71	195	28
3	Fallon Road & Dublin Boulevard	Storage	340	640	340	250	500		380	580	0	130	1,250	215
		No Project	132	166	35	201	26		#174	413	0	13	327	23
		With Project	127	#860	34	146	31		#164	387	0	***#197***	281	23
		Mitigated	#177	247	18	#224	9		#171	323	8	105	232	23
4	Fallon Road and I-580 WB Ramps	Storage				1,500	1,500	1,500		1,000			650	220
		No Project				85	86	58		#309			106	28
		With Project				85	86	54		#358			58	28
5	El Charro Road & I-580 EB Ramps	Storage	275		275					825			1,050	
		No Project	108		39					133			137	
		With Project	111		50					145			115	
6	Airway Boulevard & I-580 EB Ramps	Storage	575	380	380	250	1,000	250	360	1,000	1,000	815	815	
		No Project	261	186	66	37	136	52	62	75	0	150	68	
		With Project	151	177	63	40	138	52	61	76	0	#180	97	
7	Airway Boulevard and I-580 WB Ramps	Storage				115	1,350	475		780			530	
		No Project				44	45	32		46			m1	
		With Project				44	43	34		52			3	
8	Airway Boulevard & N. Canyons Parkway	Storage		500	500	510	510	190		540	540		100	
		No Project		8	38	#518	12	0		181	207		7	
		With Project		220	66	#516	23	0		216	111		7	
		Mitigated		220	66	#435	20	0		132	111		7	
9	Doolan Road & N. Canyons Parkway	Storage	150	500		135	650			250			250	
		No Project	#N/A			5	2			0			1	
		With Project	5	160		#55	23			15			15	

10	Isabel Avenue & Portola Avenue	Storage	850	850	350	420	1,000		300	1,850	300	195	400	
		No Project	24	124	42	89	67		159	162	49	140	120	
		With Project	24	197	42	87	66		157	158	41	135	121	
11	Isabel Avenue & I-580 WB Ramps	Storage				1,500		460		1,315			1,830	320
		No Project				266		89		191			209	50
		With Project				257		77		173			214	51
12	Isabel Avenue & I-580 EB Ramps	Storage	255		255					1,050			1,322	
		No Project	95		178					123			522	
		With Project	79		166					109			497	
13	Murrieta Boulevard & Portola Avenue	Storage	75	1,500		360	825		175	1,000	1,000		100	
		No Project	11	499		336	122		90	90	93		25	
		With Project	11	#662		336	120		88	88	88		25	
14	Croak Road & Dublin Boulevard Extension	Storage	210	500	250	150	500	250	150	150		150	150	
		No Project	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	
		With Project	#177	118	2	5	8	15	9	0		26	0	

Grey highlights indicate queue exceeds the turn pocket storage for turn movements or extends into an upstream signalized intersection for through movements

Bold Italic text indicates a significant impact

95th percentile volume exceeds capacity, queue may be longer.

Source: Kittelson & Associates, Inc. 2018

2040 DESIGN YEAR

Cumulative 2040 conditions were analyzed to provide an estimation of anticipated conditions for the Project's design year of 2040. Traffic volumes for 2040 cumulative without Project conditions were developed using the Alameda CTC Countywide Travel Demand model with all City of Dublin General Plan land uses updated which accounts for background traffic growth between existing conditions and 2040 and approved but not yet constructed and occupied changes to the land use in the area.

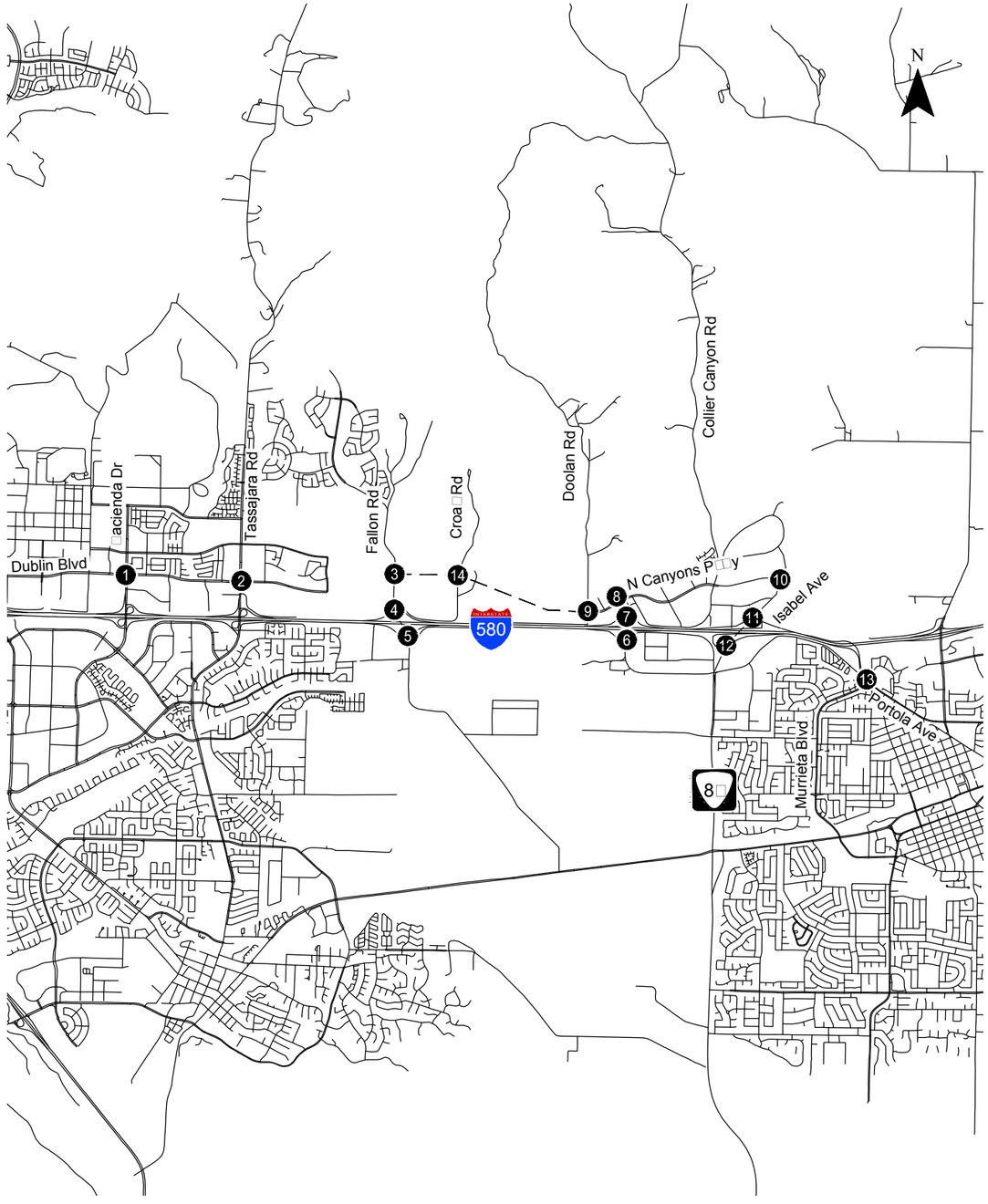
Network Assumptions

The following changes to the transportation network between existing and 2040 conditions were assumed to have been implemented prior to the Project:

- The Portola Avenue bridge over I-580 was widened from one lane in each direction to two lanes in each direction.
- Tassajara Road and Dublin Boulevard was improved consistent with the Eastern Dublin Traffic Impact Fee (TIF).
- Fallon Road and Dublin Boulevard intersection was improved to be consistent with the Eastern Dublin Specific Plan. The final lane configurations include:
    - Northbound Approach: three left turn lanes, four through lanes, and two right turn lanes.
    - Southbound Approach: two left turn lanes, four through lanes, and one right turn lane.
    - Eastbound Approach: two left turn lanes, three through lanes, and two right turn lanes.
    - Westbound Approach: two left turn lanes, three through lanes, and one right turn lane.
    - Signal timing improvements including optimization and overlaps for the northbound right turn movement.
- Fallon Road and I-580 Ramps assumed the construction of the Phase II interchange. improvements which have three through lanes in the northbound and southbound directions.

Heavy vehicle percentages, peak hour factors, traffic signal timings, and pedestrian and bicycle activity at the study intersections were left unchanged from existing conditions.

Exhibit 20 and Exhibit 21 show the estimated 2040 traffic volumes and lane configurations without and with the Project, respectively



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72(74) 421(633) 21(103)
109(38) 466(628) 268(228)
125(169) 440(960) 166(269)
197(390) 724(579) 162(482)

2 Tassajarra Rd / Dublin Blvd

88(144) 1007(732) 48(97)
47(61) 460(327) 544(364)
107(283) 244(739) 147(505)
249(468) 490(674) 294(514)

3 Fallon Rd / Dublin Blvd

162(98) 1133(706) 53(13)
5(53) 233(79) 223(964)
72(221) 187(277) 179(370)
326(163) 651(980) 807(386)

4 Fallon Rd / I-580 WB Ramps

497(757) 888(1342)
658(715) 62(2) 231(603)
1348(813)

5 El Charro Rd / I-580 EB Ramps

674(1753)
495(517) 667(257)
1356(1521)

6 Airway Blvd / I-580 EB Ramps

111(277) 64(114)
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767(616) 248(201) 287(299)
52(201) 271(364) 204(132)

7 Airway Blvd / I-580 WB Ramps

201(378)
92(162) 5(2) 49(166)
1083(849)

8 Airway Blvd / N Canyons Pkwy

0(0) 0(1) 0(0)
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11(7) 30(99)
119(151) 0(0) 1012(813)

9 Doolan Rd / N Canyons Pkwy

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11(22) 21(45)
0(2) 19(27)

10 Isabel Ave / Portola Ave

0(14) 182(281) 74(185)
176202) 477(154) 789(427)
5(10) 154(376) 209(411)
474(239) 500(423) 59(503)

11 Isabel Ave / I-580 WB Ramps

381(586) 650(774)
625(424) 1160(698)
600(608)

12 Isabel Ave / I-580 EB Ramps

1473(1041)
369(201) 419(384)
842(811)

13 Murrieta Blvd / Portola Ave

3(2) 0(1) 1(6)
3(0) 1174(610) 304(305)
6(2) 333(1029) 105(394)
287(171) 0(2) 207(652)

14 Croak Rd / Dublin Blvd

PROPOSED INTERSECTION

AM(PM) - Traffic Volume
- Traffic Signal
- Proposed Project

2040 Cumulative No Project
Volumes and Lane Configurations
Livermore, California

Exhibit
20

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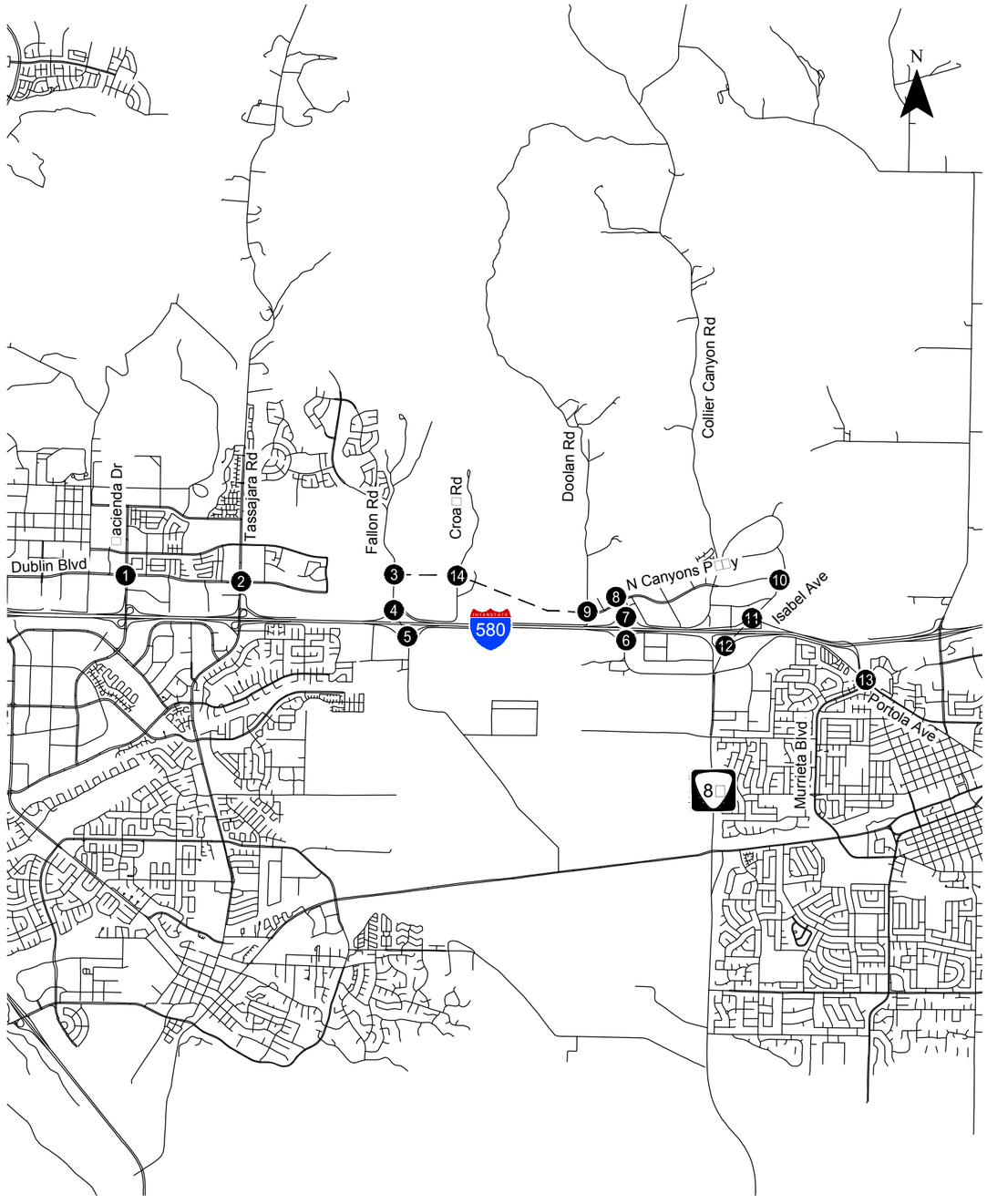
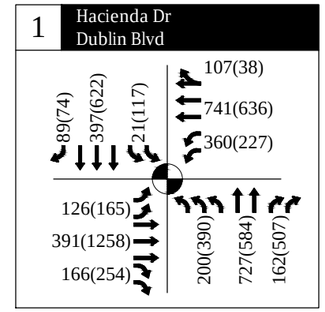
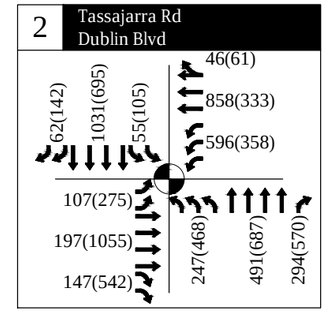
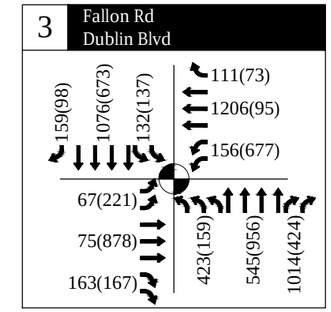
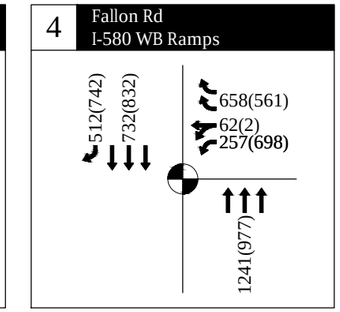
KITTELSON & ASSOCIATES

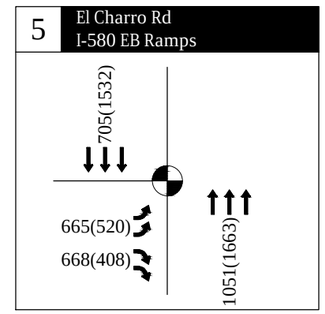


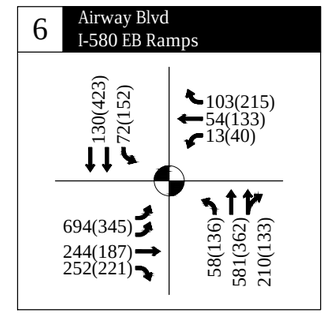


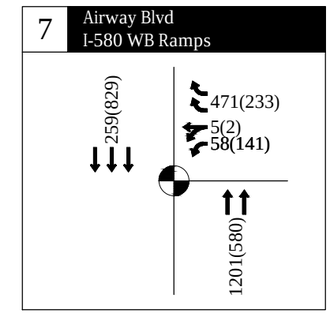


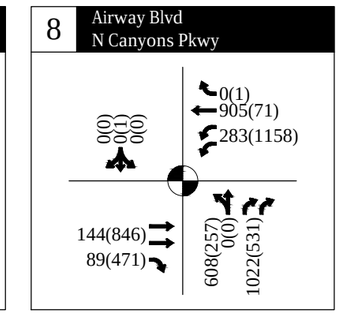


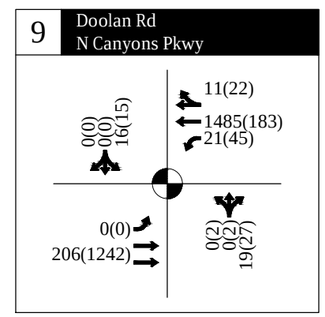


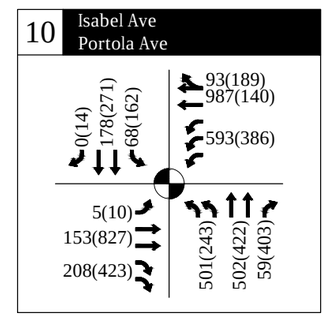


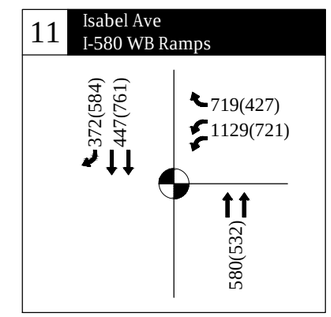


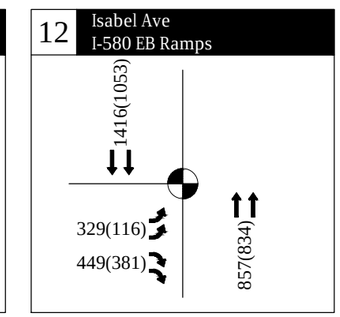


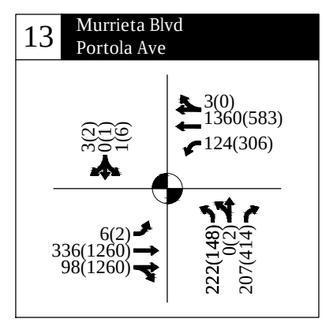


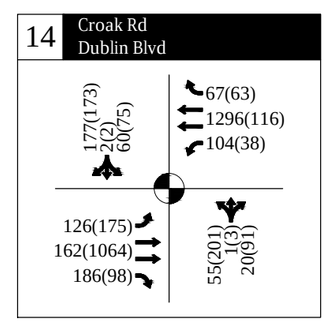












AM(PM) - Traffic Volume

- Traffic Signal

- - - Proposed Project

2040 Cumulative Plus Project
Volumes and Lane Configurations
Livermore, California

Exhibit
21

H:\20\20342 - Dublin Boulevard Extension Prelim Eng\dwgs\figs\20342 Figures.dwg Apr 13, 2018 - 9:55am - boullimore Layout Tab: 2040 Cumm Plus Proj

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2040 Cumulative Conditions Intersection Levels of Service

Levels of service calculations were conducted to evaluate intersection operations under 2040 cumulative conditions both with and without the project. The corresponding LOS calculation sheets are included in Appendix 6. The delay, LOS, and V/C ratio findings from this analysis are summarized in Exhibit 22 and Exhibit 23 for the AM and PM peak hours, respectively. The findings of the analysis indicate that the following intersections would degrade below the LOS standard for the intersection because of the Project:

- **Airway Boulevard & N. Canyons Parkway (#8)** – The Project causes the LOS to degrade from LOS E to LOS F in the AM peak hour which is below the LOS E standard for this intersection. The PM peak hour is also impacted with the Project causing the delay for this intersection already operating at a substandard LOS to increase the average vehicle delay by 5 seconds or more. These Project impacts are caused by the significant increase in the northbound left turn traffic volumes as vehicles access the Project.

2040 Cumulative Conditions 95th Percentile Queue Lengths

In addition to determining intersection delay, Kittelson also estimated 95th percentile queue lengths to determine if the Project causes queueing impacts. The findings for the 95th percentile queue length in the AM and PM peak hours are shown in Exhibit 24 and Exhibit 25, respectively. Detailed queue worksheets for these findings are included in Appendix 7. Intersection movements where the Project causes a turn pocket to exceed its available storage by more than 25 feet or increase a queue already exceeding the available turn pocket storage by more than 25 feet include:

- Airway Boulevard & N. Canyons Parkway (#8) – The Project causes the southbound left turn queue, which is already exceeding the available turn pocket storage, to increase by more than 25 feet (29 feet) during the PM peak hour.
- Isabel Avenue & I-580 Westbound Ramps (#11) – the Project causes westbound right turn lane queue to exceed the available storage by more than 25 feet (58 feet) during the AM peak hour.

Impacts and Mitigation Measures

This section documents the intersections impacted by the project under 2040 cumulative conditions and proposes mitigation measures. The analysis files for the mitigation measures are in Appendix 12 and Appendix 13 for the LOS and queue worksheets, respectively.

Impact TRAF-7: The change in travel patterns resulting from the proposed Project would result in unacceptable operations at the intersection of Airway Boulevard and N. Canyons Parkway (#8) during the AM and PM peak hours for cumulative conditions.

As one of the primary intersections to access the Project, this intersection experiences significant growth to the northbound left turn and westbound through movements. The existing lane configuration of a

single shared left and through lane for both left and through movements for the northbound approach is insufficient to handle this demand.

Mitigation Measure TRAF-7: The City of Livermore is to implement mitigation measure TRAF-2 at the time of Project completion.

Implementation of Mitigation Measure TRAF-7 would improve the operation of this intersection to LOS C during the AM peak hour and LOS D during the PM peak hour lessening Project's impact to less than significant. However, because the City of Dublin as the lead agency for this project cannot guarantee the implementation and timing of the mitigation measure as it is outside the control and jurisdiction of the City, this impact remains significant and unavoidable. The City of Livermore, City of Dublin, and Alameda County are coordinating on this project to meet their General Plan's objectives including the planned extension of this roadway. Dublin and Livermore currently have a funding agreement Memorandum of Understanding (MOU) and are exploring a separate 2 or 3-way MOU with Alameda County to continue to work together to identify the funding and timing for this mitigation.

Significance After Mitigation: Significant and unavoidable.

Impact TRAF-8: The change in travel patterns resulting from the proposed Project would result in the westbound queue at Airway Boulevard and N. Canyons Parkway (#8), which is already exceeding the available storage, to increase by more than 25 feet (29 feet) during the PM peak hour for cumulative conditions.

As one of the primary intersections to access the Project, this intersection experiences significant growth in demand. The signal timing and lane configuration is unable to provide sufficient capacity to meet the demand for this movement.

Mitigation Measure TRAF-8: The City of Livermore is to implement mitigation measure TRAF-2 at the time of Project completion.

Implementation of Mitigation Measure TRAF-8 would reduce the westbound left turn queue to less than the no project condition and lessen the Project's impact to less than significant. However, because the City of Dublin as the lead agency for this project cannot guarantee the implementation and timing of the mitigation measure as it is outside the control and jurisdiction of the City, this impact remains significant and unavoidable. The City of Livermore, City of Dublin, and Alameda County are coordinating on this project to meet their General Plan's objectives including the planned extension of this roadway. Dublin and Livermore currently have a funding agreement Memorandum of Understanding (MOU) and are exploring a separate 2 or 3-way MOU with Alameda County to continue to work together to identify the funding and timing for this mitigation.

Significance After Mitigation: Significant and unavoidable.

Impact TRAF-9: The change in travel patterns resulting from the proposed Project would result in the westbound right turn at the intersection of Isabel Avenue and I-580 Westbound Off-Ramps (#11) during the AM peak hour to exceed the available turn pocket storage by more than 25 feet (58 feet) for cumulative conditions.

The increased demand for vehicles exiting the freeway to access the Project exceeds the ability for the signal with its existing signal timings to provide sufficient capacity for the movement.

> **Mitigation Measure TRAF-9:** Caltrans is to optimize the traffic signal at Isabel Avenue and I-580 Westbound Ramps by the year 2035 to increase the green time for the westbound right turn movement.
>
> Implementation of Mitigation Measure TRAF-9 would reduce the queue to 439 feet allowing it to be contained within the available storage and reducing the Project's impact to less than significant. However, this intersection is under the jurisdiction of Caltrans and the timing and implementation of the proposed mitigation cannot be guaranteed. Therefore, the impact remains significant and unavoidable.
>
> **Significance After Mitigation:** Significant and unavoidable.

Exhibit 22: 2040 Cumulative AM Peak Hour Intersection Operation Findings

#	Location	LOS Standard	2040 AM			2040 AM + Project			2040 AM + Project Mitigated		
			V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
1	Hacienda Drive & Dublin Boulevard	D	0.56	26.3	C	0.66	28.7	C			
2	Tassajara Road & Dublin Boulevard	D	0.55	28.1	C	0.63	31.2	C			
3	Fallon Road & Dublin Boulevard	D	0.48	21.9	C	0.70	28.5	C			
4	Fallon Road & I-580 WB Ramps	D	0.66	9.8	A	0.63	9.8	A			
5	El Charro Road & I-580 EB Ramps	D	0.63	10.0	A	0.58	9.3	A			
6	Airway Boulevard & I-580 EB Ramps	E	0.54	31.7	C	0.67	35.9	D			
7	Airway Boulevard & I-580 WB Ramps	E	0.43	5.4	A	0.65	17.8	B			
8	Airway Boulevard & N. Canyons Parkway	E	0.41	57.3	E	***1.20***	***85.3***	***F***	0.68	20.8	C
9	Doolan Road & N. Canyons Parkway	Mid-D	0.03	8.8	A	0.59	3.8	A			
10	Isabel Avenue & Portola Avenue	E	0.79	37.7	D	0.93	44.0	D			
11	Isabel Avenue & I-580 WB Ramps	E	0.94	31.6	C	0.99	46.4	D	0.96	23.0	C
12	Isabel Avenue & I-580 EB Ramps	E	0.85	27.2	C	0.83	24.5	C			
13	Murrieta Boulevard & Portola Avenue	Mid-D	0.64	25.1	C	0.62	19.3	B			
14	Dublin Boulevard Extension & Croak Road	D				0.66	14.7	B			

Grey highlights indicate LOS below the LOS standard
Bold Italic text indicates a significant impact
Source: Kittelson & Associates, Inc. 2018

Exhibit 23: 2040 Cumulative PM Peak Hour Intersection Operation Findings

#	Location	LOS Standard	2040 PM			2040 PM + Project			2040 PM + Project Mitigated		
			V/C	Delay	LOS	V/C	Delay	LOS	V/C	Delay	LOS
1	Hacienda Drive & Dublin Boulevard	D	0.64	33.0	C	0.71	34.8	C			
2	Tassajara Road & Dublin Boulevard	D	0.55	31.9	C	0.65	34.2	C			
3	Fallon Road & Dublin Boulevard	D	0.70	37.1	D	0.74	41.0	D	0.76	52.3	D
4	Fallon Road & I-580 WB Ramps	D	0.65	10.2	B	0.66	11.6	B			
5	El Charro Road & I-580 EB Ramps	D	0.65	8.9	A	0.62	9.1	A			
6	Airway Boulevard & I-580 EB Ramps	E	0.62	34.9	C	0.50	33.0	C			
7	Airway Boulevard & I-580 WB Ramps	E	0.37	12.7	B	0.27	10.5	B			
8	Airway Boulevard & N. Canyons Parkway	E	0.58	94.2	F	***1.02***	***105.9***	***F***	0.91	42.3	D
9	Doolan Road & N. Canyons Parkway	Mid-D	0.06	9.0	A	0.55	7.5	A			
10	Isabel Avenue & Portola Avenue	E	0.55	30.4	C	0.68	33.3	C			
11	Isabel Avenue & I-580 WB Ramps	E	0.70	12.2	B	0.69	12.0	B			
12	Isabel Avenue & I-580 EB Ramps	E	0.61	12.5	B	0.61	11.5	B			
13	Murrieta Boulevard & Portola Avenue	Mid-D	0.92	51.2	D	0.78	32.9	C			
14	Dublin Boulevard Extension & Croak Road	D				0.70	10.7	B			

Grey highlights indicate LOS below the LOS standard
Bold Italic text indicates a significant impact
Source: Kittelson & Associates, Inc. 2018

Exhibit 24: 2040 Cumulative 95th Percentile Queue Lengths in Feet during the AM Peak Hour

#	Location		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
1	Hacienda Drive and Dublin Boulevard	Storage	270	515	240	260	670		250	460	240	280	720	215
		No Project	91	144	29	168	164		90	371	28	25	144	25
		With Project	92	130	29	223	260		91	375	28	25	138	42
2	Tassajara Road & Dublin Boulevard	Storage	250	565	300	380	830		355	930	930	280	635	250
		No Project	74	65	28	196	145		100	110	63	41	245	18
		With Project	74	54	28	214	272		99	111	63	45	252	6
3	Fallon Road & Dublin Boulevard	Storage	340	640	410	485	500		405	580	400	450	1,250	290
		No Project	50	59	53	#162	71		113	113	48	40	224	45
		With Project	48	28	48	#100	#385		146	98	34	81	214	45
4	Fallon Road and I-580 WB Ramps	Storage				1,500	1,500	1,500		1,000			650	220
		No Project				96	96	158		133			50	23
		With Project				104	104	154		120			41	23
5	El Charro Road & I-580 EB Ramps	Storage	275		275					825			1,050	
		No Project	132		142					190			81	
		With Project	138		113					120			75	
6	Airway Boulevard & I-580 EB Ramps	Storage	575	380	380	250	1,000	250	360	1,000	1,000	815	815	
		No Project	#382	239	64	30	78	39	77	145	0	87	63	
		With Project	317	235	61	27	78	72	84	#360	0	103	80	
7	Airway Boulevard and I-580 WB Ramps	Storage				115	1,350	475		780			530	
		No Project				49	50	23		16			0	
		With Project				53	54	203		553			2	
8	Airway Boulevard & N. Canyons Parkway	Storage		500	500	510	510	190		540	540		100	
		No Project		11	0	236	16	0		148	239		0	
		With Project		73	30	132	#956	0		#698	189		0	
		Mitigated		49	26	128	195	0		268	18		0	
9	Doolan Road & N. Canyons Parkway	Storage	150	500		135	650			250			250	
		No Project	#N/A			2	1			0			1	
		With Project	0	49		34	372			0			21	
10		Storage	850	850	350	420	1,000		300	1,850	300	195	400	

#	Location		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
	Isabel Avenue & Portola Avenue	No Project	19	82	13	#337	267		#350	291	17	115	111	
		With Project	19	81	13	228	524		#375	289	17	107	108	
11	Isabel Avenue & I-580 WB Ramps	Storage				1,500		460		1,315			1,830	320
		No Project				#673		402		268			166	25
		With Project				#637		***518***		258			110	25
		Mitigated				318		#439		197			122	36
12	Isabel Avenue & I-580 EB Ramps	Storage	255		255					1,050			1,322	
		No Project	189		171					141			#775	
		With Project	171		184					135			#726	
13	Murrieta Boulevard & Portola Avenue	Storage	75	1,500		360	825		175	1,000	1,000		100	
		No Project	20	193		314	429		174	175	63		0	
		With Project	20	153		156	544		138	138	63		0	
14	Croak Road & Dublin Boulevard Extension	Storage	210	500	250	150	500	250	150	150		150	150	
		No Project	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	
		With Project	#208	30	23	63	404	20	61	19		61	72	

Grey highlights indicate queue exceeds the turn pocket storage for turn movements or extends into an upstream signalized intersection for through movements

Bold Italic text indicates a significant impact

95th percentile volume exceeds capacity, queue may be longer.

Source: Kittelson & Associates, Inc. 2018

Exhibit 25: 2040 Cumulative 95th Percentile Queue Lengths in Feet during the PM Peak Hour

#	Location		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
1	Hacienda Drive and Dublin Boulevard	Storage	270	515	240	260	670		250	460	240	280	720	215
		No Project	115	324	35	146	208		157	297	43	78	230	29
		With Project	112	447	53	145	208		157	303	44	86	225	30
2	Tassajara Road & Dublin Boulevard	Storage	250	565	300	380	830		355	930	930	280	635	250
		No Project	172	179	43	146	120		181	166	210	73	201	31
		With Project	164	255	48	141	119		178	169	314	76	190	30
3	Fallon Road & Dublin Boulevard	Storage	340	640	410	485	500		405	580	400	450	1,250	290
		No Project	154	116	188	#640	30		85	273	28	19	202	30
		With Project	153	#375	68	378	35		82	262	106	#172	190	29
		Mitigated	127	270	42	#482	32		#93	213	111	87	136	27
4	Fallon Road and I-580 WB Ramps	Storage				1,500	1,500	1,500		1,000			650	220
		No Project				#189	#191	123		87			106	37
		With Project				#230	#232	97		107			60	36
5	El Charro Road & I-580 EB Ramps	Storage	275		275					825			1,050	
		No Project	148		82					158			200	
		With Project	149		129					181			164	
6	Airway Boulevard & I-580 EB Ramps	Storage	575	380	380	250	1,000	250	360	1,000	1,000	815	815	
		No Project	270	190	66	51	159	111	#324	187	0	147	155	
		With Project	148	178	59	58	151	74	#205	186	0	#212	210	
7	Airway Boulevard and I-580 WB Ramps	Storage				115	1,350	475		780			530	
		No Project				111	110	29		248			m12	
		With Project				98	97	34		143			m9	
8	Airway Boulevard & N. Canyons Parkway	Storage		500	500	510	510	190		540	540		100	
		No Project		8	38	#736	12	0		181	232		7	
		With Project		#513	89	***#765***	47	0		280	144		7	
		Mitigated		#490	211	#644	13	0		#246	29		7	
9	Doolan Road & N. Canyons Parkway	Storage	150	500		135	650			250			250	
		No Project	#N/A	#N/A		5	2			0			1	
		With Project	0	#419		#55	36			15			15	

#	Location		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
10	Isabel Avenue & Portola Avenue	Storage	850	850	350	420	1,000		300	1,850	300	195	400	
		No Project	27	185	43	150	84		135	203	177	222	130	
		With Project	26	#480	60	139	78		138	205	84	197	127	
11	Isabel Avenue & I-580 WB Ramps	Storage				1,500		460		1,315			1,830	320
		No Project				175		163		157			150	46
		With Project				170		139		136			148	47
12	Isabel Avenue & I-580 EB Ramps	Storage	255		255					1,050			1,322	
		No Project	73		100					81			256	
		With Project	45		95					68			237	
13	Murrieta Boulevard & Portola Avenue	Storage	75	1,500		360	825		175	1,000	1,000		100	
		No Project	11	#992		348	189		123	121	#427		25	
		With Project	11	#1025		345	172		111	109	99		25	
14	Croak Road & Dublin Boulevard Extension	Storage	210	500	250	150	500	250	150	150		150	150	
		No Project	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		#N/A	#N/A	
		With Project	#176	237	22	36	36	18	106	39		41	31	

Grey highlights indicate queue exceeds the turn pocket storage for turn movements or extends into an upstream signalized intersection for through movements

Bold Italic text indicates a significant impact

95th percentile volume exceeds capacity, queue may be longer.

Source: Kittelson & Associates, Inc. 2018

MULTIMODAL ANALYSIS

Previous sections of this transportation analysis have focused on the potential impacts the Project would have on vehicular circulation and access. This section focuses on impacts to the non-vehicle modes including pedestrians, bicycles, and transit passengers.

PEDESTRIAN FACILITIES

Pedestrians would be impacted by this Project if their circulation, access, and safety would be substantially impeded.

Under existing conditions, there is no pedestrian connectivity between Dublin and Livermore along the north side of I-580. Pedestrians would need to divert down Isabel Avenue and travel along Jack London Boulevard to walk between these cities today. The Project would provide a more direct pedestrian connection along the north side of I-580 connecting the Fallon Road and Dublin Boulevard intersection in Dublin with the Doolan Road and North Canyons Parkway intersection in Livermore. The proposed cross section for this new roadway connection includes a sidewalk on one side and a multiuse pathway on the other. By providing this connection on the north side of I-580, the Project is improving connectivity rather than impeding it.

Pedestrian access to the new roadway facilities would be from the intersections of Fallon Road and Dublin Boulevard and from Doolan Road and North Canyons Parkway. The Fallon Road and Dublin Boulevard intersection does not currently provide for pedestrian crosswalks across Fallon Road. However, the proposed Project would add these crosswalks providing pedestrian access to the new facility on the west end. Similarly, the Doolan Road and North Canyons Parkway intersection does not provide pedestrian access across Doolan Road because there are no land uses on the west side today. As the Project is built, this intersection will be improved to a signalized intersection providing full pedestrian signals and crosswalks.

Pedestrian safety is not anticipated to be impeded because of this Project. The new sidewalk and multiuse trail would be built to the latest applicable standards ensuring adequate separation between pedestrians and vehicle traffic. At the access intersections, the signals would be updated when the crosswalks are installed to have pedestrian signals and to provide sufficient time for pedestrians to cross the intersection. Therefore, the project is anticipated to have beneficial effects on pedestrians resulting in a less than significant impact.

BICYCLE FACILITIES

Similar to pedestrians, bicycles would be significantly impacted by the Project if it caused their circulation, access, and safety to be substantially impeded. The new connection would improve bicycle connectivity north of I-580 where there are no bicycle facilities today. The Project would implement a multiuse path along with bikeways (separated) and/or bicycle lanes along Dublin Boulevard to facilitate the connection

between Doolan Road in Livermore and Fallon Road in Dublin. Access to these new facilities would occur via signalized intersections at Fallon Road and Doolan Road. As part of the Project, the signal timing at these intersections would be improved and brought up to the latest standards for providing sufficient green time to accommodate bicycle movements.

Bicycle safety along the Project would be addressed through the design of the bikeways/bike lanes and multiuse path. These facilities would be designed to meet current standards providing sufficient separation between bicyclists and motor vehicle traffic. Therefore, the Project is not anticipated to significantly impede bicycle safety.

TRANSIT SERVICES

The primary goals of transit service in the project area are to increase ridership, improve access to BART, and reduce system inefficiencies. Similar to the bicycle and pedestrian modes, the Project will provide a roadway connection on the north side of I-580 better connecting the cities of Dublin and Livermore. This new connection would provide LAVTA the ability to relocate Route 30R from the freeway to the Project between Airway Boulevard and Fallon Road avoiding the I-580 freeway which is heavily congested during the peak commute periods. This is anticipated to improve transit travel times which may increase ridership.

The Project also provides the option to provide for future transit improvements including dedicated transit lanes and queue jumps. The dedicated transit lane would require the construction of an additional lane in each direction between Croak Road and Doolan Road increasing the roadway from four lanes (two in each direction) to six lanes (three in each direction). Based on 2040 traffic volume forecasts, the travel speed along the corridor for a transit vehicle is not anticipated to change significantly with the addition of the transit only lane (Exhibit 26). While the transit only lane is not anticipated to be needed in 2040 at this time, future land use assumptions may change the demand for the Dublin Boulevard Extension which may show a significant speed advantage for transit vehicles using a transit only-lane.

Exhibit 26: Four-Lane Versus Six-Lane Transit Travel Speeds for the Project

Travel Speeds (mph)	AM Peak Hour	PM Peak Hour
Four-Lane (No Transit-Only Lane)	38.5 mph	39.7 mph
Six-Lane (Transit-Only Lane)	39.6 mph	39.9 mph
Difference	1.1 mph (3%)	0.2 mph (1%)
Source: Alameda CTC Model and Kittelson and Associates, Inc., 2018		

Another transit improvement that can be considered as the Project is built is the installation of transit queue jumps. A queue jump provides preference to transit vehicle by providing an additional approach lane to the intersection. This lane is often restricted to transit vehicles only by may serve a dual purpose

as a right turn lane. Once a transit vehicle is detected in a queue jump lanes, they receive signal priority reducing delay for the transit vehicle at the intersection. To accommodate queue jumps, the Project has designed long right turn lanes (about 250 feet) at the intersections of Dublin Boulevard with Fallon Road and Croak Road. These lanes can be converted to exclusive transit queue jump lanes in the future based on the needs of the local transit agency.

Since the Project would provide better local connections for transit vehicles and it allows for options to improve transit performance, the Project's impact on transit will be less than significant.

TRANSPORTATION OPERATIONS SUMMARY

The Dublin Boulevard Extension Project would connect the intersection of Dublin Boulevard and Fallon Road in Dublin with the intersection of Doolan Road and N. Canyons Parkway in Livermore. Kittelson assessed the potential transportation impacts of this project during existing conditions, the anticipated opening year (2025), and cumulative (2040) conditions. The main findings of this analysis include:

- Existing Conditions
    - The Project would result in significant traffic operations impacts to two intersections including Fallon Road/Dublin Boulevard and Airway Boulevard/N. Canyons Parkway.
    - Mitigations for these two intersections would require additional lanes to accommodate the increased traffic volume. Fallon Road/Dublin Boulevard would need to be expanded to incorporate the mitigation measures from the Kaiser EIR in addition to elements of the planned intersection improvements documented in the Eastern Dublin Transportation Impact Fee Program. The intersection of Airway Boulevard/N. Canyons Parkway would require additional lanes for the northbound and westbound approaches. These additional lanes could be accommodated within the existing right-of-way.
- 2025 Near-Term Conditions
    - The Project would result in significant traffic operations impacts to two intersections including Fallon Road/Dublin Boulevard and Airway Boulevard/N. Canyons Parkway.
    - Mitigations for these two intersections would require additional lanes to accommodate the increased traffic volume. Fallon Road/Dublin Boulevard would need to be expanded to incorporate elements of the planned intersection improvements documented in the Eastern Dublin Transportation Impact Fee Program. The intersection of Airway Boulevard/N. Canyons Parkway would require additional lanes for the northbound and westbound approaches. These additional lanes could be accommodated within the existing right-of-way.
- 2040 Cumulative Conditions
    - The Project would result in significant traffic operations impacts to the intersection of Airway Boulevard and N. Canyons Parkway.
    - Similar to the 2025 mitigation requirements, adding additional lanes to the northbound and westbound approach would eliminate this significant impact. These additional lanes can be accommodated within the existing right-of-way.
    - Queue impacts were also found at the following three intersections in 2040. Mitigation of these queue impacts include updating the signal timing to better align with future traffic volumes:
        - Airway Boulevard & N. Canyons Parkway (#8)
        - Isabel Avenue & I-580 Westbound Ramps (#11)
- Pedestrians, Bicycles, and Transit
    - The Project would increase connectivity for the pedestrian and bicycle modes by connecting Dublin and Livermore north of I-580. The Project would provide pedestrian and bicycle facilities consistent with the latest design standards.

- The Project also provides an alternative transit route for transit agencies to avoid the heavily congested I-580 freeway for local transit trips between Dublin and Livermore north of I-580. The Project design has considered transit improvements such as dedicated transit lanes and queue jumps. While the future demand forecasts do not currently show a benefit of having a transit-only lane, this could change as projected land uses in the area change. The Project has also accommodated the future potential for queue jumps by designing longer right turn lanes that may eventually serve as transit queue jump lanes.

Appendix 1
Traffic Count Data

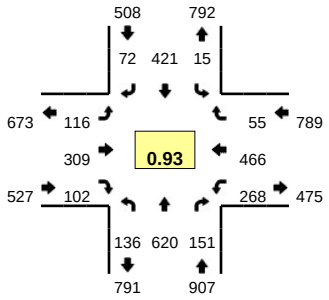
Type of peak hour being reported: Intersection Peak

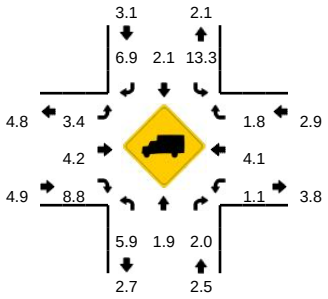
Method for determining peak hour: Total Entering Volume

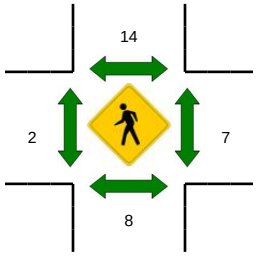
LOCATION: 1 - Hacienda Dr -- Dublin Blvd
CITY/STATE: Dublin, CA

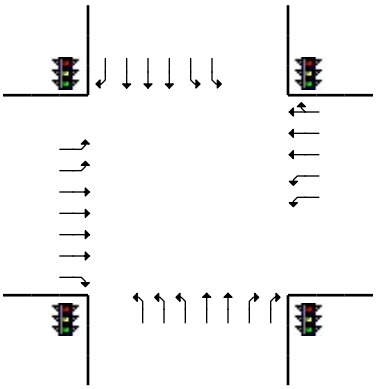
QC JOB #: 13967625
DATE: Thu, Jan 26 2017

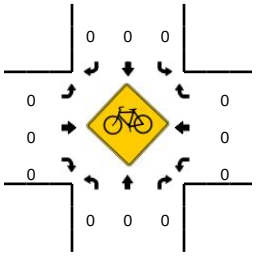
Peak-Hour: 8:00 AM -- 9:00 AM
Peak 15-Min: 8:20 AM -- 8:35 AM

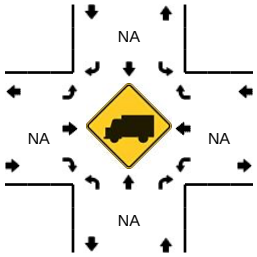


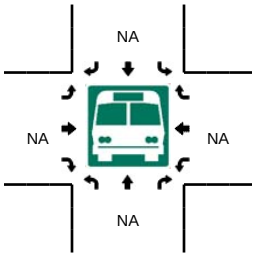












5-Min Count Period Beginning At	1 - Hacienda Dr (Northbound)				1 - Hacienda Dr (Southbound)				Dublin Blvd (Eastbound)				Dublin Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	28	41	6	0	0	13	0	0	2	12	6	0	8	36	0	0	152	
7:05 AM	24	25	0	0	1	8	4	1	1	13	8	0	9	71	3	0	168	
7:10 AM	13	29	3	0	1	17	8	0	3	12	6	0	16	60	3	0	171	
7:15 AM	18	30	9	0	2	20	9	0	8	5	6	0	13	59	4	0	183	
7:20 AM	9	47	7	0	0	18	5	0	7	8	7	0	25	86	9	0	228	
7:25 AM	10	38	8	1	0	31	8	1	3	17	4	0	12	46	2	0	181	
7:30 AM	20	39	5	0	0	17	8	0	11	13	6	0	19	76	5	0	219	
7:35 AM	15	36	4	0	2	31	15	0	1	19	9	0	20	101	3	0	256	
7:40 AM	11	34	10	0	0	28	23	0	10	21	3	0	16	73	2	0	231	
7:45 AM	18	53	20	0	2	26	8	0	7	18	5	0	13	69	9	0	248	
7:50 AM	9	44	13	0	0	31	6	0	3	22	2	0	17	30	3	0	180	
7:55 AM	8	43	8	0	0	23	1	0	23	29	2	1	20	49	8	0	215	2432
8:00 AM	11	62	9	0	2	18	1	0	24	27	10	0	26	33	6	0	229	2509
8:05 AM	8	43	10	0	1	23	8	0	11	37	4	0	7	33	7	0	192	2533
8:10 AM	6	45	16	0	0	30	3	0	12	28	7	1	15	44	5	1	213	2575
8:15 AM	13	67	9	0	1	40	4	0	9	22	8	0	9	21	4	1	208	2600
8:20 AM	28	52	13	0	1	44	9	0	5	28	13	0	19	51	5	0	268	2640
8:25 AM	16	55	18	0	0	38	7	1	7	21	9	0	29	43	7	0	251	2710
8:30 AM	3	35	10	0	0	48	8	0	8	19	7	0	30	43	6	0	217	2708
8:35 AM	6	48	16	1	4	44	9	0	4	27	10	0	31	40	3	0	243	2695
8:40 AM	7	55	12	1	2	45	9	0	4	24	7	0	16	38	2	0	222	2686
8:45 AM	14	63	11	0	0	28	6	1	6	34	10	0	29	56	1	0	259	2697
8:50 AM	8	32	14	0	1	29	6	0	10	26	5	0	27	32	6	0	196	2713
8:55 AM	14	63	13	0	1	34	2	0	15	16	12	0	28	32	3	0	233	2731

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	188	568	164	0	4	520	96	4	80	272	116	0	312	548	72	0	2944
Heavy Trucks	8	8	12		0	12	0		8	12	16		4	20	4		104
Pedestrians		8				24				4				16			52
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/6/2017 4:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

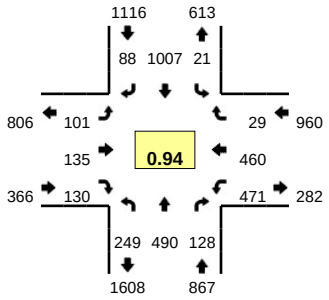
Type of peak hour being reported: Intersection Peak

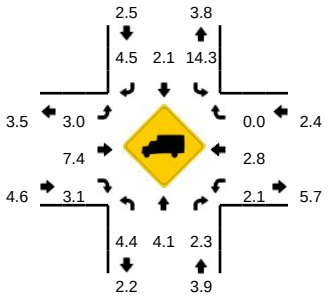
Method for determining peak hour: Total Entering Volume

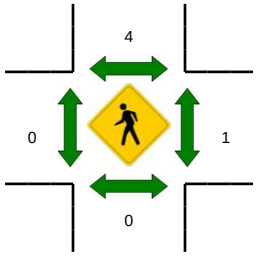
LOCATION: 2 - Tassajara Rd -- Dublin Blvd
CITY/STATE: Alameda, CA

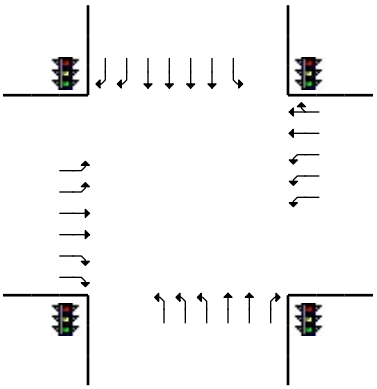
QC JOB #: 13967617
DATE: Thu, Jan 26 2017

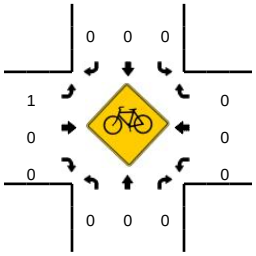
Peak-Hour: 7:50 AM -- 8:50 AM
Peak 15-Min: 8:30 AM -- 8:45 AM

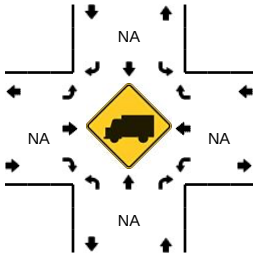


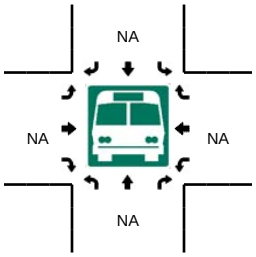












5-Min Count Period Beginning At	2 - Tassajara Rd (Northbound)				2 - Tassajara Rd (Southbound)				Dublin Blvd (Eastbound)				Dublin Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	29	45	8	0	1	39	10	0	2	4	2	0	26	21	0	0	187	
7:05 AM	44	26	8	0	0	34	3	0	1	5	7	0	32	31	2	0	193	
7:10 AM	17	39	7	0	1	55	4	0	9	4	11	0	28	34	4	0	213	
7:15 AM	15	30	5	0	2	50	8	0	1	4	8	1	36	81	1	0	242	
7:20 AM	27	42	8	0	1	59	10	0	4	1	9	0	28	25	3	0	217	
7:25 AM	20	39	5	0	0	52	4	0	3	8	7	0	23	79	4	0	244	
7:30 AM	34	51	5	0	0	81	7	0	4	3	12	1	32	40	7	0	277	
7:35 AM	30	45	8	0	0	58	12	0	1	7	15	0	28	47	3	0	254	
7:40 AM	14	41	7	0	1	60	4	0	6	15	9	0	54	52	2	0	265	
7:45 AM	29	36	5	0	2	63	7	0	2	3	5	0	34	37	3	0	226	
7:50 AM	16	54	11	0	3	93	5	0	10	8	6	2	24	40	1	0	273	
7:55 AM	14	29	11	0	3	67	6	0	6	7	10	0	45	46	2	0	246	2837
8:00 AM	22	31	11	0	2	71	4	0	8	19	16	0	24	24	0	0	232	2882
8:05 AM	14	50	7	0	0	65	7	0	11	16	10	0	35	43	5	0	263	2952
8:10 AM	31	42	10	0	2	82	6	1	5	6	8	0	45	37	3	0	278	3017
8:15 AM	22	55	9	0	0	108	9	0	9	11	8	0	35	32	2	0	300	3075
8:20 AM	16	31	9	0	3	69	8	0	5	10	14	0	58	47	4	0	274	3132
8:25 AM	13	24	21	0	0	87	7	0	9	19	14	1	42	46	2	0	285	3173
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8:35 AM	20	39	7	0	1	81	4	0	11	6	17	0	54	34	5	0	279	3232
8:40 AM	22	39	14	0	2	90	10	0	7	19	6	1	43	37	3	0	293	3260
8:45 AM	27	47	12	0	3	76	11	1	4	7	14	4	31	36	2	0	275	3309
8:50 AM	24	23	11	0	1	60	5	0	8	17	12	1	37	42	4	0	245	3281
8:55 AM	35	39	9	0	3	91	6	0	8	5	13	0	32	18	2	0	261	3296

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	296	508	108	0	12	1156	100	0	100	128	120	8	528	436	32	0	3532
Heavy Trucks	8	20	4		0	20	4		4	16	0		8	4	0		88
Pedestrians		0				8				0				0			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/6/2017 4:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

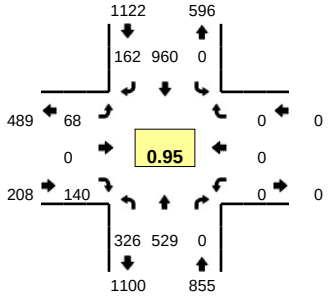
Type of peak hour being reported: Intersection Peak

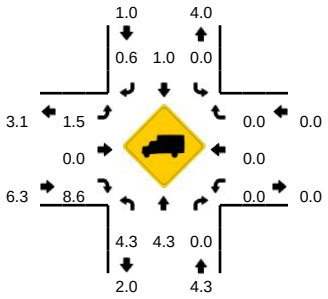
Method for determining peak hour: Total Entering Volume

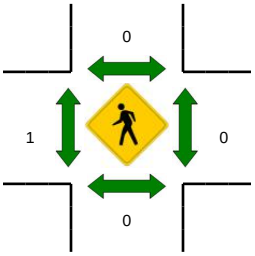
LOCATION: 3 - Fallon Rd -- Dublin Blvd
CITY/STATE: Dublin, CA

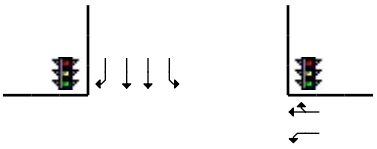
QC JOB #: 13967611
DATE: Thu, Jan 26 2017

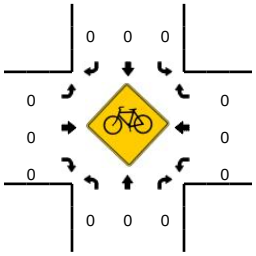
Peak-Hour: 7:35 AM -- 8:35 AM
Peak 15-Min: 8:05 AM -- 8:20 AM

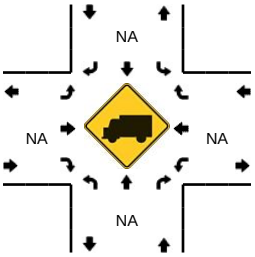


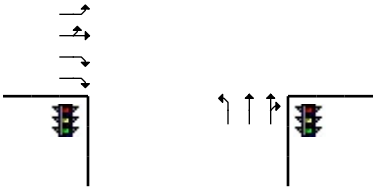


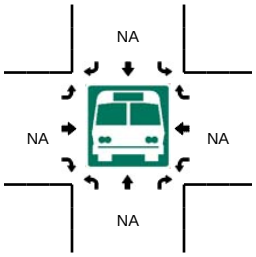












5-Min Count Period Beginning At	3 - Fallon Rd (Northbound)				3 - Fallon Rd (Southbound)				Dublin Blvd (Eastbound)				Dublin Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	19	31	0	0	0	36	5	0	4	0	13	0	0	0	0	0	108	
7:05 AM	20	35	0	0	0	49	10	0	5	0	5	0	0	0	0	0	124	
7:10 AM	39	44	0	0	0	46	10	0	3	0	6	0	0	0	0	0	148	
7:15 AM	42	49	0	0	0	57	17	0	5	0	9	0	0	0	0	0	179	
7:20 AM	35	60	1	0	0	56	14	0	3	0	13	1	0	1	0	0	184	
7:25 AM	42	46	0	0	0	74	12	0	2	0	11	0	0	0	0	0	187	
7:30 AM	37	44	0	0	0	82	13	0	3	0	9	0	0	0	0	0	188	
7:35 AM	40	38	0	0	0	73	14	0	6	0	6	0	0	0	0	0	177	
7:40 AM	24	39	0	0	0	89	15	0	2	0	4	0	0	0	0	0	173	
7:45 AM	35	61	0	0	0	75	8	0	5	0	15	0	0	0	0	0	199	
7:50 AM	33	39	0	0	0	63	12	0	3	0	14	0	0	0	0	0	164	
7:55 AM	29	47	0	0	0	77	8	0	6	0	17	0	0	0	0	0	184	2015
8:00 AM	21	49	0	0	0	51	5	0	9	0	7	0	0	0	0	0	142	2049
8:05 AM	26	63	0	0	0	65	9	0	12	0	18	0	0	0	0	0	193	2118
8:10 AM	27	59	0	0	0	82	13	0	3	0	15	1	0	0	0	0	200	2170
8:15 AM	17	44	0	0	0	85	20	0	6	0	8	0	0	0	0	0	180	2171
8:20 AM	32	39	0	0	0	71	16	0	7	0	19	0	0	0	0	0	184	2171
8:25 AM	21	27	0	0	0	121	19	0	5	0	6	0	0	0	0	0	199	2183
8:30 AM	21	24	0	0	0	108	23	0	3	0	11	0	0	0	0	0	190	2185
8:35 AM	12	29	1	0	0	84	17	0	13	0	15	0	0	0	0	0	171	2179
8:40 AM	25	21	0	0	0	88	22	0	6	0	13	0	0	0	0	0	175	2181
8:45 AM	14	40	0	0	0	85	25	0	7	0	14	1	0	0	0	0	186	2168
8:50 AM	24	23	0	0	0	55	15	0	4	0	15	0	0	0	0	0	136	2140
8:55 AM	13	30	0	0	0	80	15	0	15	0	18	0	0	0	0	0	171	2127

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	280	664	0	0	0	928	168	0	84	0	164	4	0	0	0	0	2292
Heavy Trucks	8	32	0		0	8	0		0	0	16		0	0	0		64
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/6/2017 4:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

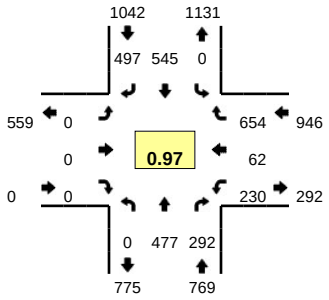
Type of peak hour being reported: Intersection Peak

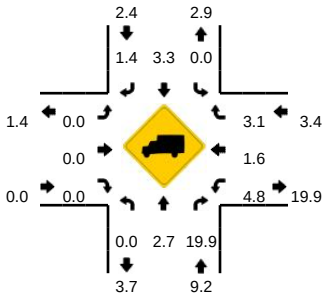
Method for determining peak hour: Total Entering Volume

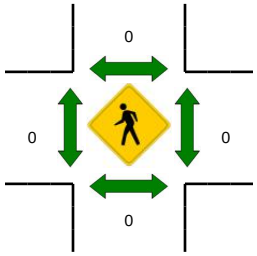
LOCATION: 4 - Fallon Rd -- I-580 WB On/Off Ramps
CITY/STATE: Alameda, CA

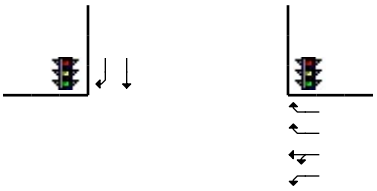
QC JOB #: 13967613
DATE: Thu, Jan 26 2017

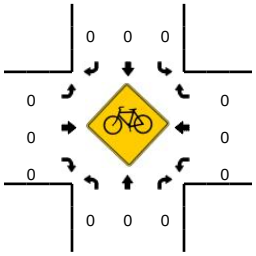
Peak-Hour: 7:15 AM -- 8:15 AM
Peak 15-Min: 7:35 AM -- 7:50 AM

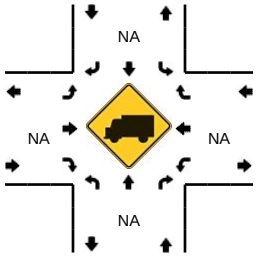


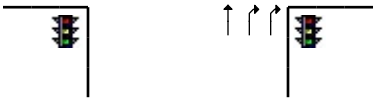


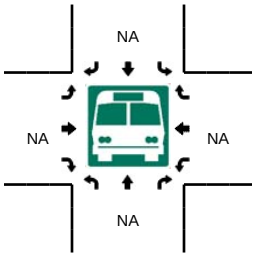












5-Min Count Period Beginning At	4 - Fallon Rd (Northbound)				4 - Fallon Rd (Southbound)				I-580 WB On/Off Ramps (Eastbound)				I-580 WB On/Off Ramps (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	25	24	0	0	35	28	0	0	0	0	0	9	1	39	0	161	
7:05 AM	0	23	21	0	0	27	37	0	0	0	0	0	20	1	50	0	179	
7:10 AM	0	32	15	0	0	21	27	0	0	0	0	0	17	11	82	0	205	
7:15 AM	0	33	25	0	0	39	31	0	0	0	0	0	16	5	72	0	221	
7:20 AM	0	31	22	0	0	46	32	0	0	0	0	0	26	4	65	0	226	
7:25 AM	0	30	25	0	0	39	47	0	0	0	0	0	16	6	59	0	222	
7:30 AM	0	31	19	0	0	44	56	0	0	0	0	0	18	10	70	0	248	
7:35 AM	0	29	25	0	0	39	46	0	0	0	0	0	26	10	51	0	226	
7:40 AM	0	45	28	0	0	49	43	0	0	0	0	0	15	3	48	0	231	
7:45 AM	0	47	24	0	0	55	46	0	0	0	0	0	17	5	58	0	252	
7:50 AM	0	37	36	0	0	48	28	0	0	0	0	0	16	6	42	0	213	
7:55 AM	0	37	16	0	0	59	36	0	0	0	0	0	28	6	56	0	238	2622
8:00 AM	0	42	27	0	0	33	37	0	0	0	0	0	15	3	48	0	205	2666
8:05 AM	0	63	23	0	0	47	43	0	0	0	0	0	21	2	45	0	244	2731
8:10 AM	0	52	22	0	0	47	52	0	0	0	0	0	16	2	40	0	231	2757
8:15 AM	0	41	24	0	0	51	42	0	0	0	0	0	11	0	38	0	207	2743
8:20 AM	0	35	25	0	0	51	46	0	0	0	0	0	18	1	36	0	212	2729
8:25 AM	0	28	24	0	0	59	69	0	0	0	0	0	15	0	41	0	236	2743
8:30 AM	0	22	25	0	0	68	48	0	0	0	0	0	15	1	35	0	214	2709
8:35 AM	0	24	13	0	0	67	49	0	0	0	0	0	24	1	39	0	217	2700
8:40 AM	0	29	17	0	0	48	46	0	0	0	0	0	25	2	26	0	193	2662
8:45 AM	0	30	21	0	0	64	47	0	0	0	0	0	24	2	44	0	232	2642
8:50 AM	0	31	24	0	0	53	29	0	0	0	0	0	23	0	31	0	191	2620
8:55 AM	0	23	15	0	0	47	50	0	0	0	0	0	19	1	29	0	184	2566

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	484	308	0	0	572	540	0	0	0	0	0	232	72	628	0	2836
Heavy Trucks	0	8	84		0	16	4		0	0	0		16	0	20		148
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/6/2017 4:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

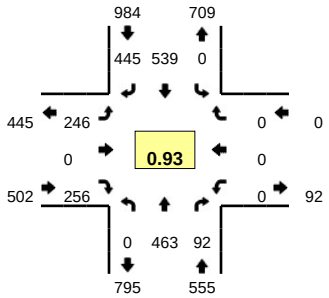
LOCATION: 5 - El Charro Rd -- I-580 EB On/Off Ramps

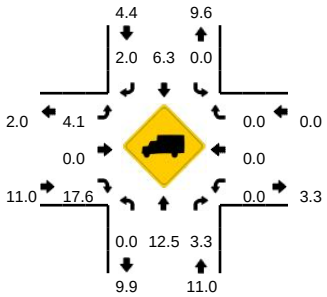
QC JOB #: 13967615

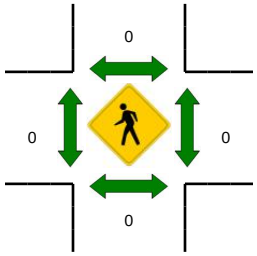
CITY/STATE: Alameda, CA

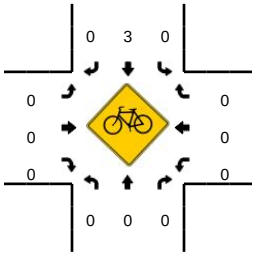
DATE: Tue, Feb 14 2017

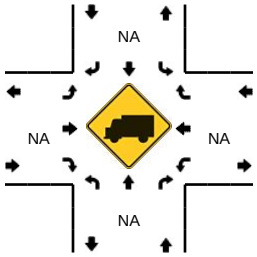
Peak-Hour: 7:45 AM -- 8:45 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

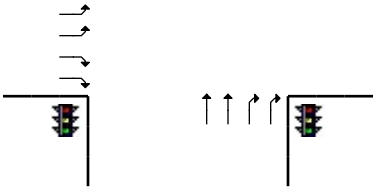


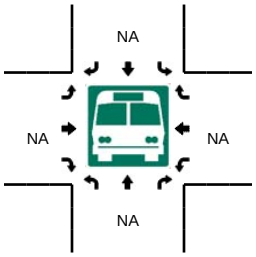












5-Min Count Period Beginning At	5 - El Charro Rd (Northbound)				5 - El Charro Rd (Southbound)				I-580 EB On/Off Ramps (Eastbound)				I-580 EB On/Off Ramps (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	40	4	0	0	32	17	0	32	0	15	0	0	0	0	0	140	
7:05 AM	0	40	11	0	0	36	23	0	24	0	25	0	0	0	0	0	159	
7:10 AM	0	49	7	0	0	35	20	0	37	0	10	0	0	0	0	0	158	
7:15 AM	0	40	13	0	0	35	20	0	14	0	9	0	0	0	0	0	131	
7:20 AM	0	40	12	0	0	40	25	0	14	0	14	0	0	0	0	0	145	
7:25 AM	0	53	6	0	0	46	17	0	19	0	19	0	0	0	0	0	160	
7:30 AM	0	43	7	0	0	49	22	0	13	0	15	0	0	0	0	0	149	
7:35 AM	0	31	11	0	0	46	26	0	12	0	14	0	0	0	0	0	140	
7:40 AM	0	41	12	0	0	42	35	0	16	0	17	0	0	0	0	0	163	
7:45 AM	0	40	11	0	0	43	44	0	18	0	17	0	0	0	0	0	173	
7:50 AM	0	56	4	0	0	56	32	0	15	0	20	0	0	0	0	0	183	
7:55 AM	0	44	2	0	0	48	38	0	33	0	27	0	0	0	0	0	192	1893
8:00 AM	0	44	14	0	0	43	38	0	19	0	14	0	0	0	0	0	172	1925
8:05 AM	0	29	5	0	0	47	32	0	19	0	12	0	0	0	0	0	144	1910
8:10 AM	0	41	9	0	0	38	40	0	20	0	16	0	0	0	0	0	164	1916
8:15 AM	0	34	8	0	0	46	32	0	18	0	16	0	0	0	0	0	154	1939
8:20 AM	0	28	6	0	0	44	32	0	26	0	22	0	0	0	0	0	158	1952
8:25 AM	0	41	8	0	0	44	36	0	22	0	24	0	0	0	0	0	175	1967
8:30 AM	0	39	8	0	0	44	26	0	15	0	22	0	0	0	0	0	154	1972
8:35 AM	0	30	3	0	0	35	55	0	27	0	41	0	0	0	0	0	191	2023
8:40 AM	0	37	14	0	0	51	40	0	14	0	25	0	0	0	0	0	181	2041
8:45 AM	0	33	4	0	0	40	44	0	16	0	32	0	0	0	0	0	169	2037
8:50 AM	0	37	6	0	0	40	41	0	14	0	30	0	0	0	0	0	168	2022
8:55 AM	0	44	6	0	0	28	36	0	19	0	48	0	0	0	0	0	181	2011

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	560	68	0	0	588	456	0	264	0	256	0	0	0	0	0	2192
Heavy Trucks	0	52	4		0	40	12		12	0	28		0	0	0		148
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	1	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/17/2017 3:55 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

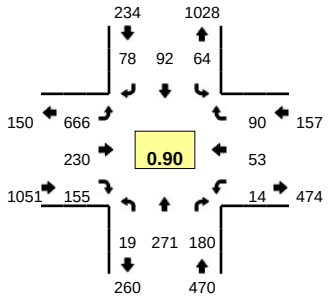
Type of peak hour being reported: Intersection Peak

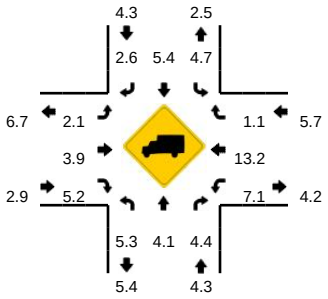
Method for determining peak hour: Total Entering Volume

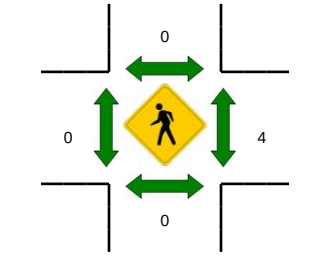
LOCATION: 6 - Airway Blvd -- I-580 EB On/Off Ramps
CITY/STATE: Livermore, CA

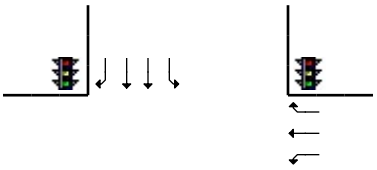
QC JOB #: 13967601
DATE: Tue, Feb 14 2017

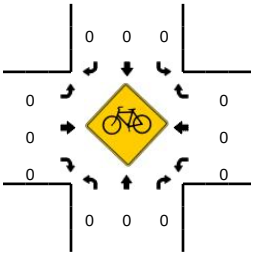
Peak-Hour: 7:50 AM -- 8:50 AM
Peak 15-Min: 7:50 AM -- 8:05 AM

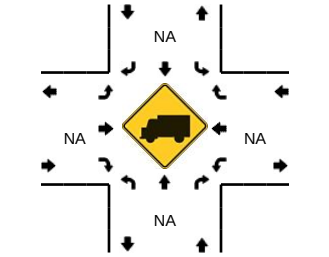


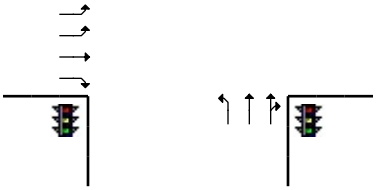


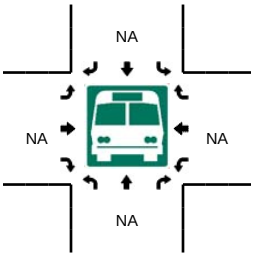












5-Min Count Period Beginning At	6 - Airway Blvd (Northbound)				6 - Airway Blvd (Southbound)				I-580 EB On/Off Ramps (Eastbound)				I-580 EB On/Off Ramps (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	2	20	8	0	5	2	1	0	35	14	6	0	0	5	14	0	112	
7:05 AM	1	12	6	0	5	2	2	0	30	12	11	0	0	6	17	0	104	
7:10 AM	0	18	7	0	4	2	7	0	29	12	11	0	1	2	5	0	98	
7:15 AM	2	15	8	0	4	1	2	0	23	10	8	0	1	6	9	1	90	
7:20 AM	1	17	6	0	8	1	2	0	28	10	7	0	3	8	5	0	96	
7:25 AM	1	23	4	0	2	2	11	0	36	16	1	0	0	8	12	0	116	
7:30 AM	1	13	8	0	3	4	10	0	35	19	13	0	0	5	6	0	117	
7:35 AM	0	16	7	0	4	7	8	0	32	17	13	0	1	3	4	0	112	
7:40 AM	0	28	9	0	5	4	6	0	66	14	6	0	0	4	10	0	152	
7:45 AM	0	22	6	0	6	7	7	0	57	10	11	0	0	6	12	0	144	
7:50 AM	3	24	17	0	8	8	6	0	71	18	15	0	1	7	11	0	189	
7:55 AM	2	23	17	0	5	11	3	0	64	18	9	0	0	5	8	0	165	1495
8:00 AM	0	29	14	0	3	12	8	0	56	22	14	0	1	5	11	0	175	1558
8:05 AM	0	21	13	0	4	6	5	0	51	14	11	0	0	5	10	0	140	1594
8:10 AM	0	26	14	0	9	6	8	0	49	16	10	0	1	7	5	0	151	1647
8:15 AM	1	15	11	0	6	10	12	0	56	22	16	0	2	4	6	0	161	1718
8:20 AM	0	24	11	0	2	7	4	0	63	24	7	0	1	0	6	0	149	1771
8:25 AM	2	25	15	0	3	8	9	0	40	13	11	0	1	6	7	0	140	1795
8:30 AM	5	23	15	0	7	5	4	0	45	20	17	0	0	7	4	1	153	1831
8:35 AM	2	23	17	0	7	6	6	1	54	23	16	0	0	1	8	0	164	1883
8:40 AM	3	20	14	0	5	6	6	0	58	22	19	0	4	3	6	0	166	1897
8:45 AM	1	18	22	0	4	7	7	0	59	18	10	0	2	3	8	0	159	1912
8:50 AM	4	20	17	0	2	4	3	0	67	25	21	0	1	2	4	0	170	1893
8:55 AM	1	12	20	0	6	5	3	0	63	18	13	0	0	3	11	0	155	1883

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	20	304	192	0	64	124	68	0	764	232	152	0	8	68	120	0	2116
Heavy Trucks	0	8	8		0	4	0		12	8	8		4	12	4		68
Pedestrians		0				0				0				12			12
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/17/2017 3:55 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

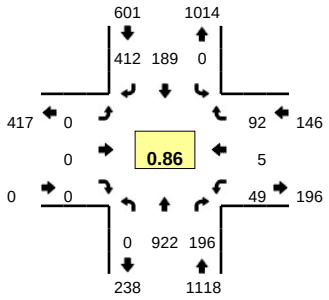
Type of peak hour being reported: Intersection Peak

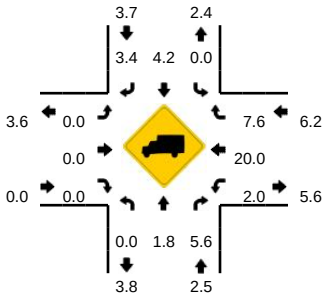
Method for determining peak hour: Total Entering Volume

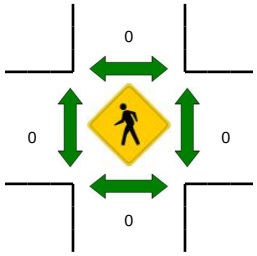
LOCATION: 7 - Airway Blvd -- I-580 WB On/Off Ramps
CITY/STATE: Livermore, CA

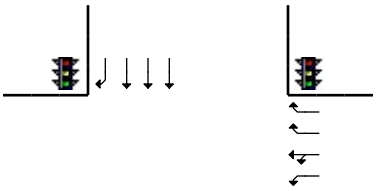
QC JOB #: 13967603
DATE: Thu, Jan 26 2017

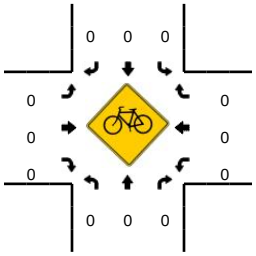
Peak-Hour: 7:45 AM -- 8:45 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

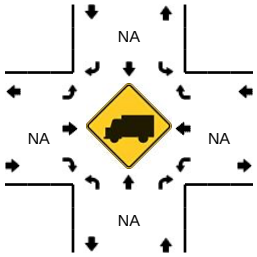


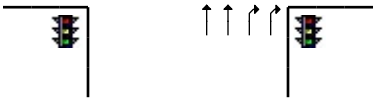


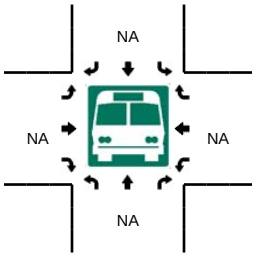












5-Min Count Period Beginning At	7 - Airway Blvd (Northbound)				7 - Airway Blvd (Southbound)				I-580 WB On/Off Ramps (Eastbound)				I-580 WB On/Off Ramps (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	39	14	0	0	14	19	0	0	0	0	0	4	0	7	0	97	
7:05 AM	0	31	15	0	0	16	31	0	0	0	0	0	4	0	9	0	106	
7:10 AM	0	34	23	0	0	11	29	0	0	0	0	0	0	0	6	0	103	
7:15 AM	0	39	23	0	0	10	32	0	0	0	0	0	3	0	10	0	117	
7:20 AM	0	40	18	0	0	14	34	0	0	0	0	0	3	1	4	0	114	
7:25 AM	0	27	19	0	0	11	42	0	0	0	0	0	10	0	8	0	117	
7:30 AM	0	72	31	0	0	13	35	0	0	0	0	0	3	1	6	0	161	
7:35 AM	0	67	10	0	0	9	32	0	0	0	0	0	1	0	4	0	123	
7:40 AM	0	71	7	0	0	12	44	0	0	0	0	0	2	2	4	0	142	
7:45 AM	0	83	18	0	0	27	27	0	0	0	0	0	2	0	6	0	163	
7:50 AM	0	107	20	0	0	20	35	0	0	0	0	0	3	4	11	0	200	
7:55 AM	0	95	15	0	0	19	38	0	0	0	0	0	6	0	9	0	182	1625
8:00 AM	0	71	19	0	0	17	34	0	0	0	0	0	5	0	9	0	155	1683
8:05 AM	0	71	19	0	0	14	44	0	0	0	0	0	1	0	6	0	155	1732
8:10 AM	0	67	16	0	0	20	34	0	0	0	0	0	5	1	9	0	152	1781
8:15 AM	0	57	19	0	0	12	28	0	0	0	0	0	2	0	4	0	122	1786
8:20 AM	0	65	20	0	0	11	30	0	0	0	0	0	4	0	5	0	135	1807
8:25 AM	0	78	5	0	0	15	39	0	0	0	0	0	8	0	7	0	152	1842
8:30 AM	0	68	14	0	0	14	27	0	0	0	0	0	3	0	8	0	134	1815
8:35 AM	0	84	21	0	0	10	28	0	0	0	0	0	4	0	6	0	153	1845
8:40 AM	0	76	10	0	0	10	48	0	0	0	0	0	6	0	12	0	162	1865
8:45 AM	0	79	11	0	0	16	26	0	0	0	0	0	7	0	11	0	150	1852
8:50 AM	0	55	16	0	0	17	29	0	0	0	0	0	8	0	13	0	138	1790
8:55 AM	0	66	16	0	0	10	22	0	0	0	0	0	4	0	6	0	124	1732

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1140	212	0	0	264	400	0	0	0	0	0	44	16	104	0	2180
Heavy Trucks	0	24	8		0	8	4		0	0	0		0	4	16		64
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/6/2017 4:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

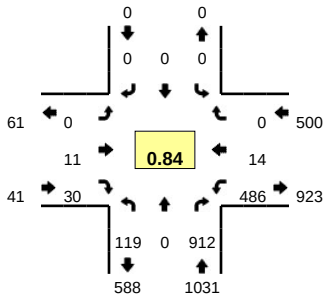
Type of peak hour being reported: Intersection Peak

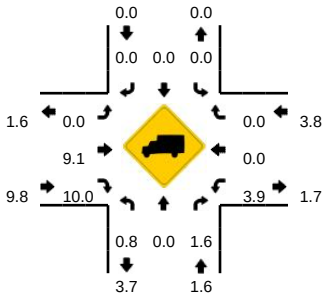
Method for determining peak hour: Total Entering Volume

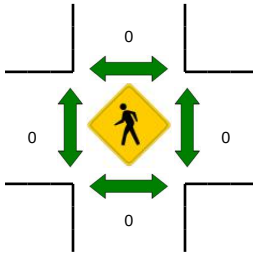
LOCATION: 8 - Airway Blvd -- N Canyons Pkwy
CITY/STATE: Livermore, CA

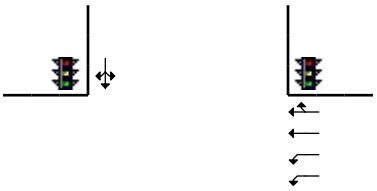
QC JOB #: 13967605
DATE: Thu, Jan 26 2017

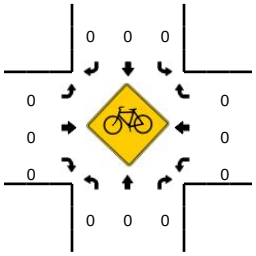
Peak-Hour: 7:45 AM -- 8:45 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

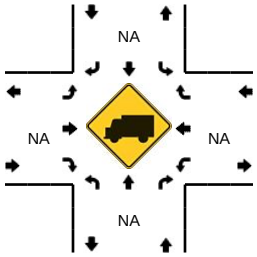


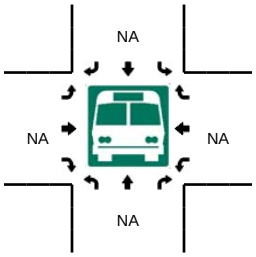












5-Min Count Period Beginning At	8 - Airway Blvd (Northbound)				8 - Airway Blvd (Southbound)				N Canyons Pkwy (Eastbound)				N Canyons Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	3	0	35	4	0	0	0	0	0	2	5	0	26	1	0	0	76	
7:05 AM	7	0	32	6	0	0	0	0	0	2	4	0	32	0	0	0	83	
7:10 AM	3	0	35	13	0	0	0	0	0	1	2	0	25	1	0	0	80	
7:15 AM	1	0	42	8	0	0	0	0	0	2	7	0	27	0	0	0	87	
7:20 AM	1	0	41	5	0	0	0	0	0	0	1	0	42	0	0	0	90	
7:25 AM	1	1	31	7	0	0	0	0	0	0	3	0	48	0	0	0	91	
7:30 AM	3	0	56	5	0	0	0	0	0	0	5	0	36	2	0	1	108	
7:35 AM	8	0	60	11	0	0	0	0	0	0	2	0	31	1	0	0	113	
7:40 AM	2	0	59	6	0	0	0	0	0	1	4	0	50	1	0	0	123	
7:45 AM	4	0	92	8	0	0	0	0	0	0	0	0	41	2	0	0	147	
7:50 AM	3	0	105	6	0	0	0	0	0	1	3	0	48	0	0	0	166	
7:55 AM	5	0	91	7	0	0	0	0	0	0	5	0	45	0	0	0	153	1317
8:00 AM	4	0	76	3	0	0	0	0	0	0	4	0	46	0	0	0	133	1374
8:05 AM	2	0	77	8	0	0	0	0	0	4	3	0	47	2	0	0	143	1434
8:10 AM	1	0	57	2	0	0	0	0	0	3	5	0	40	3	0	0	111	1465
8:15 AM	5	0	59	8	0	0	0	0	0	0	3	0	30	1	0	0	106	1484
8:20 AM	5	0	74	5	0	0	0	0	0	1	3	0	33	1	0	0	122	1516
8:25 AM	3	0	67	3	0	0	0	0	0	0	1	0	47	1	0	0	122	1547
8:30 AM	3	0	62	8	0	0	0	0	0	1	1	0	30	1	0	0	106	1545
8:35 AM	7	0	70	4	0	0	0	0	0	0	1	0	34	1	0	0	117	1549
8:40 AM	5	0	82	10	0	0	0	0	0	1	1	0	45	2	0	0	146	1572
8:45 AM	7	0	74	6	0	0	0	0	0	0	6	0	30	3	0	0	126	1551
8:50 AM	4	0	53	6	0	0	0	0	0	0	6	0	38	2	0	0	109	1494
8:55 AM	7	0	48	4	0	0	0	0	0	0	2	0	20	2	0	0	83	1424

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	48	0	1152	84	0	0	0	0	0	4	32	0	536	8	0	0	1864
Heavy Trucks	0	0	28		0	0	0		0	0	4		12	0	0		44
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/6/2017 4:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

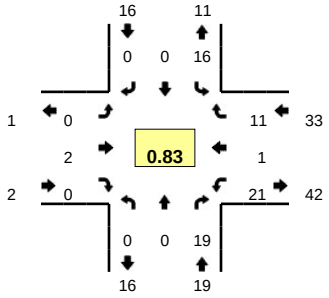
Type of peak hour being reported: Intersection Peak

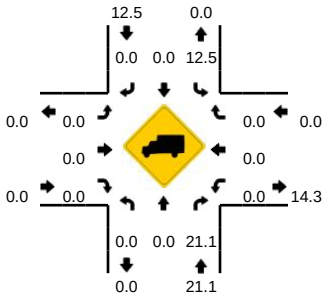
Method for determining peak hour: Total Entering Volume

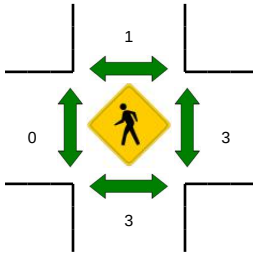
LOCATION: 9 - Doolan Rd -- N Canyons Pkwy
CITY/STATE: Livermore, CA

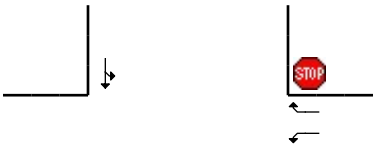
QC JOB #: 13967609
DATE: Thu, Jan 26 2017

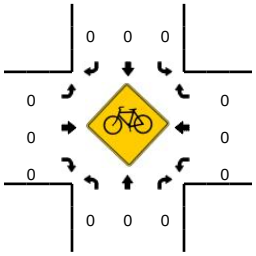
Peak-Hour: 7:25 AM -- 8:25 AM
Peak 15-Min: 8:00 AM -- 8:15 AM

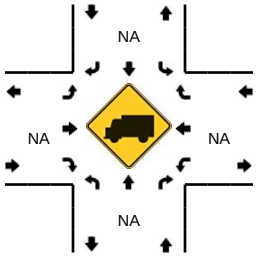


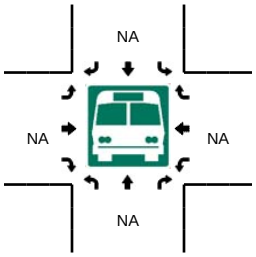












5-Min Count Period Beginning At	9 - Doolan Rd (Northbound)				9 - Doolan Rd (Southbound)				N Canyons Pkwy (Eastbound)				N Canyons Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	3	0	3	1	0	0	0	0	0	0	1	0	1	0	9	
7:05 AM	0	0	4	0	1	0	0	0	0	0	0	0	2	0	1	1	9	
7:10 AM	0	0	2	0	1	0	0	0	0	0	0	0	0	0	1	0	4	
7:15 AM	0	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	5	
7:20 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
7:25 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	3	
7:30 AM	0	0	1	0	3	0	0	0	0	0	0	0	2	0	1	0	7	
7:35 AM	0	0	1	0	1	0	0	0	0	0	0	0	2	0	3	1	8	
7:40 AM	0	0	2	0	1	0	0	0	0	0	0	0	1	0	0	0	4	
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	4	
7:50 AM	0	0	3	0	1	0	0	0	0	1	0	0	1	1	0	0	7	
7:55 AM	0	0	2	0	0	0	0	0	0	0	0	0	2	0	2	0	6	67
8:00 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	1	0	5	63
8:05 AM	0	0	2	0	3	0	0	0	0	0	0	0	2	0	0	0	7	61
8:10 AM	0	0	4	0	0	0	0	0	0	1	0	0	1	0	1	2	9	66
8:15 AM	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	3	64
8:20 AM	0	0	0	0	2	0	0	0	0	0	0	0	3	0	0	2	7	70
8:25 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	3	70
8:30 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	65
8:35 AM	0	0	0	0	1	0	0	0	0	0	0	0	4	0	1	1	7	64
8:40 AM	0	0	1	0	0	0	0	0	0	0	0	0	1	0	3	0	5	65
8:45 AM	0	0	1	0	1	0	0	0	0	0	0	0	3	0	0	2	7	68
8:50 AM	0	0	2	0	1	0	0	0	0	0	0	0	0	0	1	1	5	66
8:55 AM	0	0	0	0	1	0	0	0	0	0	0	0	3	0	2	1	7	67

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	32	0	20	0	0	0	0	4	0	0	12	0	8	8	84
Heavy Trucks	0	0	4		4	0	0		0	0	0		0	0	0		8
Pedestrians		4				0				0				4			8
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/6/2017 4:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

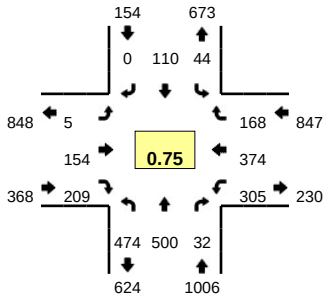
Type of peak hour being reported: Intersection Peak

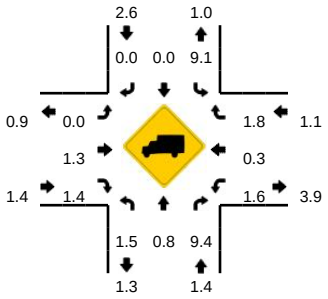
Method for determining peak hour: Total Entering Volume

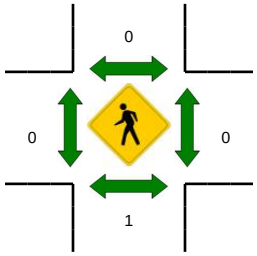
LOCATION: 10 - Isabel Ave -- Portola Ave
CITY/STATE: Livermore, CA

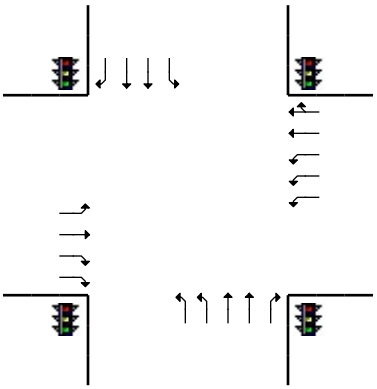
QC JOB #: 13967607
DATE: Thu, Jan 26 2017

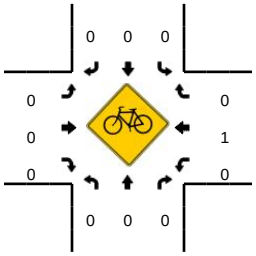
Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM

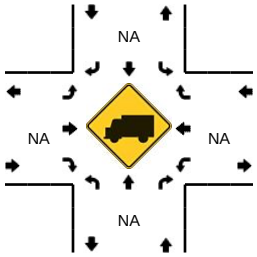


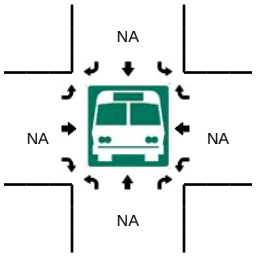












5-Min Count Period Beginning At	10 - Isabel Ave (Northbound)				10 - Isabel Ave (Southbound)				Portola Ave (Eastbound)				Portola Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	31	3	6	0	0	1	0	0	0	8	8	0	21	12	3	0	93	
7:05 AM	20	7	9	0	0	10	0	0	0	3	14	0	36	11	0	0	110	
7:10 AM	22	12	4	0	2	6	0	0	0	3	10	0	24	13	4	0	100	
7:15 AM	19	13	1	0	4	10	0	0	0	5	11	0	31	14	1	0	109	
7:20 AM	19	9	2	0	4	7	0	0	0	4	8	0	28	29	3	0	113	
7:25 AM	27	23	5	0	2	2	0	0	0	4	24	0	20	24	3	0	134	
7:30 AM	22	40	5	0	2	8	0	0	0	7	16	0	24	17	7	0	148	
7:35 AM	45	42	3	0	4	6	0	0	2	6	14	0	21	20	10	0	173	
7:40 AM	24	41	4	0	4	10	0	0	0	8	22	0	34	26	21	0	194	
7:45 AM	55	65	1	0	3	13	0	0	0	8	12	0	22	47	21	0	247	
7:50 AM	53	90	3	0	7	12	0	0	0	10	14	0	13	33	36	0	271	
7:55 AM	50	95	3	0	6	14	0	0	2	12	18	0	22	30	22	0	274	1966
8:00 AM	27	41	2	0	5	14	0	0	0	20	22	0	35	37	14	0	217	2090
8:05 AM	46	19	1	0	4	7	0	0	0	13	15	0	26	40	7	0	178	2158
8:10 AM	38	18	1	0	0	10	0	0	0	22	20	0	30	36	4	0	179	2237
8:15 AM	35	12	4	0	0	7	0	0	0	19	25	0	28	31	8	0	169	2297
8:20 AM	46	18	0	0	5	6	0	0	0	16	15	0	18	30	11	0	165	2349
8:25 AM	33	19	5	0	4	3	0	0	1	13	16	0	32	27	7	0	160	2375
8:30 AM	27	27	0	0	0	6	0	0	0	9	14	0	22	24	6	0	135	2362
8:35 AM	34	47	5	0	3	4	0	0	0	8	9	0	28	19	11	0	168	2357
8:40 AM	28	46	5	0	1	9	1	0	0	7	9	0	22	22	11	0	161	2324
8:45 AM	41	46	0	0	6	1	0	0	1	8	9	0	22	11	10	0	155	2232
8:50 AM	36	40	8	0	5	6	0	0	0	6	9	0	20	21	21	0	172	2133
8:55 AM	34	52	1	0	3	7	0	0	1	7	10	0	22	20	23	0	180	2039

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	632	1000	28	0	64	156	0	0	8	120	176	0	228	440	316	0	3168
Heavy Trucks	12	0	0		4	0	0		0	0	4		4	0	4		28
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/6/2017 4:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

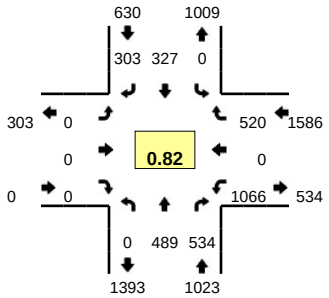
Type of peak hour being reported: Intersection Peak

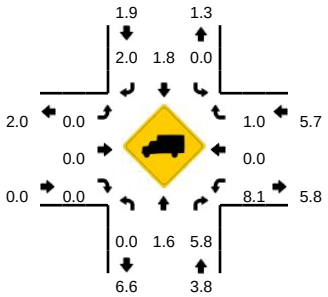
Method for determining peak hour: Total Entering Volume

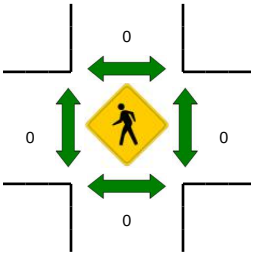
LOCATION: 11 - Isabel Ave -- I-580 WB On/Off Ramps
CITY/STATE: Alameda, CA

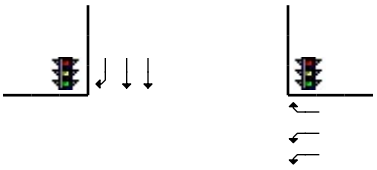
QC JOB #: 13967621
DATE: Thu, Jan 26 2017

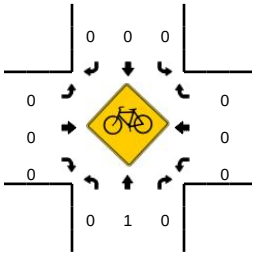
Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:40 AM -- 7:55 AM

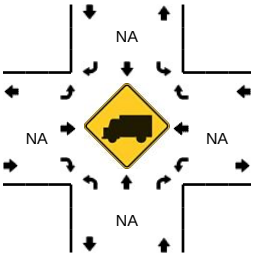


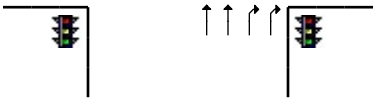


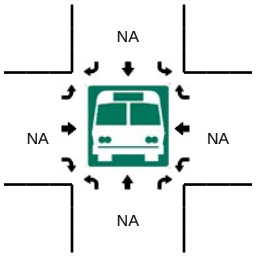












5-Min Count Period Beginning At	11 - Isabel Ave (Northbound)				11 - Isabel Ave (Southbound)				I-580 WB On/Off Ramps (Eastbound)				I-580 WB On/Off Ramps (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	11	34	0	0	12	15	0	0	0	0	0	71	0	20	0	163	
7:05 AM	0	12	46	0	0	25	40	0	0	0	0	0	54	0	19	0	196	
7:10 AM	0	4	44	0	0	11	20	0	0	0	0	0	100	0	29	0	208	
7:15 AM	0	14	43	0	0	17	33	0	0	0	0	0	85	0	19	0	211	
7:20 AM	0	14	63	0	0	16	27	0	0	0	0	0	73	0	27	0	220	
7:25 AM	0	24	35	0	0	26	23	0	0	0	0	0	90	0	34	0	232	
7:30 AM	0	31	33	0	0	26	28	0	0	0	0	0	75	0	43	0	236	
7:35 AM	0	36	43	0	0	19	23	0	0	0	0	0	105	0	44	0	270	
7:40 AM	0	51	58	0	0	36	30	0	0	0	0	0	106	0	53	0	334	
7:45 AM	0	66	48	0	0	23	19	0	0	0	0	0	113	0	55	0	324	
7:50 AM	0	92	51	0	0	25	15	0	0	0	0	0	93	0	59	0	335	
7:55 AM	0	65	34	0	0	28	26	0	0	0	0	0	74	0	53	0	280	3009
8:00 AM	0	30	40	0	0	41	28	0	0	0	0	0	88	0	34	0	261	3107
8:05 AM	0	22	38	0	0	27	24	0	0	0	0	0	92	0	47	0	250	3161
8:10 AM	0	21	47	0	0	30	26	0	0	0	0	0	72	0	36	0	232	3185
8:15 AM	0	17	41	0	0	30	36	0	0	0	0	0	78	0	37	0	239	3213
8:20 AM	0	20	44	0	0	17	23	0	0	0	0	0	93	0	33	0	230	3223
8:25 AM	0	38	57	0	0	25	25	0	0	0	0	0	77	0	26	0	248	3239
8:30 AM	0	27	51	0	0	18	23	0	0	0	0	0	84	0	31	0	234	3237
8:35 AM	0	42	38	0	0	16	30	0	0	0	0	0	70	0	39	0	235	3202
8:40 AM	0	46	56	0	0	18	20	0	0	0	0	0	104	0	48	0	292	3160
8:45 AM	0	39	42	0	0	10	24	0	0	0	0	0	58	0	49	0	222	3058
8:50 AM	0	46	33	0	0	11	23	0	0	0	0	0	81	0	45	0	239	2962
8:55 AM	0	40	36	0	0	20	22	0	0	0	0	0	69	0	43	0	230	2912

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	836	628	0	0	336	256	0	0	0	0	0	1248	0	668	0	3972
Heavy Trucks	0	8	24		0	8	4		0	0	0		100	0	8		152
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/6/2017 4:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

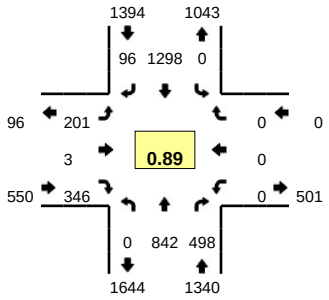
Type of peak hour being reported: Intersection Peak

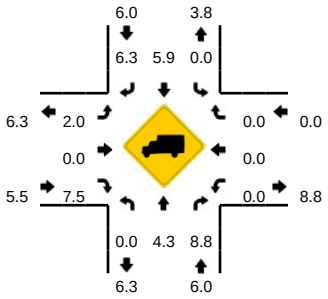
Method for determining peak hour: Total Entering Volume

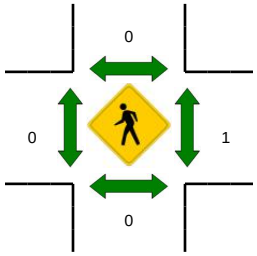
LOCATION: 12 - Isabel Ave -- I-580 EB On/Off Ramps
CITY/STATE: Alameda, CA

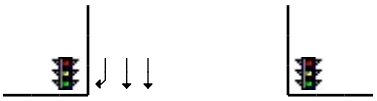
QC JOB #: 13967623
DATE: Thu, Jan 26 2017

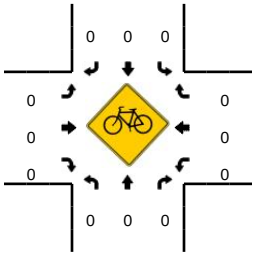
Peak-Hour: 7:35 AM -- 8:35 AM
Peak 15-Min: 7:40 AM -- 7:55 AM

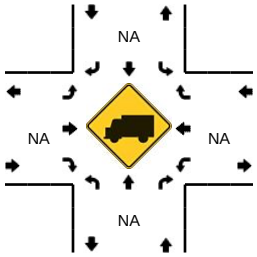


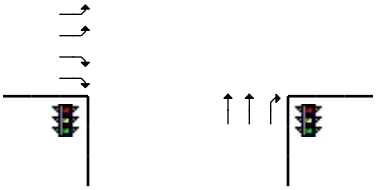


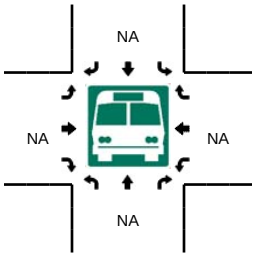












5-Min Count Period Beginning At	12 - Isabel Ave (Northbound)				12 - Isabel Ave (Southbound)				I-580 EB On/Off Ramps (Eastbound)				I-580 EB On/Off Ramps (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	32	25	0	0	89	5	0	7	0	16	0	0	0	0	0	174	
7:05 AM	0	54	48	0	0	77	5	0	4	0	19	0	0	0	0	0	207	
7:10 AM	0	51	30	0	0	98	10	0	0	0	19	0	0	0	0	0	208	
7:15 AM	0	58	29	0	1	87	3	0	5	0	18	0	0	0	0	0	201	
7:20 AM	0	75	42	0	0	87	7	0	7	0	23	0	0	0	0	0	241	
7:25 AM	0	43	31	0	0	102	10	0	15	0	33	0	0	0	0	0	234	
7:30 AM	0	57	44	0	0	112	6	0	9	0	26	0	0	0	0	0	254	
7:35 AM	0	64	42	0	0	118	4	0	17	1	17	0	0	0	0	0	263	
7:40 AM	0	88	35	0	0	140	4	0	22	0	24	0	0	0	0	0	313	
7:45 AM	0	94	36	0	0	103	5	0	33	0	31	0	0	0	0	0	302	
7:50 AM	0	95	26	0	0	118	7	0	37	0	25	0	0	0	0	0	308	
7:55 AM	0	65	50	0	0	104	8	0	23	1	33	0	0	0	0	0	284	2989
8:00 AM	0	55	46	0	0	98	12	0	14	0	30	0	0	0	0	0	255	3070
8:05 AM	0	57	41	0	0	109	10	0	11	0	34	0	0	0	0	0	262	3125
8:10 AM	0	60	61	0	0	106	13	0	5	0	31	0	0	0	0	0	276	3193
8:15 AM	0	52	26	0	0	96	8	0	8	1	25	0	0	0	0	0	216	3208
8:20 AM	0	71	41	0	0	109	9	0	8	0	36	0	0	0	0	0	274	3241
8:25 AM	0	66	45	0	0	88	7	0	14	0	33	0	0	0	0	0	253	3260
8:30 AM	0	75	49	0	0	109	9	0	9	0	27	0	0	0	0	0	278	3284
8:35 AM	0	80	49	0	0	71	13	0	17	0	30	0	0	0	0	0	260	3281
8:40 AM	0	60	40	0	0	120	4	0	17	0	23	0	0	0	0	0	264	3232
8:45 AM	0	74	56	0	0	73	3	0	17	0	38	0	0	0	0	0	261	3191
8:50 AM	0	49	38	0	0	77	4	0	18	0	30	0	0	0	0	0	216	3099
8:55 AM	0	77	46	0	0	86	11	0	19	0	22	0	0	0	0	0	261	3076

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	1108	388	0	0	1444	64	0	368	0	320	0	0	0	0	0	3692
Heavy Trucks	0	32	28		0	84	4		0	0	28		0	0	0		176
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/6/2017 4:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

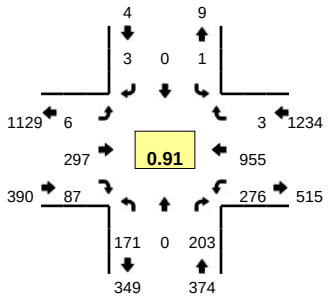
Type of peak hour being reported: Intersection Peak

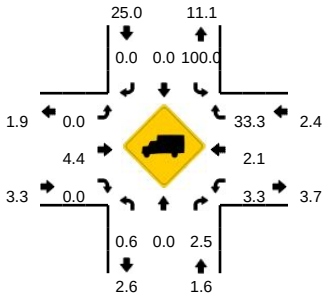
Method for determining peak hour: Total Entering Volume

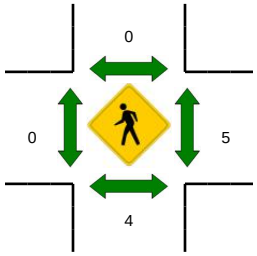
LOCATION: 13 - Murrieta Blvd -- Portola Ave
CITY/STATE: Alameda, CA

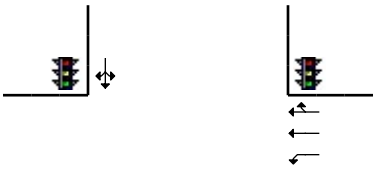
QC JOB #: 13967619
DATE: Thu, Jan 26 2017

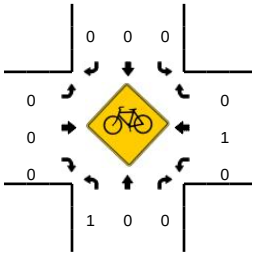
Peak-Hour: 7:35 AM -- 8:35 AM
Peak 15-Min: 7:50 AM -- 8:05 AM

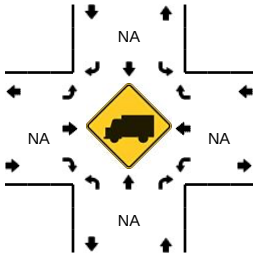


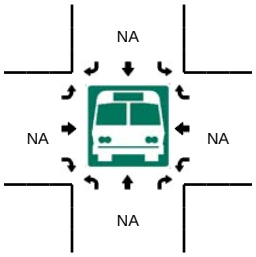












5-Min Count Period Beginning At	13 - Murrieta Blvd (Northbound)				13 - Murrieta Blvd (Southbound)				Portola Ave (Eastbound)				Portola Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	6	0	5	0	0	0	0	0	0	10	4	0	8	54	0	0	87	
7:05 AM	11	0	5	0	0	0	0	0	0	13	3	0	11	42	0	0	85	
7:10 AM	3	0	6	0	0	0	0	0	0	12	3	0	15	76	0	0	115	
7:15 AM	7	0	5	0	0	0	0	0	0	19	2	0	13	47	0	0	93	
7:20 AM	7	0	11	0	0	0	0	0	0	14	3	0	24	71	0	2	132	
7:25 AM	10	0	6	0	0	0	0	0	0	15	3	0	20	63	0	1	118	
7:30 AM	14	0	7	0	0	0	0	0	0	13	5	0	24	67	0	1	131	
7:35 AM	5	0	12	0	0	0	1	0	0	13	10	0	22	82	0	1	146	
7:40 AM	16	0	12	0	0	0	0	0	0	28	6	0	10	97	0	1	170	
7:45 AM	21	0	14	0	0	0	0	0	0	16	4	0	22	94	0	2	173	
7:50 AM	16	0	11	0	1	0	0	0	0	26	6	0	17	95	2	0	174	
7:55 AM	25	0	19	0	0	0	1	0	2	25	3	0	13	85	0	1	174	1598
8:00 AM	20	0	19	0	0	0	0	0	0	30	12	0	30	90	0	0	201	1712
8:05 AM	12	0	16	0	0	0	0	0	0	21	3	0	32	81	0	1	166	1793
8:10 AM	15	0	15	0	0	0	0	0	2	34	16	0	17	62	0	0	161	1839
8:15 AM	7	0	20	0	0	0	0	0	0	10	6	0	33	68	1	5	150	1896
8:20 AM	12	0	19	0	0	0	0	0	0	40	7	0	21	75	0	2	176	1940
8:25 AM	13	0	25	0	0	0	0	0	0	33	6	0	16	58	0	1	152	1974
8:30 AM	9	0	21	0	0	0	1	0	2	21	8	0	29	68	0	0	159	2002
8:35 AM	24	0	13	0	0	0	1	0	0	22	4	0	11	66	0	2	143	1999
8:40 AM	11	0	15	0	0	0	0	0	0	13	9	0	17	45	0	2	112	1941
8:45 AM	8	0	17	0	0	1	0	0	0	19	5	0	20	67	0	0	137	1905
8:50 AM	15	1	8	0	0	0	0	0	1	27	5	0	7	57	0	0	121	1852
8:55 AM	7	0	11	0	0	0	0	0	0	15	0	0	14	49	1	1	98	1776

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	244	0	196	0	4	0	4	0	8	324	84	0	240	1080	8	4	2196
Heavy Trucks	4	0	4		4	0	0		0	12	0		8	8	4		44
Pedestrians		4				0				0				12			16
Bicycles	1	0	0		0	0	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/6/2017 4:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

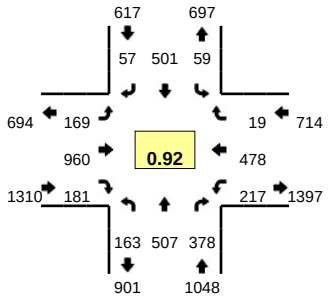
Type of peak hour being reported: Intersection Peak

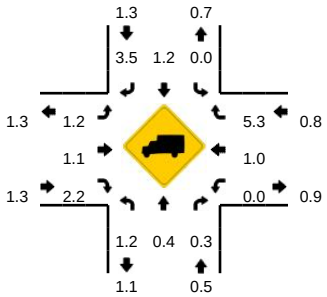
Method for determining peak hour: Total Entering Volume

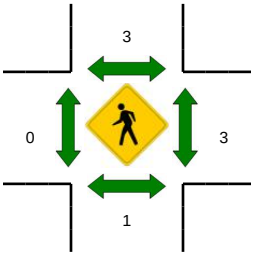
LOCATION: 1 - Hacienda Dr -- Dublin Blvd
CITY/STATE: Dublin, CA

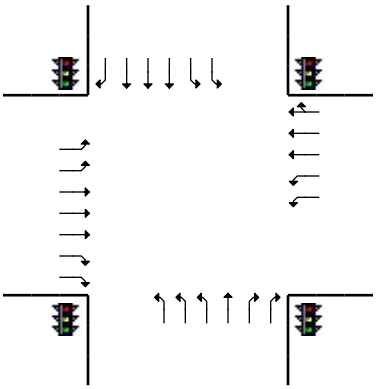
QC JOB #: 13967626
DATE: Thu, Jan 26 2017

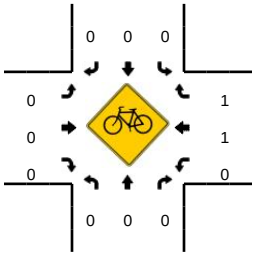
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:05 PM -- 5:20 PM

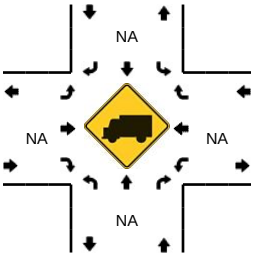


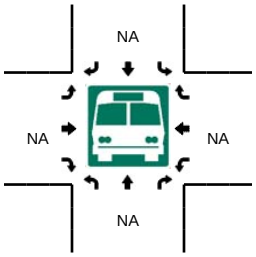












5-Min Count Period Beginning At	1 - Hacienda Dr (Northbound)				1 - Hacienda Dr (Southbound)				Dublin Blvd (Eastbound)				Dublin Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	10	19	16	0	3	30	4	2	25	89	10	0	11	26	0	0	245	
4:05 PM	10	14	13	0	0	31	1	0	15	50	15	1	18	25	0	0	193	
4:10 PM	9	18	21	0	2	47	6	0	13	96	13	0	16	46	1	0	288	
4:15 PM	5	31	28	0	3	43	2	0	11	55	11	0	17	27	1	0	234	
4:20 PM	12	18	9	0	5	24	3	0	10	56	16	0	16	36	1	0	206	
4:25 PM	6	20	26	0	4	27	3	0	20	74	18	0	6	39	2	0	245	
4:30 PM	8	43	37	0	1	40	5	0	5	68	13	0	13	28	3	0	264	
4:35 PM	8	25	18	0	2	39	10	0	11	66	16	0	6	50	1	0	252	
4:40 PM	10	24	21	0	4	53	3	0	12	85	21	0	13	35	1	0	282	
4:45 PM	10	24	22	0	5	25	3	0	13	80	12	0	13	44	1	1	253	
4:50 PM	6	36	21	0	7	43	7	0	7	71	11	0	22	46	1	0	278	
4:55 PM	8	33	33	0	3	33	3	0	8	67	14	0	14	39	3	0	258	2998
5:00 PM	9	31	28	0	2	40	4	0	8	88	17	0	20	31	3	1	282	3035
5:05 PM	11	32	35	0	8	54	5	1	17	78	13	0	23	39	3	0	319	3161
5:10 PM	12	36	30	0	3	57	9	0	13	110	21	0	19	50	1	0	361	3234
5:15 PM	9	56	38	0	5	46	6	0	10	88	24	0	11	24	3	0	320	3320
5:20 PM	18	67	34	0	4	35	7	0	10	62	15	0	13	39	2	0	306	3420
5:25 PM	16	39	25	1	7	42	3	0	21	92	6	0	26	46	0	0	324	3499
5:30 PM	14	37	30	1	5	46	4	0	12	73	13	0	14	57	0	0	306	3541
5:35 PM	15	46	31	0	7	35	4	1	12	77	14	0	19	43	1	0	305	3594
5:40 PM	13	38	30	0	3	46	5	0	23	73	18	0	21	39	1	0	310	3622
5:45 PM	10	45	35	2	6	34	2	0	7	57	14	0	4	37	3	0	256	3625
5:50 PM	19	40	26	0	4	33	6	0	18	86	10	0	22	41	0	1	306	3653
5:55 PM	13	40	36	0	3	33	2	0	18	76	16	0	23	32	2	0	294	3689

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	128	496	412	0	64	628	80	4	160	1104	232	0	212	452	28	0	4000
Heavy Trucks	0	0	0		0	4	4		4	8	4		0	0	4		28
Pedestrians		4				8				0				8			20
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/6/2017 4:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

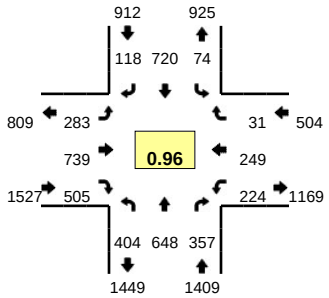
Type of peak hour being reported: Intersection Peak

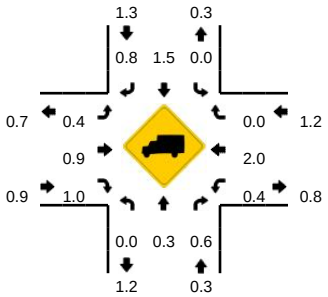
Method for determining peak hour: Total Entering Volume

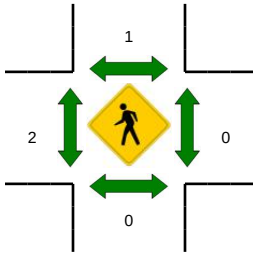
LOCATION: 2 - Tassajara Rd -- Dublin Blvd
CITY/STATE: Alameda, CA

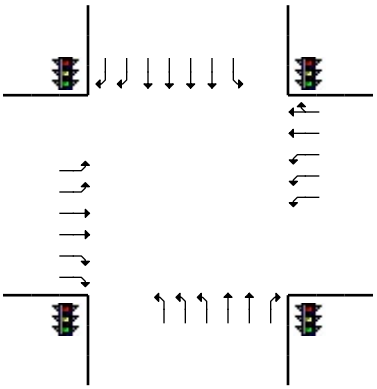
QC JOB #: 13967618
DATE: Tue, Feb 14 2017

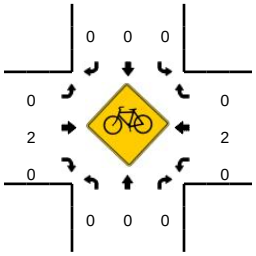
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:45 PM -- 6:00 PM

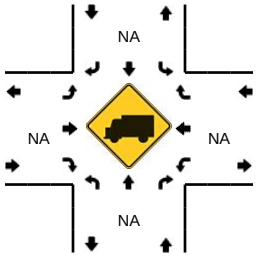


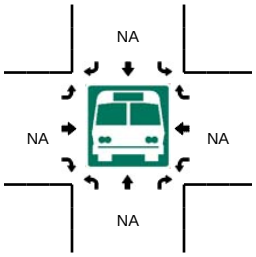












5-Min Count Period Beginning At	2 - Tassajara Rd (Northbound)				2 - Tassajara Rd (Southbound)				Dublin Blvd (Eastbound)				Dublin Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	35	38	20	0	9	67	10	0	17	43	51	1	18	18	5	0	332	
4:05 PM	31	52	23	0	3	56	7	0	15	59	39	1	22	15	4	0	327	
4:10 PM	25	43	21	0	10	59	14	0	16	51	32	1	12	34	1	0	319	
4:15 PM	44	47	19	0	2	77	9	0	16	39	34	3	16	25	2	0	333	
4:20 PM	29	36	20	0	1	47	7	0	26	39	42	4	19	16	3	0	289	
4:25 PM	24	32	15	0	8	57	7	0	11	51	34	4	24	9	3	0	279	
4:30 PM	31	46	21	0	3	59	8	0	14	38	38	2	16	27	1	0	304	
4:35 PM	23	30	15	0	6	48	6	0	12	70	56	1	21	27	2	0	317	
4:40 PM	33	44	21	0	4	46	6	0	21	39	35	0	18	22	2	0	291	
4:45 PM	41	38	21	0	5	77	8	0	17	55	36	2	16	24	4	0	344	
4:50 PM	27	48	38	0	6	44	7	0	19	38	25	5	11	3	2	0	273	
4:55 PM	32	40	26	0	12	61	13	0	22	61	37	2	28	28	4	0	366	3774
5:00 PM	24	30	25	0	6	29	8	0	25	70	40	3	22	27	3	0	312	3754
5:05 PM	48	45	20	0	5	70	9	0	19	47	43	6	19	21	4	0	356	3783
5:10 PM	20	43	16	0	5	57	9	0	13	51	39	1	18	22	0	0	294	3758
5:15 PM	47	39	34	0	5	89	8	0	16	80	35	3	17	21	2	0	396	3821
5:20 PM	27	56	31	0	7	76	4	0	23	69	44	0	17	16	3	0	373	3905
5:25 PM	39	49	35	0	12	63	18	0	14	49	35	3	21	15	2	0	355	3981
5:30 PM	31	50	45	0	2	71	9	0	24	60	50	3	26	26	0	0	397	4074
5:35 PM	29	88	27	0	5	46	8	1	14	60	39	6	15	16	1	0	355	4112
5:40 PM	44	38	36	0	9	62	13	0	18	63	34	1	25	29	4	0	376	4197
5:45 PM	35	75	29	0	8	50	10	0	30	54	52	4	13	18	3	0	381	4234
5:50 PM	27	61	29	0	3	43	10	0	24	86	47	3	24	17	4	0	378	4339
5:55 PM	33	74	30	0	6	64	12	0	25	50	47	5	7	21	5	0	379	4352

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	380	840	352	0	68	628	128	0	316	760	584	48	176	224	48	0	4552
Heavy Trucks	0	0	0		0	16	0		4	12	12		0	8	0		52
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	1	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/17/2017 3:55 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

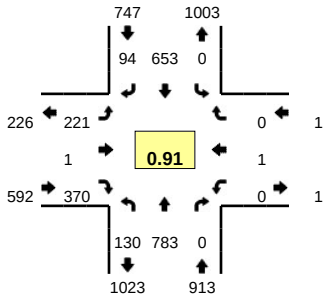
Type of peak hour being reported: Intersection Peak

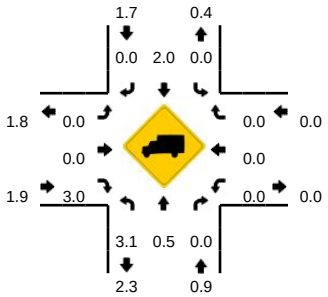
Method for determining peak hour: Total Entering Volume

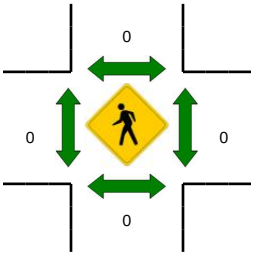
LOCATION: 3 - Fallon Rd -- Dublin Blvd
CITY/STATE: Dublin, CA

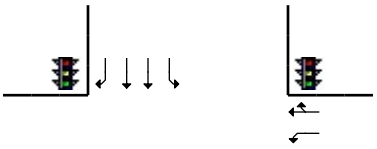
QC JOB #: 13967612
DATE: Thu, Jan 26 2017

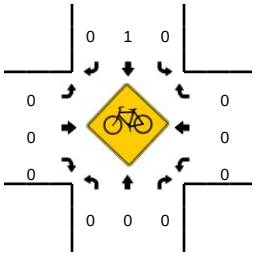
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:35 PM -- 5:50 PM

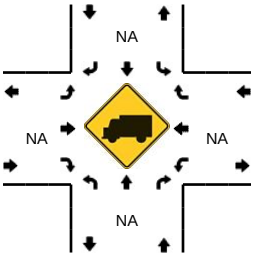


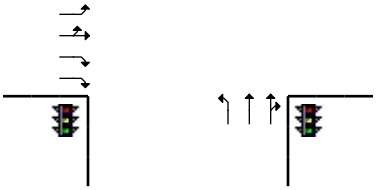


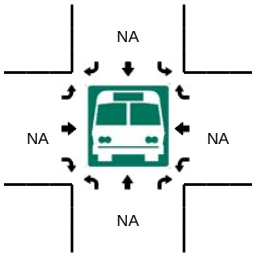












5-Min Count Period Beginning At	3 - Fallon Rd (Northbound)				3 - Fallon Rd (Southbound)				Dublin Blvd (Eastbound)				Dublin Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	14	31	0	0	0	50	10	0	9	0	27	0	0	0	0	0	141	
4:05 PM	4	29	0	0	0	46	7	0	19	0	42	0	0	0	0	0	147	
4:10 PM	9	48	0	0	0	50	15	0	7	0	41	0	0	0	0	0	170	
4:15 PM	8	30	0	0	0	49	8	0	9	0	42	0	0	0	0	0	146	
4:20 PM	6	58	0	0	0	64	7	0	13	0	31	0	0	0	0	0	179	
4:25 PM	13	39	1	0	0	38	3	0	10	0	33	2	0	0	0	0	139	
4:30 PM	8	39	0	0	0	62	7	0	13	0	31	1	0	0	0	0	161	
4:35 PM	10	37	0	0	0	42	5	0	18	0	30	0	1	0	0	0	143	
4:40 PM	10	38	0	0	0	48	6	0	13	0	47	0	0	0	0	0	162	
4:45 PM	6	48	0	0	0	62	7	0	10	2	39	0	0	0	0	0	174	
4:50 PM	7	62	0	0	0	41	11	0	6	0	33	1	0	0	0	0	161	
4:55 PM	5	48	0	0	0	39	6	0	12	0	45	0	0	0	0	0	155	1878
5:00 PM	14	43	0	0	0	52	4	0	9	0	15	0	0	0	0	0	137	1874
5:05 PM	9	37	0	0	0	52	10	0	23	0	36	0	0	0	0	0	167	1894
5:10 PM	15	61	0	0	0	61	8	0	25	0	25	0	0	0	0	0	195	1919
5:15 PM	12	74	0	0	0	34	7	0	25	0	41	0	0	0	0	0	193	1966
5:20 PM	8	43	0	0	0	61	9	0	11	0	39	0	0	0	0	0	171	1958
5:25 PM	10	76	0	0	0	48	2	0	15	1	40	1	0	0	0	0	193	2012
5:30 PM	6	79	0	0	0	50	8	0	22	0	29	0	0	0	0	0	194	2045
5:35 PM	5	72	0	0	0	64	5	0	20	0	24	0	0	0	0	0	190	2092
5:40 PM	15	70	0	0	0	58	5	0	21	0	30	0	0	1	0	0	200	2130
5:45 PM	14	73	0	0	0	63	12	0	24	0	40	0	0	0	0	0	226	2182
5:50 PM	12	73	0	0	0	59	11	0	10	0	24	0	0	0	0	0	189	2210
5:55 PM	10	82	0	0	0	51	13	0	15	0	27	0	0	0	0	0	198	2253

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	136	860	0	0	0	740	88	0	260	0	376	0	0	4	0	0	2464
Heavy Trucks	4	0	0		0	16	0		0	0	4		0	0	0		24
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/6/2017 4:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

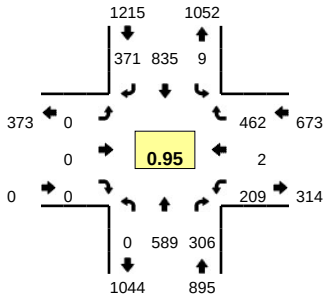
Type of peak hour being reported: Intersection Peak

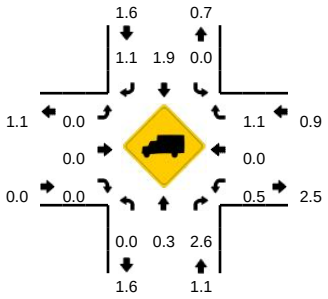
Method for determining peak hour: Total Entering Volume

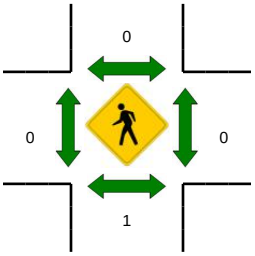
LOCATION: 4 - Fallon Rd -- I-580 WB On/Off Ramps
CITY/STATE: Alameda, CA

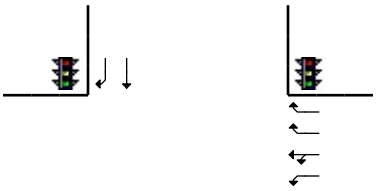
QC JOB #: 13967614
DATE: Thu, Jan 26 2017

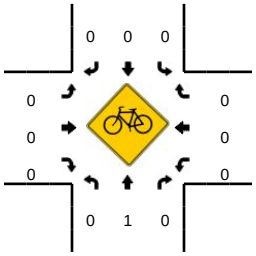
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:10 PM -- 5:25 PM

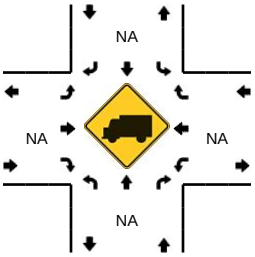


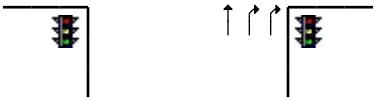


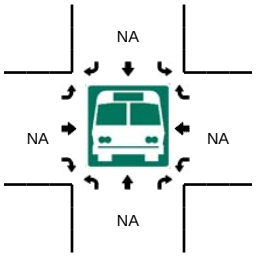












5-Min Count Period Beginning At	4 - Fallon Rd (Northbound)				4 - Fallon Rd (Southbound)				I-580 WB On/Off Ramps (Eastbound)				I-580 WB On/Off Ramps (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	26	17	0	0	75	22	0	0	0	0	0	16	0	24	0	180	
4:05 PM	0	30	25	0	0	75	29	0	0	0	0	0	9	1	24	0	193	
4:10 PM	0	34	38	0	0	83	25	0	0	0	0	0	16	1	27	0	224	
4:15 PM	0	29	24	0	0	87	31	0	0	0	0	0	13	1	40	0	225	
4:20 PM	0	50	32	0	0	70	38	0	0	0	0	0	7	2	38	0	237	
4:25 PM	0	38	27	0	0	65	21	0	0	0	0	0	19	1	25	0	196	
4:30 PM	0	34	22	0	0	82	34	0	0	0	0	0	12	0	31	0	215	
4:35 PM	0	26	23	0	0	62	31	0	0	0	0	0	12	0	33	0	187	
4:40 PM	0	37	31	0	0	78	24	0	0	0	0	0	14	0	32	0	216	
4:45 PM	0	35	35	0	0	78	41	0	0	0	0	0	23	0	40	0	252	
4:50 PM	0	40	34	0	0	65	29	0	0	0	0	0	11	0	39	0	218	
4:55 PM	0	38	32	0	0	78	19	0	0	0	0	0	14	1	34	0	216	2559
5:00 PM	0	35	22	0	0	63	24	0	0	0	0	0	19	0	33	0	196	2575
5:05 PM	0	30	23	0	0	62	31	0	0	0	0	0	18	0	43	0	207	2589
5:10 PM	0	58	32	0	0	85	30	0	0	0	0	0	16	1	44	0	266	2631
5:15 PM	0	31	30	0	0	77	26	0	0	0	0	0	15	0	55	0	234	2640
5:20 PM	0	39	31	0	0	82	32	0	0	0	0	0	20	0	27	0	231	2634
5:25 PM	0	60	24	0	0	73	36	0	0	0	0	0	24	0	36	0	253	2691
5:30 PM	0	52	29	0	0	57	28	0	0	0	0	0	14	1	36	0	217	2693
5:35 PM	0	51	26	0	0	54	35	1	0	0	0	0	18	0	40	0	225	2731
5:40 PM	0	61	22	0	0	70	28	0	0	0	0	0	13	0	41	0	235	2750
5:45 PM	0	45	27	0	0	79	42	0	0	0	0	0	18	0	38	0	249	2747
5:50 PM	0	60	20	0	8	63	27	0	0	0	0	0	21	0	31	0	230	2759
5:55 PM	0	67	20	0	0	70	32	0	0	0	0	0	13	0	38	0	240	2783

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	512	372	0	0	976	352	0	0	0	0	0	204	4	504	0	2924
Heavy Trucks	0	4	16		0	16	0		0	0	0		0	0	12		48
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/6/2017 4:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

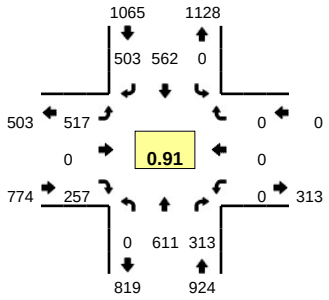
LOCATION: 5 - El Charro Rd -- I-580 EB On/Off Ramps

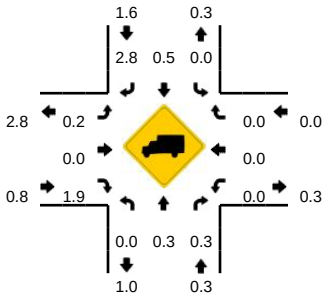
QC JOB #: 13967616

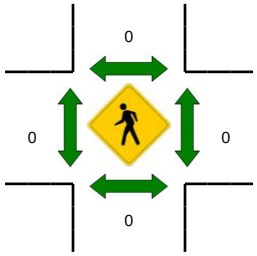
CITY/STATE: Alameda, CA

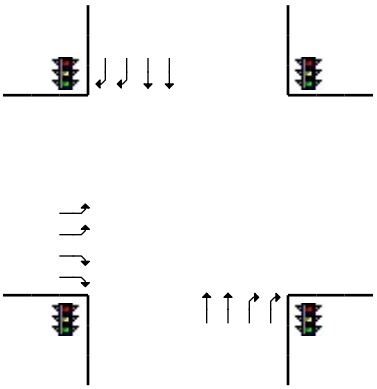
DATE: Tue, Feb 14 2017

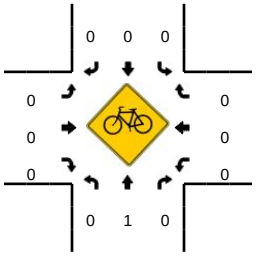
Peak-Hour: 4:20 PM -- 5:20 PM
Peak 15-Min: 5:00 PM -- 5:15 PM

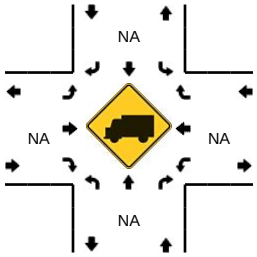


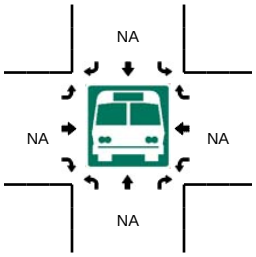












5-Min Count Period Beginning At	5 - El Charro Rd (Northbound)				5 - El Charro Rd (Southbound)				I-580 EB On/Off Ramps (Eastbound)				I-580 EB On/Off Ramps (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	40	39	0	0	40	30	0	34	0	17	0	0	0	0	0	200	
4:05 PM	0	60	36	0	0	51	32	0	17	0	22	0	0	0	0	0	218	
4:10 PM	0	63	49	0	0	41	38	0	15	0	19	0	0	0	0	0	225	
4:15 PM	0	38	20	0	0	33	41	0	33	0	18	0	0	0	0	0	183	
4:20 PM	0	50	20	0	0	62	41	0	31	0	26	0	0	0	0	0	230	
4:25 PM	0	54	21	0	0	49	40	0	32	0	22	0	0	0	0	0	218	
4:30 PM	0	45	25	0	0	55	38	0	32	0	19	0	0	0	0	0	214	
4:35 PM	0	63	20	0	0	41	34	0	30	0	12	0	0	0	0	0	200	
4:40 PM	0	60	30	0	0	60	45	0	37	0	22	0	0	0	0	0	254	
4:45 PM	0	37	34	0	0	50	29	0	51	0	25	0	0	0	0	0	226	
4:50 PM	0	52	22	0	0	47	43	0	39	0	27	0	0	0	0	0	230	
4:55 PM	0	44	30	0	0	45	34	0	55	0	19	0	0	0	0	0	227	2625
5:00 PM	0	55	26	0	0	43	73	0	48	0	23	0	0	0	0	0	268	2693
5:05 PM	0	56	31	0	0	40	35	0	59	0	21	0	0	0	0	0	242	2717
5:10 PM	0	51	29	0	0	39	43	0	63	0	22	0	0	0	0	0	247	2739
5:15 PM	0	44	25	0	0	31	48	0	40	0	19	0	0	0	0	0	207	2763
5:20 PM	0	44	33	0	0	28	46	0	46	0	19	0	0	0	0	0	216	2749
5:25 PM	0	42	26	0	0	29	36	0	48	0	14	0	0	0	0	0	195	2726
5:30 PM	0	29	18	0	0	25	55	0	43	0	24	0	0	0	0	0	194	2706
5:35 PM	0	49	17	0	0	28	40	0	41	0	15	0	0	0	0	0	190	2696
5:40 PM	0	39	22	0	0	19	48	0	65	0	14	0	0	0	0	0	207	2649
5:45 PM	0	40	22	0	0	24	31	0	46	0	20	0	0	0	0	0	183	2606
5:50 PM	0	35	11	0	0	19	29	0	45	0	20	0	0	0	0	0	159	2535
5:55 PM	0	35	22	0	0	21	42	0	51	0	20	0	0	0	0	0	191	2499

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	648	344	0	0	488	604	0	680	0	264	0	0	0	0	0	3028
Heavy Trucks	0	4	0		0	4	24		0	0	4		0	0	0		36
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/17/2017 3:55 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

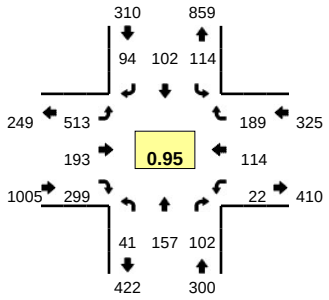
Type of peak hour being reported: Intersection Peak

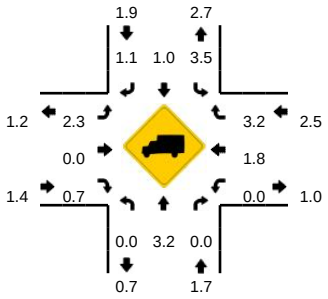
Method for determining peak hour: Total Entering Volume

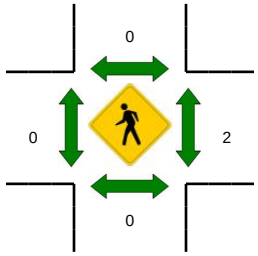
LOCATION: 6 - Airway Blvd -- I-580 EB On/Off Ramps
CITY/STATE: Livermore, CA

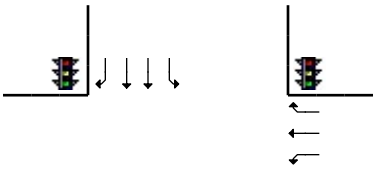
QC JOB #: 13967602
DATE: Tue, Feb 14 2017

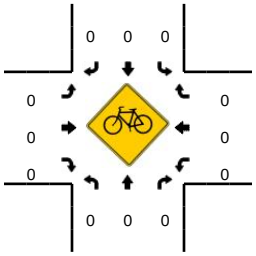
Peak-Hour: 4:50 PM -- 5:50 PM
Peak 15-Min: 5:15 PM -- 5:30 PM

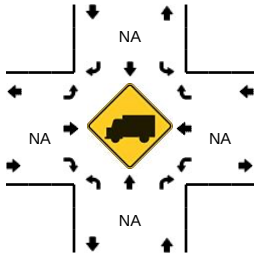


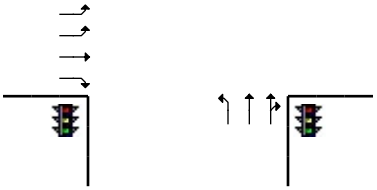


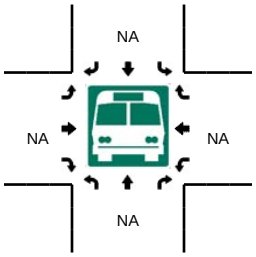












5-Min Count Period Beginning At	6 - Airway Blvd (Northbound)				6 - Airway Blvd (Southbound)				I-580 EB On/Off Ramps (Eastbound)				I-580 EB On/Off Ramps (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	1	20	5	0	6	3	13	0	34	8	16	0	1	8	16	0	131	
4:05 PM	2	10	5	0	3	7	14	0	32	17	18	0	3	15	14	0	140	
4:10 PM	0	10	4	0	5	9	10	1	28	16	16	0	4	13	11	0	127	
4:15 PM	3	11	16	0	8	11	18	0	30	10	26	0	0	6	11	0	150	
4:20 PM	1	11	6	0	7	10	10	0	31	14	29	0	1	9	14	0	143	
4:25 PM	0	9	8	0	11	10	4	0	49	15	23	0	1	3	21	0	154	
4:30 PM	1	13	15	0	9	6	7	1	35	17	26	0	1	5	12	0	148	
4:35 PM	0	16	10	0	4	5	11	1	25	17	21	0	0	5	17	0	132	
4:40 PM	2	12	3	0	12	3	8	0	27	14	16	0	1	12	18	0	128	
4:45 PM	4	14	7	0	7	11	0	1	40	17	23	0	0	12	12	1	149	
4:50 PM	4	14	6	0	14	11	12	0	44	13	24	0	0	8	19	0	169	
4:55 PM	1	9	5	0	4	5	8	0	44	23	26	0	2	4	16	0	147	1718
5:00 PM	3	13	7	0	6	13	6	0	36	16	22	0	0	8	14	0	144	1731
5:05 PM	5	17	11	0	15	7	13	0	43	16	26	0	1	13	15	0	182	1773
5:10 PM	4	12	8	0	12	5	5	0	37	17	26	0	5	13	15	0	159	1805
5:15 PM	5	17	14	0	12	8	8	0	35	13	24	0	1	6	17	0	160	1815
5:20 PM	0	9	14	0	13	9	10	0	46	24	28	0	4	4	23	0	184	1856
5:25 PM	1	12	11	0	8	10	12	0	46	15	26	0	1	10	12	0	164	1866
5:30 PM	5	14	9	0	9	10	7	0	41	17	14	0	1	13	15	0	155	1873
5:35 PM	7	17	6	0	8	9	1	0	64	16	25	0	1	10	14	1	179	1920
5:40 PM	3	10	4	0	4	7	4	0	42	18	31	0	2	9	13	0	147	1939
5:45 PM	3	13	7	0	9	8	8	0	35	5	27	0	3	16	16	0	150	1940
5:50 PM	2	11	5	0	7	9	9	0	46	11	18	0	1	4	11	0	134	1905
5:55 PM	1	9	8	0	13	5	10	0	44	8	31	0	0	7	10	0	146	1904

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	24	152	156	0	132	108	120	0	508	208	312	0	24	80	208	0	2032
Heavy Trucks	0	4	0		8	0	0		8	0	0		0	0	12		32
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/17/2017 3:55 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

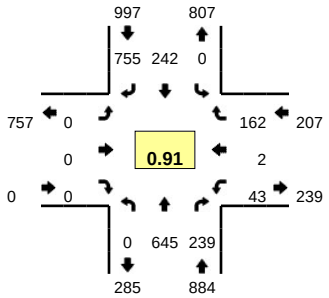
Type of peak hour being reported: Intersection Peak

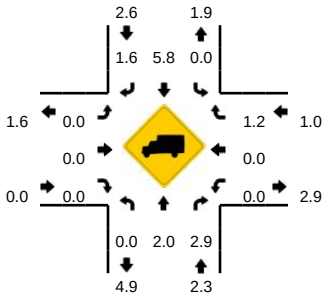
Method for determining peak hour: Total Entering Volume

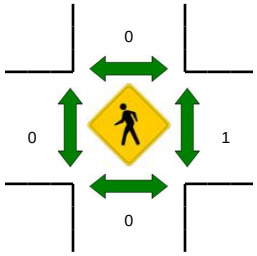
LOCATION: 7 - Airway Blvd -- I-580 WB On/Off Ramps
CITY/STATE: Livermore, CA

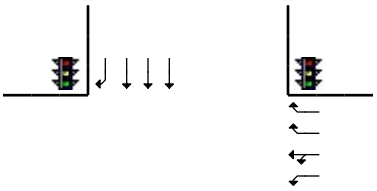
QC JOB #: 13967604
DATE: Thu, Jan 26 2017

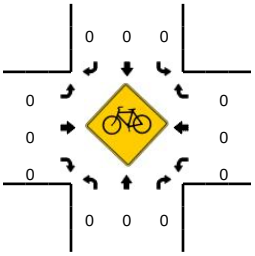
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:05 PM -- 5:20 PM

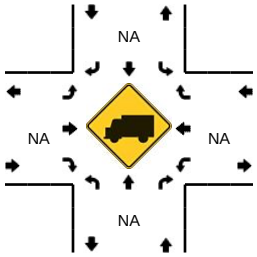


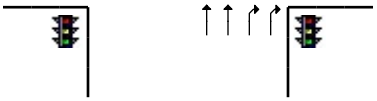


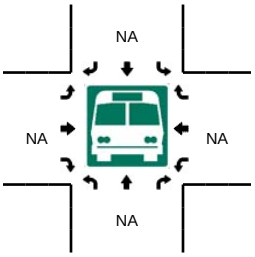












5-Min Count Period Beginning At	7 - Airway Blvd (Northbound)				7 - Airway Blvd (Southbound)				I-580 WB On/Off Ramps (Eastbound)				I-580 WB On/Off Ramps (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	55	16	1	0	22	58	1	0	0	0	0	1	0	8	0	162	
4:05 PM	0	37	11	0	0	25	65	0	0	0	0	0	5	0	8	0	151	
4:10 PM	0	40	18	0	0	32	57	0	0	0	0	0	4	1	13	0	165	
4:15 PM	0	50	17	0	0	20	41	0	0	0	0	0	4	0	7	0	139	
4:20 PM	0	40	15	0	0	27	47	0	0	0	0	0	0	0	17	0	146	
4:25 PM	0	42	13	0	0	28	65	0	0	0	0	0	7	0	11	0	166	
4:30 PM	0	47	20	0	0	23	55	0	0	0	0	0	5	0	9	0	159	
4:35 PM	0	49	19	0	0	27	63	0	0	0	0	0	4	0	12	0	174	
4:40 PM	0	42	15	0	0	17	57	0	0	0	0	0	5	0	13	0	149	
4:45 PM	0	60	19	0	0	15	52	0	0	0	0	0	4	0	15	0	165	
4:50 PM	0	33	14	0	0	23	66	0	0	0	0	0	2	0	13	0	151	
4:55 PM	0	39	19	0	0	19	52	0	0	0	0	0	4	0	12	0	145	1872
5:00 PM	0	43	14	0	0	13	56	0	0	0	0	0	2	0	17	0	145	1855
5:05 PM	0	49	28	0	0	25	73	0	0	0	0	0	4	0	11	0	190	1894
5:10 PM	0	54	23	0	0	22	80	0	0	0	0	0	3	0	10	0	192	1921
5:15 PM	0	61	17	0	0	28	65	0	0	0	0	0	8	1	14	0	194	1976
5:20 PM	0	59	22	0	0	19	74	0	0	0	0	0	3	0	12	0	189	2019
5:25 PM	0	41	21	0	0	23	59	0	0	0	0	0	0	0	14	0	158	2011
5:30 PM	0	55	16	0	0	14	52	0	0	0	0	0	3	0	13	0	153	2005
5:35 PM	0	60	26	0	0	30	65	0	0	0	0	0	2	0	16	0	199	2030
5:40 PM	0	51	12	0	0	17	61	0	0	0	0	0	6	0	15	0	162	2043
5:45 PM	0	62	21	0	0	25	61	0	0	0	0	0	6	1	13	0	189	2067
5:50 PM	0	51	19	0	0	7	59	0	0	0	0	0	5	0	13	0	154	2070
5:55 PM	0	59	20	0	0	19	50	0	0	0	0	0	1	0	14	0	163	2088

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	656	272	0	0	300	872	0	0	0	0	0	60	4	140	0	2304
Heavy Trucks	0	16	8		0	24	16		0	0	0		0	0	4		68
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/6/2017 4:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

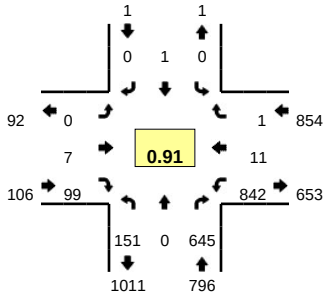
Type of peak hour being reported: Intersection Peak

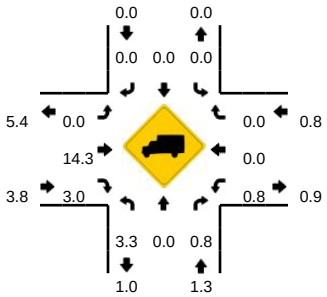
Method for determining peak hour: Total Entering Volume

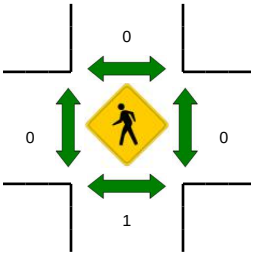
LOCATION: 8 - Airway Blvd -- N Canyons Pkwy
CITY/STATE: Livermore, CA

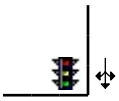
QC JOB #: 13967606
DATE: Thu, Jan 26 2017

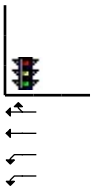
Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:10 PM -- 5:25 PM

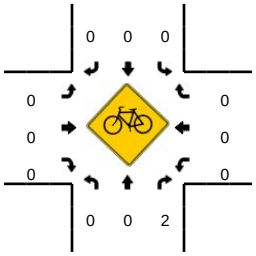


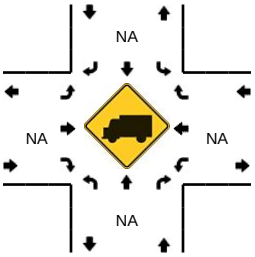


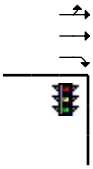


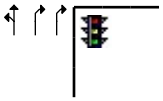


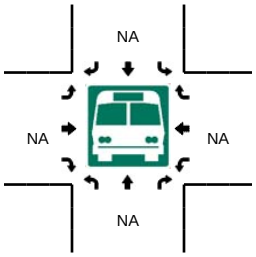












5-Min Count Period Beginning At	8 - Airway Blvd (Northbound)				8 - Airway Blvd (Southbound)				N Canyons Pkwy (Eastbound)				N Canyons Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	5	0	60	7	0	0	0	0	0	2	5	0	71	2	0	0	152	
4:05 PM	6	0	29	9	0	0	0	0	0	3	7	0	80	0	0	0	134	
4:10 PM	3	0	47	8	0	0	0	0	0	3	9	0	73	1	0	0	144	
4:15 PM	5	0	45	1	0	0	0	0	0	3	6	0	61	0	0	0	121	
4:20 PM	6	0	42	6	0	0	0	0	0	2	9	0	65	1	1	0	132	
4:25 PM	3	0	44	5	0	0	0	0	0	3	7	0	69	1	0	0	132	
4:30 PM	4	0	43	6	0	0	0	0	0	3	4	0	69	1	0	0	130	
4:35 PM	2	0	48	6	0	0	0	0	0	0	8	0	76	2	0	0	142	
4:40 PM	3	0	42	4	0	0	0	0	0	1	8	0	63	1	0	1	123	
4:45 PM	6	0	57	3	0	0	0	0	0	0	7	0	55	1	0	2	131	
4:50 PM	4	0	38	10	0	0	0	0	0	4	2	0	78	1	0	1	138	
4:55 PM	3	0	38	5	0	0	0	0	0	0	3	0	61	0	0	0	110	1589
5:00 PM	4	0	47	2	0	0	0	0	0	1	6	0	63	0	0	0	123	1560
5:05 PM	2	0	54	5	0	0	0	0	0	0	7	0	84	2	0	0	154	1580
5:10 PM	7	0	44	5	0	0	0	0	0	2	9	0	88	2	0	0	157	1593
5:15 PM	10	0	62	9	0	0	0	0	0	0	13	0	75	0	0	0	169	1641
5:20 PM	4	0	58	3	0	0	0	0	0	1	8	0	83	1	0	1	159	1668
5:25 PM	10	0	40	9	0	0	0	0	0	0	9	0	67	1	0	0	136	1672
5:30 PM	11	0	50	8	0	0	0	0	0	0	8	0	57	1	0	0	135	1677
5:35 PM	9	0	59	6	0	0	0	0	0	0	5	0	79	1	0	0	159	1694
5:40 PM	6	0	54	2	0	1	0	0	0	2	11	0	65	0	1	0	142	1713
5:45 PM	8	0	64	12	0	0	0	0	0	1	12	0	65	0	0	0	162	1744
5:50 PM	5	0	58	3	0	0	0	0	0	0	8	0	52	3	0	0	129	1735
5:55 PM	5	0	55	6	0	0	0	0	0	0	3	0	63	0	0	0	132	1757

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	84	0	656	68	0	0	0	0	0	12	120	0	984	12	0	4	1940
Heavy Trucks	12	0	8		0	0	0		0	4	0		12	0	0		36
Pedestrians		4				0				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/6/2017 4:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

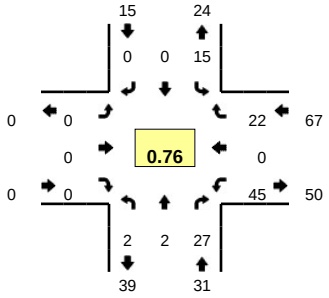
Type of peak hour being reported: Intersection Peak

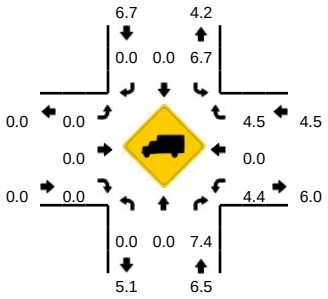
Method for determining peak hour: Total Entering Volume

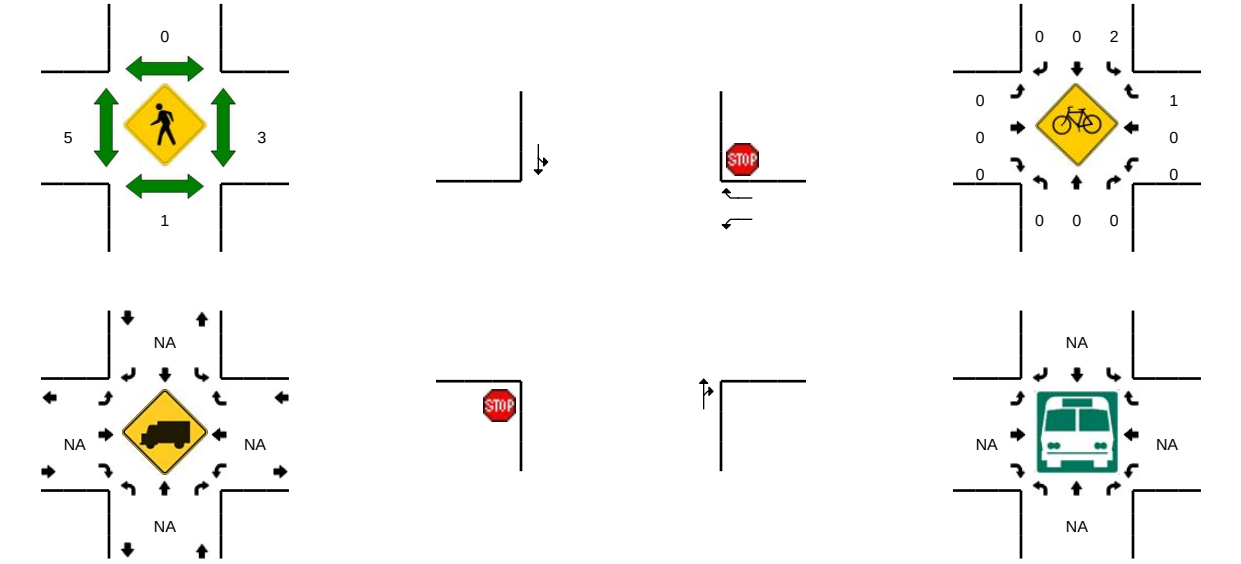
LOCATION: 9 - Doolan Rd -- N Canyons Pkwy
CITY/STATE: Livermore, CA

QC JOB #: 13967610
DATE: Thu, Jan 26 2017

Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:35 PM -- 5:50 PM







5-Min Count Period Beginning At	9 - Doolan Rd (Northbound)				9 - Doolan Rd (Southbound)				N Canyons Pkwy (Eastbound)				N Canyons Pkwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	1	0	0	1	0	0	0	0	0	0	3	0	0	1	6	
4:05 PM	0	0	2	0	1	0	0	0	0	0	0	0	4	0	1	1	9	
4:10 PM	0	0	6	0	1	0	0	0	0	0	0	0	1	0	1	1	10	
4:15 PM	0	0	3	0	1	0	0	0	0	0	0	0	3	0	2	0	9	
4:20 PM	0	0	3	0	1	0	0	0	0	0	0	0	4	0	1	0	9	
4:25 PM	0	0	4	0	3	0	0	0	0	0	0	0	4	0	1	1	13	
4:30 PM	0	0	2	0	1	0	0	0	0	0	0	0	3	0	0	0	6	
4:35 PM	0	0	4	0	2	0	0	0	0	0	0	0	4	0	1	0	11	
4:40 PM	0	0	3	0	1	1	0	0	0	0	0	0	3	0	0	0	8	
4:45 PM	0	0	5	0	1	0	0	0	0	0	0	0	5	0	1	0	12	
4:50 PM	0	0	2	0	0	0	0	0	0	0	0	0	1	0	3	1	7	
4:55 PM	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	2	5	105
5:00 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	3	102
5:05 PM	0	0	0	0	1	0	0	0	0	0	0	0	2	0	1	2	6	99
5:10 PM	0	1	2	0	1	0	0	0	0	0	0	0	4	0	0	1	9	98
5:15 PM	0	0	4	0	3	0	0	0	0	0	0	0	3	0	3	0	13	102
5:20 PM	0	0	4	0	1	0	0	0	0	0	0	0	1	0	2	1	9	102
5:25 PM	0	1	4	0	1	0	0	0	0	0	0	0	5	0	0	1	12	101
5:30 PM	0	0	2	0	1	0	0	0	0	0	0	0	4	0	2	1	10	105
5:35 PM	0	0	1	1	0	0	0	0	0	0	0	0	3	0	5	1	11	105
5:40 PM	0	0	5	0	4	0	0	0	0	0	0	0	6	0	0	0	15	112
5:45 PM	0	0	2	0	1	0	0	0	0	0	0	0	5	0	3	0	11	111
5:50 PM	0	0	1	1	1	0	0	0	0	0	0	0	2	0	1	0	6	110
5:55 PM	0	0	1	0	0	0	0	0	0	0	0	0	2	0	4	1	8	113

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	32	4	20	0	0	0	0	0	0	0	56	0	32	4	148
Heavy Trucks	0	0	4		0	0	0		0	0	0		4	0	0		8
Pedestrians		0				0				8				4			12
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/6/2017 4:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

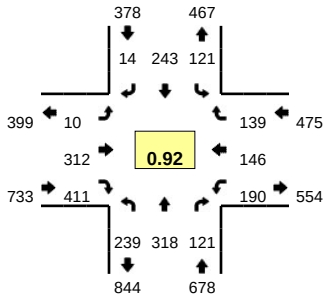
Type of peak hour being reported: Intersection Peak

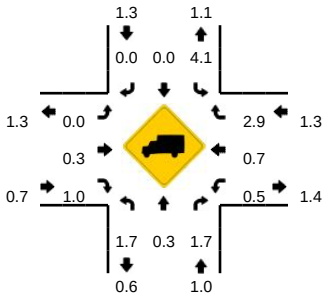
Method for determining peak hour: Total Entering Volume

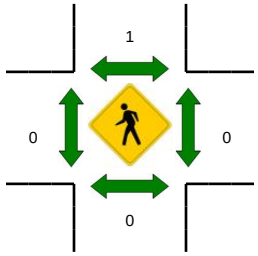
LOCATION: 10 - Isabel Ave -- Portola Ave
CITY/STATE: Livermore, CA

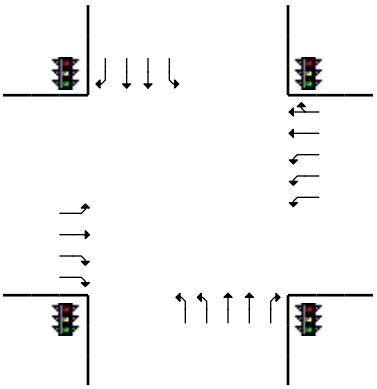
QC JOB #: 13967608
DATE: Thu, Jan 26 2017

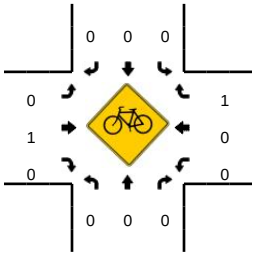
Peak-Hour: 4:50 PM -- 5:50 PM
Peak 15-Min: 4:50 PM -- 5:05 PM

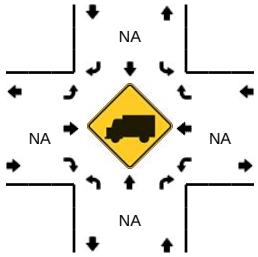


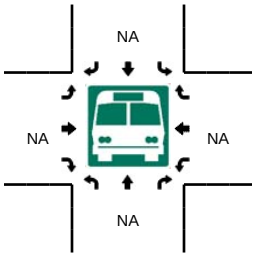












5-Min Count Period Beginning At	10 - Isabel Ave (Northbound)				10 - Isabel Ave (Southbound)				Portola Ave (Eastbound)				Portola Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	13	15	6	0	12	24	0	0	0	22	31	0	9	6	7	0	145	
4:05 PM	13	10	5	0	7	13	0	0	2	31	42	0	14	8	6	0	151	
4:10 PM	16	15	5	0	8	8	0	0	0	18	32	0	16	8	4	0	130	
4:15 PM	16	20	10	0	4	20	3	0	0	20	30	0	12	10	6	0	151	
4:20 PM	14	14	5	0	5	14	2	0	1	22	23	0	12	6	7	0	125	
4:25 PM	12	17	14	0	8	16	2	0	0	23	23	0	16	9	7	0	147	
4:30 PM	7	18	5	0	4	14	0	0	1	31	42	0	13	12	3	0	150	
4:35 PM	18	13	6	0	14	24	0	0	0	23	37	0	11	7	20	0	173	
4:40 PM	11	17	6	0	11	14	0	0	1	33	34	0	24	13	17	0	181	
4:45 PM	15	32	10	0	10	16	0	0	0	23	27	0	7	12	11	0	163	
4:50 PM	14	38	7	0	14	44	2	0	2	27	32	0	13	14	16	0	223	
4:55 PM	16	22	13	0	12	35	0	0	0	20	45	0	19	15	10	0	207	1946
5:00 PM	18	21	8	0	15	24	0	0	1	24	39	0	11	10	13	0	184	1985
5:05 PM	18	16	5	0	7	9	4	0	0	41	42	0	16	8	10	0	176	2010
5:10 PM	16	23	10	0	7	12	3	0	1	27	42	0	20	12	11	0	184	2064
5:15 PM	24	29	11	0	4	13	1	0	2	35	36	0	13	10	12	0	190	2103
5:20 PM	19	34	7	0	9	17	1	0	1	27	36	0	21	14	15	0	201	2179
5:25 PM	16	26	13	0	7	18	1	0	1	23	35	0	12	13	13	0	178	2210
5:30 PM	15	24	13	0	10	23	0	0	1	24	25	0	13	14	12	0	174	2234
5:35 PM	28	16	9	0	11	11	0	0	1	27	26	0	16	12	10	0	167	2228
5:40 PM	29	35	15	0	13	13	2	0	0	16	31	0	16	12	7	0	189	2236
5:45 PM	26	34	10	0	12	24	0	0	0	21	22	0	20	12	10	0	191	2264
5:50 PM	31	24	8	0	10	17	1	0	2	22	32	0	15	10	13	0	185	2226
5:55 PM	17	37	11	0	9	16	0	0	1	21	34	0	11	15	12	0	184	2203

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	192	324	112	0	164	412	8	0	12	284	464	0	172	156	156	0	2456
Heavy Trucks	4	0	4		4	0	0		0	0	12		4	0	4		32
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/6/2017 4:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

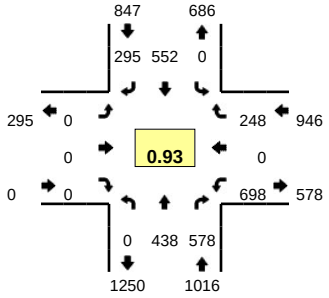
Type of peak hour being reported: Intersection Peak

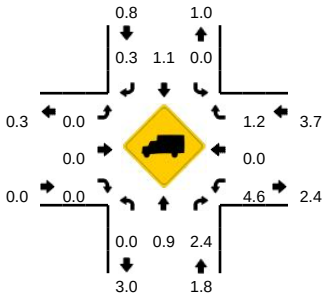
Method for determining peak hour: Total Entering Volume

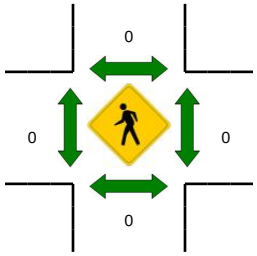
LOCATION: 11 - Isabel Ave -- I-580 WB On/Off Ramps
CITY/STATE: Alameda, CA

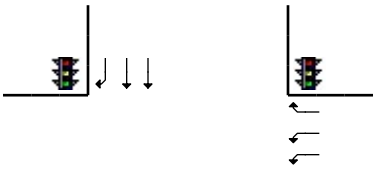
QC JOB #: 13967622
DATE: Thu, Jan 26 2017

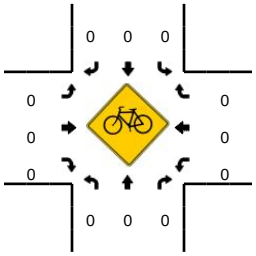
Peak-Hour: 4:50 PM -- 5:50 PM
Peak 15-Min: 4:50 PM -- 5:05 PM

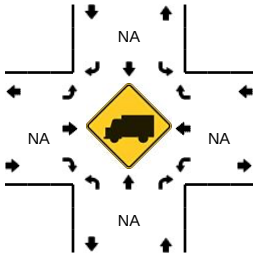


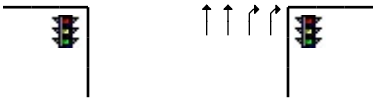


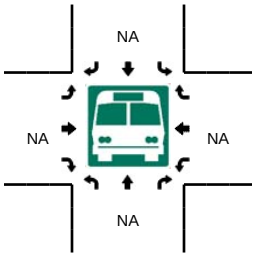












5-Min Count Period Beginning At	11 - Isabel Ave (Northbound)				11 - Isabel Ave (Southbound)				I-580 WB On/Off Ramps (Eastbound)				I-580 WB On/Off Ramps (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	21	45	0	0	52	17	0	0	0	0	0	60	0	10	0	205	
4:05 PM	0	19	56	0	0	53	19	0	0	0	0	0	53	0	17	0	217	
4:10 PM	0	21	51	0	0	35	19	0	0	0	0	0	58	0	10	0	194	
4:15 PM	0	34	62	0	0	40	19	0	0	0	0	0	77	0	16	0	248	
4:20 PM	0	18	45	0	0	37	17	0	0	0	0	0	65	0	14	0	196	
4:25 PM	0	27	42	0	0	33	19	0	0	0	0	0	53	0	15	0	189	
4:30 PM	0	27	62	0	0	55	19	0	0	0	0	0	53	0	12	0	228	
4:35 PM	0	14	37	0	0	46	18	0	0	0	0	0	59	0	13	0	187	
4:40 PM	0	31	45	0	0	52	30	0	0	0	0	0	54	0	13	0	225	
4:45 PM	0	31	36	0	0	38	11	0	0	0	0	0	71	0	21	0	208	
4:50 PM	0	42	63	0	0	52	28	0	0	0	0	0	57	0	21	0	263	
4:55 PM	0	32	36	0	0	58	41	0	0	0	0	0	72	0	15	0	254	2614
5:00 PM	0	31	57	0	0	43	30	0	0	0	0	0	58	0	18	0	237	2646
5:05 PM	0	34	54	0	0	58	19	0	0	0	0	0	58	0	14	0	237	2666
5:10 PM	0	33	44	0	0	52	25	0	0	0	0	0	59	0	20	0	233	2705
5:15 PM	0	28	41	0	0	31	20	0	0	0	0	0	73	0	29	0	222	2679
5:20 PM	0	40	44	0	0	57	23	0	0	0	0	0	54	0	11	0	229	2712
5:25 PM	0	41	56	0	0	48	21	0	0	0	0	0	63	0	21	0	250	2773
5:30 PM	0	32	39	0	0	33	22	0	0	0	0	0	62	0	17	0	205	2750
5:35 PM	0	34	51	0	0	34	20	0	0	0	0	0	52	0	24	0	215	2778
5:40 PM	0	51	51	0	0	45	19	0	0	0	0	0	40	0	27	0	233	2786
5:45 PM	0	40	42	0	0	41	27	0	0	0	0	0	50	0	31	0	231	2809
5:50 PM	0	46	27	0	0	47	20	0	0	0	0	0	53	0	23	0	216	2762
5:55 PM	0	45	38	0	0	41	21	0	0	0	0	0	43	0	23	0	211	2719

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	420	624	0	0	612	396	0	0	0	0	0	748	0	216	0	3016
Heavy Trucks	0	4	28		0	16	0		0	0	0		56	0	4		108
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/6/2017 4:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

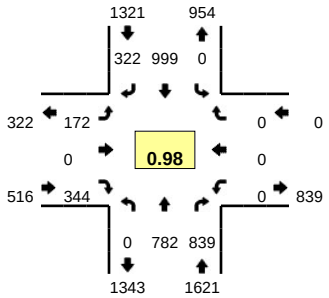
Type of peak hour being reported: Intersection Peak

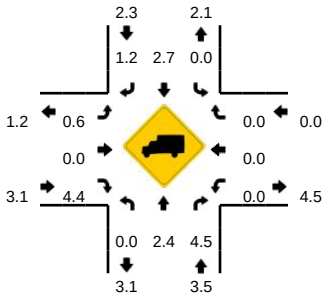
Method for determining peak hour: Total Entering Volume

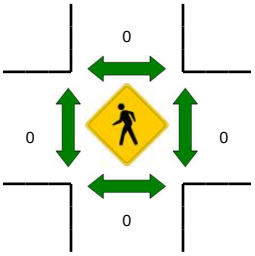
LOCATION: 12 - Isabel Ave -- I-580 EB On/Off Ramps
CITY/STATE: Alameda, CA

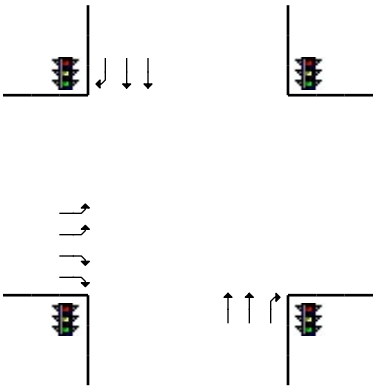
QC JOB #: 13967624
DATE: Thu, Jan 26 2017

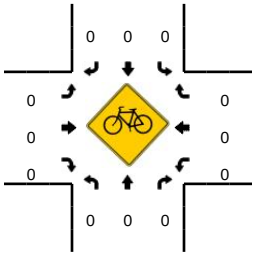
Peak-Hour: 4:30 PM -- 5:30 PM
Peak 15-Min: 4:55 PM -- 5:10 PM

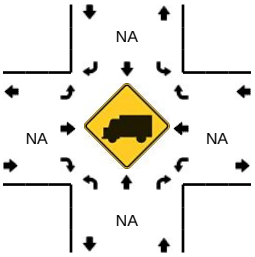


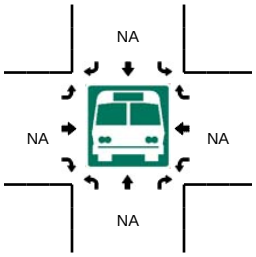












5-Min Count Period Beginning At	12 - Isabel Ave (Northbound)				12 - Isabel Ave (Southbound)				I-580 EB On/Off Ramps (Eastbound)				I-580 EB On/Off Ramps (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	61	58	0	0	87	30	0	11	0	29	0	0	0	0	0	276	
4:05 PM	0	65	79	0	0	63	39	0	7	0	22	0	0	0	0	0	275	
4:10 PM	0	67	83	0	0	79	19	0	10	0	29	0	0	0	0	0	287	
4:15 PM	0	71	99	0	0	78	21	0	18	0	34	0	0	0	0	0	321	
4:20 PM	0	59	77	0	0	81	21	0	6	0	27	0	0	0	0	0	271	
4:25 PM	0	54	55	0	0	91	15	0	15	0	31	0	0	0	0	0	261	
4:30 PM	0	75	86	0	0	74	23	0	7	0	22	0	0	0	0	0	287	
4:35 PM	0	43	72	0	0	77	32	0	9	0	27	0	0	0	0	0	260	
4:40 PM	0	68	92	0	0	94	19	0	11	0	28	0	0	0	0	0	312	
4:45 PM	0	58	70	0	0	81	24	0	13	0	25	0	0	0	0	0	271	
4:50 PM	0	80	42	0	0	75	27	0	14	0	29	0	0	0	0	0	267	
4:55 PM	0	69	56	0	0	106	29	0	20	0	28	0	0	0	0	0	308	3396
5:00 PM	0	56	58	0	0	74	27	0	16	0	34	0	0	0	0	0	265	3385
5:05 PM	0	69	85	0	0	82	31	0	15	0	27	0	0	0	0	0	309	3419
5:10 PM	0	69	73	0	0	90	27	0	13	0	33	0	0	0	0	0	305	3437
5:15 PM	0	47	80	0	0	69	18	0	17	0	36	0	0	0	0	0	267	3383
5:20 PM	0	83	53	0	0	87	34	0	12	0	28	0	0	0	0	0	297	3409
5:25 PM	0	65	72	0	0	90	31	0	25	0	27	0	0	0	0	0	310	3458
5:30 PM	0	54	58	0	0	67	19	0	16	0	31	0	0	0	0	0	245	3416
5:35 PM	0	81	48	0	0	74	17	0	22	0	35	0	0	0	0	0	277	3433
5:40 PM	0	59	43	0	0	71	18	0	20	0	39	0	0	0	0	0	250	3371
5:45 PM	0	62	58	0	0	67	21	0	22	0	34	0	0	0	0	0	264	3364
5:50 PM	0	59	61	0	0	83	19	0	20	0	36	0	0	0	0	0	278	3375
5:55 PM	0	47	40	0	0	61	17	0	29	0	36	0	0	0	0	0	230	3297

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	776	796	0	0	1048	348	0	204	0	356	0	0	0	0	0	3528
Heavy Trucks	0	32	48		0	52	8		4	0	24		0	0	0		168
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/6/2017 4:05 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

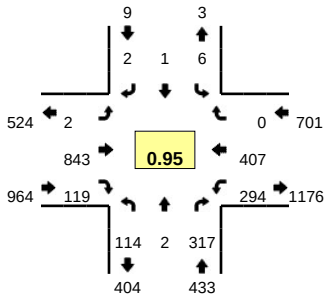
Type of peak hour being reported: Intersection Peak

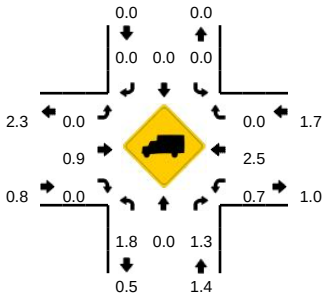
Method for determining peak hour: Total Entering Volume

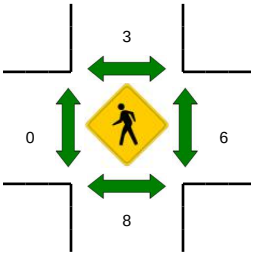
LOCATION: 13 - Murrieta Blvd -- Portola Ave
CITY/STATE: Alameda, CA

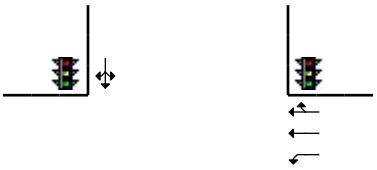
QC JOB #: 13967620
DATE: Tue, Feb 14 2017

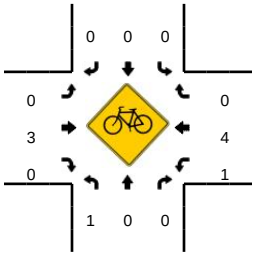
Peak-Hour: 4:55 PM -- 5:55 PM
Peak 15-Min: 5:00 PM -- 5:15 PM

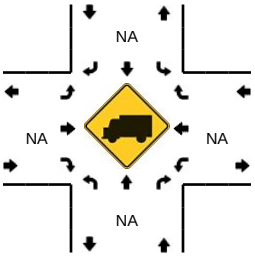


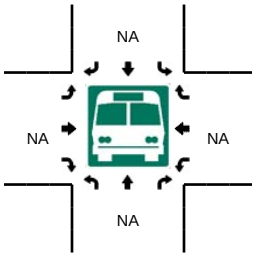












5-Min Count Period Beginning At	13 - Murrieta Blvd (Northbound)				13 - Murrieta Blvd (Southbound)				Portola Ave (Eastbound)				Portola Ave (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	9	0	25	0	0	2	1	0	0	33	7	0	22	28	0	0	127	
4:05 PM	5	0	26	0	0	0	0	0	0	53	4	0	19	25	0	2	134	
4:10 PM	10	0	20	0	0	0	0	0	0	81	15	0	16	27	0	0	169	
4:15 PM	13	1	25	0	0	1	0	0	0	43	10	0	20	29	0	3	145	
4:20 PM	8	0	28	0	0	0	0	0	0	52	7	0	24	32	0	0	151	
4:25 PM	7	1	25	0	0	0	0	0	0	65	9	0	19	36	0	2	164	
4:30 PM	10	0	35	0	0	1	0	0	0	70	12	0	15	36	0	0	179	
4:35 PM	6	0	30	0	2	0	1	0	0	59	11	0	14	30	0	2	155	
4:40 PM	10	0	26	0	1	0	0	0	0	66	10	0	15	50	0	0	178	
4:45 PM	16	0	32	0	0	0	0	0	0	57	10	0	12	26	0	2	155	
4:50 PM	6	0	31	0	2	1	0	0	0	42	13	0	26	19	0	1	141	
4:55 PM	7	0	18	0	1	0	0	0	0	73	9	0	36	37	0	1	182	1880
5:00 PM	5	0	28	0	3	0	0	0	0	72	18	0	20	28	0	1	175	1928
5:05 PM	13	0	29	0	0	1	0	0	0	74	12	0	20	32	0	0	181	1975
5:10 PM	9	0	29	0	0	0	0	0	0	91	8	0	16	40	0	3	196	2002
5:15 PM	8	0	19	0	0	0	0	0	0	85	10	0	21	27	0	0	170	2027
5:20 PM	10	0	27	0	0	0	0	0	0	70	12	1	25	35	0	0	180	2056
5:25 PM	8	0	35	0	0	0	0	0	0	67	9	0	28	41	0	1	189	2081
5:30 PM	10	1	37	0	0	0	1	0	0	65	11	0	21	26	0	3	175	2077
5:35 PM	15	0	22	0	0	0	0	0	1	56	6	0	18	32	0	1	151	2073
5:40 PM	3	0	28	0	2	0	0	0	0	48	9	0	32	36	0	0	158	2053
5:45 PM	11	0	21	0	0	0	1	0	0	78	8	0	29	37	0	0	185	2083
5:50 PM	15	1	24	0	0	0	0	0	0	64	7	0	18	36	0	0	165	2107
5:55 PM	7	0	27	0	1	0	0	0	0	44	9	0	22	36	0	2	148	2073

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	108	0	344	0	12	4	0	0	0	948	152	0	224	400	0	16	2208
Heavy Trucks	0	0	4		0	0	0		0	4	0		0	12	0		20
Pedestrians		20				0				0				16			36
Bicycles	0	0	0		0	0	0		0	0	0		1	2	0		3
Railroad																	
Stopped Buses																	

Comments:

Report generated on 2/17/2017 3:55 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

Appendix 2
Existing Level of Service Worksheets

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	116	309	102	268	466	55	136	620	151	15	421	72
Future Volume (vph)	116	309	102	268	466	55	136	620	151	15	421	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91		0.94	0.95	0.88	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3400	4988	2565	3467	4908		4802	3539	2739	3099	5085	1489
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3400	4988	2565	3467	4908		4802	3539	2739	3099	5085	1489
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	125	332	110	288	501	59	146	667	162	16	453	77
RTOR Reduction (vph)	0	0	87	0	11	0	0	0	103	0	0	55
Lane Group Flow (vph)	125	332	23	288	549	0	146	667	59	16	453	22
Confl. Peds. (#/hr)			8			14			7			2
Heavy Vehicles (%)	3%	4%	9%	1%	4%	2%	6%	2%	2%	13%	2%	7%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	8.2	16.1	16.1	12.0	19.9		7.6	28.4	28.4	1.7	22.5	22.5
Effective Green, g (s)	8.2	16.1	16.1	12.0	19.9		7.6	28.4	28.4	1.7	22.5	22.5
Actuated g/C Ratio	0.10	0.21	0.21	0.15	0.25		0.10	0.36	0.36	0.02	0.29	0.29
Clearance Time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Vehicle Extension (s)	2.0	3.5	3.5	2.0	3.5		2.0	3.5	3.5	2.0	3.5	3.5
Lane Grp Cap (vph)	356	1026	528	532	1248		466	1285	994	67	1463	428
v/s Ratio Prot	0.04	0.07		c0.08	c0.11		c0.03	c0.19		0.01	0.09	
v/s Ratio Perm			0.01						0.02			0.01
v/c Ratio	0.35	0.32	0.04	0.54	0.44		0.31	0.52	0.06	0.24	0.31	0.05
Uniform Delay, d1	32.5	26.4	24.9	30.6	24.5		32.9	19.5	16.2	37.6	21.8	20.1
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	0.2	0.2	0.0	0.6	0.3		0.1	0.4	0.0	0.7	0.1	0.1
Delay (s)	32.7	26.6	24.9	31.2	24.8		33.0	20.0	16.2	38.3	21.9	20.2
Level of Service	C	C	C	C	C		C	B	B	D	C	C
Approach Delay (s)		27.6			26.9			21.3			22.2	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	24.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	78.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	101	135	130	471	460	29	249	490	128	21	1007	88
Future Volume (vph)	101	135	130	471	460	29	249	490	128	21	1007	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Lane Util. Factor	0.97	0.95	0.88	0.94	0.95		0.94	0.95	1.00	0.97	0.86	0.88
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3400	3374	2760	4990	3477		4894	3471	1563	3072	6408	2733
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3400	3374	2760	4990	3477		4894	3471	1563	3072	6408	2733
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	107	144	138	501	489	31	265	521	136	22	1071	94
RTOR Reduction (vph)	0	0	115	0	4	0	0	0	78	0	0	62
Lane Group Flow (vph)	107	144	23	501	516	0	265	521	58	22	1071	32
Confl. Peds. (#/hr)						4			1			
Heavy Vehicles (%)	3%	7%	3%	2%	3%	0%	4%	4%	2%	14%	2%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases			2						4			8
Actuated Green, G (s)	7.6	15.4	15.4	13.9	21.7		9.7	38.9	38.9	2.0	31.2	31.2
Effective Green, g (s)	7.6	15.4	15.4	13.9	21.7		9.7	38.9	38.9	2.0	31.2	31.2
Actuated g/C Ratio	0.08	0.17	0.17	0.15	0.24		0.11	0.42	0.42	0.02	0.34	0.34
Clearance Time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	281	566	463	755	821		517	1470	662	66	2177	928
v/s Ratio Prot	0.03	0.04		c0.10	c0.15		c0.05	0.15		0.01	c0.17	
v/s Ratio Perm			0.01						0.04			0.01
v/c Ratio	0.38	0.25	0.05	0.66	0.63		0.51	0.35	0.09	0.33	0.49	0.03
Uniform Delay, d1	39.9	33.2	32.1	36.7	31.4		38.8	17.9	15.8	44.2	24.0	20.2
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	0.3	0.2	0.0	1.7	1.5		0.4	0.2	0.1	1.1	0.2	0.0
Delay (s)	40.2	33.4	32.1	38.5	33.0		39.2	18.1	15.9	45.3	24.3	20.3
Level of Service	D	C	C	D	C		D	B	B	D	C	C
Approach Delay (s)		34.8			35.7			23.9			24.3	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	91.8	Sum of lost time (s)	21.6
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	0	140	0	0	0	326	529	0	0	960	162
Future Volume (vph)	68	0	140	0	0	0	326	529	0	0	960	162
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	4.9			4.9	4.9
Lane Util. Factor	0.95	0.95	0.88				1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00				1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00				0.95	1.00			1.00	1.00
Satd. Flow (prot)	1681	1681	2608				1736	3471			3574	1579
Flt Permitted	0.95	0.55	1.00				0.95	1.00			1.00	1.00
Satd. Flow (perm)	1681	976	2608				1736	3471			3574	1579
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	72	0	147	0	0	0	343	557	0	0	1011	171
RTOR Reduction (vph)	0	0	63	0	0	0	0	0	0	0	0	116
Lane Group Flow (vph)	36	36	84	0	0	0	343	557	0	0	1011	55
Confl. Peds. (#/hr)												1
Heavy Vehicles (%)	2%	0%	9%	2%	2%	2%	4%	4%	0%	0%	1%	1%
Turn Type	Prot	NA	pt+ov	Prot			Prot	NA		Prot	NA	Perm
Protected Phases	5	2	2 3	1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	11.3	30.8	56.3				20.2	57.3			31.8	31.8
Effective Green, g (s)	11.3	30.8	56.3				20.2	57.3			31.8	31.8
Actuated g/C Ratio	0.11	0.31	0.57				0.21	0.58			0.32	0.32
Clearance Time (s)	5.3	5.3					5.3	4.9			4.9	4.9
Vehicle Extension (s)	2.0	4.0					2.0	4.0			4.0	4.0
Lane Grp Cap (vph)	193	386	1493				356	2023			1156	510
v/s Ratio Prot	c0.02	0.01	0.03				c0.20	0.16			c0.28	
v/s Ratio Perm		c0.02										0.04
v/c Ratio	0.19	0.09	0.06				0.96	0.28			0.87	0.11
Uniform Delay, d1	39.3	23.9	9.3				38.7	10.2			31.4	23.3
Progression Factor	1.00	1.00	1.00				1.00	1.00			1.00	1.00
Incremental Delay, d2	0.2	0.1	0.0				37.6	0.1			7.8	0.1
Delay (s)	39.5	24.0	9.3				76.3	10.3			39.2	23.4
Level of Service	D	C	A				E	B			D	C
Approach Delay (s)		16.7			0.0			35.5			36.9	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	34.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	98.3	Sum of lost time (s)	19.5
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	230	62	654	0	477	0	0	545	497
Future Volume (vph)	0	0	0	230	62	654	0	477	0	0	545	497
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.7	3.7	3.7		4.8			4.8	4.8
Lane Util. Factor				0.95	0.95	0.88		1.00			0.95	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	0.97	1.00		1.00			1.00	1.00
Satd. Flow (prot)				1633	1691	2760		1845			3505	1599
Flt Permitted				0.95	0.97	1.00		1.00			1.00	1.00
Satd. Flow (perm)				1633	1691	2760		1845			3505	1599
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	0	237	64	674	0	492	0	0	562	512
RTOR Reduction (vph)	0	0	0	0	0	230	0	0	0	0	0	220
Lane Group Flow (vph)	0	0	0	149	152	444	0	492	0	0	562	292
Heavy Vehicles (%)	0%	0%	0%	5%	2%	3%	0%	3%	20%	0%	3%	1%
Turn Type				Split	NA	custom		NA			NA	Perm
Protected Phases				8	8	8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				16.0	16.0	26.2		22.3			32.5	32.5
Effective Green, g (s)				16.0	16.0	26.2		22.3			32.5	32.5
Actuated g/C Ratio				0.28	0.28	0.46		0.39			0.57	0.57
Clearance Time (s)				3.7	3.7			4.8			4.8	4.8
Vehicle Extension (s)				4.0	4.0			4.0			2.5	2.5
Lane Grp Cap (vph)				458	474	1268		721			1998	911
v/s Ratio Prot				0.09	0.09	c0.16		c0.27			0.16	
v/s Ratio Perm												0.18
v/c Ratio				0.33	0.32	0.35		0.68			0.28	0.32
Uniform Delay, d1				16.2	16.2	9.9		14.4			6.3	6.4
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.6	0.5	0.2		2.9			0.1	0.1
Delay (s)				16.8	16.7	10.1		17.3			6.3	6.6
Level of Service				B	B	B		B			A	A
Approach Delay (s)		0.0			12.2			17.3			6.5	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	57.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	246	256	0	463	539	0
Future Volume (vph)	246	256	0	463	539	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.88		0.95	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3367	2409		3223	3406	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3367	2409		3223	3406	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	265	275	0	498	580	0
RTOR Reduction (vph)	0	212	0	0	0	0
Lane Group Flow (vph)	265	63	0	498	580	0
Confl. Bikes (#/hr)						3
Heavy Vehicles (%)	4%	18%	0%	12%	6%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	5.5	5.5		10.6	10.6	
Effective Green, g (s)	5.5	5.5		10.6	10.6	
Actuated g/C Ratio	0.23	0.23		0.44	0.44	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	
Lane Grp Cap (vph)	768	549		1417	1498	
v/s Ratio Prot	c0.08			0.15	c0.17	
v/s Ratio Perm		0.03				
v/c Ratio	0.35	0.11		0.35	0.39	
Uniform Delay, d1	7.8	7.4		4.5	4.6	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.0		0.1	0.1	
Delay (s)	7.9	7.4		4.5	4.6	
Level of Service	A	A		A	A	
Approach Delay (s)	7.6			4.5	4.6	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	5.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	24.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	30.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	666	230	155	14	53	90	19	271	180	64	92	0
Future Volume (vph)	666	230	155	14	53	90	19	271	180	64	92	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.9	4.9	4.9	3.5	5.3		4.0	5.3	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1827	1538	1687	1681	1599	1719	3229		1719	3438	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1827	1538	1687	1681	1599	1719	3229		1719	3438	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	740	256	172	16	59	100	21	301	200	71	102	0
RTOR Reduction (vph)	0	0	123	0	0	76	0	100	0	0	0	0
Lane Group Flow (vph)	740	256	49	16	59	24	21	401	0	71	102	0
Confl. Peds. (#/hr)									4			
Heavy Vehicles (%)	2%	4%	5%	7%	13%	1%	5%	4%	4%	5%	5%	3%
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	7	7		8	8	8 1	5	2		1	6	
Permitted Phases			7									
Actuated Green, G (s)	29.9	29.9	29.9	11.2	11.2	25.3	3.2	37.0		9.2	43.5	
Effective Green, g (s)	29.9	29.9	29.9	11.2	11.2	25.3	3.2	37.0		9.2	43.5	
Actuated g/C Ratio	0.28	0.28	0.28	0.11	0.11	0.24	0.03	0.35		0.09	0.41	
Clearance Time (s)	3.5	3.5	3.5	4.9	4.9		3.5	5.3		4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	977	520	437	179	179	385	52	1137		150	1424	
v/s Ratio Prot	c0.22	0.14		0.01	c0.04	0.02	0.01	c0.12		c0.04	0.03	
v/s Ratio Perm			0.03									
v/c Ratio	0.76	0.49	0.11	0.09	0.33	0.06	0.40	0.35		0.47	0.07	
Uniform Delay, d1	34.2	31.2	27.7	42.3	43.4	30.7	50.0	25.1		45.6	18.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.77	0.72	
Incremental Delay, d2	3.4	0.7	0.1	0.2	1.1	0.1	5.1	0.9		2.3	0.1	
Delay (s)	37.6	32.0	27.9	42.5	44.5	30.8	55.0	26.0		37.5	13.4	
Level of Service	D	C	C	D	D	C	E	C		D	B	
Approach Delay (s)		35.0			36.5			27.2			23.3	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	49	5	92	0	922	0	0	189	0
Future Volume (vph)	0	0	0	49	5	92	0	922	0	0	189	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0	4.0		5.3			5.3	
Lane Util. Factor				0.95	0.95	0.88		0.95			0.91	
Frt				1.00	1.00	0.85		1.00			1.00	
Flt Protected				0.95	0.96	1.00		1.00			1.00	
Satd. Flow (prot)				1681	1646	2632		3539			4988	
Flt Permitted				0.95	0.96	1.00		1.00			1.00	
Satd. Flow (perm)				1681	1646	2632		3539			4988	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	0	0	0	57	6	107	0	1072	0	0	220	0
RTOR Reduction (vph)	0	0	0	0	0	90	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	31	32	17	0	1072	0	0	220	0
Heavy Vehicles (%)	0%	0%	0%	2%	20%	8%	0%	2%	6%	0%	4%	3%
Turn Type				Split	NA	custom		NA			NA	
Protected Phases				8	8	8 1		2			6	
Permitted Phases												
Actuated Green, G (s)				7.6	7.6	17.1		79.6			88.1	
Effective Green, g (s)				7.6	7.6	17.1		79.6			88.1	
Actuated g/C Ratio				0.07	0.07	0.16		0.76			0.84	
Clearance Time (s)				4.0	4.0			5.3			5.3	
Vehicle Extension (s)				3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)				121	119	428		2682			4185	
v/s Ratio Prot				0.02	c0.02	c0.01		c0.30			0.04	
v/s Ratio Perm												
v/c Ratio				0.26	0.27	0.04		0.40			0.05	
Uniform Delay, d1				46.0	46.1	37.0		4.4			1.4	
Progression Factor				1.00	1.00	1.00		0.20			0.24	
Incremental Delay, d2				1.1	1.2	0.0		0.4			0.0	
Delay (s)				47.2	47.3	37.1		1.2			0.4	
Level of Service				D	D	D		A			A	
Approach Delay (s)		0.0			40.8			1.2			0.4	
Approach LOS		A			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.3
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	11	30	486	14	0	119	0	912	0	0	0
Future Volume (vph)	0	11	30	486	14	0	119	0	912	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0			4.2	4.2			
Lane Util. Factor		0.95	1.00	0.97	1.00			1.00	0.88			
Frt		1.00	0.85	1.00	1.00			1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (prot)		3312	1468	3367	1900			1787	2787			
Flt Permitted		1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (perm)		3312	1468	3367	1900			1787	2787			
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.92	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	0	13	36	579	17	0	142	0	1086	0	0	0
RTOR Reduction (vph)	0	0	31	0	0	0	0	0	273	0	0	0
Lane Group Flow (vph)	0	13	5	579	17	0	0	142	813	0	0	0
Heavy Vehicles (%)	0%	9%	10%	4%	0%	0%	1%	0%	2%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA	Perm	Split	NA	pt+ov			
Protected Phases		2		1	6		8	8	8 1		4	
Permitted Phases			2			6				4		
Actuated Green, G (s)		14.4	14.4	54.0	74.4			20.4	78.6			
Effective Green, g (s)		14.4	14.4	54.0	74.4			20.4	78.6			
Actuated g/C Ratio		0.14	0.14	0.51	0.71			0.19	0.75			
Clearance Time (s)		6.0	6.0	6.0	6.0			4.2				
Vehicle Extension (s)		3.0	3.0	3.0	3.0			3.0				
Lane Grp Cap (vph)		454	201	1731	1346			347	2086			
v/s Ratio Prot		c0.00		0.17	0.01			0.08	c0.29			
v/s Ratio Perm			0.00									
v/c Ratio		0.03	0.02	0.33	0.01			0.41	0.39			
Uniform Delay, d1		39.2	39.2	15.0	4.5			37.0	4.7			
Progression Factor		1.00	1.00	1.00	1.00			1.14	13.43			
Incremental Delay, d2		0.0	0.0	0.5	0.0			0.7	0.1			
Delay (s)		39.3	39.3	15.5	4.5			43.0	63.0			
Level of Service		D	D	B	A			D	E			
Approach Delay (s)		39.3			15.2			60.7			0.0	
Approach LOS		D			B			E			A	

Intersection Summary			
HCM 2000 Control Delay	45.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	20.2
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	21	11	0	19	16	0
Future Volume (Veh/h)	21	11	0	19	16	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	25	13	0	23	19	0
Pedestrians	3		3			1
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	0		0			0
Right turn flare (veh)		30				
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	56	16			26	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	56	16			26	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	97	99			99	
cM capacity (veh/h)	941	1066			1522	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	38	23	19
Volume Left	25	0	19
Volume Right	13	23	0
cSH	1430	1700	1522
Volume to Capacity	0.03	0.01	0.01
Queue Length 95th (ft)	2	0	1
Control Delay (s)	8.8	0.0	7.4
Lane LOS	A		A
Approach Delay (s)	8.8	0.0	7.4
Approach LOS	A		

Intersection Summary			
Average Delay	5.9		
Intersection Capacity Utilization	17.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	154	209	305	374	168	474	500	32	44	110	0
Future Volume (vph)	5	154	209	305	374	168	474	500	32	44	110	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	
Lane Util. Factor	1.00	1.00	0.88	0.94	0.95		0.97	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	1881	2779	4990	3408		3433	3574	1482	1656	3610	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1805	1881	2779	4990	3408		3433	3574	1482	1656	3610	
Peak-hour factor, PHF	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Adj. Flow (vph)	7	205	279	407	499	224	632	667	43	59	147	0
RTOR Reduction (vph)	0	0	209	0	35	0	0	0	29	0	0	0
Lane Group Flow (vph)	7	205	70	407	688	0	632	667	14	59	147	0
Confl. Peds. (#/hr)			1									
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	1%	1%	2%	0%	2%	2%	1%	9%	9%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	1.3	22.3	22.3	12.0	33.0		20.8	28.3	28.3	7.7	15.6	
Effective Green, g (s)	1.3	22.3	22.3	12.0	33.0		20.8	28.3	28.3	7.7	15.6	
Actuated g/C Ratio	0.01	0.25	0.25	0.13	0.37		0.23	0.32	0.32	0.09	0.18	
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	26	471	697	673	1265		803	1137	471	143	633	
v/s Ratio Prot	0.00	0.11		c0.08	c0.20		c0.18	c0.19		0.04	0.04	
v/s Ratio Perm			0.03						0.01			
v/c Ratio	0.27	0.44	0.10	0.60	0.54		0.79	0.59	0.03	0.41	0.23	
Uniform Delay, d1	43.3	28.0	25.6	36.2	22.0		32.0	25.4	20.8	38.5	31.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.0	0.6	0.1	1.1	0.5		4.7	0.8	0.0	0.7	0.2	
Delay (s)	45.4	28.7	25.7	37.3	22.5		36.7	26.2	20.9	39.2	31.7	
Level of Service	D	C	C	D	C		D	C	C	D	C	
Approach Delay (s)		27.2			27.8			31.0			33.8	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	88.9	Sum of lost time (s)	18.6
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	1066	0	520	0	489	0	0	327	303
Future Volume (vph)	0	0	0	1066	0	520	0	489	0	0	327	303
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.7		4.7		6.3			5.7	5.7
Lane Util. Factor				0.97		1.00		0.95			0.95	1.00
Frpb, ped/bikes				1.00		1.00		1.00			1.00	1.00
Flpb, ped/bikes				1.00		1.00		1.00			1.00	1.00
Frt				1.00		0.85		1.00			1.00	1.00
Flt Protected				0.95		1.00		1.00			1.00	1.00
Satd. Flow (prot)				3242		1599		3539			3539	1863
Flt Permitted				0.95		1.00		1.00			1.00	1.00
Satd. Flow (perm)				3242		1599		3539			3539	1863
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	0	0	0	1300	0	634	0	596	0	0	399	370
RTOR Reduction (vph)	0	0	0	0	0	38	0	0	0	0	0	235
Lane Group Flow (vph)	0	0	0	1300	0	596	0	596	0	0	399	135
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	8%	0%	1%	0%	2%	6%	0%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	2	0	0
Turn Type				Prot		custom		NA			NA	Perm
Protected Phases				8		8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				35.1		45.1		15.5			26.1	26.1
Effective Green, g (s)				35.1		45.1		15.5			26.1	26.1
Actuated g/C Ratio				0.49		0.63		0.22			0.36	0.36
Clearance Time (s)				4.7				6.3			5.7	5.7
Vehicle Extension (s)				0.2				0.2			0.2	0.2
Lane Grp Cap (vph)				1589		1007		766			1290	679
v/s Ratio Prot				c0.40		c0.37		c0.17			0.11	
v/s Ratio Perm												0.07
v/c Ratio				0.82		0.59		0.78			0.31	0.20
Uniform Delay, d1				15.5		7.8		26.4			16.3	15.6
Progression Factor				1.00		1.00		1.00			1.00	1.00
Incremental Delay, d2				3.2		0.6		4.6			0.0	0.1
Delay (s)				18.8		8.4		31.0			16.3	15.6
Level of Service				B		A		C			B	B
Approach Delay (s)		0.0			15.4			31.0			16.0	
Approach LOS		A			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	71.6	Sum of lost time (s)	15.7
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	201	346	0	842	1298	0
Future Volume (vph)	201	346	0	842	1298	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	4.7		5.8	6.8	
Lane Util. Factor	0.97	0.88		0.95	0.95	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3433	2632		3471	3406	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3433	2632		3471	3406	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	226	389	0	946	1458	0
RTOR Reduction (vph)	0	2	0	0	0	0
Lane Group Flow (vph)	226	387	0	946	1458	0
Heavy Vehicles (%)	2%	8%	0%	4%	6%	6%
Turn Type	Prot	custom		NA	NA	
Protected Phases	4	4 5		2	6	
Permitted Phases						
Actuated Green, G (s)	8.5	27.6		70.2	50.1	
Effective Green, g (s)	8.5	21.8		70.2	50.1	
Actuated g/C Ratio	0.10	0.24		0.79	0.56	
Clearance Time (s)	4.7			5.8	6.8	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	327	643		2731	1913	
v/s Ratio Prot	c0.07	c0.15		0.27	c0.43	
v/s Ratio Perm						
v/c Ratio	0.69	0.60		0.35	0.76	
Uniform Delay, d1	39.1	29.9		2.8	15.0	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.0	1.1		0.0	1.7	
Delay (s)	44.1	31.0		2.8	16.6	
Level of Service	D	C		A	B	
Approach Delay (s)	35.8			2.8	16.6	
Approach LOS	D			A	B	

Intersection Summary			
HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	89.2	Sum of lost time (s)	17.3
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	297	87	276	955	3	171	0	203	1	0	3
Future Volume (vph)	6	297	87	276	955	3	171	0	203	1	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95	1.00		1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.98		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Frt	1.00	0.97		1.00	1.00		1.00	1.00	0.85		0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.95	1.00		0.99	
Satd. Flow (prot)	1805	3361		1752	3534		1698	1698	1539		1653	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.95	1.00		1.00	
Satd. Flow (perm)	1805	3361		1752	3534		1698	1698	1539		1674	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	7	326	96	303	1049	3	188	0	223	1	0	3
RTOR Reduction (vph)	0	16	0	0	0	0	0	0	198	0	4	0
Lane Group Flow (vph)	7	406	0	303	1052	0	94	94	25	0	0	0
Confl. Peds. (#/hr)			4						5			
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	4%	0%	3%	2%	33%	1%	0%	3%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA		Split	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		8	8			4	
Permitted Phases									8	4		
Actuated Green, G (s)	1.2	58.9		24.1	81.8		12.6	12.6	12.6		0.9	
Effective Green, g (s)	1.2	58.9		24.1	81.8		12.6	12.6	12.6		0.9	
Actuated g/C Ratio	0.01	0.52		0.21	0.72		0.11	0.11	0.11		0.01	
Clearance Time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)	19	1736		370	2535		187	187	170		13	
v/s Ratio Prot	0.00	0.12		c0.17	c0.30		c0.06	0.06				
v/s Ratio Perm									0.02		c0.00	
v/c Ratio	0.37	0.23		0.82	0.41		0.50	0.50	0.14		0.00	
Uniform Delay, d1	56.0	15.1		42.9	6.5		47.7	47.7	45.8		56.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	4.4	0.3		12.5	0.5		0.8	0.8	0.1		0.0	
Delay (s)	60.4	15.5		55.4	7.0		48.5	48.5	46.0		56.1	
Level of Service	E	B		E	A		D	D	D		E	
Approach Delay (s)		16.2			17.8			47.1			56.1	
Approach LOS		B			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	23.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	114.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	169	960	181	217	478	19	163	507	378	59	501	57
Future Volume (vph)	169	960	181	217	478	19	163	507	378	59	501	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91		0.94	0.95	0.88	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3467	5136	2751	3502	5095		5040	3610	2801	3502	5136	1553
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3467	5136	2751	3502	5095		5040	3610	2801	3502	5136	1553
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)	184	1043	197	236	520	21	177	551	411	64	545	62
RTOR Reduction (vph)	0	0	131	0	3	0	0	0	295	0	0	46
Lane Group Flow (vph)	184	1043	66	236	538	0	177	551	116	64	545	16
Confl. Peds. (#/hr)			1			3			3			
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	1%	1%	2%	0%	1%	5%	1%	0%	0%	0%	1%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	9.9	31.5	31.5	11.3	32.9		8.1	26.7	26.7	5.1	23.7	23.7
Effective Green, g (s)	9.9	31.5	31.5	11.3	32.9		8.1	26.7	26.7	5.1	23.7	23.7
Actuated g/C Ratio	0.10	0.33	0.33	0.12	0.35		0.09	0.28	0.28	0.05	0.25	0.25
Clearance Time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Vehicle Extension (s)	2.0	3.5	3.5	2.0	3.5		2.0	3.5	3.5	2.0	3.5	3.5
Lane Grp Cap (vph)	362	1710	916	418	1771		431	1018	790	188	1286	389
v/s Ratio Prot	0.05	c0.20		c0.07	0.11		c0.04	c0.15		0.02	0.11	
v/s Ratio Perm			0.02						0.04			0.01
v/c Ratio	0.51	0.61	0.07	0.56	0.30		0.41	0.54	0.15	0.34	0.42	0.04
Uniform Delay, d1	40.0	26.4	21.6	39.3	22.5		41.0	28.8	25.4	43.1	29.7	26.8
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	0.4	0.7	0.0	1.0	0.1		0.2	0.7	0.1	0.4	0.3	0.1
Delay (s)	40.5	27.1	21.6	40.4	22.6		41.2	29.4	25.5	43.5	30.0	26.9
Level of Service	D	C	C	D	C		D	C	C	D	C	C
Approach Delay (s)		28.0			28.0			29.8			31.0	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	94.6	Sum of lost time (s)	20.0
Intersection Capacity Utilization	60.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	283	739	505	224	249	31	404	648	357	74	720	118
Future Volume (vph)	283	739	505	224	249	31	404	648	357	74	720	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Lane Util. Factor	0.97	0.95	0.88	0.94	0.95		0.94	0.95	1.00	0.97	0.86	0.88
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3502	3574	2777	5090	3483		5090	3610	1599	3502	6408	2775
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3502	3574	2777	5090	3483		5090	3610	1599	3502	6408	2775
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	295	770	526	233	259	32	421	675	372	77	750	123
RTOR Reduction (vph)	0	0	359	0	7	0	0	0	254	0	0	93
Lane Group Flow (vph)	295	770	167	233	284	0	421	675	118	77	750	30
Confl. Peds. (#/hr)						1						2
Confl. Bikes (#/hr)			2			2						
Heavy Vehicles (%)	0%	1%	1%	0%	2%	0%	0%	0%	1%	0%	2%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases			2						4			8
Actuated Green, G (s)	13.3	31.6	31.6	9.4	27.7		13.1	31.6	31.6	5.6	24.1	24.1
Effective Green, g (s)	13.3	31.6	31.6	9.4	27.7		13.1	31.6	31.6	5.6	24.1	24.1
Actuated g/C Ratio	0.13	0.32	0.32	0.09	0.28		0.13	0.32	0.32	0.06	0.24	0.24
Clearance Time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	466	1131	879	479	966		668	1143	506	196	1547	670
v/s Ratio Prot	c0.08	c0.22		0.05	0.08		c0.08	c0.19		0.02	0.12	
v/s Ratio Perm			0.06						0.07			0.01
v/c Ratio	0.63	0.68	0.19	0.49	0.29		0.63	0.59	0.23	0.39	0.48	0.04
Uniform Delay, d1	40.9	29.7	24.8	42.9	28.4		41.1	28.7	25.2	45.5	32.5	29.0
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	2.1	1.7	0.1	0.3	0.2		1.4	1.0	0.3	0.5	0.3	0.0
Delay (s)	43.0	31.4	24.9	43.2	28.5		42.5	29.6	25.5	45.9	32.8	29.1
Level of Service	D	C	C	D	C		D	C	C	D	C	C
Approach Delay (s)		31.4			35.0			32.3			33.4	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	99.8	Sum of lost time (s)	21.6
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	221	1	370	0	1	0	130	783	0	0	653	94
Future Volume (vph)	221	1	370	0	1	0	130	783	0	0	653	94
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		4.0		5.3	4.9			4.9	4.9
Lane Util. Factor	0.95	0.95	0.88		1.00		1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00		1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00		1.00		1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85		1.00		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.95	1.00		1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1715	1720	2760		1863		1752	3574			3539	1594
Flt Permitted	0.95	0.50	1.00		1.00		0.95	1.00			1.00	1.00
Satd. Flow (perm)	1715	912	2760		1863		1752	3574			3539	1594
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	243	1	407	0	1	0	143	860	0	0	718	103
RTOR Reduction (vph)	0	0	170	0	0	0	0	0	0	0	0	72
Lane Group Flow (vph)	121	123	237	0	1	0	143	860	0	0	718	31
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	0%	3%	2%	2%	2%	3%	1%	0%	0%	2%	0%
Turn Type	Prot	NA	pt+ov	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2	2 3	1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	21.0	34.1	50.8		9.1		11.4	42.8			26.1	26.1
Effective Green, g (s)	21.0	34.1	50.8		9.1		11.4	42.8			26.1	26.1
Actuated g/C Ratio	0.24	0.39	0.58		0.10		0.13	0.49			0.30	0.30
Clearance Time (s)	5.3	5.3			4.0		5.3	4.9			4.9	4.9
Vehicle Extension (s)	2.0	4.0			2.0		2.0	4.0			4.0	4.0
Lane Grp Cap (vph)	413	551	1609		194		229	1756			1060	477
v/s Ratio Prot	c0.07	0.05	0.09		0.00		c0.08	0.24			c0.20	
v/s Ratio Perm		c0.03										0.02
v/c Ratio	0.29	0.22	0.15		0.01		0.62	0.49			0.68	0.06
Uniform Delay, d1	27.0	17.7	8.3		34.9		35.8	14.8			26.8	21.8
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	0.1	0.3	0.1		0.0		3.8	0.3			1.9	0.1
Delay (s)	27.1	18.0	8.3		34.9		39.6	15.1			28.7	21.9
Level of Service	C	B	A		C		D	B			C	C
Approach Delay (s)		13.6			34.9			18.6			27.8	
Approach LOS		B			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	87.1	Sum of lost time (s)	19.5
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	209	2	462	0	589	0	0	835	371
Future Volume (vph)	0	0	0	209	2	462	0	589	0	0	835	371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.7	3.7	3.7		4.8			4.8	4.8
Lane Util. Factor				0.95	0.95	0.88		1.00			0.95	1.00
Frpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	1.00
Flpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	0.95	1.00		1.00			1.00	1.00
Satd. Flow (prot)				1715	1721	2814		1900			3539	1599
Flt Permitted				0.95	0.95	1.00		1.00			1.00	1.00
Satd. Flow (perm)				1715	1721	2814		1900			3539	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	220	2	486	0	620	0	0	879	391
RTOR Reduction (vph)	0	0	0	0	0	170	0	0	0	0	0	148
Lane Group Flow (vph)	0	0	0	110	112	316	0	620	0	0	879	243
Confl. Peds. (#/hr)			1									
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	0%	3%	0%	2%	1%
Turn Type				Split	NA	custom		NA			NA	Perm
Protected Phases				8	8	8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				13.1	13.1	22.8		25.6			35.3	35.3
Effective Green, g (s)				13.1	13.1	22.8		25.6			35.3	35.3
Actuated g/C Ratio				0.23	0.23	0.40		0.45			0.62	0.62
Clearance Time (s)				3.7	3.7			4.8			4.8	4.8
Vehicle Extension (s)				4.0	4.0			4.0			2.5	2.5
Lane Grp Cap (vph)				394	396	1127		854			2195	991
v/s Ratio Prot				0.06	0.07	c0.11		c0.33			c0.25	
v/s Ratio Perm												0.15
v/c Ratio				0.28	0.28	0.28		0.73			0.40	0.24
Uniform Delay, d1				18.0	18.0	11.5		12.8			5.5	4.8
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.5	0.5	0.2		3.3			0.1	0.1
Delay (s)				18.5	18.6	11.7		16.1			5.5	4.9
Level of Service				B	B	B		B			A	A
Approach Delay (s)		0.0			13.9			16.1			5.4	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	56.9	Sum of lost time (s)	12.2
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	517	257	0	611	562	0
Future Volume (vph)	517	257	0	611	562	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.88		0.95	0.95	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3502	2787		3610	3430	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3502	2787		3610	3430	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	568	282	0	671	618	0
RTOR Reduction (vph)	0	199	0	0	0	0
Lane Group Flow (vph)	568	83	0	671	618	0
Heavy Vehicles (%)	0%	2%	0%	0%	0%	3%
Parking (#/hr)					0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	8.3	8.3		11.8	11.8	
Effective Green, g (s)	8.3	8.3		11.8	11.8	
Actuated g/C Ratio	0.30	0.30		0.42	0.42	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	
Lane Grp Cap (vph)	1034	823		1515	1440	
v/s Ratio Prot	c0.16			c0.19	0.18	
v/s Ratio Perm		0.03				
v/c Ratio	0.55	0.10		0.44	0.43	
Uniform Delay, d1	8.3	7.2		5.8	5.8	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.0		0.1	0.1	
Delay (s)	8.6	7.2		5.9	5.8	
Level of Service	A	A		A	A	
Approach Delay (s)	8.2			5.9	5.8	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	6.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	28.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	513	193	299	22	114	189	41	157	102	114	102	0
Future Volume (vph)	513	193	299	22	114	189	41	157	102	114	102	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.9	4.9	4.9	3.5	5.3		4.0	5.3	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1900	1599	1805	1863	1568	1805	3306		1736	3396	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1900	1599	1805	1863	1568	1805	3306		1736	3396	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	540	203	315	23	120	199	43	165	107	120	107	0
RTOR Reduction (vph)	0	0	242	0	0	141	0	69	0	0	0	0
Lane Group Flow (vph)	540	203	74	23	120	58	43	203	0	120	107	0
Confl. Peds. (#/hr)									2			
Heavy Vehicles (%)	2%	0%	1%	0%	2%	3%	0%	3%	0%	4%	1%	1%
Parking (#/hr)											0	
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	7	7		8	8	8 1	5	2		1	6	
Permitted Phases			7									
Actuated Green, G (s)	24.5	24.5	24.5	14.3	14.3	30.8	5.4	36.9		11.6	43.6	
Effective Green, g (s)	24.5	24.5	24.5	14.3	14.3	30.8	5.4	36.9		11.6	43.6	
Actuated g/C Ratio	0.23	0.23	0.23	0.14	0.14	0.29	0.05	0.35		0.11	0.42	
Clearance Time (s)	3.5	3.5	3.5	4.9	4.9		3.5	5.3		4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	801	443	373	245	253	459	92	1161		191	1410	
v/s Ratio Prot	c0.16	0.11		0.01	c0.06	0.04	0.02	c0.06		c0.07	0.03	
v/s Ratio Perm			0.05									
v/c Ratio	0.67	0.46	0.20	0.09	0.47	0.13	0.47	0.17		0.63	0.08	
Uniform Delay, d1	36.6	34.6	32.3	39.7	41.9	27.2	48.4	23.5		44.6	18.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.51	0.88	
Incremental Delay, d2	2.3	0.8	0.3	0.2	1.4	0.1	3.7	0.3		6.3	0.1	
Delay (s)	38.9	35.3	32.6	39.8	43.3	27.4	52.1	23.9		29.0	16.4	
Level of Service	D	D	C	D	D	C	D	C		C	B	
Approach Delay (s)		36.3			33.8			27.7			23.1	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	43	2	162	0	645	0	0	242	0
Future Volume (vph)	0	0	0	43	2	162	0	645	0	0	242	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0	4.0		5.3			5.3	
Lane Util. Factor				0.95	0.95	0.88		0.95			0.91	
Frpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	
Flpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	
Frt				1.00	1.00	0.85		1.00			1.00	
Flt Protected				0.95	0.96	1.00		1.00			1.00	
Satd. Flow (prot)				1715	1726	2814		3539			4893	
Flt Permitted				0.95	0.96	1.00		1.00			1.00	
Satd. Flow (perm)				1715	1726	2814		3539			4893	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	0	47	2	178	0	709	0	0	266	0
RTOR Reduction (vph)	0	0	0	0	0	150	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	24	25	28	0	709	0	0	266	0
Confl. Peds. (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	2%	3%	0%	6%	2%
Turn Type				Split	NA	custom		NA			NA	
Protected Phases				8	8	8 1		2			6	
Permitted Phases												
Actuated Green, G (s)				7.1	7.1	16.6		80.1			88.6	
Effective Green, g (s)				7.1	7.1	16.6		80.1			88.6	
Actuated g/C Ratio				0.07	0.07	0.16		0.76			0.84	
Clearance Time (s)				4.0	4.0			5.3			5.3	
Vehicle Extension (s)				3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)				115	116	444		2699			4128	
v/s Ratio Prot				0.01	c0.01	c0.01		c0.20			0.05	
v/s Ratio Perm												
v/c Ratio				0.21	0.22	0.06		0.26			0.06	
Uniform Delay, d1				46.3	46.3	37.6		3.7			1.4	
Progression Factor				1.00	1.00	1.00		0.80			0.14	
Incremental Delay, d2				0.9	0.9	0.1		0.2			0.0	
Delay (s)				47.2	47.3	37.6		3.2			0.2	
Level of Service				D	D	D		A			A	
Approach Delay (s)		0.0			39.7			3.2			0.2	
Approach LOS		A			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.3
Intersection Capacity Utilization	31.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	7	99	842	11	1	151	0	645	0	1	0
Future Volume (vph)	0	7	99	842	11	1	151	0	645	0	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0	6.0		4.2	4.2		4.0	
Lane Util. Factor		0.95	1.00	0.97	1.00	1.00		1.00	0.88		1.00	
Frpb, ped/bikes		1.00	0.99	1.00	1.00	1.00		1.00	1.00		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt		1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	
Flt Protected		1.00	1.00	0.95	1.00	1.00		0.95	1.00		1.00	
Satd. Flow (prot)		3167	1548	3467	1900	1615		1752	2814		1900	
Flt Permitted		1.00	1.00	0.95	1.00	1.00		0.95	1.00		1.00	
Satd. Flow (perm)		3167	1548	3467	1900	1615		1752	2814		1900	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	8	109	925	12	1	166	0	709	0	1	0
RTOR Reduction (vph)	0	0	81	0	0	0	0	0	298	0	0	0
Lane Group Flow (vph)	0	8	28	925	12	1	0	166	411	0	1	0
Confl. Peds. (#/hr)			1									
Confl. Bikes (#/hr)									2			
Heavy Vehicles (%)	0%	14%	3%	1%	0%	0%	3%	0%	1%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA	Perm	Split	NA	pt+ov		NA	
Protected Phases		2		1	6		8	8	8 1		4	
Permitted Phases			2			6				4		
Actuated Green, G (s)		27.0	27.0	38.5	71.5	71.5		18.1	60.8		1.2	
Effective Green, g (s)		27.0	27.0	38.5	71.5	71.5		18.1	60.8		1.2	
Actuated g/C Ratio		0.26	0.26	0.37	0.68	0.68		0.17	0.58		0.01	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0		4.2			4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		814	398	1271	1293	1099		302	1629		21	
v/s Ratio Prot		0.00		c0.27	0.01			c0.09	0.15		c0.00	
v/s Ratio Perm			c0.02			0.00						
v/c Ratio		0.01	0.07	0.73	0.01	0.00		0.55	0.25		0.05	
Uniform Delay, d1		29.0	29.5	28.7	5.4	5.3		39.7	10.9		51.3	
Progression Factor		1.00	1.00	1.00	1.00	1.00		1.04	9.52		1.00	
Incremental Delay, d2		0.0	0.1	3.7	0.0	0.0		2.0	0.1		0.9	
Delay (s)		29.0	29.6	32.4	5.4	5.3		43.3	103.8		52.3	
Level of Service		C	C	C	A	A		D	F		D	
Approach Delay (s)		29.5			32.0			92.3			52.3	
Approach LOS		C			C			F			D	

Intersection Summary			
HCM 2000 Control Delay	59.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	20.2
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	45	22	2	27	15	0
Future Volume (Veh/h)	45	22	2	27	15	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	59	29	3	36	20	0
Pedestrians	3		1			
Lane Width (ft)	12.0		12.0			
Walking Speed (ft/s)	4.0		4.0			
Percent Blockage	0		0			
Right turn flare (veh)		30				
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	65	24			42	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	65	24			42	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	94	97			99	
cM capacity (veh/h)	920	1044			1532	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	88	39	20
Volume Left	59	0	20
Volume Right	29	36	0
cSH	1373	1700	1532
Volume to Capacity	0.06	0.02	0.01
Queue Length 95th (ft)	5	0	1
Control Delay (s)	9.0	0.0	7.4
Lane LOS	A		A
Approach Delay (s)	9.0	0.0	7.4
Approach LOS	A		

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	17.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	312	411	190	146	139	239	318	121	121	243	14
Future Volume (vph)	10	312	411	190	146	139	239	318	121	121	243	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	4.9
Lane Util. Factor	1.00	1.00	0.88	0.94	0.95		0.97	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1900	2779	5090	3260		3433	3610	1583	1736	3610	1615
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1805	1900	2779	5090	3260		3433	3610	1583	1736	3610	1615
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)	11	339	447	207	159	151	260	346	132	132	264	15
RTOR Reduction (vph)	0	0	304	0	87	0	0	0	108	0	0	12
Lane Group Flow (vph)	11	339	143	207	223	0	260	346	24	132	264	3
Confl. Peds. (#/hr)						1						
Confl. Bikes (#/hr)			1			1						
Heavy Vehicles (%)	0%	0%	1%	0%	1%	3%	2%	0%	2%	4%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	1.4	25.6	25.6	9.6	33.8		11.2	14.7	14.7	11.5	15.4	15.4
Effective Green, g (s)	1.4	25.6	25.6	9.6	33.8		11.2	14.7	14.7	11.5	15.4	15.4
Actuated g/C Ratio	0.02	0.32	0.32	0.12	0.42		0.14	0.18	0.18	0.14	0.19	0.19
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	4.9
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	3.0	3.0	2.0	3.0	3.0
Lane Grp Cap (vph)	31	608	889	610	1377		480	663	290	249	694	310
v/s Ratio Prot	0.01	c0.18		c0.04	0.07		0.08	c0.10		c0.08	0.07	
v/s Ratio Perm			0.05						0.02			0.00
v/c Ratio	0.35	0.56	0.16	0.34	0.16		0.54	0.52	0.08	0.53	0.38	0.01
Uniform Delay, d1	38.9	22.5	19.5	32.3	14.3		32.0	29.5	27.1	31.7	28.1	26.1
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	2.5	1.1	0.1	0.1	0.1		0.7	0.7	0.1	1.1	0.3	0.0
Delay (s)	41.4	23.6	19.6	32.4	14.4		32.7	30.2	27.2	32.8	28.5	26.1
Level of Service	D	C	B	C	B		C	C	C	C	C	C
Approach Delay (s)		21.6			21.6			30.5			29.8	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	18.6
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	698	0	248	0	438	0	0	552	295
Future Volume (vph)	0	0	0	698	0	248	0	438	0	0	552	295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.7		4.7		6.3			5.7	5.7
Lane Util. Factor				0.97		1.00		0.95			0.95	1.00
Frt				1.00		0.85		1.00			1.00	1.00
Flt Protected				0.95		1.00		1.00			1.00	1.00
Satd. Flow (prot)				3335		1599		3574			3574	1863
Flt Permitted				0.95		1.00		1.00			1.00	1.00
Satd. Flow (perm)				3335		1599		3574			3574	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.93	0.92	0.93	0.92	0.93	0.93	0.93	0.93	0.92
Adj. Flow (vph)	0	0	0	751	0	267	0	471	0	0	594	321
RTOR Reduction (vph)	0	0	0	0	0	88	0	0	0	0	0	167
Lane Group Flow (vph)	0	0	0	751	0	179	0	471	0	0	594	154
Heavy Vehicles (%)	2%	2%	2%	5%	2%	1%	2%	1%	2%	0%	1%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	2	0	0
Turn Type				Prot		custom		NA			NA	Perm
Protected Phases				8		8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				13.6		22.3		12.7			22.0	22.0
Effective Green, g (s)				13.6		22.3		12.7			22.0	22.0
Actuated g/C Ratio				0.30		0.48		0.28			0.48	0.48
Clearance Time (s)				4.7				6.3			5.7	5.7
Vehicle Extension (s)				0.2				0.2			0.2	0.2
Lane Grp Cap (vph)				986		775		986			1709	891
v/s Ratio Prot				c0.23		0.11		c0.13			c0.17	
v/s Ratio Perm												0.08
v/c Ratio				0.76		0.23		0.48			0.35	0.17
Uniform Delay, d1				14.7		6.9		13.9			7.5	6.8
Progression Factor				1.00		1.00		1.00			1.00	1.00
Incremental Delay, d2				3.2		0.1		0.1			0.0	0.0
Delay (s)				17.9		6.9		14.0			7.6	6.9
Level of Service				B		A		B			A	A
Approach Delay (s)		0.0			15.0			14.0			7.3	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	46.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	49.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	172	344	0	782	999	0
Future Volume (vph)	172	344	0	782	999	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	4.7		5.8	6.8	
Lane Util. Factor	0.97	0.88		0.95	0.95	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3467	2733		3539	3505	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3467	2733		3539	3505	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	176	351	0	798	1019	0
RTOR Reduction (vph)	0	13	0	0	0	0
Lane Group Flow (vph)	176	338	0	798	1019	0
Heavy Vehicles (%)	1%	4%	0%	2%	3%	1%
Turn Type	Prot	custom		NA	NA	
Protected Phases	4	4 5		2	6	
Permitted Phases						
Actuated Green, G (s)	7.2	20.9		38.6	23.9	
Effective Green, g (s)	7.2	15.1		38.6	23.9	
Actuated g/C Ratio	0.13	0.27		0.69	0.42	
Clearance Time (s)	4.7			5.8	6.8	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	443	733		2426	1487	
v/s Ratio Prot	0.05	c0.12		0.23	c0.29	
v/s Ratio Perm						
v/c Ratio	0.40	0.46		0.33	0.69	
Uniform Delay, d1	22.6	17.2		3.6	13.1	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.2		0.0	1.1	
Delay (s)	22.8	17.4		3.6	14.2	
Level of Service	C	B		A	B	
Approach Delay (s)	19.2			3.6	14.2	
Approach LOS	B			A	B	

Intersection Summary			
HCM 2000 Control Delay	11.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	56.3	Sum of lost time (s)	17.3
Intersection Capacity Utilization	49.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	843	119	294	407	0	114	2	317	6	1	2
Future Volume (vph)	2	843	119	294	407	0	114	2	317	6	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Frt	1.00	0.98		1.00	1.00		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (prot)	1805	3495		1787	3539		1681	1689	1565		1784	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.95	1.00		1.00	
Satd. Flow (perm)	1805	3495		1787	3539		1681	1689	1565		1843	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	2	887	125	309	428	0	120	2	334	6	1	2
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	304	0	2	0
Lane Group Flow (vph)	2	1006	0	309	428	0	61	61	30	0	7	0
Confl. Peds. (#/hr)			8			3			6			
Confl. Bikes (#/hr)			3			4						
Heavy Vehicles (%)	0%	1%	0%	1%	2%	0%	2%	0%	1%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		8	8			4	
Permitted Phases									8	4		
Actuated Green, G (s)	1.1	72.6		26.8	98.3		11.5	11.5	11.5		1.6	
Effective Green, g (s)	1.1	72.6		26.8	98.3		11.5	11.5	11.5		1.6	
Actuated g/C Ratio	0.01	0.56		0.21	0.76		0.09	0.09	0.09		0.01	
Clearance Time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)	15	1951		368	2676		148	149	138		22	
v/s Ratio Prot	0.00	c0.29		c0.17	0.12		c0.04	0.04				
v/s Ratio Perm									0.02		c0.00	
v/c Ratio	0.13	0.52		0.84	0.16		0.41	0.41	0.21		0.32	
Uniform Delay, d1	64.0	17.8		49.5	4.4		56.1	56.0	55.1		63.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	1.5	1.0		14.8	0.1		0.7	0.7	0.3		3.0	
Delay (s)	65.4	18.8		64.3	4.5		56.7	56.7	55.3		66.7	
Level of Service	E	B		E	A		E	E	E		E	
Approach Delay (s)		18.9			29.6			55.7			66.7	
Approach LOS		B			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	30.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	116	310	102	334	675	58	132	617	151	15	420	73
Future Volume (vph)	116	310	102	334	675	58	132	617	151	15	420	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91		0.94	0.95	0.88	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3400	4988	2564	3467	4928		4802	3539	2738	3099	5085	1489
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3400	4988	2564	3467	4928		4802	3539	2738	3099	5085	1489
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	125	333	110	359	726	62	142	663	162	16	452	78
RTOR Reduction (vph)	0	0	85	0	7	0	0	0	106	0	0	57
Lane Group Flow (vph)	125	333	25	359	781	0	142	663	56	16	452	21
Confl. Peds. (#/hr)			8			14			7			2
Heavy Vehicles (%)	3%	4%	9%	1%	4%	2%	6%	2%	2%	13%	2%	7%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	8.2	19.0	19.0	13.7	24.5		7.6	28.4	28.4	1.7	22.5	22.5
Effective Green, g (s)	8.2	19.0	19.0	13.7	24.5		7.6	28.4	28.4	1.7	22.5	22.5
Actuated g/C Ratio	0.10	0.23	0.23	0.17	0.30		0.09	0.34	0.34	0.02	0.27	0.27
Clearance Time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Vehicle Extension (s)	2.0	3.5	3.5	2.0	3.5		2.0	3.5	3.5	2.0	3.5	3.5
Lane Grp Cap (vph)	336	1144	588	573	1458		440	1213	939	63	1381	404
v/s Ratio Prot	0.04	0.07		c0.10	c0.16		c0.03	c0.19		0.01	0.09	
v/s Ratio Perm			0.01						0.02			0.01
v/c Ratio	0.37	0.29	0.04	0.63	0.54		0.32	0.55	0.06	0.25	0.33	0.05
Uniform Delay, d1	34.9	26.3	24.8	32.2	24.4		35.2	22.0	18.2	39.9	24.1	22.3
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	0.3	0.2	0.0	1.5	0.4		0.2	0.6	0.0	0.8	0.2	0.1
Delay (s)	35.1	26.5	24.9	33.7	24.8		35.3	22.6	18.3	40.7	24.3	22.3
Level of Service	D	C	C	C	C		D	C	B	D	C	C
Approach Delay (s)		28.1			27.6			23.7			24.5	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	82.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	101	136	130	516	759	30	221	488	128	22	996	96
Future Volume (vph)	101	136	130	516	759	30	221	488	128	22	996	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Lane Util. Factor	0.97	0.95	0.88	0.94	0.95		0.94	0.95	1.00	0.97	0.86	0.88
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3400	3374	2760	4990	3487		4894	3471	1563	3072	6408	2733
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3400	3374	2760	4990	3487		4894	3471	1563	3072	6408	2733
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	107	145	138	549	807	32	235	519	136	23	1060	102
RTOR Reduction (vph)	0	0	106	0	2	0	0	0	84	0	0	70
Lane Group Flow (vph)	107	145	32	549	837	0	235	519	52	23	1060	32
Confl. Peds. (#/hr)						4			1			
Heavy Vehicles (%)	3%	7%	3%	2%	3%	0%	4%	4%	2%	14%	2%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases			2						4			8
Actuated Green, G (s)	7.8	23.3	23.3	15.6	31.1		9.5	39.1	39.1	2.1	31.7	31.7
Effective Green, g (s)	7.8	23.3	23.3	15.6	31.1		9.5	39.1	39.1	2.1	31.7	31.7
Actuated g/C Ratio	0.08	0.23	0.23	0.15	0.31		0.09	0.38	0.38	0.02	0.31	0.31
Clearance Time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	260	773	632	765	1066		457	1334	600	63	1997	851
v/s Ratio Prot	0.03	0.04		c0.11	c0.24		c0.05	0.15		0.01	c0.17	
v/s Ratio Perm			0.01						0.03			0.01
v/c Ratio	0.41	0.19	0.05	0.72	0.79		0.51	0.39	0.09	0.37	0.53	0.04
Uniform Delay, d1	44.8	31.6	30.6	41.0	32.2		43.9	22.7	19.9	49.1	28.9	24.4
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	0.4	0.1	0.0	2.7	3.9		0.4	0.3	0.1	1.3	0.3	0.0
Delay (s)	45.1	31.7	30.6	43.6	36.1		44.3	22.9	20.0	50.5	29.2	24.4
Level of Service	D	C	C	D	D		D	C	C	D	C	C
Approach Delay (s)		35.0			39.1			28.1			29.2	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	33.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	101.7	Sum of lost time (s)	21.6
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	17	127	45	968	98	499	431	315	28	938	161
Future Volume (vph)	68	17	127	45	968	98	499	431	315	28	938	161
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	4.0	4.0		5.3	4.9		5.3	4.9	4.9
Lane Util. Factor	0.95	0.95	0.88	1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	0.97	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1681	1732	2608	1770	1837		1736	3305		1805	3574	1579
Flt Permitted	0.95	0.36	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1681	633	2608	1770	1837		1736	3305		1805	3574	1579
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	72	18	134	47	1019	103	525	454	332	29	987	169
RTOR Reduction (vph)	0	0	68	0	3	0	0	90	0	0	0	113
Lane Group Flow (vph)	45	45	66	47	1119	0	525	696	0	29	987	56
Confl. Peds. (#/hr)												1
Heavy Vehicles (%)	2%	0%	9%	2%	2%	2%	4%	4%	0%	0%	1%	1%
Turn Type	Prot	NA	pt+ov	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2	2 3	1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	4.5	31.1	52.3	4.4	26.5		20.4	53.3		2.6	35.5	35.5
Effective Green, g (s)	4.5	31.1	52.3	4.4	26.5		20.4	53.3		2.6	35.5	35.5
Actuated g/C Ratio	0.04	0.29	0.49	0.04	0.25		0.19	0.50		0.02	0.33	0.33
Clearance Time (s)	5.3	5.3		4.0	4.0		5.3	4.9		5.3	4.9	4.9
Vehicle Extension (s)	2.0	4.0		2.0	2.0		2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)	71	231	1281	73	457		332	1655		44	1192	526
v/s Ratio Prot	c0.03	0.01	0.03	0.03	c0.61		c0.30	0.21		0.02	c0.28	
v/s Ratio Perm		0.05										0.04
v/c Ratio	0.63	0.19	0.05	0.64	2.45		1.58	0.42		0.66	0.83	0.11
Uniform Delay, d1	50.1	28.3	14.1	50.2	40.0		43.0	16.8		51.5	32.6	24.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	12.8	0.6	0.0	13.6	658.4		275.6	0.2		23.9	5.1	0.1
Delay (s)	62.9	28.8	14.1	63.9	698.4		318.6	17.0		75.4	37.7	24.6
Level of Service	E	C	B	E	F		F	B		E	D	C
Approach Delay (s)		26.9			672.9			137.8			36.8	
Approach LOS		C			F			F			D	

Intersection Summary			
HCM 2000 Control Delay	261.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.49		
Actuated Cycle Length (s)	106.4	Sum of lost time (s)	19.5
Intersection Capacity Utilization	122.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	220	62	654	0	279	0	0	458	502
Future Volume (vph)	0	0	0	220	62	654	0	279	0	0	458	502
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.7	3.7	3.7		4.8			4.8	4.8
Lane Util. Factor				0.95	0.95	0.88		1.00			0.95	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	0.97	1.00		1.00			1.00	1.00
Satd. Flow (prot)				1633	1693	2760		1845			3505	1599
Flt Permitted				0.95	0.97	1.00		1.00			1.00	1.00
Satd. Flow (perm)				1633	1693	2760		1845			3505	1599
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	0	227	64	674	0	288	0	0	472	518
RTOR Reduction (vph)	0	0	0	0	0	368	0	0	0	0	0	246
Lane Group Flow (vph)	0	0	0	143	148	306	0	288	0	0	472	272
Heavy Vehicles (%)	0%	0%	0%	5%	2%	3%	0%	3%	20%	0%	3%	1%
Turn Type				Split	NA	custom		NA			NA	Perm
Protected Phases				8	8	8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				9.8	9.8	17.5		12.5			20.2	20.2
Effective Green, g (s)				9.8	9.8	17.5		12.5			20.2	20.2
Actuated g/C Ratio				0.25	0.25	0.45		0.32			0.52	0.52
Clearance Time (s)				3.7	3.7			4.8			4.8	4.8
Vehicle Extension (s)				4.0	4.0			4.0			2.5	2.5
Lane Grp Cap (vph)				415	430	1254		599			1838	838
v/s Ratio Prot				c0.09	0.09	0.11		c0.16			0.13	
v/s Ratio Perm												c0.17
v/c Ratio				0.34	0.34	0.24		0.48			0.26	0.32
Uniform Delay, d1				11.7	11.7	6.4		10.4			5.0	5.2
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.7	0.7	0.1		0.8			0.1	0.2
Delay (s)				12.4	12.4	6.6		11.2			5.1	5.4
Level of Service				B	B	A		B			A	A
Approach Delay (s)		0.0			8.3			11.2			5.3	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	7.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	38.5	Sum of lost time (s)	12.2
Intersection Capacity Utilization	46.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	254	256	0	421	536	0
Future Volume (vph)	254	256	0	421	536	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.88		0.95	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3367	2409		3223	3406	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3367	2409		3223	3406	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	273	275	0	453	576	0
RTOR Reduction (vph)	0	211	0	0	0	0
Lane Group Flow (vph)	273	64	0	453	576	0
Confl. Bikes (#/hr)						3
Heavy Vehicles (%)	4%	18%	0%	12%	6%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	5.6	5.6		10.6	10.6	
Effective Green, g (s)	5.6	5.6		10.6	10.6	
Actuated g/C Ratio	0.23	0.23		0.44	0.44	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	
Lane Grp Cap (vph)	779	557		1411	1491	
v/s Ratio Prot	c0.08			0.14	c0.17	
v/s Ratio Perm		0.03				
v/c Ratio	0.35	0.11		0.32	0.39	
Uniform Delay, d1	7.8	7.3		4.4	4.6	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.0		0.0	0.1	
Delay (s)	7.9	7.4		4.5	4.7	
Level of Service	A	A		A	A	
Approach Delay (s)	7.6			4.5	4.7	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	5.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	24.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	30.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	609	227	151	14	52	102	19	580	178	67	103	0
Future Volume (vph)	609	227	151	14	52	102	19	580	178	67	103	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.9	4.9	4.9	3.5	5.3		4.0	5.3	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1827	1538	1687	1681	1599	1719	3328		1719	3438	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1827	1538	1687	1681	1599	1719	3328		1719	3438	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	677	252	168	16	58	113	21	644	198	74	114	0
RTOR Reduction (vph)	0	0	124	0	0	44	0	26	0	0	0	0
Lane Group Flow (vph)	677	252	44	16	58	69	21	816	0	74	114	0
Confl. Peds. (#/hr)									4			
Heavy Vehicles (%)	2%	4%	5%	7%	13%	1%	5%	4%	4%	5%	5%	3%
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	7	7		8	8	8 1	5	2		1	6	
Permitted Phases			7									
Actuated Green, G (s)	27.7	27.7	27.7	14.0	14.0	28.2	3.2	36.3		9.3	42.9	
Effective Green, g (s)	27.7	27.7	27.7	14.0	14.0	28.2	3.2	36.3		9.3	42.9	
Actuated g/C Ratio	0.26	0.26	0.26	0.13	0.13	0.27	0.03	0.35		0.09	0.41	
Clearance Time (s)	3.5	3.5	3.5	4.9	4.9		3.5	5.3		4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	905	481	405	224	224	429	52	1150		152	1404	
v/s Ratio Prot	c0.20	0.14		0.01	c0.03	0.04	0.01	c0.25		c0.04	0.03	
v/s Ratio Perm			0.03									
v/c Ratio	0.75	0.52	0.11	0.07	0.26	0.16	0.40	0.71		0.49	0.08	
Uniform Delay, d1	35.4	33.0	29.3	39.8	40.8	29.4	50.0	29.8		45.6	19.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.56	0.95	
Incremental Delay, d2	3.4	1.0	0.1	0.1	0.6	0.2	5.1	3.7		2.4	0.1	
Delay (s)	38.9	34.0	29.4	39.9	41.5	29.5	55.0	33.5		28.2	18.2	
Level of Service	D	C	C	D	D	C	E	C		C	B	
Approach Delay (s)		36.3			34.1			34.0			22.2	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	34.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	49	5	446	0	1215	0	0	228	0
Future Volume (vph)	0	0	0	49	5	446	0	1215	0	0	228	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0	4.0		5.3			5.3	
Lane Util. Factor				0.95	0.95	0.88		0.95			0.91	
Frt				1.00	1.00	0.85		1.00			1.00	
Flt Protected				0.95	0.96	1.00		1.00			1.00	
Satd. Flow (prot)				1681	1646	2632		3539			4988	
Flt Permitted				0.95	0.96	1.00		1.00			1.00	
Satd. Flow (perm)				1681	1646	2632		3539			4988	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	0	0	0	57	6	519	0	1413	0	0	265	0
RTOR Reduction (vph)	0	0	0	0	0	79	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	31	32	440	0	1413	0	0	265	0
Heavy Vehicles (%)	0%	0%	0%	2%	20%	8%	0%	2%	6%	0%	4%	3%
Turn Type				Split	NA	custom		NA			NA	
Protected Phases				8	8	8 1		2			6	
Permitted Phases												
Actuated Green, G (s)				16.6	16.6	27.9		68.8			79.1	
Effective Green, g (s)				16.6	16.6	27.9		68.8			79.1	
Actuated g/C Ratio				0.16	0.16	0.27		0.66			0.75	
Clearance Time (s)				4.0	4.0			5.3			5.3	
Vehicle Extension (s)				3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)				265	260	699		2318			3757	
v/s Ratio Prot				0.02	0.02	c0.17		c0.40			0.05	
v/s Ratio Perm												
v/c Ratio				0.12	0.12	0.63		0.61			0.07	
Uniform Delay, d1				37.9	38.0	34.0		10.4			3.4	
Progression Factor				1.00	1.00	1.00		1.39			0.27	
Incremental Delay, d2				0.2	0.2	1.9		0.9			0.0	
Delay (s)				38.1	38.2	35.9		15.4			0.9	
Level of Service				D	D	D		B			A	
Approach Delay (s)		0.0			36.1			15.4			0.9	
Approach LOS		A			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.3
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	65	66	230	439	0	810	0	871	0	0	0
Future Volume (vph)	0	65	66	230	439	0	810	0	871	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0			4.2	4.2			
Lane Util. Factor		0.95	1.00	0.97	1.00			1.00	0.88			
Frt		1.00	0.85	1.00	1.00			1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (prot)		3312	1468	3367	1900			1787	2787			
Flt Permitted		1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (perm)		3312	1468	3367	1900			1787	2787			
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.92	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	0	77	79	274	523	0	964	0	1037	0	0	0
RTOR Reduction (vph)	0	0	65	0	0	0	0	0	234	0	0	0
Lane Group Flow (vph)	0	77	14	274	523	0	0	964	803	0	0	0
Heavy Vehicles (%)	0%	9%	10%	4%	0%	0%	1%	0%	2%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA	Perm	Split	NA	pt+ov			
Protected Phases		2		1	6		8	8	8 1		4	
Permitted Phases			2			6				4		
Actuated Green, G (s)		19.2	19.2	28.8	54.0			40.8	73.8			
Effective Green, g (s)		19.2	19.2	28.8	54.0			40.8	73.8			
Actuated g/C Ratio		0.18	0.18	0.27	0.51			0.39	0.70			
Clearance Time (s)		6.0	6.0	6.0	6.0			4.2				
Vehicle Extension (s)		3.0	3.0	3.0	3.0			3.0				
Lane Grp Cap (vph)		605	268	923	977			694	1958			
v/s Ratio Prot		0.02		0.08	c0.28			c0.54	0.29			
v/s Ratio Perm			0.01									
v/c Ratio		0.13	0.05	0.30	0.54			1.39	0.41			
Uniform Delay, d1		35.9	35.4	30.1	17.1			32.1	6.5			
Progression Factor		1.00	1.00	1.00	1.00			1.15	4.03			
Incremental Delay, d2		0.1	0.1	0.8	2.1			182.4	0.1			
Delay (s)		36.0	35.5	30.9	19.2			219.2	26.4			
Level of Service		D	D	C	B			F	C			
Approach Delay (s)		35.7			23.2			119.2			0.0	
Approach LOS		D			C			F			A	

Intersection Summary			
HCM 2000 Control Delay	88.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	20.2
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	103	0	21	1128	10	0	0	19	16	0	0
Future Volume (vph)	1	103	0	21	1128	10	0	0	19	16	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.86			1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.95	
Satd. Flow (prot)	1770	3539		1798	3534			1339			1608	
Flt Permitted	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (perm)	1770	3539		1798	3534			1339			1693	
Peak-hour factor, PHF	0.92	0.92	0.92	0.83	0.92	0.83	0.92	0.83	0.83	0.83	0.83	0.92
Adj. Flow (vph)	1	112	0	25	1226	12	0	0	23	19	0	0
RTOR Reduction (vph)	0	0	0	0	1	0	0	21	0	0	0	0
Lane Group Flow (vph)	1	112	0	25	1237	0	0	2	0	0	19	0
Confl. Peds. (#/hr)				3		1			3	3		
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	0%	21%	12%	0%	2%
Turn Type	Prot	NA		Prot	NA			NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	0.4	38.1		0.5	38.2			3.9			3.9	
Effective Green, g (s)	0.4	38.1		0.5	38.2			3.9			3.9	
Actuated g/C Ratio	0.01	0.70		0.01	0.70			0.07			0.07	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	12	2474		16	2477			95			121	
v/s Ratio Prot	0.00	0.03		c0.01	c0.35			0.00				
v/s Ratio Perm											c0.01	
v/c Ratio	0.08	0.05		1.56	0.50			0.02			0.16	
Uniform Delay, d1	26.9	2.5		27.0	3.8			23.5			23.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	3.0	0.0		435.0	0.2			0.1			0.6	
Delay (s)	29.8	2.6		462.0	3.9			23.6			24.4	
Level of Service	C	A		F	A			C			C	
Approach Delay (s)		2.8			13.0			23.6			24.4	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	54.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	45.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	154	209	256	524	166	480	498	32	44	109	0
Future Volume (vph)	5	154	209	256	524	166	480	498	32	44	109	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	
Lane Util. Factor	1.00	0.95	0.88	0.94	0.95		0.97	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3574	2779	4990	3453		3433	3574	1482	1656	3610	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1805	3574	2779	4990	3453		3433	3574	1482	1656	3610	
Peak-hour factor, PHF	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Adj. Flow (vph)	7	205	279	341	699	221	640	664	43	59	145	0
RTOR Reduction (vph)	0	0	203	0	20	0	0	0	30	0	0	0
Lane Group Flow (vph)	7	205	76	341	900	0	640	664	13	59	145	0
Confl. Peds. (#/hr)			1									
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	1%	1%	2%	0%	2%	2%	1%	9%	9%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	1.3	24.1	24.1	10.8	33.6		20.6	27.4	27.4	7.8	15.0	
Effective Green, g (s)	1.3	24.1	24.1	10.8	33.6		20.6	27.4	27.4	7.8	15.0	
Actuated g/C Ratio	0.01	0.27	0.27	0.12	0.38		0.23	0.31	0.31	0.09	0.17	
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	26	971	755	607	1308		797	1104	457	145	610	
v/s Ratio Prot	0.00	0.06		c0.07	c0.26		c0.19	c0.19		0.04	0.04	
v/s Ratio Perm			0.03						0.01			
v/c Ratio	0.27	0.21	0.10	0.56	0.69		0.80	0.60	0.03	0.41	0.24	
Uniform Delay, d1	43.2	25.0	24.2	36.7	23.1		32.1	26.0	21.4	38.3	31.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.0	0.1	0.1	0.7	1.5		5.5	0.9	0.0	0.7	0.2	
Delay (s)	45.3	25.1	24.2	37.4	24.7		37.7	26.9	21.4	38.9	32.1	
Level of Service	D	C	C	D	C		D	C	C	D	C	
Approach Delay (s)		24.9			28.1			31.9			34.1	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	88.7	Sum of lost time (s)	18.6
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	1040	0	526	0	490	0	0	317	255
Future Volume (vph)	0	0	0	1040	0	526	0	490	0	0	317	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.7		4.7		6.3			5.7	5.7
Lane Util. Factor				0.97		1.00		0.95			0.95	1.00
Frpb, ped/bikes				1.00		1.00		1.00			1.00	1.00
Flpb, ped/bikes				1.00		1.00		1.00			1.00	1.00
Frt				1.00		0.85		1.00			1.00	1.00
Flt Protected				0.95		1.00		1.00			1.00	1.00
Satd. Flow (prot)				3242		1599		3539			3539	1863
Flt Permitted				0.95		1.00		1.00			1.00	1.00
Satd. Flow (perm)				3242		1599		3539			3539	1863
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	0	0	0	1268	0	641	0	598	0	0	387	311
RTOR Reduction (vph)	0	0	0	0	0	38	0	0	0	0	0	197
Lane Group Flow (vph)	0	0	0	1268	0	603	0	598	0	0	387	114
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	8%	0%	1%	0%	2%	6%	0%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	2	0	0
Turn Type				Prot		custom		NA			NA	Perm
Protected Phases				8		8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				35.2		45.4		15.6			26.4	26.4
Effective Green, g (s)				35.2		45.4		15.6			26.4	26.4
Actuated g/C Ratio				0.49		0.63		0.22			0.37	0.37
Clearance Time (s)				4.7				6.3			5.7	5.7
Vehicle Extension (s)				0.2				0.2			0.2	0.2
Lane Grp Cap (vph)				1584		1008		766			1297	683
v/s Ratio Prot				c0.39		c0.38		c0.17			0.11	
v/s Ratio Perm												0.06
v/c Ratio				0.80		0.60		0.78			0.30	0.17
Uniform Delay, d1				15.5		7.9		26.6			16.2	15.4
Progression Factor				1.00		1.00		1.00			1.00	1.00
Incremental Delay, d2				2.8		0.6		4.8			0.0	0.0
Delay (s)				18.3		8.5		31.4			16.3	15.4
Level of Service				B		A		C			B	B
Approach Delay (s)		0.0			15.0			31.4			15.9	
Approach LOS		A			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	72.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	195	338	0	723	1263	0
Future Volume (vph)	195	338	0	723	1263	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	4.7		5.8	6.8	
Lane Util. Factor	0.97	0.88		0.95	0.95	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3433	2632		3471	3406	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3433	2632		3471	3406	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	219	380	0	812	1419	0
RTOR Reduction (vph)	0	2	0	0	0	0
Lane Group Flow (vph)	219	378	0	812	1419	0
Heavy Vehicles (%)	2%	8%	0%	4%	6%	6%
Turn Type	Prot	custom		NA	NA	
Protected Phases	4	4 5		2	6	
Permitted Phases						
Actuated Green, G (s)	8.4	27.2		69.9	50.1	
Effective Green, g (s)	8.4	21.4		69.9	50.1	
Actuated g/C Ratio	0.09	0.24		0.79	0.56	
Clearance Time (s)	4.7			5.8	6.8	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	324	634		2732	1921	
v/s Ratio Prot	c0.06	c0.14		0.23	c0.42	
v/s Ratio Perm						
v/c Ratio	0.68	0.60		0.30	0.74	
Uniform Delay, d1	38.9	29.9		2.6	14.5	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.3	1.0		0.0	1.3	
Delay (s)	43.2	30.9		2.6	15.8	
Level of Service	D	C		A	B	
Approach Delay (s)	35.4			2.6	15.8	
Approach LOS	D			A	B	

Intersection Summary			
HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	88.8	Sum of lost time (s)	17.3
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	295	85	268	1115	3	158	0	203	1	0	3
Future Volume (vph)	6	295	85	268	1115	3	158	0	203	1	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95	1.00		1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.98		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Frt	1.00	0.97		1.00	1.00		1.00	1.00	0.85		0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.95	1.00		0.99	
Satd. Flow (prot)	1805	3363		1752	3535		1698	1698	1539		1653	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.95	1.00		1.00	
Satd. Flow (perm)	1805	3363		1752	3535		1698	1698	1539		1674	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	7	324	93	295	1225	3	174	0	223	1	0	3
RTOR Reduction (vph)	0	15	0	0	0	0	0	0	199	0	4	0
Lane Group Flow (vph)	7	402	0	295	1228	0	87	87	24	0	0	0
Confl. Peds. (#/hr)			4						5			
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	4%	0%	3%	2%	33%	1%	0%	3%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA		Split	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		8	8			4	
Permitted Phases									8	4		
Actuated Green, G (s)	1.2	59.7		23.6	82.1		12.3	12.3	12.3		0.9	
Effective Green, g (s)	1.2	59.7		23.6	82.1		12.3	12.3	12.3		0.9	
Actuated g/C Ratio	0.01	0.52		0.21	0.72		0.11	0.11	0.11		0.01	
Clearance Time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)	19	1761		362	2545		183	183	166		13	
v/s Ratio Prot	0.00	0.12		c0.17	c0.35		c0.05	0.05				
v/s Ratio Perm									0.02		c0.00	
v/c Ratio	0.37	0.23		0.81	0.48		0.48	0.48	0.14		0.00	
Uniform Delay, d1	56.0	14.7		43.1	6.8		47.8	47.8	46.1		56.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	4.4	0.3		12.5	0.7		0.7	0.7	0.1		0.0	
Delay (s)	60.4	15.0		55.6	7.5		48.5	48.5	46.2		56.1	
Level of Service	E	B		E	A		D	D	D		E	
Approach Delay (s)		15.7			16.8			47.2			56.1	
Approach LOS		B			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	21.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	114.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	58	7	5	1089	27	1	0	0	56	0	177
Future Volume (vph)	54	58	7	5	1089	27	1	0	0	56	0	177
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0			4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00			1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00			1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95			0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770			1770	1583	
Flt Permitted	0.95	1.00	1.00	0.71	1.00	1.00	0.53			0.76	1.00	
Satd. Flow (perm)	1770	3539	1583	1330	3539	1583	980			1410	1583	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	59	63	8	5	1184	29	1	0	0	61	0	192
RTOR Reduction (vph)	0	0	2	0	0	13	0	0	0	0	141	0
Lane Group Flow (vph)	59	63	6	5	1184	16	1	0	0	61	51	0
Turn Type	Prot	NA	Perm	Perm	NA	Perm	Perm			Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases			2	6		6	8			4		
Actuated Green, G (s)	3.2	40.2	40.2	33.0	33.0	33.0	10.1			10.1	10.1	
Effective Green, g (s)	3.2	40.2	40.2	33.0	33.0	33.0	10.1			10.1	10.1	
Actuated g/C Ratio	0.05	0.69	0.69	0.57	0.57	0.57	0.17			0.17	0.17	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0			4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0	
Lane Grp Cap (vph)	97	2440	1091	752	2003	896	169			244	274	
v/s Ratio Prot	c0.03	0.02			c0.33						0.03	
v/s Ratio Perm			0.00	0.00		0.01	0.00			c0.04		
v/c Ratio	0.61	0.03	0.01	0.01	0.59	0.02	0.01			0.25	0.19	
Uniform Delay, d1	26.9	2.9	2.8	5.5	8.3	5.5	19.9			20.8	20.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00	
Incremental Delay, d2	10.3	0.0	0.0	0.0	0.5	0.0	0.0			0.5	0.3	
Delay (s)	37.3	2.9	2.8	5.5	8.7	5.6	20.0			21.4	20.9	
Level of Service	D	A	A	A	A	A	B			C	C	
Approach Delay (s)		18.5			8.6			20.0			21.0	
Approach LOS		B			A			B			C	

Intersection Summary			
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	58.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	449	454	173	1331	125	16
Future Volume (vph)	449	454	173	1331	125	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frt	0.92		1.00	1.00	0.98	
Flt Protected	1.00		0.95	1.00	0.96	
Satd. Flow (prot)	4702		1770	5085	1757	
Flt Permitted	1.00		0.95	1.00	0.96	
Satd. Flow (perm)	4702		1770	5085	1757	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	488	493	188	1447	136	17
RTOR Reduction (vph)	265	0	0	0	10	0
Lane Group Flow (vph)	716	0	188	1447	143	0
Turn Type	NA		Prot	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases						
Actuated Green, G (s)	17.6		6.2	27.8	9.2	
Effective Green, g (s)	17.6		6.2	27.8	9.2	
Actuated g/C Ratio	0.39		0.14	0.62	0.20	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	1839		243	3141	359	
v/s Ratio Prot	0.15		c0.11	c0.28	c0.08	
v/s Ratio Perm						
v/c Ratio	0.39		0.77	0.46	0.40	
Uniform Delay, d1	9.8		18.7	4.6	15.5	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.1		14.2	0.1	0.7	
Delay (s)	10.0		32.9	4.7	16.2	
Level of Service	A		C	A	B	
Approach Delay (s)	10.0			7.9	16.2	
Approach LOS	A			A	B	

Intersection Summary			
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	1051	172	217	478	19	163	508	396	64	496	57
Future Volume (vph)	170	1051	172	217	478	19	163	508	396	64	496	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91		0.94	0.95	0.88	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3467	5136	2751	3502	5095		5040	3610	2801	3502	5136	1553
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3467	5136	2751	3502	5095		5040	3610	2801	3502	5136	1553
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)	185	1142	187	236	520	21	177	552	430	70	539	62
RTOR Reduction (vph)	0	0	118	0	3	0	0	0	311	0	0	47
Lane Group Flow (vph)	185	1142	69	236	538	0	177	552	119	70	539	15
Confl. Peds. (#/hr)			1			3			3			
Heavy Vehicles (%)	1%	1%	2%	0%	1%	5%	1%	0%	0%	0%	1%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	9.9	33.3	33.3	11.3	34.7		8.1	26.7	26.7	5.2	23.8	23.8
Effective Green, g (s)	9.9	33.3	33.3	11.3	34.7		8.1	26.7	26.7	5.2	23.8	23.8
Actuated g/C Ratio	0.10	0.35	0.35	0.12	0.36		0.08	0.28	0.28	0.05	0.25	0.25
Clearance Time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Vehicle Extension (s)	2.0	3.5	3.5	2.0	3.5		2.0	3.5	3.5	2.0	3.5	3.5
Lane Grp Cap (vph)	355	1772	949	410	1832		423	998	774	188	1266	383
v/s Ratio Prot	0.05	c0.22		c0.07	0.11		c0.04	c0.15		0.02	0.10	
v/s Ratio Perm			0.03						0.04			0.01
v/c Ratio	0.52	0.64	0.07	0.58	0.29		0.42	0.55	0.15	0.37	0.43	0.04
Uniform Delay, d1	41.1	26.6	21.2	40.3	22.1		42.0	29.8	26.4	44.1	30.6	27.7
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	0.8	0.0	1.2	0.1		0.2	0.7	0.1	0.5	0.3	0.1
Delay (s)	41.7	27.5	21.3	41.5	22.2		42.2	30.5	26.5	44.5	30.9	27.7
Level of Service	D	C	C	D	C		D	C	C	D	C	C
Approach Delay (s)		28.4			28.1			30.8			32.0	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	96.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	283	882	476	214	249	31	404	645	407	75	714	118
Future Volume (vph)	283	882	476	214	249	31	404	645	407	75	714	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Lane Util. Factor	0.97	0.95	0.88	0.94	0.95		0.94	0.95	1.00	0.97	0.86	0.88
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3502	3574	2814	5090	3483		5090	3610	1599	3502	6408	2774
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3502	3574	2814	5090	3483		5090	3610	1599	3502	6408	2774
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	295	919	496	223	259	32	421	672	424	78	744	123
RTOR Reduction (vph)	0	0	275	0	7	0	0	0	294	0	0	94
Lane Group Flow (vph)	295	919	221	223	284	0	421	672	130	78	744	29
Confl. Peds. (#/hr)						1						2
Heavy Vehicles (%)	0%	1%	1%	0%	2%	0%	0%	0%	1%	0%	2%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases			2						4			8
Actuated Green, G (s)	13.4	35.9	35.9	9.2	31.7		13.2	31.8	31.8	5.6	24.2	24.2
Effective Green, g (s)	13.4	35.9	35.9	9.2	31.7		13.2	31.8	31.8	5.6	24.2	24.2
Actuated g/C Ratio	0.13	0.34	0.34	0.09	0.30		0.13	0.31	0.31	0.05	0.23	0.23
Clearance Time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	450	1232	970	449	1060		645	1102	488	188	1489	644
v/s Ratio Prot	c0.08	c0.26		0.04	0.08		c0.08	c0.19		0.02	0.12	
v/s Ratio Perm			0.08						0.08			0.01
v/c Ratio	0.66	0.75	0.23	0.50	0.27		0.65	0.61	0.27	0.41	0.50	0.04
Uniform Delay, d1	43.2	30.1	24.2	45.2	27.4		43.3	30.9	27.3	47.7	34.7	31.0
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	2.6	2.5	0.1	0.3	0.1		1.8	1.1	0.4	0.5	0.4	0.0
Delay (s)	45.8	32.6	24.4	45.6	27.6		45.1	32.0	27.7	48.2	35.1	31.0
Level of Service	D	C	C	D	C		D	C	C	D	D	C
Approach Delay (s)		32.5			35.4			34.4			35.6	
Approach LOS		C			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	34.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	104.1	Sum of lost time (s)	21.6
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	222	458	120	114	4	2	130	782	3	80	601	94
Future Volume (vph)	222	458	120	114	4	2	130	782	3	80	601	94
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	4.0	4.0		5.3	4.9		5.3	4.9	4.9
Lane Util. Factor	0.95	0.95	0.88	1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.95		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		0.95	1.00	1.00
Satd. Flow (prot)	1715	1801	2760	1770	1770		1752	3573		1805	3539	1615
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1715	1805	2760	1770	1770		1752	3573		1805	3539	1615
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	244	503	132	125	4	2	143	859	3	88	660	103
RTOR Reduction (vph)	0	0	67	0	2	0	0	0	0	0	0	75
Lane Group Flow (vph)	220	527	65	125	4	0	143	862	0	88	660	28
Heavy Vehicles (%)	0%	0%	3%	2%	2%	2%	3%	1%	0%	0%	2%	0%
Turn Type	Prot	NA	pt+ov	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2	2 3	1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	40.5	48.2	51.8	10.4	3.7		12.7	33.7		7.6	28.6	28.6
Effective Green, g (s)	40.5	48.2	51.8	10.4	3.7		12.7	33.7		7.6	28.6	28.6
Actuated g/C Ratio	0.39	0.46	0.49	0.10	0.04		0.12	0.32		0.07	0.27	0.27
Clearance Time (s)	5.3	5.3		4.0	4.0		5.3	4.9		5.3	4.9	4.9
Vehicle Extension (s)	2.0	4.0		2.0	2.0		2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)	661	828	1361	175	62		211	1146		130	963	439
v/s Ratio Prot	0.13	c0.25	0.02	0.07	0.00		c0.08	c0.24		0.05	0.19	
v/s Ratio Perm		c0.05										0.02
v/c Ratio	0.33	0.64	0.05	0.71	0.07		0.68	0.75		0.68	0.69	0.06
Uniform Delay, d1	22.7	21.7	13.8	45.9	49.0		44.2	31.9		47.5	34.2	28.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.1	1.8	0.0	10.9	0.2		6.6	3.0		10.4	2.2	0.1
Delay (s)	22.8	23.5	13.8	56.8	49.1		50.8	34.9		57.9	36.4	28.4
Level of Service	C	C	B	E	D		D	C		E	D	C
Approach Delay (s)		21.9			56.4			37.2			37.6	
Approach LOS		C			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	33.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	210	2	398	0	652	0	0	479	373
Future Volume (vph)	0	0	0	210	2	398	0	652	0	0	479	373
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.7	3.7	3.7		4.8			4.8	4.8
Lane Util. Factor				0.95	0.95	0.88		1.00			0.95	1.00
Frpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	1.00
Flpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	0.95	1.00		1.00			1.00	1.00
Satd. Flow (prot)				1715	1720	2814		1900			3539	1599
Flt Permitted				0.95	0.95	1.00		1.00			1.00	1.00
Satd. Flow (perm)				1715	1720	2814		1900			3539	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	221	2	419	0	686	0	0	504	393
RTOR Reduction (vph)	0	0	0	0	0	126	0	0	0	0	0	161
Lane Group Flow (vph)	0	0	0	110	113	293	0	686	0	0	504	232
Confl. Peds. (#/hr)			1									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	0%	3%	0%	2%	1%
Turn Type				Split	NA	custom		NA			NA	Perm
Protected Phases				8	8	8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				10.5	10.5	18.3		19.7			27.5	27.5
Effective Green, g (s)				10.5	10.5	18.3		19.7			27.5	27.5
Actuated g/C Ratio				0.23	0.23	0.39		0.42			0.59	0.59
Clearance Time (s)				3.7	3.7			4.8			4.8	4.8
Vehicle Extension (s)				4.0	4.0			4.0			2.5	2.5
Lane Grp Cap (vph)				387	388	1107		804			2092	945
v/s Ratio Prot				0.06	0.07	c0.10		c0.36			0.14	
v/s Ratio Perm												0.15
v/c Ratio				0.28	0.29	0.26		0.85			0.24	0.25
Uniform Delay, d1				14.9	14.9	9.5		12.1			4.5	4.5
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.6	0.6	0.2		9.0			0.0	0.1
Delay (s)				15.4	15.5	9.7		21.1			4.6	4.6
Level of Service				B	B	A		C			A	A
Approach Delay (s)		0.0			11.7			21.1			4.6	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	46.5	Sum of lost time (s)	12.2
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	517	351	0	665	443	0
Future Volume (vph)	517	351	0	665	443	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.88		0.95	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3502	2787		3610	3430	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3502	2787		3610	3430	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	568	386	0	731	487	0
RTOR Reduction (vph)	0	272	0	0	0	0
Lane Group Flow (vph)	568	114	0	731	487	0
Confl. Bikes (#/hr)						3
Heavy Vehicles (%)	0%	2%	0%	0%	0%	3%
Parking (#/hr)					0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	8.6	8.6		12.6	12.6	
Effective Green, g (s)	8.6	8.6		12.6	12.6	
Actuated g/C Ratio	0.29	0.29		0.43	0.43	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	
Lane Grp Cap (vph)	1031	820		1557	1480	
v/s Ratio Prot	c0.16			c0.20	0.14	
v/s Ratio Perm		0.04				
v/c Ratio	0.55	0.14		0.47	0.33	
Uniform Delay, d1	8.7	7.6		5.9	5.5	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.0		0.1	0.0	
Delay (s)	9.0	7.6		6.0	5.5	
Level of Service	A	A		A	A	
Approach Delay (s)	8.5			6.0	5.5	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	7.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	29.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	268	183	270	24	116	189	40	161	101	131	172	0
Future Volume (vph)	268	183	270	24	116	189	40	161	101	131	172	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.9	4.9	4.9	3.5	5.3		4.0	5.3	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1900	1599	1805	1863	1568	1805	3310		1736	3396	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1900	1599	1805	1863	1568	1805	3310		1736	3396	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	282	193	284	25	122	199	42	169	106	138	181	0
RTOR Reduction (vph)	0	0	235	0	0	139	0	63	0	0	0	0
Lane Group Flow (vph)	282	193	49	25	122	60	42	212	0	138	181	0
Confl. Peds. (#/hr)									2			
Heavy Vehicles (%)	2%	0%	1%	0%	2%	3%	0%	3%	0%	4%	1%	1%
Parking (#/hr)											0	
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	7	7		8	8	8 1	5	2		1	6	
Permitted Phases			7									
Actuated Green, G (s)	18.1	18.1	18.1	14.4	14.4	31.8	5.4	42.3		12.5	49.9	
Effective Green, g (s)	18.1	18.1	18.1	14.4	14.4	31.8	5.4	42.3		12.5	49.9	
Actuated g/C Ratio	0.17	0.17	0.17	0.14	0.14	0.30	0.05	0.40		0.12	0.48	
Clearance Time (s)	3.5	3.5	3.5	4.9	4.9		3.5	5.3		4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	591	327	275	247	255	474	92	1333		206	1613	
v/s Ratio Prot	0.08	c0.10		0.01	c0.07	0.04	0.02	c0.06		c0.08	0.05	
v/s Ratio Perm			0.03									
v/c Ratio	0.48	0.59	0.18	0.10	0.48	0.13	0.46	0.16		0.67	0.11	
Uniform Delay, d1	39.2	40.0	37.1	39.6	41.8	26.5	48.4	20.0		44.3	15.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.72	0.75	
Incremental Delay, d2	0.6	2.8	0.3	0.2	1.4	0.1	3.6	0.3		8.0	0.1	
Delay (s)	39.8	42.9	37.4	39.8	43.2	26.7	51.9	20.3		39.7	11.6	
Level of Service	D	D	D	D	D	C	D	C		D	B	
Approach Delay (s)		39.7			33.5			24.5			23.7	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	42	2	190	0	412	0	0	436	0
Future Volume (vph)	0	0	0	42	2	190	0	412	0	0	436	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0	4.0		5.3			5.3	
Lane Util. Factor				0.95	0.95	0.88		0.95			0.91	
Frpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	
Flpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	
Frt				1.00	1.00	0.85		1.00			1.00	
Flt Protected				0.95	0.96	1.00		1.00			1.00	
Satd. Flow (prot)				1715	1726	2814		3539			4893	
Flt Permitted				0.95	0.96	1.00		1.00			1.00	
Satd. Flow (perm)				1715	1726	2814		3539			4893	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	0	46	2	209	0	453	0	0	479	0
RTOR Reduction (vph)	0	0	0	0	0	176	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	24	24	33	0	453	0	0	479	0
Confl. Peds. (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	2%	3%	0%	6%	2%
Turn Type				Split	NA	custom		NA			NA	
Protected Phases				8	8	8 1		2			6	
Permitted Phases												
Actuated Green, G (s)				7.1	7.1	16.6		80.1			88.6	
Effective Green, g (s)				7.1	7.1	16.6		80.1			88.6	
Actuated g/C Ratio				0.07	0.07	0.16		0.76			0.84	
Clearance Time (s)				4.0	4.0			5.3			5.3	
Vehicle Extension (s)				3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)				115	116	444		2699			4128	
v/s Ratio Prot				c0.01	0.01	0.01		c0.13			c0.10	
v/s Ratio Perm												
v/c Ratio				0.21	0.21	0.07		0.17			0.12	
Uniform Delay, d1				46.3	46.3	37.7		3.4			1.4	
Progression Factor				1.00	1.00	1.00		0.80			0.22	
Incremental Delay, d2				0.9	0.9	0.1		0.1			0.0	
Delay (s)				47.2	47.2	37.7		2.8			0.4	
Level of Service				D	D	D		A			A	
Approach Delay (s)		0.0			39.5			2.8			0.4	
Approach LOS		A			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.3
Intersection Capacity Utilization	32.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	470	277	836	29	1	190	0	412	0	1	0
Future Volume (vph)	0	470	277	836	29	1	190	0	412	0	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0	6.0		4.2	4.2		4.0	
Lane Util. Factor		0.95	1.00	0.97	1.00	1.00		1.00	0.88		1.00	
Frpb, ped/bikes		1.00	0.99	1.00	1.00	1.00		1.00	1.00		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt		1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	
Flt Protected		1.00	1.00	0.95	1.00	1.00		0.95	1.00		1.00	
Satd. Flow (prot)		3167	1548	3467	1900	1615		1752	2814		1900	
Flt Permitted		1.00	1.00	0.95	1.00	1.00		0.95	1.00		1.00	
Satd. Flow (perm)		3167	1548	3467	1900	1615		1752	2814		1900	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	516	304	919	32	1	209	0	453	0	1	0
RTOR Reduction (vph)	0	0	226	0	0	0	0	0	191	0	0	0
Lane Group Flow (vph)	0	516	78	919	32	1	0	209	262	0	1	0
Confl. Peds. (#/hr)			1									
Heavy Vehicles (%)	0%	14%	3%	1%	0%	0%	3%	0%	1%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA	Perm	Split	NA	pt+ov		NA	
Protected Phases		2		1	6		8	8	8 1		4	
Permitted Phases			2			6				4		
Actuated Green, G (s)		27.0	27.0	37.2	70.2	70.2		19.4	60.8		1.2	
Effective Green, g (s)		27.0	27.0	37.2	70.2	70.2		19.4	60.8		1.2	
Actuated g/C Ratio		0.26	0.26	0.35	0.67	0.67		0.18	0.58		0.01	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0		4.2			4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		814	398	1228	1270	1079		323	1629		21	
v/s Ratio Prot		c0.16		c0.27	0.02			c0.12	0.09		c0.00	
v/s Ratio Perm			0.05			0.00						
v/c Ratio		0.63	0.20	0.75	0.03	0.00		0.65	0.16		0.05	
Uniform Delay, d1		34.6	30.5	29.8	5.9	5.8		39.6	10.3		51.3	
Progression Factor		1.00	1.00	1.00	1.00	1.00		1.04	3.81		1.00	
Incremental Delay, d2		1.6	0.2	4.2	0.0	0.0		4.4	0.0		0.9	
Delay (s)		36.2	30.8	34.0	5.9	5.8		45.7	39.2		52.3	
Level of Service		D	C	C	A	A		D	D		D	
Approach Delay (s)		34.2			33.0			41.2			52.3	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	35.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	20.2
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	662	0	45	69	21	2	2	27	15	0	0
Future Volume (vph)	1	662	0	45	69	21	2	2	27	15	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.96			0.88			1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.95	
Satd. Flow (prot)	1770	3539		1805	3405			1386			1609	
Flt Permitted	0.95	1.00		0.95	1.00			0.98			1.00	
Satd. Flow (perm)	1770	3539		1805	3405			1360			1694	
Peak-hour factor, PHF	0.92	0.92	0.92	0.83	0.92	0.83	0.92	0.83	0.83	0.83	0.83	0.92
Adj. Flow (vph)	1	720	0	54	75	25	2	2	33	18	0	0
RTOR Reduction (vph)	0	0	0	0	10	0	0	30	0	0	0	0
Lane Group Flow (vph)	1	720	0	54	90	0	0	7	0	0	18	0
Confl. Peds. (#/hr)				3		1			3	3		
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	0%	21%	12%	0%	2%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	0.5	25.9		1.2	26.6			4.0			4.0	
Effective Green, g (s)	0.5	25.9		1.2	26.6			4.0			4.0	
Actuated g/C Ratio	0.01	0.60		0.03	0.62			0.09			0.09	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	20	2126		50	2101			126			157	
v/s Ratio Prot	0.00	c0.20		c0.03	0.03							
v/s Ratio Perm								0.01			c0.01	
v/c Ratio	0.05	0.34		1.08	0.04			0.06			0.11	
Uniform Delay, d1	21.1	4.3		20.9	3.2			17.8			17.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1.0	0.1		151.5	0.0			0.2			0.3	
Delay (s)	22.1	4.4		172.4	3.3			18.0			18.3	
Level of Service	C	A		F	A			B			B	
Approach Delay (s)		4.4			62.6			18.0			18.3	
Approach LOS		A			E			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	43.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	38.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	503	419	182	145	138	235	311	84	118	244	14
Future Volume (vph)	10	503	419	182	145	138	235	311	84	118	244	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	4.9
Lane Util. Factor	1.00	0.95	0.88	0.94	0.95		0.97	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	3610	2814	5090	3260		3433	3610	1583	1736	3610	1615
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1805	3610	2814	5090	3260		3433	3610	1583	1736	3610	1615
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)	11	547	455	198	158	150	255	338	91	128	265	15
RTOR Reduction (vph)	0	0	309	0	87	0	0	0	75	0	0	12
Lane Group Flow (vph)	11	547	146	198	221	0	255	338	16	128	265	3
Confl. Peds. (#/hr)						1						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	0%	1%	0%	1%	3%	2%	0%	2%	4%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	1.4	25.2	25.2	9.5	33.3		11.0	14.1	14.1	11.3	14.8	14.8
Effective Green, g (s)	1.4	25.2	25.2	9.5	33.3		11.0	14.1	14.1	11.3	14.8	14.8
Actuated g/C Ratio	0.02	0.32	0.32	0.12	0.42		0.14	0.18	0.18	0.14	0.19	0.19
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	4.9
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	3.0	3.0	2.0	3.0	3.0
Lane Grp Cap (vph)	32	1155	901	614	1379		479	646	283	249	678	303
v/s Ratio Prot	0.01	c0.15		c0.04	0.07		c0.07	c0.09		0.07	0.07	
v/s Ratio Perm			0.05						0.01			0.00
v/c Ratio	0.34	0.47	0.16	0.32	0.16		0.53	0.52	0.06	0.51	0.39	0.01
Uniform Delay, d1	38.2	21.4	19.2	31.7	14.0		31.5	29.3	26.8	31.2	28.0	26.0
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	2.3	0.3	0.1	0.1	0.1		0.6	0.8	0.1	0.7	0.4	0.0
Delay (s)	40.5	21.7	19.3	31.8	14.1		32.0	30.0	26.9	31.9	28.4	26.0
Level of Service	D	C	B	C	B		C	C	C	C	C	C
Approach Delay (s)		20.8			21.0			30.4			29.4	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	78.7	Sum of lost time (s)	18.6
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	706	0	249	0	386	0	0	565	287
Future Volume (vph)	0	0	0	706	0	249	0	386	0	0	565	287
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.7		4.7		6.3			5.7	5.7
Lane Util. Factor				0.97		1.00		0.95			0.95	1.00
Frpb, ped/bikes				1.00		1.00		1.00			1.00	1.00
Flpb, ped/bikes				1.00		1.00		1.00			1.00	1.00
Frt				1.00		0.85		1.00			1.00	1.00
Flt Protected				0.95		1.00		1.00			1.00	1.00
Satd. Flow (prot)				3335		1599		3574			3574	1863
Flt Permitted				0.95		1.00		1.00			1.00	1.00
Satd. Flow (perm)				3335		1599		3574			3574	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.93	0.92	0.93	0.92	0.93	0.93	0.93	0.93	0.92
Adj. Flow (vph)	0	0	0	759	0	268	0	415	0	0	608	312
RTOR Reduction (vph)	0	0	0	0	0	111	0	0	0	0	0	163
Lane Group Flow (vph)	0	0	0	759	0	157	0	415	0	0	608	149
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	2%	2%	2%	5%	2%	1%	2%	1%	2%	0%	1%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	2	0	0
Turn Type				Prot		custom		NA			NA	Perm
Protected Phases				8		8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				13.3		22.0		12.4			21.7	21.7
Effective Green, g (s)				13.3		22.0		12.4			21.7	21.7
Actuated g/C Ratio				0.29		0.48		0.27			0.48	0.48
Clearance Time (s)				4.7				6.3			5.7	5.7
Vehicle Extension (s)				0.2				0.2			0.2	0.2
Lane Grp Cap (vph)				976		774		976			1708	890
v/s Ratio Prot				c0.23		0.10		0.12			c0.17	
v/s Ratio Perm												0.08
v/c Ratio				0.78		0.20		0.43			0.36	0.17
Uniform Delay, d1				14.7		6.7		13.6			7.5	6.7
Progression Factor				1.00		1.00		1.00			1.00	1.00
Incremental Delay, d2				3.6		0.0		0.1			0.0	0.0
Delay (s)				18.3		6.7		13.7			7.5	6.8
Level of Service				B		A		B			A	A
Approach Delay (s)		0.0			15.3			13.7			7.2	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	45.4	Sum of lost time (s)	15.7
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	139	312	0	756	1010	0
Future Volume (vph)	139	312	0	756	1010	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	4.7		5.8	6.8	
Lane Util. Factor	0.97	0.88		0.95	0.95	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3467	2733		3539	3505	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3467	2733		3539	3505	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	142	318	0	771	1031	0
RTOR Reduction (vph)	0	13	0	0	0	0
Lane Group Flow (vph)	142	305	0	771	1031	0
Heavy Vehicles (%)	1%	4%	0%	2%	3%	1%
Turn Type	Prot	custom		NA	NA	
Protected Phases	4	4 5		2	6	
Permitted Phases						
Actuated Green, G (s)	6.6	19.8		38.5	24.3	
Effective Green, g (s)	6.6	14.0		38.5	24.3	
Actuated g/C Ratio	0.12	0.25		0.69	0.44	
Clearance Time (s)	4.7			5.8	6.8	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	411	688		2450	1531	
v/s Ratio Prot	0.04	c0.11		0.22	c0.29	
v/s Ratio Perm						
v/c Ratio	0.35	0.44		0.31	0.67	
Uniform Delay, d1	22.5	17.5		3.4	12.5	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.2		0.0	0.9	
Delay (s)	22.7	17.7		3.4	13.4	
Level of Service	C	B		A	B	
Approach Delay (s)	19.2			3.4	13.4	
Approach LOS	B			A	B	

Intersection Summary			
HCM 2000 Control Delay	11.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	55.6	Sum of lost time (s)	17.3
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	999	114	294	398	0	112	2	284	6	1	2
Future Volume (vph)	2	999	114	294	398	0	112	2	284	6	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Frt	1.00	0.98		1.00	1.00		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (prot)	1805	3509		1787	3539		1681	1689	1565		1784	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.95	1.00		1.00	
Satd. Flow (perm)	1805	3509		1787	3539		1681	1689	1565		1843	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	2	1052	120	309	419	0	118	2	299	6	1	2
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	273	0	2	0
Lane Group Flow (vph)	2	1168	0	309	419	0	60	60	26	0	7	0
Confl. Peds. (#/hr)			8			3			6			
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	1%	0%	1%	2%	0%	2%	0%	1%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		8	8			4	
Permitted Phases									8	4		
Actuated Green, G (s)	1.1	72.7		26.8	98.4		11.4	11.4	11.4		1.6	
Effective Green, g (s)	1.1	72.7		26.8	98.4		11.4	11.4	11.4		1.6	
Actuated g/C Ratio	0.01	0.56		0.21	0.76		0.09	0.09	0.09		0.01	
Clearance Time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)	15	1962		368	2678		147	148	137		22	
v/s Ratio Prot	0.00	c0.33		c0.17	0.12		c0.04	0.04				
v/s Ratio Perm									0.02		c0.00	
v/c Ratio	0.13	0.60		0.84	0.16		0.41	0.41	0.19		0.32	
Uniform Delay, d1	64.0	18.9		49.5	4.4		56.1	56.1	55.0		63.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	1.5	1.3		14.8	0.1		0.7	0.7	0.2		3.0	
Delay (s)	65.4	20.3		64.3	4.5		56.8	56.8	55.3		66.7	
Level of Service	E	C		E	A		E	E	E		E	
Approach Delay (s)		20.3			29.9			55.7			66.7	
Approach LOS		C			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	29.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	176	614	4	2	15	57	9	0	5	42	0	101
Future Volume (vph)	176	614	4	2	15	57	9	0	5	42	0	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1583		1770	1583	
Flt Permitted	0.95	1.00	1.00	0.40	1.00	1.00	0.69	1.00		0.75	1.00	
Satd. Flow (perm)	1770	3539	1583	742	3539	1583	1278	1583		1405	1583	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	191	667	4	2	16	62	10	0	5	46	0	110
RTOR Reduction (vph)	0	0	2	0	0	44	0	4	0	0	92	0
Lane Group Flow (vph)	191	667	2	2	16	18	10	1	0	46	18	0
Turn Type	Prot	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases			2	6		6	8			4		
Actuated Green, G (s)	7.9	22.9	22.9	11.0	11.0	11.0	6.1	6.1		6.1	6.1	
Effective Green, g (s)	7.9	22.9	22.9	11.0	11.0	11.0	6.1	6.1		6.1	6.1	
Actuated g/C Ratio	0.21	0.62	0.62	0.30	0.30	0.30	0.16	0.16		0.16	0.16	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	377	2190	979	220	1052	470	210	260		231	260	
v/s Ratio Prot	c0.11	c0.19			0.00			0.00			0.01	
v/s Ratio Perm			0.00	0.00		0.01	0.01			c0.03		
v/c Ratio	0.51	0.30	0.00	0.01	0.02	0.04	0.05	0.00		0.20	0.07	
Uniform Delay, d1	12.8	3.3	2.7	9.2	9.2	9.2	13.0	12.9		13.3	13.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0		0.4	0.1	
Delay (s)	13.9	3.4	2.7	9.2	9.2	9.3	13.1	12.9		13.8	13.2	
Level of Service	B	A	A	A	A	A	B	B		B	B	
Approach Delay (s)		5.7			9.3			13.0			13.3	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	7.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	37.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	32.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1341	98	38	452	201	91
Future Volume (vph)	1341	98	38	452	201	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frt	0.99		1.00	1.00	0.96	
Flt Protected	1.00		0.95	1.00	0.97	
Satd. Flow (prot)	5033		1770	5085	1725	
Flt Permitted	1.00		0.95	1.00	0.97	
Satd. Flow (perm)	5033		1770	5085	1725	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1458	107	41	491	218	99
RTOR Reduction (vph)	8	0	0	0	23	0
Lane Group Flow (vph)	1557	0	41	491	294	0
Turn Type	NA		Prot	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases						
Actuated Green, G (s)	32.8		2.1	38.9	16.4	
Effective Green, g (s)	32.8		2.1	38.9	16.4	
Actuated g/C Ratio	0.52		0.03	0.61	0.26	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	2607		58	3124	446	
v/s Ratio Prot	c0.31		c0.02	0.10	c0.17	
v/s Ratio Perm						
v/c Ratio	0.60		0.71	0.16	0.66	
Uniform Delay, d1	10.6		30.3	5.2	21.0	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.4		32.4	0.0	3.5	
Delay (s)	11.0		62.7	5.2	24.5	
Level of Service	B		E	A	C	
Approach Delay (s)	11.0			9.7	24.5	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	63.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Appendix 3
Existing 95th Percentile Queue Length

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	125	332	110	288	560	146	667	162	16	453	77
v/c Ratio	0.35	0.32	0.18	0.53	0.44	0.31	0.51	0.15	0.07	0.36	0.18
Control Delay	41.2	27.6	7.1	37.5	24.5	40.2	23.1	4.8	46.7	25.6	5.0
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	41.2	27.6	7.1	37.5	24.5	40.2	23.1	4.8	46.7	25.6	5.0
Queue Length 50th (ft)	22	39	0	50	63	18	94	0	3	53	0
Queue Length 95th (ft)	85	100	23	165	148	65	308	27	19	140	25
Internal Link Dist (ft)		589			719		560			779	
Turn Bay Length (ft)	270		240	260		250		240	280		215
Base Capacity (vph)	988	2590	1380	1007	2608	1395	1839	1497	900	2609	810
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	0.13	0.13	0.08	0.29	0.21	0.10	0.36	0.11	0.02	0.17	0.10

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	107	144	138	501	520	265	521	136	22	1071	94
v/c Ratio	0.37	0.25	0.23	0.64	0.61	0.50	0.34	0.18	0.12	0.54	0.10
Control Delay	46.5	34.3	7.2	41.1	33.4	43.4	20.1	5.0	48.2	27.6	5.1
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	46.5	34.3	7.2	41.1	33.4	43.4	20.1	5.0	48.2	27.6	5.1
Queue Length 50th (ft)	28	36	0	90	133	48	84	0	5	135	0
Queue Length 95th (ft)	70	74	27	168	217	99	213	43	22	244	18
Internal Link Dist (ft)		661			907		451			715	
Turn Bay Length (ft)	250		300	380		355			280		250
Base Capacity (vph)	791	1375	1206	1162	1448	1139	1550	773	715	2611	1176
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	0.14	0.10	0.11	0.43	0.36	0.23	0.34	0.18	0.03	0.41	0.08

Intersection Summary

Lane Group	EBL	EBT	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	36	36	147	343	557	1011	171
v/c Ratio	0.14	0.18	0.10	0.92	0.26	0.83	0.25
Control Delay	31.6	27.6	2.1	68.5	9.5	36.5	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.6	27.6	2.1	68.5	9.5	36.5	2.3
Queue Length 50th (ft)	22	~48	0	206	83	306	0
Queue Length 95th (ft)	44	44	15	#419	111	386	22
Internal Link Dist (ft)		734			641	612	
Turn Bay Length (ft)	340			380			215
Base Capacity (vph)	430	203	1502	374	2125	1212	678
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.18	0.10	0.92	0.26	0.83	0.25

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	149	152	674	492	562	512
v/c Ratio	0.33	0.32	0.45	0.69	0.28	0.45
Control Delay	20.8	20.6	5.4	20.8	7.0	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.8	20.6	5.4	20.8	7.0	2.1
Queue Length 50th (ft)	41	42	26	141	50	0
Queue Length 95th (ft)	107	109	80	247	78	32
Internal Link Dist (ft)		377		311	651	
Turn Bay Length (ft)	140		140			220
Base Capacity (vph)	596	618	1860	1179	3125	1481
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.25	0.36	0.42	0.18	0.35

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	265	275	498	580
v/c Ratio	0.34	0.36	0.35	0.39
Control Delay	9.2	3.0	5.5	5.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	9.2	3.0	5.5	5.6
Queue Length 50th (ft)	12	0	15	18
Queue Length 95th (ft)	28	13	34	40
Internal Link Dist (ft)	429		834	429
Turn Bay Length (ft)	275	275		
Base Capacity (vph)	3314	2376	3223	3406
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	0.08	0.12	0.15	0.17

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	740	256	172	16	59	100	21	501	71	102
v/c Ratio	0.76	0.49	0.31	0.07	0.26	0.22	0.19	0.40	0.47	0.07
Control Delay	39.5	34.3	5.8	40.9	44.4	7.1	49.7	20.2	45.0	15.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.5	34.3	5.8	40.9	44.4	7.1	49.7	20.2	45.0	15.6
Queue Length 50th (ft)	226	138	0	10	36	0	14	97	47	22
Queue Length 95th (ft)	302	222	49	30	76	39	38	145	93	53
Internal Link Dist (ft)		425			472			683		834
Turn Bay Length (ft)	575		380	250		250	360			
Base Capacity (vph)	1033	550	583	245	244	429	163	1300	171	1537
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.47	0.30	0.07	0.24	0.23	0.13	0.39	0.42	0.07

Intersection Summary

Lane Group	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	31	32	107	1072	220
v/c Ratio	0.26	0.27	0.22	0.40	0.05
Control Delay	50.6	51.1	8.6	1.3	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	50.6	51.1	8.6	1.3	0.4
Queue Length 50th (ft)	21	22	0	13	0
Queue Length 95th (ft)	49	50	23	27	0
Internal Link Dist (ft)		679		834	527
Turn Bay Length (ft)	115		475		
Base Capacity (vph)	192	188	637	2683	4187
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.16	0.17	0.17	0.40	0.05

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBT	NBR
Lane Group Flow (vph)	13	36	579	17	142	1086
v/c Ratio	0.02	0.10	0.32	0.01	0.41	0.44
Control Delay	31.9	0.6	19.1	6.4	43.7	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.9	0.6	19.1	6.4	43.7	6.0
Queue Length 50th (ft)	3	0	136	3	98	9
Queue Length 95th (ft)	11	0	195	12	149	194
Internal Link Dist (ft)	552			505	527	
Turn Bay Length (ft)						
Base Capacity (vph)	757	425	1808	1346	394	2441
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.08	0.32	0.01	0.36	0.44

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	7	205	279	407	723	632	667	43	59	147
v/c Ratio	0.04	0.50	0.34	0.58	0.53	0.75	0.56	0.08	0.31	0.24
Control Delay	43.4	33.2	4.5	39.3	20.3	39.1	29.0	0.3	44.4	33.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.4	33.2	4.5	39.3	20.3	39.1	29.0	0.3	44.4	33.7
Queue Length 50th (ft)	3	89	0	65	123	141	145	0	26	33
Queue Length 95th (ft)	17	146	12	115	197	#298	256	0	72	67
Internal Link Dist (ft)		924			708		1923			661
Turn Bay Length (ft)			350	420		300		300	195	
Base Capacity (vph)	551	727	1244	1524	1442	839	1366	622	405	1341
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.28	0.22	0.27	0.50	0.75	0.49	0.07	0.15	0.11

Intersection Summary

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

Lane Group	WBL	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	1300	634	596	399	370
v/c Ratio	0.82	0.61	0.78	0.31	0.41
Control Delay	22.3	10.2	34.3	16.7	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	22.3	10.2	34.3	16.7	3.2
Queue Length 50th (ft)	228	112	131	64	0
Queue Length 95th (ft)	343	225	167	85	31
Internal Link Dist (ft)			1423	1923	
Turn Bay Length (ft)		460			
Base Capacity (vph)	1589	1458	1883	3367	1790
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	0.82	0.43	0.32	0.12	0.21

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	226	389	946	1458
v/c Ratio	0.69	0.48	0.35	0.76
Control Delay	50.9	26.7	3.3	19.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	50.9	26.7	3.3	19.2
Queue Length 50th (ft)	64	99	62	308
Queue Length 95th (ft)	104	142	96	462
Internal Link Dist (ft)	342		409	1423
Turn Bay Length (ft)	255	255		
Base Capacity (vph)	1927	2040	3471	1912
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	0.12	0.19	0.27	0.76

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	7	422	303	1052	94	94	223	4
v/c Ratio	0.09	0.23	0.82	0.38	0.50	0.50	0.61	0.02
Control Delay	54.2	15.9	60.3	6.9	54.8	54.8	12.7	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.2	15.9	60.3	6.9	54.8	54.8	12.7	0.2
Queue Length 50th (ft)	5	68	213	77	70	70	0	0
Queue Length 95th (ft)	20	164	290	319	111	111	63	0
Internal Link Dist (ft)		594		855		459		223
Turn Bay Length (ft)	75		360		175			
Base Capacity (vph)	142	1845	491	2733	393	393	527	246
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.23	0.62	0.38	0.24	0.24	0.42	0.02

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	184	1043	197	236	541	177	551	411	64	545	62
v/c Ratio	0.51	0.61	0.19	0.56	0.30	0.41	0.54	0.38	0.27	0.45	0.14
Control Delay	48.4	28.7	4.3	47.6	23.5	47.4	32.8	4.2	50.3	32.5	2.9
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	48.4	28.7	4.3	47.6	23.5	47.4	32.8	4.2	50.3	32.5	2.9
Queue Length 50th (ft)	55	186	0	70	83	36	152	0	19	102	0
Queue Length 95th (ft)	108	293	28	132	140	72	248	40	48	165	13
Internal Link Dist (ft)		589			719		560			779	
Turn Bay Length (ft)	270		240	260		250		240	280		215
Base Capacity (vph)	769	2054	1218	777	2073	1119	1402	1338	777	1995	662
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	0.24	0.51	0.16	0.30	0.26	0.16	0.39	0.31	0.08	0.27	0.09

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	295	770	526	233	291	421	675	372	77	750	123
v/c Ratio	0.63	0.68	0.42	0.49	0.30	0.63	0.59	0.49	0.32	0.51	0.17
Control Delay	49.4	33.3	3.5	49.2	29.2	47.2	33.0	5.6	52.9	35.9	7.3
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	49.4	33.3	3.5	49.2	29.2	47.2	33.0	5.6	52.9	35.9	7.3
Queue Length 50th (ft)	90	217	0	49	72	89	191	0	24	118	0
Queue Length 95th (ft)	168	342	40	95	131	155	322	73	58	194	27
Internal Link Dist (ft)		661			907		451			715	
Turn Bay Length (ft)	250		300	380		355			280		250
Base Capacity (vph)	731	1370	1388	1063	1306	1063	1341	827	731	2342	1091
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	0.40	0.56	0.38	0.22	0.22	0.40	0.50	0.45	0.11	0.32	0.11

Intersection Summary

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	121	123	407	1	143	860	718	103
v/c Ratio	0.26	0.28	0.23	0.00	0.60	0.47	0.65	0.16
Control Delay	28.0	28.1	1.6	40.0	46.2	13.5	27.9	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.0	28.1	1.6	40.0	46.2	13.5	27.9	0.5
Queue Length 50th (ft)	44	44	0	1	70	141	167	0
Queue Length 95th (ft)	134	136	24	6	146	181	244	0
Internal Link Dist (ft)		734		89		641	612	
Turn Bay Length (ft)	340				380			215
Base Capacity (vph)	542	432	1987	547	425	1918	1345	740
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	0.22	0.28	0.20	0.00	0.34	0.45	0.53	0.14

Intersection Summary

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	110	112	486	620	879	391
v/c Ratio	0.28	0.28	0.37	0.74	0.40	0.34
Control Delay	21.8	21.9	6.5	19.7	6.6	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.8	21.9	6.5	19.7	6.6	1.6
Queue Length 50th (ft)	32	32	24	161	67	0
Queue Length 95th (ft)	82	83	65	322	131	29
Internal Link Dist (ft)		377		311	651	
Turn Bay Length (ft)	140		140			220
Base Capacity (vph)	626	628	1723	1214	3169	1472
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.18	0.28	0.51	0.28	0.27

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	568	282	671	618
v/c Ratio	0.55	0.28	0.45	0.43
Control Delay	10.9	2.4	7.2	7.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	10.9	2.4	7.2	7.2
Queue Length 50th (ft)	31	0	31	27
Queue Length 95th (ft)	71	15	66	62
Internal Link Dist (ft)	429		834	429
Turn Bay Length (ft)	275	275		
Base Capacity (vph)	3196	2568	3610	3429
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	0.18	0.11	0.19	0.18

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	540	203	315	23	120	199	43	272	120	107
v/c Ratio	0.68	0.46	0.51	0.09	0.47	0.34	0.32	0.22	0.62	0.07
Control Delay	40.8	37.5	6.8	40.6	48.7	5.6	51.8	16.1	37.0	18.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.8	37.5	6.8	40.6	48.7	5.6	51.8	16.1	37.0	18.6
Queue Length 50th (ft)	168	116	0	14	76	0	28	40	61	32
Queue Length 95th (ft)	221	182	66	37	133	51	62	75	147	68
Internal Link Dist (ft)		425			472			683		834
Turn Bay Length (ft)	575		380	250		250	360			
Base Capacity (vph)	897	496	651	263	271	573	171	1246	219	1458
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.41	0.48	0.09	0.44	0.35	0.25	0.22	0.55	0.07

Intersection Summary

Lane Group	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	24	25	178	709	266
v/c Ratio	0.21	0.22	0.31	0.26	0.06
Control Delay	49.9	50.1	7.4	3.3	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	49.9	50.1	7.4	3.3	0.2
Queue Length 50th (ft)	16	16	0	20	0
Queue Length 95th (ft)	44	45	32	51	1
Internal Link Dist (ft)		679		834	527
Turn Bay Length (ft)	115		475		
Base Capacity (vph)	294	295	732	2699	4129
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	0.08	0.08	0.24	0.26	0.06

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	8	109	925	12	1	166	709	1
v/c Ratio	0.01	0.23	0.67	0.01	0.00	0.55	0.35	0.01
Control Delay	29.1	6.4	31.2	7.5	0.0	46.9	8.2	47.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.1	6.4	31.2	7.5	0.0	46.9	8.2	47.0
Queue Length 50th (ft)	2	0	248	2	0	110	33	1
Queue Length 95th (ft)	8	38	#489	12	0	179	175	7
Internal Link Dist (ft)	552			505		527		495
Turn Bay Length (ft)					200			
Base Capacity (vph)	814	484	1378	1352	1165	336	2024	289
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	0.01	0.23	0.67	0.01	0.00	0.49	0.35	0.00

Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	339	447	207	310	260	346	132	132	264	15
v/c Ratio	0.05	0.62	0.40	0.33	0.20	0.52	0.50	0.32	0.51	0.37	0.04
Control Delay	38.1	29.7	3.5	35.6	8.3	36.6	32.4	8.7	40.4	29.9	0.2
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	38.1	29.7	3.5	35.6	8.3	36.6	32.4	8.7	40.4	29.9	0.2
Queue Length 50th (ft)	5	133	0	31	20	57	75	0	57	55	0
Queue Length 95th (ft)	24	261	35	69	66	121	151	49	138	114	0
Internal Link Dist (ft)		924			708		1923			661	
Turn Bay Length (ft)			350	420		300		300	195		190
Base Capacity (vph)	604	784	1408	1706	1555	920	1452	715	465	1471	712
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	0.02	0.43	0.32	0.12	0.20	0.28	0.24	0.18	0.28	0.18	0.02

Intersection Summary

Lane Group	WBL	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	751	267	471	594	321
v/c Ratio	0.76	0.31	0.48	0.35	0.30
Control Delay	20.4	3.9	16.6	8.9	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	20.4	3.9	16.6	8.9	2.2
Queue Length 50th (ft)	89	12	53	46	0
Queue Length 95th (ft)	147	44	102	93	34
Internal Link Dist (ft)			1423	1923	
Turn Bay Length (ft)		460			
Base Capacity (vph)	2557	1521	2976	3574	1863
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	0.29	0.18	0.16	0.17	0.17

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	176	351	798	1019
v/c Ratio	0.40	0.34	0.33	0.69
Control Delay	26.7	13.7	4.1	16.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	26.7	13.7	4.1	16.3
Queue Length 50th (ft)	28	45	43	136
Queue Length 95th (ft)	59	82	73	225
Internal Link Dist (ft)	342		409	1423
Turn Bay Length (ft)	255	255		
Base Capacity (vph)	3074	2733	3539	3192
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	0.06	0.13	0.23	0.32

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	2	1012	309	428	61	61	334	9
v/c Ratio	0.03	0.50	0.84	0.15	0.41	0.41	0.76	0.11
Control Delay	61.0	20.3	68.7	4.9	61.7	61.6	16.5	53.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.0	20.3	68.7	4.9	61.7	61.6	16.5	53.7
Queue Length 50th (ft)	2	223	252	22	53	53	0	6
Queue Length 95th (ft)	11	497	334	117	90	90	86	25
Internal Link Dist (ft)		594		855		459		223
Turn Bay Length (ft)	75		360		175			
Base Capacity (vph)	138	2041	481	2851	354	355	593	115
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	0.01	0.50	0.64	0.15	0.17	0.17	0.56	0.08

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	125	333	110	359	788	142	663	162	16	452	78
v/c Ratio	0.36	0.29	0.16	0.62	0.53	0.32	0.54	0.15	0.08	0.38	0.18
Control Delay	43.5	27.4	6.9	39.8	25.1	42.5	25.4	4.9	48.7	27.7	5.3
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	43.5	27.4	6.9	39.8	25.1	42.5	25.4	4.9	48.7	27.7	5.3
Queue Length 50th (ft)	25	42	0	70	97	19	110	0	3	60	0
Queue Length 95th (ft)	85	101	23	203	213	64	309	27	19	141	26
Internal Link Dist (ft)		589			719		560			779	
Turn Bay Length (ft)	270		240	260		250		240	280		215
Base Capacity (vph)	919	2414	1294	937	2449	1298	1714	1406	838	2430	761
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	0.14	0.14	0.09	0.38	0.32	0.11	0.39	0.12	0.02	0.19	0.10

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	107	145	138	549	839	235	519	136	23	1060	102
v/c Ratio	0.40	0.18	0.18	0.70	0.76	0.50	0.38	0.19	0.14	0.58	0.12
Control Delay	51.2	32.3	6.5	45.9	36.3	48.5	24.3	5.3	52.0	32.3	6.0
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	51.2	32.3	6.5	45.9	36.3	48.5	24.3	5.3	52.0	32.3	6.0
Queue Length 50th (ft)	34	37	0	117	243	51	113	0	7	167	0
Queue Length 95th (ft)	70	74	27	183	372	90	213	43	23	239	21
Internal Link Dist (ft)		661			907		451			715	
Turn Bay Length (ft)	250		300	380		355			280		250
Base Capacity (vph)	703	1222	1087	1033	1293	1012	1387	706	635	2321	1057
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	0.15	0.12	0.13	0.53	0.65	0.23	0.37	0.19	0.04	0.46	0.10

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	45	45	134	47	1122	525	786	29	987	169
v/c Ratio	0.40	0.59	0.10	0.39	2.31	1.50	0.43	0.27	0.87	0.26
Control Delay	59.1	79.1	3.0	58.6	617.3	269.1	14.5	56.1	43.9	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.1	79.1	3.0	58.6	617.3	269.1	14.5	56.1	43.9	2.5
Queue Length 50th (ft)	31	31	0	31	~1239	~513	125	19	350	0
Queue Length 95th (ft)	74	74	18	73	#1670	#808	231	52	452	21
Internal Link Dist (ft)		734			1066		641		612	
Turn Bay Length (ft)	340					380		130		215
Base Capacity (vph)	340	76	1404	215	527	351	1832	219	1134	648
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.59	0.10	0.22	2.13	1.50	0.43	0.13	0.87	0.26

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	143	148	674	288	472	518
v/c Ratio	0.34	0.34	0.42	0.48	0.26	0.48
Control Delay	15.4	15.3	1.8	13.6	5.5	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.4	15.3	1.8	13.6	5.5	2.3
Queue Length 50th (ft)	25	26	0	49	25	0
Queue Length 95th (ft)	70	72	24	95	42	27
Internal Link Dist (ft)		377		311	651	
Turn Bay Length (ft)	140		140			220
Base Capacity (vph)	439	455	1609	1373	3268	1526
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.33	0.42	0.21	0.14	0.34

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	273	275	453	576
v/c Ratio	0.35	0.36	0.32	0.39
Control Delay	9.3	3.0	5.3	5.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	9.3	3.0	5.3	5.7
Queue Length 50th (ft)	12	0	14	18
Queue Length 95th (ft)	29	13	31	40
Internal Link Dist (ft)	429		834	429
Turn Bay Length (ft)	275	275		
Base Capacity (vph)	3310	2373	3223	3406
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	0.08	0.12	0.14	0.17

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	677	252	168	16	58	113	21	842	74	114
v/c Ratio	0.75	0.52	0.32	0.07	0.26	0.25	0.19	0.72	0.49	0.08
Control Delay	41.0	36.9	6.2	40.9	44.3	16.5	49.7	33.6	36.2	19.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.0	36.9	6.2	40.9	44.3	16.5	49.7	33.6	36.2	19.6
Queue Length 50th (ft)	208	140	0	10	36	27	14	255	49	30
Queue Length 95th (ft)	272	219	49	30	75	71	38	338	96	68
Internal Link Dist (ft)		425			472			683		834
Turn Bay Length (ft)	575		380	250		250	360			
Base Capacity (vph)	980	522	559	245	244	425	163	1177	171	1473
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.48	0.30	0.07	0.24	0.27	0.13	0.72	0.43	0.08

Intersection Summary

Lane Group	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	31	32	519	1413	265
v/c Ratio	0.12	0.12	0.69	0.61	0.07
Control Delay	39.8	39.9	32.8	16.0	1.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	39.8	39.9	32.8	16.0	1.0
Queue Length 50th (ft)	17	18	136	251	3
Queue Length 95th (ft)	48	48	192	558	2
Internal Link Dist (ft)		679		834	527
Turn Bay Length (ft)	115		475		
Base Capacity (vph)	266	260	867	2344	3976
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	0.12	0.12	0.60	0.60	0.07

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBT	NBR
Lane Group Flow (vph)	77	79	274	523	964	1037
v/c Ratio	0.12	0.20	0.29	0.54	1.39	0.46
Control Delay	32.9	3.6	32.9	19.6	213.5	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.9	3.6	32.9	19.6	213.5	7.2
Queue Length 50th (ft)	21	0	79	225	~866	137
Queue Length 95th (ft)	38	12	109	291	#1039	199
Internal Link Dist (ft)	552			505	527	
Turn Bay Length (ft)						
Base Capacity (vph)	757	425	961	977	694	2265
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.19	0.29	0.54	1.39	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.

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	1	112	25	1238	23	19
v/c Ratio	0.01	0.04	0.12	0.41	0.02	0.06
Control Delay	33.0	4.4	31.1	5.1	0.1	21.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.0	4.4	31.1	5.1	0.1	21.7
Queue Length 50th (ft)	0	0	4	0	0	3
Queue Length 95th (ft)	6	27	36	303	0	23
Internal Link Dist (ft)		1242		627	261	357
Turn Bay Length (ft)	150		135			
Base Capacity (vph)	169	3157	215	3175	1133	970
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.04	0.12	0.39	0.02	0.02

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	7	205	279	341	920	640	664	43	59	145
v/c Ratio	0.04	0.24	0.32	0.54	0.66	0.77	0.57	0.08	0.31	0.24
Control Delay	41.6	26.4	4.3	39.5	23.5	39.0	28.9	0.3	43.0	33.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.6	26.4	4.3	39.5	23.5	39.0	28.9	0.3	43.0	33.3
Queue Length 50th (ft)	3	43	0	54	176	141	142	0	26	32
Queue Length 95th (ft)	17	69	12	98	271	#296	250	0	72	66
Internal Link Dist (ft)		924			708		1923			661
Turn Bay Length (ft)			350	420		300		300	195	
Base Capacity (vph)	549	1376	1241	1517	1386	835	1356	618	402	1334
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.15	0.22	0.22	0.66	0.77	0.49	0.07	0.15	0.11

Intersection Summary

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

Lane Group	WBL	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	1268	641	598	387	311
v/c Ratio	0.80	0.61	0.78	0.30	0.35
Control Delay	21.8	10.4	34.3	16.5	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	21.8	10.4	34.3	16.5	3.1
Queue Length 50th (ft)	220	115	131	62	0
Queue Length 95th (ft)	337	233	168	82	30
Internal Link Dist (ft)			1423	1923	
Turn Bay Length (ft)		460			
Base Capacity (vph)	1583	1453	1876	3357	1783
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	0.80	0.44	0.32	0.12	0.17

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	219	380	812	1419
v/c Ratio	0.68	0.47	0.30	0.74
Control Delay	50.4	26.7	3.0	18.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	50.4	26.7	3.0	18.2
Queue Length 50th (ft)	62	96	49	290
Queue Length 95th (ft)	101	139	78	435
Internal Link Dist (ft)	342		409	1423
Turn Bay Length (ft)	255	255		
Base Capacity (vph)	1937	2043	3471	1922
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	0.11	0.19	0.23	0.74

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	7	417	295	1228	87	87	223	4
v/c Ratio	0.09	0.22	0.81	0.45	0.48	0.48	0.61	0.02
Control Delay	54.2	15.5	60.3	7.5	54.3	54.3	13.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.2	15.5	60.3	7.5	54.3	54.3	13.0	0.2
Queue Length 50th (ft)	5	65	208	94	65	65	0	0
Queue Length 95th (ft)	20	161	284	397	104	104	63	0
Internal Link Dist (ft)		594		855		459		223
Turn Bay Length (ft)	75		360		175			
Base Capacity (vph)	142	1871	491	2744	393	393	527	246
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.22	0.60	0.45	0.22	0.22	0.42	0.02

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	SBL	SBT
Lane Group Flow (vph)	59	63	8	5	1184	29	1	61	192
v/c Ratio	0.30	0.03	0.01	0.01	0.58	0.03	0.01	0.24	0.46
Control Delay	34.7	4.1	2.3	8.6	11.0	0.9	23.0	25.0	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.7	4.1	2.3	8.6	11.0	0.9	23.0	25.0	9.9
Queue Length 50th (ft)	17	2	0	1	130	0	0	17	6
Queue Length 95th (ft)	#79	13	4	7	309	4	4	58	59
Internal Link Dist (ft)		598			4088				1450
Turn Bay Length (ft)	210		250	150		250	150	150	
Base Capacity (vph)	202	3248	1454	1116	2971	1338	465	670	841
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.02	0.01	0.00	0.40	0.02	0.00	0.09	0.23

Intersection Summary

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

Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	981	188	1447	153
v/c Ratio	0.46	0.76	0.44	0.36
Control Delay	7.5	46.9	6.7	15.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.5	46.9	6.7	15.1
Queue Length 50th (ft)	32	42	55	28
Queue Length 95th (ft)	91	#186	175	66
Internal Link Dist (ft)	1066		843	293
Turn Bay Length (ft)		150		
Base Capacity (vph)	2350	247	3576	988
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	0.42	0.76	0.40	0.15

Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	185	1142	187	236	541	177	552	430	70	539	62
v/c Ratio	0.52	0.64	0.17	0.57	0.29	0.42	0.55	0.40	0.29	0.45	0.14
Control Delay	49.4	29.3	4.9	48.6	23.3	48.3	33.7	4.2	51.0	33.2	2.9
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	49.4	29.3	4.9	48.6	23.3	48.3	33.7	4.2	51.0	33.2	2.9
Queue Length 50th (ft)	57	210	1	72	84	37	158	0	21	104	0
Queue Length 95th (ft)	109	327	29	132	141	72	250	41	52	163	13
Internal Link Dist (ft)		589			719		560			779	
Turn Bay Length (ft)	270		240	260		250		240	280		215
Base Capacity (vph)	749	2002	1182	757	2034	1089	1366	1325	757	1943	648
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	0.25	0.57	0.16	0.31	0.27	0.16	0.40	0.32	0.09	0.28	0.10

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	295	919	496	223	291	421	672	424	78	744	123
v/c Ratio	0.65	0.74	0.40	0.50	0.27	0.65	0.60	0.54	0.34	0.52	0.17
Control Delay	51.7	34.8	5.9	51.1	28.4	49.3	34.8	5.9	54.1	37.5	7.3
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	51.7	34.8	5.9	51.1	28.4	49.3	34.8	5.9	54.1	37.5	7.3
Queue Length 50th (ft)	95	276	18	50	73	93	200	0	25	123	0
Queue Length 95th (ft)	167	422	65	92	131	155	320	79	59	193	27
Internal Link Dist (ft)		661			907		451			715	
Turn Bay Length (ft)	250		300	380		355			280		250
Base Capacity (vph)	692	1303	1292	1007	1240	1007	1271	837	692	2219	1040
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	0.43	0.71	0.38	0.22	0.23	0.42	0.53	0.51	0.11	0.34	0.12

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	220	527	132	125	6	143	862	88	660	103
v/c Ratio	0.32	0.73	0.09	0.69	0.04	0.65	0.72	0.55	0.69	0.17
Control Delay	28.5	36.0	3.2	66.0	37.8	57.6	34.1	60.1	37.2	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.5	36.0	3.2	66.0	37.8	57.6	34.1	60.1	37.2	0.6
Queue Length 50th (ft)	90	265	0	77	3	89	268	55	201	0
Queue Length 95th (ft)	#295	#869	18	#183	15	169	349	120	286	0
Internal Link Dist (ft)		734			1066		641		612	
Turn Bay Length (ft)	340					380		130		215
Base Capacity (vph)	690	725	1599	214	394	353	1416	218	1119	659
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.73	0.08	0.58	0.02	0.41	0.61	0.40	0.59	0.16

Intersection Summary

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

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	110	113	419	686	504	393
v/c Ratio	0.28	0.29	0.34	0.86	0.24	0.36
Control Delay	17.0	17.1	5.7	27.1	5.3	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.0	17.1	5.7	27.1	5.3	1.8
Queue Length 50th (ft)	26	27	20	160	29	0
Queue Length 95th (ft)	60	61	45	#358	53	27
Internal Link Dist (ft)		377		311	651	
Turn Bay Length (ft)	140		140			220
Base Capacity (vph)	493	494	1217	838	2156	1128
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.23	0.34	0.82	0.23	0.35

Intersection Summary

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

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	568	386	731	487
v/c Ratio	0.56	0.36	0.47	0.33
Control Delay	11.5	2.5	7.4	6.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	11.5	2.5	7.4	6.5
Queue Length 50th (ft)	32	0	34	21
Queue Length 95th (ft)	79	20	77	51
Internal Link Dist (ft)	429		834	429
Turn Bay Length (ft)	275	275		
Base Capacity (vph)	3101	2512	3610	3429
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	0.18	0.15	0.20	0.14

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	282	193	284	25	122	199	42	275	138	181
v/c Ratio	0.48	0.59	0.56	0.10	0.48	0.33	0.31	0.20	0.67	0.11
Control Delay	40.7	46.3	8.5	40.5	48.6	5.4	51.6	14.5	47.8	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.7	46.3	8.5	40.5	48.6	5.4	51.6	14.5	47.8	13.5
Queue Length 50th (ft)	89	121	0	15	77	0	27	37	61	32
Queue Length 95th (ft)	117	175	64	40	133	51	61	76	#169	97
Internal Link Dist (ft)		425			472			683		834
Turn Bay Length (ft)	575		380	250		250	360			
Base Capacity (vph)	882	488	622	265	273	579	171	1395	226	1660
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.40	0.46	0.09	0.45	0.34	0.25	0.20	0.61	0.11

Intersection Summary

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

Lane Group	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	24	24	209	453	479
v/c Ratio	0.21	0.21	0.35	0.17	0.12
Control Delay	49.9	49.8	7.2	2.9	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	49.9	49.8	7.2	2.9	0.4
Queue Length 50th (ft)	16	16	0	18	3
Queue Length 95th (ft)	44	43	34	50	3
Internal Link Dist (ft)		679		834	527
Turn Bay Length (ft)	115		475		
Base Capacity (vph)	294	295	756	2699	4129
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	0.08	0.08	0.28	0.17	0.12

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	516	304	919	32	1	209	453	1
v/c Ratio	0.63	0.49	0.69	0.02	0.00	0.65	0.23	0.01
Control Delay	38.8	6.6	32.4	7.4	0.0	49.9	4.1	47.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.8	6.6	32.4	7.4	0.0	49.9	4.1	47.0
Queue Length 50th (ft)	162	0	254	5	0	128	0	1
Queue Length 95th (ft)	220	66	#492	23	0	213	88	7
Internal Link Dist (ft)	552			505		527		495
Turn Bay Length (ft)					200			
Base Capacity (vph)	814	623	1335	1329	1146	348	1920	289
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	0.63	0.49	0.69	0.02	0.00	0.60	0.24	0.00

Intersection Summary

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

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	1	720	54	100	37	18
v/c Ratio	0.00	0.27	0.25	0.04	0.11	0.05
Control Delay	23.0	7.0	25.3	5.2	7.2	13.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.0	7.0	25.3	5.2	7.2	13.1
Queue Length 50th (ft)	0	0	8	0	1	2
Queue Length 95th (ft)	5	160	#55	23	15	15
Internal Link Dist (ft)		1242		627	261	357
Turn Bay Length (ft)	150		135			
Base Capacity (vph)	212	2784	217	2682	991	1222
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.26	0.25	0.04	0.04	0.01

Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	547	455	198	308	255	338	91	128	265	15
v/c Ratio	0.05	0.53	0.40	0.31	0.20	0.51	0.50	0.25	0.49	0.38	0.04
Control Delay	37.1	24.7	3.4	34.6	8.1	35.7	32.2	9.5	39.4	29.8	0.2
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	37.1	24.7	3.4	34.6	8.1	35.7	32.2	9.5	39.4	29.8	0.2
Queue Length 50th (ft)	4	105	0	28	18	54	72	0	53	54	0
Queue Length 95th (ft)	24	185	34	66	64	118	146	42	133	114	0
Internal Link Dist (ft)		924			708		1923			661	
Turn Bay Length (ft)			350	420		300		300	195		190
Base Capacity (vph)	614	1515	1445	1732	1555	934	1474	700	472	1493	721
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	0.02	0.36	0.31	0.11	0.20	0.27	0.23	0.13	0.27	0.18	0.02

Intersection Summary

Lane Group	WBL	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	759	268	415	608	312
v/c Ratio	0.78	0.30	0.43	0.36	0.30
Control Delay	20.7	2.9	16.0	8.9	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	20.7	2.9	16.0	8.9	2.2
Queue Length 50th (ft)	90	7	45	46	0
Queue Length 95th (ft)	143	34	89	93	33
Internal Link Dist (ft)			1423	1923	
Turn Bay Length (ft)		460			
Base Capacity (vph)	2582	1530	3004	3574	1863
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	0.29	0.18	0.14	0.17	0.17

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	142	318	771	1031
v/c Ratio	0.35	0.32	0.32	0.67
Control Delay	26.0	13.7	3.8	15.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	26.0	13.7	3.8	15.4
Queue Length 50th (ft)	23	40	38	131
Queue Length 95th (ft)	48	73	64	216
Internal Link Dist (ft)	342		409	1423
Turn Bay Length (ft)	255	255		
Base Capacity (vph)	3131	2733	3539	3165
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	0.05	0.12	0.22	0.33

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	2	1172	309	419	60	60	299	9
v/c Ratio	0.03	0.57	0.84	0.15	0.41	0.41	0.73	0.11
Control Delay	61.0	21.6	68.7	4.9	61.6	61.5	16.3	53.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.0	21.6	68.7	4.9	61.6	61.5	16.3	53.7
Queue Length 50th (ft)	2	276	252	21	52	52	0	6
Queue Length 95th (ft)	11	#660	334	114	88	88	80	25
Internal Link Dist (ft)		594		855		459		223
Turn Bay Length (ft)	75		360		175			
Base Capacity (vph)	138	2051	481	2852	354	355	565	115
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	0.01	0.57	0.64	0.15	0.17	0.17	0.53	0.08

Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	191	667	4	2	16	62	10	5	46	110
v/c Ratio	0.49	0.27	0.00	0.01	0.02	0.12	0.03	0.01	0.13	0.09
Control Delay	24.5	5.7	1.2	14.0	13.7	3.3	10.3	0.0	11.1	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	5.7	1.2	14.0	13.7	3.3	10.3	0.0	11.1	0.2
Queue Length 50th (ft)	27	25	0	0	1	0	1	0	6	0
Queue Length 95th (ft)	#177	118	2	5	8	15	9	0	26	0
Internal Link Dist (ft)		598			4088			531		1450
Turn Bay Length (ft)	210		250	150		250	150		150	
Base Capacity (vph)	389	3041	1363	391	1870	879	948	1215	1043	1441
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.22	0.00	0.01	0.01	0.07	0.01	0.00	0.04	0.08

Intersection Summary

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

Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	1565	41	491	317
v/c Ratio	0.58	0.34	0.16	0.66
Control Delay	12.1	41.8	6.0	26.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.1	41.8	6.0	26.7
Queue Length 50th (ft)	152	17	26	106
Queue Length 95th (ft)	243	#57	51	192
Internal Link Dist (ft)	1066		843	293
Turn Bay Length (ft)		150		
Base Capacity (vph)	3187	120	3883	1102
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	0.49	0.34	0.13	0.29

Intersection Summary

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

Appendix 4
2025 Near-Term Level of Service Worksheets

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	128	361	124	268	466	86	161	666	157	19	421	76
Future Volume (vph)	128	361	124	268	466	86	161	666	157	19	421	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91		0.94	0.95	0.88	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3400	4988	2565	3467	4870		4802	3539	2739	3099	5085	1489
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3400	4988	2565	3467	4870		4802	3539	2739	3099	5085	1489
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	138	388	133	288	501	92	173	716	169	20	453	82
RTOR Reduction (vph)	0	0	105	0	21	0	0	0	107	0	0	59
Lane Group Flow (vph)	138	388	28	288	572	0	173	716	62	20	453	23
Confl. Peds. (#/hr)			8			14			7			2
Heavy Vehicles (%)	3%	4%	9%	1%	4%	2%	6%	2%	2%	13%	2%	7%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	8.6	17.2	17.2	12.2	20.8		8.1	29.3	29.3	1.8	23.0	23.0
Effective Green, g (s)	8.6	17.2	17.2	12.2	20.8		8.1	29.3	29.3	1.8	23.0	23.0
Actuated g/C Ratio	0.11	0.21	0.21	0.15	0.26		0.10	0.36	0.36	0.02	0.29	0.29
Clearance Time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Vehicle Extension (s)	2.0	3.5	3.5	2.0	3.5		2.0	3.5	3.5	2.0	3.5	3.5
Lane Grp Cap (vph)	363	1065	548	525	1258		483	1288	996	69	1452	425
v/s Ratio Prot	0.04	0.08		c0.08	c0.12		c0.04	c0.20		0.01	0.09	
v/s Ratio Perm			0.01						0.02			0.02
v/c Ratio	0.38	0.36	0.05	0.55	0.45		0.36	0.56	0.06	0.29	0.31	0.06
Uniform Delay, d1	33.5	27.0	25.2	31.6	25.1		33.8	20.4	16.7	38.7	22.5	20.9
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	0.2	0.3	0.0	0.6	0.3		0.2	0.6	0.0	0.8	0.1	0.1
Delay (s)	33.7	27.2	25.2	32.2	25.4		33.9	21.0	16.7	39.6	22.7	20.9
Level of Service	C	C	C	C	C		C	C	B	D	C	C
Approach Delay (s)		28.2			27.6			22.4			23.0	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	80.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	106	182	130	568	460	43	249	490	397	55	1007	88
Future Volume (vph)	106	182	130	568	460	43	249	490	397	55	1007	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Lane Util. Factor	0.97	0.95	0.88	0.94	0.95		0.94	0.95	1.00	0.97	0.86	0.88
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3400	3374	2760	4990	3464		4894	3471	1563	3072	6408	2733
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3400	3374	2760	4990	3464		4894	3471	1563	3072	6408	2733
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	113	194	138	604	489	46	265	521	422	59	1071	94
RTOR Reduction (vph)	0	0	116	0	5	0	0	0	265	0	0	64
Lane Group Flow (vph)	113	194	22	604	530	0	265	521	157	59	1071	30
Confl. Peds. (#/hr)						4			1			
Heavy Vehicles (%)	3%	7%	3%	2%	3%	0%	4%	4%	2%	14%	2%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases			2						4			8
Actuated Green, G (s)	7.8	14.6	14.6	15.5	22.3		9.8	33.6	33.6	5.2	29.0	29.0
Effective Green, g (s)	7.8	14.6	14.6	15.5	22.3		9.8	33.6	33.6	5.2	29.0	29.0
Actuated g/C Ratio	0.09	0.16	0.16	0.17	0.25		0.11	0.37	0.37	0.06	0.32	0.32
Clearance Time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	293	544	445	854	853		529	1288	580	176	2053	875
v/s Ratio Prot	0.03	0.06		c0.12	c0.15		c0.05	c0.15		0.02	c0.17	
v/s Ratio Perm			0.01						0.10			0.01
v/c Ratio	0.39	0.36	0.05	0.71	0.62		0.50	0.40	0.27	0.34	0.52	0.03
Uniform Delay, d1	39.1	33.8	32.1	35.4	30.3		38.0	21.0	19.9	41.0	25.1	21.1
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	0.3	0.4	0.0	2.2	1.4		0.3	0.3	0.3	0.4	0.3	0.0
Delay (s)	39.4	34.2	32.1	37.6	31.8		38.3	21.3	20.2	41.4	25.4	21.2
Level of Service	D	C	C	D	C		D	C	C	D	C	C
Approach Delay (s)		34.9			34.8			24.7			25.8	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	90.5	Sum of lost time (s)	21.6
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	12	169	92	146	2	326	590	98	4	1035	162
Future Volume (vph)	68	12	169	92	146	2	326	590	98	4	1035	162
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	4.0	4.0		5.3	4.9		5.3	4.9	4.9
Lane Util. Factor	0.97	1.00	0.88	1.00	1.00		0.97	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1900	2608	1770	1859		3367	3416		1805	3574	1579
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1900	2608	1770	1859		3367	3416		1805	3574	1579
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	72	13	178	97	154	2	343	621	103	4	1089	171
RTOR Reduction (vph)	0	0	51	0	1	0	0	9	0	0	0	85
Lane Group Flow (vph)	72	13	127	97	155	0	343	715	0	4	1089	86
Confl. Peds. (#/hr)												1
Heavy Vehicles (%)	2%	0%	9%	2%	2%	2%	4%	4%	0%	0%	1%	1%
Turn Type	Prot	NA	pt+ov	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2	2 3	1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	5.0	16.5	34.4	7.7	19.2		12.6	51.9		0.9	40.2	40.2
Effective Green, g (s)	5.0	16.5	34.4	7.7	19.2		12.6	51.9		0.9	40.2	40.2
Actuated g/C Ratio	0.05	0.17	0.36	0.08	0.20		0.13	0.54		0.01	0.42	0.42
Clearance Time (s)	5.3	5.3		4.0	4.0		5.3	4.9		5.3	4.9	4.9
Vehicle Extension (s)	2.0	4.0		2.0	2.0		2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)	177	324	929	141	369		439	1837		16	1488	657
v/s Ratio Prot	0.02	0.01	0.05	c0.05	c0.08		c0.10	0.21		0.00	c0.30	
v/s Ratio Perm												0.05
v/c Ratio	0.41	0.04	0.14	0.69	0.42		0.78	0.39		0.25	0.73	0.13
Uniform Delay, d1	44.3	33.4	21.0	43.2	33.8		40.6	13.0		47.5	23.6	17.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.6	0.1	0.1	10.6	0.3		8.1	0.2		3.0	2.0	0.1
Delay (s)	44.9	33.5	21.1	53.8	34.1		48.7	13.2		50.4	25.6	17.5
Level of Service	D	C	C	D	C		D	B		D	C	B
Approach Delay (s)		28.2			41.6			24.6			24.6	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	96.5	Sum of lost time (s)	19.5
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	256	62	654	0	601	0	0	681	497
Future Volume (vph)	0	0	0	256	62	654	0	601	0	0	681	497
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.7	3.7	3.7		4.8			4.8	4.8
Lane Util. Factor				0.95	0.95	0.88		1.00			0.95	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	0.97	1.00		1.00			1.00	1.00
Satd. Flow (prot)				1633	1687	2760		1845			3505	1599
Flt Permitted				0.95	0.97	1.00		1.00			1.00	1.00
Satd. Flow (perm)				1633	1687	2760		1845			3505	1599
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	0	264	64	674	0	620	0	0	702	512
RTOR Reduction (vph)	0	0	0	0	0	254	0	0	0	0	0	195
Lane Group Flow (vph)	0	0	0	164	164	420	0	620	0	0	702	317
Heavy Vehicles (%)	0%	0%	0%	5%	2%	3%	0%	3%	20%	0%	3%	1%
Turn Type				Split	NA	custom		NA			NA	Perm
Protected Phases				8	8	8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				9.9	9.9	17.7		22.0			29.8	29.8
Effective Green, g (s)				9.9	9.9	17.7		22.0			29.8	29.8
Actuated g/C Ratio				0.21	0.21	0.37		0.46			0.62	0.62
Clearance Time (s)				3.7	3.7			4.8			4.8	4.8
Vehicle Extension (s)				4.0	4.0			4.0			2.5	2.5
Lane Grp Cap (vph)				335	346	1013		842			2166	988
v/s Ratio Prot				c0.10	0.10	c0.15		c0.34			0.20	
v/s Ratio Perm												0.20
v/c Ratio				0.49	0.47	0.41		0.74			0.32	0.32
Uniform Delay, d1				16.9	16.9	11.4		10.7			4.4	4.4
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				1.5	1.4	0.4		3.6			0.1	0.1
Delay (s)				18.5	18.3	11.8		14.3			4.5	4.5
Level of Service				B	B	B		B			A	A
Approach Delay (s)		0.0			13.9			14.3			4.5	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	48.2	Sum of lost time (s)	12.2
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	280	480	0	544	595	0
Future Volume (vph)	280	480	0	544	595	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.88		0.95	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3367	2409		3223	3406	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3367	2409		3223	3406	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	301	516	0	585	640	0
RTOR Reduction (vph)	0	311	0	0	0	0
Lane Group Flow (vph)	301	205	0	585	640	0
Confl. Bikes (#/hr)						3
Heavy Vehicles (%)	4%	18%	0%	12%	6%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	6.1	6.1		11.1	11.1	
Effective Green, g (s)	6.1	6.1		11.1	11.1	
Actuated g/C Ratio	0.24	0.24		0.44	0.44	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	
Lane Grp Cap (vph)	815	583		1419	1500	
v/s Ratio Prot	c0.09			0.18	c0.19	
v/s Ratio Perm		0.09				
v/c Ratio	0.37	0.35		0.41	0.43	
Uniform Delay, d1	7.9	7.9		4.8	4.9	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.1		0.1	0.1	
Delay (s)	8.1	8.0		4.9	4.9	
Level of Service	A	A		A	A	
Approach Delay (s)	8.0			4.9	4.9	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	6.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	25.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	784	238	155	14	54	90	19	271	180	64	92	0
Future Volume (vph)	784	238	155	14	54	90	19	271	180	64	92	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.9	4.9	4.9	3.5	5.3		4.0	5.3	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1827	1538	1687	1681	1599	1719	3229		1719	3438	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1827	1538	1687	1681	1599	1719	3229		1719	3438	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	871	264	172	16	60	100	21	301	200	71	102	0
RTOR Reduction (vph)	0	0	116	0	0	73	0	110	0	0	0	0
Lane Group Flow (vph)	871	264	56	16	60	27	21	391	0	71	102	0
Confl. Peds. (#/hr)									4			
Heavy Vehicles (%)	2%	4%	5%	7%	13%	1%	5%	4%	4%	5%	5%	3%
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	7	7		8	8	8 1	5	2		1	6	
Permitted Phases			7									
Actuated Green, G (s)	34.2	34.2	34.2	14.0	14.0	28.1	3.2	29.9		9.2	36.4	
Effective Green, g (s)	34.2	34.2	34.2	14.0	14.0	28.1	3.2	29.9		9.2	36.4	
Actuated g/C Ratio	0.33	0.33	0.33	0.13	0.13	0.27	0.03	0.28		0.09	0.35	
Clearance Time (s)	3.5	3.5	3.5	4.9	4.9		3.5	5.3		4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	1118	595	500	224	224	427	52	919		150	1191	
v/s Ratio Prot	c0.25	0.14		0.01	c0.04	0.02	0.01	c0.12		c0.04	0.03	
v/s Ratio Perm			0.04									
v/c Ratio	0.78	0.44	0.11	0.07	0.27	0.06	0.40	0.43		0.47	0.09	
Uniform Delay, d1	32.0	27.9	24.8	39.8	40.9	28.6	50.0	30.6		45.6	23.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.73	0.70	
Incremental Delay, d2	3.5	0.5	0.1	0.1	0.6	0.1	5.1	1.4		2.3	0.1	
Delay (s)	35.5	28.4	24.9	39.9	41.5	28.7	55.0	32.0		35.7	16.3	
Level of Service	D	C	C	D	D	C	E	C		D	B	
Approach Delay (s)		32.7			34.1			32.9			24.2	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	49	5	92	0	982	0	0	192	0
Future Volume (vph)	0	0	0	49	5	92	0	982	0	0	192	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0	4.0		5.3			5.3	
Lane Util. Factor				0.95	0.95	0.88		0.95			0.91	
Frt				1.00	1.00	0.85		1.00			1.00	
Flt Protected				0.95	0.96	1.00		1.00			1.00	
Satd. Flow (prot)				1681	1646	2632		3539			4988	
Flt Permitted				0.95	0.96	1.00		1.00			1.00	
Satd. Flow (perm)				1681	1646	2632		3539			4988	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	0	0	0	57	6	107	0	1142	0	0	223	0
RTOR Reduction (vph)	0	0	0	0	0	90	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	31	32	17	0	1142	0	0	223	0
Heavy Vehicles (%)	0%	0%	0%	2%	20%	8%	0%	2%	6%	0%	4%	3%
Turn Type				Split	NA	custom		NA			NA	
Protected Phases				8	8	8 1		2			6	
Permitted Phases												
Actuated Green, G (s)				7.6	7.6	17.1		79.6			88.1	
Effective Green, g (s)				7.6	7.6	17.1		79.6			88.1	
Actuated g/C Ratio				0.07	0.07	0.16		0.76			0.84	
Clearance Time (s)				4.0	4.0			5.3			5.3	
Vehicle Extension (s)				3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)				121	119	428		2682			4185	
v/s Ratio Prot				0.02	c0.02	c0.01		c0.32			0.04	
v/s Ratio Perm												
v/c Ratio				0.26	0.27	0.04		0.43			0.05	
Uniform Delay, d1				46.0	46.1	37.0		4.5			1.4	
Progression Factor				1.00	1.00	1.00		0.14			0.24	
Incremental Delay, d2				1.1	1.2	0.0		0.4			0.0	
Delay (s)				47.2	47.3	37.1		1.0			0.4	
Level of Service				D	D	D		A			A	
Approach Delay (s)		0.0			40.8			1.0			0.4	
Approach LOS		A			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.3
Intersection Capacity Utilization	38.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	11	31	534	18	0	138	0	912	0	0	0
Future Volume (vph)	0	11	31	534	18	0	138	0	912	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0			4.2	4.2			
Lane Util. Factor		0.95	1.00	0.97	1.00			1.00	0.88			
Frt		1.00	0.85	1.00	1.00			1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (prot)		3312	1468	3367	1900			1787	2787			
Flt Permitted		1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (perm)		3312	1468	3367	1900			1787	2787			
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.92	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	0	13	37	636	21	0	164	0	1086	0	0	0
RTOR Reduction (vph)	0	0	32	0	0	0	0	0	273	0	0	0
Lane Group Flow (vph)	0	13	5	636	21	0	0	164	813	0	0	0
Heavy Vehicles (%)	0%	9%	10%	4%	0%	0%	1%	0%	2%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA	Perm	Split	NA	pt+ov			
Protected Phases		2		1	6		8	8	8 1		4	
Permitted Phases			2			6				4		
Actuated Green, G (s)		14.4	14.4	52.2	72.6			22.2	78.6			
Effective Green, g (s)		14.4	14.4	52.2	72.6			22.2	78.6			
Actuated g/C Ratio		0.14	0.14	0.50	0.69			0.21	0.75			
Clearance Time (s)		6.0	6.0	6.0	6.0			4.2				
Vehicle Extension (s)		3.0	3.0	3.0	3.0			3.0				
Lane Grp Cap (vph)		454	201	1673	1313			377	2086			
v/s Ratio Prot		c0.00		0.19	0.01			c0.09	c0.29			
v/s Ratio Perm			0.00									
v/c Ratio		0.03	0.03	0.38	0.02			0.44	0.39			
Uniform Delay, d1		39.2	39.2	16.4	5.1			36.0	4.7			
Progression Factor		1.00	1.00	1.00	1.00			1.13	14.80			
Incremental Delay, d2		0.0	0.1	0.7	0.0			0.8	0.1			
Delay (s)		39.3	39.3	17.0	5.1			41.4	69.5			
Level of Service		D	D	B	A			D	E			
Approach Delay (s)		39.3			16.6			65.8			0.0	
Approach LOS		D			B			E			A	

Intersection Summary			
HCM 2000 Control Delay	48.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	20.2
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	21	28	0	19	16	0
Future Volume (Veh/h)	21	28	0	19	16	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	25	34	0	23	19	0
Pedestrians	3		3			1
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	0		0			0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	56	16			26	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	56	16			26	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	97	97			99	
cM capacity (veh/h)	941	1066			1522	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	25	34	23	19
Volume Left	25	0	0	19
Volume Right	0	34	23	0
cSH	941	1066	1700	1522
Volume to Capacity	0.03	0.03	0.01	0.01
Queue Length 95th (ft)	2	2	0	1
Control Delay (s)	8.9	8.5	0.0	7.4
Lane LOS	A	A		A
Approach Delay (s)	8.7		0.0	7.4
Approach LOS	A			

Intersection Summary			
Average Delay	6.5		
Intersection Capacity Utilization	17.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	154	246	485	381	168	593	500	44	44	143	0
Future Volume (vph)	5	154	246	485	381	168	593	500	44	44	143	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	
Lane Util. Factor	1.00	0.95	0.88	0.94	0.95		0.97	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3574	2779	4990	3410		3433	3574	1482	1656	3610	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1805	3574	2779	4990	3410		3433	3574	1482	1656	3610	
Peak-hour factor, PHF	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Adj. Flow (vph)	7	205	328	647	508	224	791	667	59	59	191	0
RTOR Reduction (vph)	0	0	255	0	33	0	0	0	41	0	0	0
Lane Group Flow (vph)	7	205	73	647	699	0	791	667	18	59	191	0
Confl. Peds. (#/hr)			1									
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	1%	1%	2%	0%	2%	2%	1%	9%	9%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	1.2	20.3	20.3	16.2	35.3		20.9	28.4	28.4	7.8	15.7	
Effective Green, g (s)	1.2	20.3	20.3	16.2	35.3		20.9	28.4	28.4	7.8	15.7	
Actuated g/C Ratio	0.01	0.22	0.22	0.18	0.39		0.23	0.31	0.31	0.09	0.17	
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	23	794	617	885	1318		785	1111	460	141	620	
v/s Ratio Prot	0.00	0.06		c0.13	c0.20		c0.23	c0.19		0.04	0.05	
v/s Ratio Perm			0.03						0.01			
v/c Ratio	0.30	0.26	0.12	0.73	0.53		1.01	0.60	0.04	0.42	0.31	
Uniform Delay, d1	44.6	29.3	28.4	35.5	21.6		35.2	26.6	21.9	39.6	33.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.7	0.2	0.1	2.7	0.4		34.0	0.9	0.0	0.7	0.3	
Delay (s)	47.4	29.5	28.4	38.2	22.0		69.2	27.6	22.0	40.3	33.3	
Level of Service	D	C	C	D	C		E	C	C	D	C	
Approach Delay (s)		29.1			29.6			49.1			35.0	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	37.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	91.3	Sum of lost time (s)	18.6
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	1095	0	520	0	489	0	0	439	509
Future Volume (vph)	0	0	0	1095	0	520	0	489	0	0	439	509
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.7		4.7		6.3			5.7	5.7
Lane Util. Factor				0.97		1.00		0.95			0.95	1.00
Frpb, ped/bikes				1.00		1.00		1.00			1.00	1.00
Flpb, ped/bikes				1.00		1.00		1.00			1.00	1.00
Frt				1.00		0.85		1.00			1.00	1.00
Flt Protected				0.95		1.00		1.00			1.00	1.00
Satd. Flow (prot)				3242		1599		3539			3539	1863
Flt Permitted				0.95		1.00		1.00			1.00	1.00
Satd. Flow (perm)				3242		1599		3539			3539	1863
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	0	0	0	1335	0	634	0	596	0	0	535	621
RTOR Reduction (vph)	0	0	0	0	0	38	0	0	0	0	0	395
Lane Group Flow (vph)	0	0	0	1335	0	596	0	596	0	0	535	226
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	8%	0%	1%	0%	2%	6%	0%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	2	0	0
Turn Type				Prot		custom		NA			NA	Perm
Protected Phases				8		8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				35.1		45.1		15.5			26.1	26.1
Effective Green, g (s)				35.1		45.1		15.5			26.1	26.1
Actuated g/C Ratio				0.49		0.63		0.22			0.36	0.36
Clearance Time (s)				4.7				6.3			5.7	5.7
Vehicle Extension (s)				0.2				0.2			0.2	0.2
Lane Grp Cap (vph)				1589		1007		766			1290	679
v/s Ratio Prot				c0.41		c0.37		c0.17			0.15	
v/s Ratio Perm												0.12
v/c Ratio				0.84		0.59		0.78			0.41	0.33
Uniform Delay, d1				15.8		7.8		26.4			17.0	16.5
Progression Factor				1.00		1.00		1.00			1.00	1.00
Incremental Delay, d2				4.0		0.6		4.6			0.1	0.1
Delay (s)				19.8		8.4		31.0			17.1	16.6
Level of Service				B		A		C			B	B
Approach Delay (s)		0.0			16.2			31.0			16.8	
Approach LOS		A			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	71.6	Sum of lost time (s)	15.7
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	201	526	0	942	1383	0
Future Volume (vph)	201	526	0	942	1383	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	4.7		5.8	6.8	
Lane Util. Factor	0.97	0.88		0.95	0.95	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3433	2632		3471	3406	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3433	2632		3471	3406	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	226	591	0	1058	1554	0
RTOR Reduction (vph)	0	1	0	0	0	0
Lane Group Flow (vph)	226	590	0	1058	1554	0
Heavy Vehicles (%)	2%	8%	0%	4%	6%	6%
Turn Type	Prot	custom		NA	NA	
Protected Phases	4	4 5		2	6	
Permitted Phases						
Actuated Green, G (s)	9.0	35.3		77.5	50.2	
Effective Green, g (s)	9.0	29.5		77.5	50.2	
Actuated g/C Ratio	0.09	0.30		0.80	0.52	
Clearance Time (s)	4.7			5.8	6.8	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	318	800		2773	1762	
v/s Ratio Prot	0.07	c0.22		0.30	c0.46	
v/s Ratio Perm						
v/c Ratio	0.71	0.74		0.38	0.88	
Uniform Delay, d1	42.7	30.3		2.8	20.8	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.1	3.1		0.0	5.4	
Delay (s)	48.8	33.4		2.9	26.2	
Level of Service	D	C		A	C	
Approach Delay (s)	37.6			2.9	26.2	
Approach LOS	D			A	C	

Intersection Summary			
HCM 2000 Control Delay	21.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	97.0	Sum of lost time (s)	17.3
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	297	87	276	955	3	171	0	206	1	0	3
Future Volume (vph)	6	297	87	276	955	3	171	0	206	1	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95	1.00		1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.98		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Frt	1.00	0.97		1.00	1.00		1.00	1.00	0.85		0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.95	1.00		0.99	
Satd. Flow (prot)	1805	3361		1752	3534		1698	1698	1539		1653	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.95	1.00		1.00	
Satd. Flow (perm)	1805	3361		1752	3534		1698	1698	1539		1674	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	7	326	96	303	1049	3	188	0	226	1	0	3
RTOR Reduction (vph)	0	16	0	0	0	0	0	0	201	0	4	0
Lane Group Flow (vph)	7	406	0	303	1052	0	94	94	25	0	0	0
Confl. Peds. (#/hr)			4						5			
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	4%	0%	3%	2%	33%	1%	0%	3%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA		Split	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		8	8			4	
Permitted Phases									8	4		
Actuated Green, G (s)	1.2	58.9		24.1	81.8		12.6	12.6	12.6		0.9	
Effective Green, g (s)	1.2	58.9		24.1	81.8		12.6	12.6	12.6		0.9	
Actuated g/C Ratio	0.01	0.52		0.21	0.72		0.11	0.11	0.11		0.01	
Clearance Time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)	19	1736		370	2535		187	187	170		13	
v/s Ratio Prot	0.00	0.12		c0.17	c0.30		c0.06	0.06				
v/s Ratio Perm									0.02		c0.00	
v/c Ratio	0.37	0.23		0.82	0.41		0.50	0.50	0.15		0.00	
Uniform Delay, d1	56.0	15.1		42.9	6.5		47.7	47.7	45.8		56.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	4.4	0.3		12.5	0.5		0.8	0.8	0.1		0.0	
Delay (s)	60.4	15.5		55.4	7.0		48.5	48.5	46.0		56.1	
Level of Service	E	B		E	A		D	D	D		E	
Approach Delay (s)		16.2			17.8			47.1			56.1	
Approach LOS		B			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	114.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	169	960	213	222	511	28	205	523	461	83	562	69
Future Volume (vph)	169	960	213	222	511	28	205	523	461	83	562	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91		0.94	0.95	0.88	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3467	5136	2751	3502	5082		5040	3610	2801	3502	5136	1553
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3467	5136	2751	3502	5082		5040	3610	2801	3502	5136	1553
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)	184	1043	232	241	555	30	223	568	501	90	611	75
RTOR Reduction (vph)	0	0	156	0	4	0	0	0	355	0	0	56
Lane Group Flow (vph)	184	1043	76	241	581	0	223	568	146	90	611	19
Confl. Peds. (#/hr)			1			3			3			
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	1%	1%	2%	0%	1%	5%	1%	0%	0%	0%	1%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	10.0	32.5	32.5	11.6	34.1		9.1	28.7	28.7	5.8	25.4	25.4
Effective Green, g (s)	10.0	32.5	32.5	11.6	34.1		9.1	28.7	28.7	5.8	25.4	25.4
Actuated g/C Ratio	0.10	0.33	0.33	0.12	0.35		0.09	0.29	0.29	0.06	0.26	0.26
Clearance Time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Vehicle Extension (s)	2.0	3.5	3.5	2.0	3.5		2.0	3.5	3.5	2.0	3.5	3.5
Lane Grp Cap (vph)	351	1692	906	412	1757		465	1050	815	206	1323	400
v/s Ratio Prot	0.05	c0.20		c0.07	0.11		c0.04	c0.16		0.03	0.12	
v/s Ratio Perm			0.03						0.05			0.01
v/c Ratio	0.52	0.62	0.08	0.58	0.33		0.48	0.54	0.18	0.44	0.46	0.05
Uniform Delay, d1	42.0	27.8	22.8	41.2	23.8		42.5	29.4	26.1	44.8	30.8	27.5
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	0.7	0.0	1.4	0.1		0.3	0.6	0.1	0.5	0.3	0.1
Delay (s)	42.7	28.5	22.8	42.6	24.0		42.8	30.0	26.3	45.4	31.1	27.6
Level of Service	D	C	C	D	C		D	C	C	D	C	C
Approach Delay (s)		29.4			29.4			30.8			32.4	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	30.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	98.6	Sum of lost time (s)	20.0
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	310	739	525	550	278	65	419	648	427	93	720	125
Future Volume (vph)	310	739	525	550	278	65	419	648	427	93	720	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Lane Util. Factor	0.97	0.95	0.88	0.94	0.95		0.94	0.95	1.00	0.97	0.86	0.88
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3502	3574	2776	5090	3442		5090	3610	1599	3502	6408	2774
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3502	3574	2776	5090	3442		5090	3610	1599	3502	6408	2774
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	323	770	547	573	290	68	436	675	445	97	750	130
RTOR Reduction (vph)	0	0	378	0	14	0	0	0	307	0	0	101
Lane Group Flow (vph)	323	770	169	573	344	0	436	675	138	97	750	29
Confl. Peds. (#/hr)						1						2
Confl. Bikes (#/hr)			2			2						
Heavy Vehicles (%)	0%	1%	1%	0%	2%	0%	0%	0%	1%	0%	2%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases			2						4			8
Actuated Green, G (s)	14.7	31.7	31.7	16.6	33.6		14.1	30.8	30.8	7.6	24.3	24.3
Effective Green, g (s)	14.7	31.7	31.7	16.6	33.6		14.1	30.8	30.8	7.6	24.3	24.3
Actuated g/C Ratio	0.14	0.29	0.29	0.15	0.31		0.13	0.28	0.28	0.07	0.22	0.22
Clearance Time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	475	1046	812	780	1067		662	1026	454	245	1437	622
v/s Ratio Prot	0.09	c0.22		c0.11	0.10		c0.09	c0.19		0.03	0.12	
v/s Ratio Perm			0.06						0.09			0.01
v/c Ratio	0.68	0.74	0.21	0.73	0.32		0.66	0.66	0.30	0.40	0.52	0.05
Uniform Delay, d1	44.6	34.5	28.9	43.7	28.6		44.8	34.1	30.4	48.2	36.9	32.9
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	3.2	2.7	0.1	3.1	0.2		1.8	1.7	0.5	0.4	0.4	0.0
Delay (s)	47.7	37.3	29.0	46.9	28.8		46.6	35.8	30.9	48.5	37.3	33.0
Level of Service	D	D	C	D	C		D	D	C	D	D	C
Approach Delay (s)		36.6			39.9			37.4			37.9	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	37.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	108.3	Sum of lost time (s)	21.6
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	221	147	370	164	13	4	212	783	104	3	695	95
Future Volume (vph)	221	147	370	164	13	4	212	783	104	3	695	95
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	4.0	4.0		5.3	4.9		5.3	4.9	4.9
Lane Util. Factor	0.97	1.00	0.88	1.00	1.00		0.97	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	1900	2760	1770	1801		3400	3516		1805	3539	1595
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	1900	2760	1770	1801		3400	3516		1805	3539	1595
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	243	162	407	180	14	4	233	860	114	3	764	104
RTOR Reduction (vph)	0	0	261	0	4	0	0	6	0	0	0	69
Lane Group Flow (vph)	243	162	146	180	14	0	233	968	0	3	764	35
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	0%	3%	2%	2%	2%	3%	1%	0%	0%	2%	0%
Turn Type	Prot	NA	pt+ov	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2	2 3	1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	25.0	20.3	34.3	14.3	9.6		8.7	40.6		0.6	32.5	32.5
Effective Green, g (s)	25.0	20.3	34.3	14.3	9.6		8.7	40.6		0.6	32.5	32.5
Actuated g/C Ratio	0.26	0.21	0.36	0.15	0.10		0.09	0.43		0.01	0.34	0.34
Clearance Time (s)	5.3	5.3		4.0	4.0		5.3	4.9		5.3	4.9	4.9
Vehicle Extension (s)	2.0	4.0		2.0	2.0		2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)	918	404	993	265	181		310	1497		11	1206	543
v/s Ratio Prot	0.07	c0.09	0.05	c0.10	0.01		c0.07	c0.28		0.00	0.22	
v/s Ratio Perm												0.02
v/c Ratio	0.26	0.40	0.15	0.68	0.08		0.75	0.65		0.27	0.63	0.07
Uniform Delay, d1	27.9	32.3	20.6	38.3	38.8		42.2	21.7		47.1	26.4	21.2
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.1	0.9	0.1	5.4	0.1		8.8	1.1		4.8	1.2	0.1
Delay (s)	27.9	33.2	20.7	43.7	38.9		51.0	22.7		52.0	27.6	21.2
Level of Service	C	C	C	D	D		D	C		D	C	C
Approach Delay (s)		25.4			43.2			28.2			26.9	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	95.3	Sum of lost time (s)	19.5
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	314	2	519	0	589	0	0	875	404
Future Volume (vph)	0	0	0	314	2	519	0	589	0	0	875	404
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.7	3.7	3.7		4.8			4.8	4.8
Lane Util. Factor				0.95	0.95	0.88		1.00			0.95	1.00
Frpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	1.00
Flpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	0.95	1.00		1.00			1.00	1.00
Satd. Flow (prot)				1715	1720	2814		1900			3539	1599
Flt Permitted				0.95	0.95	1.00		1.00			1.00	1.00
Satd. Flow (perm)				1715	1720	2814		1900			3539	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	331	2	546	0	620	0	0	921	425
RTOR Reduction (vph)	0	0	0	0	0	152	0	0	0	0	0	183
Lane Group Flow (vph)	0	0	0	165	168	394	0	620	0	0	921	242
Confl. Peds. (#/hr)			1									
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	0%	3%	0%	2%	1%
Turn Type				Split	NA	custom		NA			NA	Perm
Protected Phases				8	8	8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				11.6	11.6	19.5		18.8			26.7	26.7
Effective Green, g (s)				11.6	11.6	19.5		18.8			26.7	26.7
Actuated g/C Ratio				0.25	0.25	0.42		0.40			0.57	0.57
Clearance Time (s)				3.7	3.7			4.8			4.8	4.8
Vehicle Extension (s)				4.0	4.0			4.0			2.5	2.5
Lane Grp Cap (vph)				425	426	1172		763			2019	912
v/s Ratio Prot				0.10	c0.10	0.14		c0.33			c0.26	
v/s Ratio Perm												0.15
v/c Ratio				0.39	0.39	0.34		0.81			0.46	0.27
Uniform Delay, d1				14.6	14.7	9.3		12.4			5.8	5.1
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.8	0.8	0.2		6.9			0.1	0.1
Delay (s)				15.5	15.5	9.5		19.4			6.0	5.2
Level of Service				B	B	A		B			A	A
Approach Delay (s)		0.0			11.8			19.4			5.7	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	46.8	Sum of lost time (s)	12.2
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	517	257	0	928	928	0
Future Volume (vph)	517	257	0	928	928	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.88		0.95	0.95	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3502	2787		3610	3430	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3502	2787		3610	3430	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	568	282	0	1020	1020	0
RTOR Reduction (vph)	0	111	0	0	0	0
Lane Group Flow (vph)	568	171	0	1020	1020	0
Heavy Vehicles (%)	0%	2%	0%	0%	0%	3%
Parking (#/hr)					0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	10.3	10.3		17.8	17.8	
Effective Green, g (s)	10.3	10.3		17.8	17.8	
Actuated g/C Ratio	0.29	0.29		0.49	0.49	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	
Lane Grp Cap (vph)	999	795		1780	1691	
v/s Ratio Prot	c0.16			0.28	c0.30	
v/s Ratio Perm		0.06				
v/c Ratio	0.57	0.21		0.57	0.60	
Uniform Delay, d1	11.0	9.8		6.5	6.6	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.0		0.3	0.4	
Delay (s)	11.4	9.9		6.7	7.0	
Level of Service	B	A		A	A	
Approach Delay (s)	10.9			6.7	7.0	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	8.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	36.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	47.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	597	197	299	22	118	195	41	157	102	118	102	0
Future Volume (vph)	597	197	299	22	118	195	41	157	102	118	102	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.9	4.9	4.9	3.5	5.3		4.0	5.3	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1900	1599	1805	1863	1568	1805	3306		1736	3396	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1900	1599	1805	1863	1568	1805	3306		1736	3396	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	628	207	315	23	124	205	43	165	107	124	107	0
RTOR Reduction (vph)	0	0	234	0	0	144	0	72	0	0	0	0
Lane Group Flow (vph)	628	207	81	23	124	61	43	200	0	124	107	0
Confl. Peds. (#/hr)									2			
Heavy Vehicles (%)	2%	0%	1%	0%	2%	3%	0%	3%	0%	4%	1%	1%
Parking (#/hr)											0	
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	7	7		8	8	8 1	5	2		1	6	
Permitted Phases			7									
Actuated Green, G (s)	26.9	26.9	26.9	14.3	14.3	31.0	5.4	34.3		11.8	41.2	
Effective Green, g (s)	26.9	26.9	26.9	14.3	14.3	31.0	5.4	34.3		11.8	41.2	
Actuated g/C Ratio	0.26	0.26	0.26	0.14	0.14	0.30	0.05	0.33		0.11	0.39	
Clearance Time (s)	3.5	3.5	3.5	4.9	4.9		3.5	5.3		4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	879	486	409	245	253	462	92	1079		195	1332	
v/s Ratio Prot	c0.18	0.11		0.01	c0.07	0.04	0.02	c0.06		c0.07	0.03	
v/s Ratio Perm			0.05									
v/c Ratio	0.71	0.43	0.20	0.09	0.49	0.13	0.47	0.19		0.64	0.08	
Uniform Delay, d1	35.6	32.6	30.6	39.7	42.0	27.1	48.4	25.3		44.5	20.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.49	0.87	
Incremental Delay, d2	2.8	0.6	0.2	0.2	1.5	0.1	3.7	0.4		6.6	0.1	
Delay (s)	38.3	33.2	30.8	39.8	43.5	27.3	52.1	25.7		28.6	17.5	
Level of Service	D	C	C	D	D	C	D	C		C	B	
Approach Delay (s)		35.4			33.8			29.3			23.5	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	43	2	162	0	741	0	0	242	0
Future Volume (vph)	0	0	0	43	2	162	0	741	0	0	242	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0	4.0		5.3			5.3	
Lane Util. Factor				0.95	0.95	0.88		0.95			0.91	
Frpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	
Flpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	
Frt				1.00	1.00	0.85		1.00			1.00	
Flt Protected				0.95	0.96	1.00		1.00			1.00	
Satd. Flow (prot)				1715	1726	2814		3539			4893	
Flt Permitted				0.95	0.96	1.00		1.00			1.00	
Satd. Flow (perm)				1715	1726	2814		3539			4893	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	0	47	2	178	0	814	0	0	266	0
RTOR Reduction (vph)	0	0	0	0	0	150	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	24	25	28	0	814	0	0	266	0
Confl. Peds. (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	2%	3%	0%	6%	2%
Turn Type				Split	NA	custom		NA			NA	
Protected Phases				8	8	8 1		2			6	
Permitted Phases												
Actuated Green, G (s)				7.1	7.1	16.6		80.1			88.6	
Effective Green, g (s)				7.1	7.1	16.6		80.1			88.6	
Actuated g/C Ratio				0.07	0.07	0.16		0.76			0.84	
Clearance Time (s)				4.0	4.0			5.3			5.3	
Vehicle Extension (s)				3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)				115	116	444		2699			4128	
v/s Ratio Prot				0.01	c0.01	c0.01		c0.23			0.05	
v/s Ratio Perm												
v/c Ratio				0.21	0.22	0.06		0.30			0.06	
Uniform Delay, d1				46.3	46.3	37.6		3.8			1.4	
Progression Factor				1.00	1.00	1.00		0.93			0.19	
Incremental Delay, d2				0.9	0.9	0.1		0.2			0.0	
Delay (s)				47.2	47.3	37.6		3.8			0.3	
Level of Service				D	D	D		A			A	
Approach Delay (s)		0.0			39.7			3.8			0.3	
Approach LOS		A			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.3
Intersection Capacity Utilization	33.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	7	99	860	11	1	153	0	710	0	1	0
Future Volume (vph)	0	7	99	860	11	1	153	0	710	0	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0	6.0		4.2	4.2		4.0	
Lane Util. Factor		0.95	1.00	0.97	1.00	1.00		1.00	0.88		1.00	
Frpb, ped/bikes		1.00	0.99	1.00	1.00	1.00		1.00	1.00		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt		1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	
Flt Protected		1.00	1.00	0.95	1.00	1.00		0.95	1.00		1.00	
Satd. Flow (prot)		3167	1548	3467	1900	1615		1752	2814		1900	
Flt Permitted		1.00	1.00	0.95	1.00	1.00		0.95	1.00		1.00	
Satd. Flow (perm)		3167	1548	3467	1900	1615		1752	2814		1900	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	8	109	945	12	1	168	0	780	0	1	0
RTOR Reduction (vph)	0	0	81	0	0	0	0	0	328	0	0	0
Lane Group Flow (vph)	0	8	28	945	12	1	0	168	452	0	1	0
Confl. Peds. (#/hr)			1									
Confl. Bikes (#/hr)									2			
Heavy Vehicles (%)	0%	14%	3%	1%	0%	0%	3%	0%	1%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA	Perm	Split	NA	pt+ov		NA	
Protected Phases		2		1	6		8	8	8 1		4	
Permitted Phases			2			6				4		
Actuated Green, G (s)		27.0	27.0	37.5	70.5	70.5		19.1	60.8		1.2	
Effective Green, g (s)		27.0	27.0	37.5	70.5	70.5		19.1	60.8		1.2	
Actuated g/C Ratio		0.26	0.26	0.36	0.67	0.67		0.18	0.58		0.01	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0		4.2			4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		814	398	1238	1275	1084		318	1629		21	
v/s Ratio Prot		0.00		c0.27	0.01			c0.10	0.16		c0.00	
v/s Ratio Perm			c0.02			0.00						
v/c Ratio		0.01	0.07	0.76	0.01	0.00		0.53	0.28		0.05	
Uniform Delay, d1		29.0	29.5	29.8	5.7	5.7		38.9	11.1		51.3	
Progression Factor		1.00	1.00	1.00	1.00	1.00		1.03	12.25		1.00	
Incremental Delay, d2		0.0	0.1	4.5	0.0	0.0		1.5	0.1		0.9	
Delay (s)		29.0	29.6	34.3	5.7	5.7		41.4	135.9		52.3	
Level of Service		C	C	C	A	A		D	F		D	
Approach Delay (s)		29.5			33.9			119.1			52.3	
Approach LOS		C			C			F			D	

Intersection Summary			
HCM 2000 Control Delay	73.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	20.2
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	45	22	2	27	16	0
Future Volume (Veh/h)	45	22	2	27	16	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	59	29	3	36	21	0
Pedestrians	3		1			
Lane Width (ft)	12.0		12.0			
Walking Speed (ft/s)	4.0		4.0			
Percent Blockage	0		0			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	67	24			42	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	67	24			42	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	94	97			99	
cM capacity (veh/h)	917	1044			1532	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	59	29	39	21
Volume Left	59	0	0	21
Volume Right	0	29	36	0
cSH	917	1044	1700	1532
Volume to Capacity	0.06	0.03	0.02	0.01
Queue Length 95th (ft)	5	2	0	1
Control Delay (s)	9.2	8.5	0.0	7.4
Lane LOS	A	A		A
Approach Delay (s)	9.0		0.0	7.4
Approach LOS	A			

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	17.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	312	612	257	146	139	333	343	121	121	243	14
Future Volume (vph)	10	312	612	257	146	139	333	343	121	121	243	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	4.9
Lane Util. Factor	1.00	0.95	0.88	0.94	0.95		0.97	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	3610	2778	5090	3260		3433	3610	1583	1736	3610	1615
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1805	3610	2778	5090	3260		3433	3610	1583	1736	3610	1615
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)	11	339	665	279	159	151	362	373	132	132	264	15
RTOR Reduction (vph)	0	0	475	0	91	0	0	0	106	0	0	12
Lane Group Flow (vph)	11	339	190	279	219	0	362	373	26	132	264	3
Confl. Peds. (#/hr)						1						
Confl. Bikes (#/hr)			1			1						
Heavy Vehicles (%)	0%	0%	1%	0%	1%	3%	2%	0%	2%	4%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	1.3	22.0	22.0	10.0	30.7		12.9	15.1	15.1	11.4	14.0	14.0
Effective Green, g (s)	1.3	22.0	22.0	10.0	30.7		12.9	15.1	15.1	11.4	14.0	14.0
Actuated g/C Ratio	0.02	0.29	0.29	0.13	0.40		0.17	0.20	0.20	0.15	0.18	0.18
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	4.9
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	3.0	3.0	2.0	3.0	3.0
Lane Grp Cap (vph)	30	1030	792	660	1298		574	707	310	256	655	293
v/s Ratio Prot	0.01	c0.09		c0.05	0.07		c0.11	c0.10		0.08	0.07	
v/s Ratio Perm			0.07						0.02			0.00
v/c Ratio	0.37	0.33	0.24	0.42	0.17		0.63	0.53	0.08	0.52	0.40	0.01
Uniform Delay, d1	37.5	21.7	21.1	30.9	15.0		29.9	27.8	25.3	30.3	27.9	25.9
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	2.8	0.2	0.2	0.2	0.1		1.7	0.7	0.1	0.7	0.4	0.0
Delay (s)	40.2	21.9	21.3	31.1	15.0		31.5	28.5	25.5	31.0	28.3	25.9
Level of Service	D	C	C	C	B		C	C	C	C	C	C
Approach Delay (s)		21.7			22.6			29.3			29.1	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	77.1	Sum of lost time (s)	18.6
Intersection Capacity Utilization	52.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	1030	0	301	0	585	0	0	763	374
Future Volume (vph)	0	0	0	1030	0	301	0	585	0	0	763	374
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.7		4.7		6.3			5.7	5.7
Lane Util. Factor				0.97		1.00		0.95			0.95	1.00
Frt				1.00		0.85		1.00			1.00	1.00
Flt Protected				0.95		1.00		1.00			1.00	1.00
Satd. Flow (prot)				3335		1599		3574			3574	1863
Flt Permitted				0.95		1.00		1.00			1.00	1.00
Satd. Flow (perm)				3335		1599		3574			3574	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.93	0.92	0.93	0.92	0.93	0.93	0.93	0.93	0.92
Adj. Flow (vph)	0	0	0	1108	0	324	0	629	0	0	820	407
RTOR Reduction (vph)	0	0	0	0	0	34	0	0	0	0	0	261
Lane Group Flow (vph)	0	0	0	1108	0	290	0	629	0	0	820	146
Heavy Vehicles (%)	2%	2%	2%	5%	2%	1%	2%	1%	2%	0%	1%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	2	0	0
Turn Type				Prot		custom		NA			NA	Perm
Protected Phases				8		8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				33.6		42.3		15.2			24.5	24.5
Effective Green, g (s)				33.6		42.3		15.2			24.5	24.5
Actuated g/C Ratio				0.49		0.62		0.22			0.36	0.36
Clearance Time (s)				4.7				6.3			5.7	5.7
Vehicle Extension (s)				0.2				0.2			0.2	0.2
Lane Grp Cap (vph)				1635		987		793			1278	666
v/s Ratio Prot				c0.33		0.18		c0.18			c0.23	
v/s Ratio Perm												0.08
v/c Ratio				0.68		0.29		0.79			0.64	0.22
Uniform Delay, d1				13.3		6.1		25.2			18.3	15.3
Progression Factor				1.00		1.00		1.00			1.00	1.00
Incremental Delay, d2				0.9		0.1		5.1			0.8	0.1
Delay (s)				14.2		6.2		30.3			19.2	15.4
Level of Service				B		A		C			B	B
Approach Delay (s)		0.0			12.4			30.3			17.9	
Approach LOS		A			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	68.5	Sum of lost time (s)	15.7
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	189	470	0	1165	1497	0
Future Volume (vph)	189	470	0	1165	1497	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	4.7		5.8	6.8	
Lane Util. Factor	0.97	0.88		0.95	0.95	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3467	2733		3539	3505	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3467	2733		3539	3505	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	193	480	0	1189	1528	0
RTOR Reduction (vph)	0	1	0	0	0	0
Lane Group Flow (vph)	193	479	0	1189	1528	0
Heavy Vehicles (%)	1%	4%	0%	2%	3%	1%
Turn Type	Prot	custom		NA	NA	
Protected Phases	4	4 5		2	6	
Permitted Phases						
Actuated Green, G (s)	7.9	29.5		72.7	50.1	
Effective Green, g (s)	7.9	23.7		72.7	50.1	
Actuated g/C Ratio	0.09	0.26		0.80	0.55	
Clearance Time (s)	4.7			5.8	6.8	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	300	711		2824	1927	
v/s Ratio Prot	0.06	c0.18		0.34	c0.44	
v/s Ratio Perm						
v/c Ratio	0.64	0.67		0.42	0.79	
Uniform Delay, d1	40.2	30.2		2.8	16.4	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.5	2.0		0.0	2.2	
Delay (s)	43.8	32.2		2.8	18.5	
Level of Service	D	C		A	B	
Approach Delay (s)	35.5			2.8	18.5	
Approach LOS	D			A	B	

Intersection Summary			
HCM 2000 Control Delay	16.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	91.1	Sum of lost time (s)	17.3
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	843	119	295	424	0	114	2	365	6	1	2
Future Volume (vph)	2	843	119	295	424	0	114	2	365	6	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Frt	1.00	0.98		1.00	1.00		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (prot)	1805	3495		1787	3539		1681	1689	1565		1784	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.95	1.00		1.00	
Satd. Flow (perm)	1805	3495		1787	3539		1681	1689	1565		1843	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	2	887	125	311	446	0	120	2	384	6	1	2
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	349	0	2	0
Lane Group Flow (vph)	2	1006	0	311	446	0	61	61	35	0	7	0
Confl. Peds. (#/hr)			8			3			6			
Confl. Bikes (#/hr)			3			4						
Heavy Vehicles (%)	0%	1%	0%	1%	2%	0%	2%	0%	1%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		8	8			4	
Permitted Phases									8	4		
Actuated Green, G (s)	1.1	72.2		27.0	98.1		11.7	11.7	11.7		1.6	
Effective Green, g (s)	1.1	72.2		27.0	98.1		11.7	11.7	11.7		1.6	
Actuated g/C Ratio	0.01	0.56		0.21	0.75		0.09	0.09	0.09		0.01	
Clearance Time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)	15	1941		371	2670		151	152	140		22	
v/s Ratio Prot	0.00	c0.29		c0.17	0.13		c0.04	0.04				
v/s Ratio Perm									0.02		c0.00	
v/c Ratio	0.13	0.52		0.84	0.17		0.40	0.40	0.25		0.32	
Uniform Delay, d1	64.0	18.0		49.4	4.5		55.9	55.8	55.0		63.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	1.5	1.0		14.5	0.1		0.6	0.6	0.3		3.0	
Delay (s)	65.4	19.0		64.0	4.6		56.5	56.5	55.4		66.7	
Level of Service	E	B		E	A		E	E	E		E	
Approach Delay (s)		19.1			29.0			55.7			66.7	
Approach LOS		B			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	30.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	128	362	124	334	675	89	157	663	157	19	420	77
Future Volume (vph)	128	362	124	334	675	89	157	663	157	19	420	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91		0.94	0.95	0.88	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3400	4988	2564	3467	4899		4802	3539	2738	3099	5085	1489
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3400	4988	2564	3467	4899		4802	3539	2738	3099	5085	1489
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	138	389	133	359	726	96	169	713	169	20	452	83
RTOR Reduction (vph)	0	0	102	0	13	0	0	0	111	0	0	61
Lane Group Flow (vph)	138	389	31	359	809	0	169	713	58	20	452	22
Confl. Peds. (#/hr)			8			14			7			2
Heavy Vehicles (%)	3%	4%	9%	1%	4%	2%	6%	2%	2%	13%	2%	7%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	8.6	20.1	20.1	14.0	25.5		8.2	29.5	29.5	1.8	23.1	23.1
Effective Green, g (s)	8.6	20.1	20.1	14.0	25.5		8.2	29.5	29.5	1.8	23.1	23.1
Actuated g/C Ratio	0.10	0.24	0.24	0.16	0.30		0.10	0.35	0.35	0.02	0.27	0.27
Clearance Time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Vehicle Extension (s)	2.0	3.5	3.5	2.0	3.5		2.0	3.5	3.5	2.0	3.5	3.5
Lane Grp Cap (vph)	342	1173	603	568	1462		461	1222	945	65	1375	402
v/s Ratio Prot	0.04	0.08		c0.10	c0.17		c0.04	c0.20		0.01	0.09	
v/s Ratio Perm			0.01						0.02			0.02
v/c Ratio	0.40	0.33	0.05	0.63	0.55		0.37	0.58	0.06	0.31	0.33	0.06
Uniform Delay, d1	36.0	27.1	25.3	33.3	25.2		36.2	22.9	18.7	41.2	24.9	23.1
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	0.3	0.2	0.0	1.7	0.5		0.2	0.8	0.0	1.0	0.2	0.1
Delay (s)	36.3	27.3	25.3	35.0	25.7		36.3	23.7	18.7	42.2	25.1	23.1
Level of Service	D	C	C	C	C		D	C	B	D	C	C
Approach Delay (s)		28.8			28.5			24.9			25.4	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	85.4	Sum of lost time (s)	20.0
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	106	183	130	613	759	44	221	488	397	56	996	96
Future Volume (vph)	106	183	130	613	759	44	221	488	397	56	996	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Lane Util. Factor	0.97	0.95	0.88	0.94	0.95		0.94	0.95	1.00	0.97	0.86	0.88
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3400	3374	2760	4990	3479		4894	3471	1563	3072	6408	2733
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3400	3374	2760	4990	3479		4894	3471	1563	3072	6408	2733
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	113	195	138	652	807	47	235	519	422	60	1060	102
RTOR Reduction (vph)	0	0	108	0	3	0	0	0	280	0	0	72
Lane Group Flow (vph)	113	195	30	652	851	0	235	519	142	60	1060	30
Confl. Peds. (#/hr)						4			1			
Heavy Vehicles (%)	3%	7%	3%	2%	3%	0%	4%	4%	2%	14%	2%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases			2						4			8
Actuated Green, G (s)	7.9	22.2	22.2	17.5	31.8		9.5	33.9	33.9	5.4	29.8	29.8
Effective Green, g (s)	7.9	22.2	22.2	17.5	31.8		9.5	33.9	33.9	5.4	29.8	29.8
Actuated g/C Ratio	0.08	0.22	0.22	0.17	0.32		0.09	0.34	0.34	0.05	0.30	0.30
Clearance Time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	266	744	609	868	1099		462	1169	526	164	1898	809
v/s Ratio Prot	0.03	0.06		c0.13	c0.24		c0.05	c0.15		0.02	c0.17	
v/s Ratio Perm			0.01						0.09			0.01
v/c Ratio	0.42	0.26	0.05	0.75	0.77		0.51	0.44	0.27	0.37	0.56	0.04
Uniform Delay, d1	44.2	32.4	30.9	39.5	31.2		43.3	26.0	24.3	45.9	29.9	25.2
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	0.4	0.2	0.0	3.3	3.5		0.3	0.4	0.4	0.5	0.4	0.0
Delay (s)	44.6	32.6	30.9	42.8	34.6		43.7	26.4	24.7	46.5	30.3	25.2
Level of Service	D	C	C	D	C		D	C	C	D	C	C
Approach Delay (s)		35.1			38.1			29.2			30.7	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	33.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	100.6	Sum of lost time (s)	21.6
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	29	156	45	1114	100	499	492	413	32	1013	161
Future Volume (vph)	68	29	156	45	1114	100	499	492	413	32	1013	161
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	4.0	4.0		5.3	4.9		5.3	4.9	4.9
Lane Util. Factor	0.97	1.00	0.88	1.00	1.00		0.97	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.93		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	1900	2608	1770	1840		3367	3291		1805	3574	1579
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	1900	2608	1770	1840		3367	3291		1805	3574	1579
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	72	31	164	47	1173	105	525	518	435	34	1066	169
RTOR Reduction (vph)	0	0	89	0	3	0	0	127	0	0	0	94
Lane Group Flow (vph)	72	31	75	47	1275	0	525	826	0	34	1066	75
Confl. Peds. (#/hr)												1
Heavy Vehicles (%)	2%	0%	9%	2%	2%	2%	4%	4%	0%	0%	1%	1%
Turn Type	Prot	NA	pt+ov	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2	2 3	1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	5.2	30.5	49.4	5.6	30.9		13.6	48.5		4.4	39.3	39.3
Effective Green, g (s)	5.2	30.5	49.4	5.6	30.9		13.6	48.5		4.4	39.3	39.3
Actuated g/C Ratio	0.05	0.28	0.46	0.05	0.28		0.13	0.45		0.04	0.36	0.36
Clearance Time (s)	5.3	5.3		4.0	4.0		5.3	4.9		5.3	4.9	4.9
Vehicle Extension (s)	2.0	4.0		2.0	2.0		2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)	164	534	1187	91	524		422	1471		73	1294	571
v/s Ratio Prot	0.02	0.02	0.03	c0.03	c0.69		c0.16	0.25		0.02	c0.30	
v/s Ratio Perm												0.05
v/c Ratio	0.44	0.06	0.06	0.52	2.43		1.24	0.56		0.47	0.82	0.13
Uniform Delay, d1	50.2	28.5	16.6	50.1	38.8		47.5	22.2		50.9	31.5	23.2
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	0.1	0.0	2.1	650.8		128.4	0.6		1.7	4.6	0.1
Delay (s)	50.9	28.6	16.6	52.2	689.6		175.9	22.8		52.6	36.1	23.3
Level of Service	D	C	B	D	F		F	C		D	D	C
Approach Delay (s)		27.2			667.0			77.1			34.8	
Approach LOS		C			F			E			C	

Intersection Summary			
HCM 2000 Control Delay	241.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.43		
Actuated Cycle Length (s)	108.5	Sum of lost time (s)	19.5
Intersection Capacity Utilization	118.9%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	246	62	654	0	403	0	0	594	502
Future Volume (vph)	0	0	0	246	62	654	0	403	0	0	594	502
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.7	3.7	3.7		4.8			4.8	4.8
Lane Util. Factor				0.95	0.95	0.88		1.00			0.95	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	0.97	1.00		1.00			1.00	1.00
Satd. Flow (prot)				1633	1688	2760		1845			3505	1599
Flt Permitted				0.95	0.97	1.00		1.00			1.00	1.00
Satd. Flow (perm)				1633	1688	2760		1845			3505	1599
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	0	254	64	674	0	415	0	0	612	518
RTOR Reduction (vph)	0	0	0	0	0	389	0	0	0	0	0	227
Lane Group Flow (vph)	0	0	0	157	161	285	0	415	0	0	612	291
Heavy Vehicles (%)	0%	0%	0%	5%	2%	3%	0%	3%	20%	0%	3%	1%
Turn Type				Split	NA	custom		NA			NA	Perm
Protected Phases				8	8	8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				9.9	9.9	17.7		15.7			23.5	23.5
Effective Green, g (s)				9.9	9.9	17.7		15.7			23.5	23.5
Actuated g/C Ratio				0.24	0.24	0.42		0.37			0.56	0.56
Clearance Time (s)				3.7	3.7			4.8			4.8	4.8
Vehicle Extension (s)				4.0	4.0			4.0			2.5	2.5
Lane Grp Cap (vph)				385	398	1165		691			1965	896
v/s Ratio Prot				c0.10	0.10	0.10		c0.22			0.17	
v/s Ratio Perm												c0.18
v/c Ratio				0.41	0.40	0.24		0.60			0.31	0.32
Uniform Delay, d1				13.5	13.5	7.8		10.6			4.9	4.9
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				1.0	0.9	0.1		1.7			0.1	0.2
Delay (s)				14.5	14.4	7.9		12.3			5.0	5.1
Level of Service				B	B	A		B			A	A
Approach Delay (s)		0.0			10.0			12.3			5.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	41.9	Sum of lost time (s)	12.2
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	288	480	0	502	592	0
Future Volume (vph)	288	480	0	502	592	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.88		0.95	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3367	2409		3223	3406	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3367	2409		3223	3406	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	310	516	0	540	637	0
RTOR Reduction (vph)	0	312	0	0	0	0
Lane Group Flow (vph)	310	204	0	540	637	0
Confl. Bikes (#/hr)						3
Heavy Vehicles (%)	4%	18%	0%	12%	6%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	6.1	6.1		11.0	11.0	
Effective Green, g (s)	6.1	6.1		11.0	11.0	
Actuated g/C Ratio	0.24	0.24		0.44	0.44	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	
Lane Grp Cap (vph)	818	585		1412	1492	
v/s Ratio Prot	c0.09			0.17	c0.19	
v/s Ratio Perm		0.08				
v/c Ratio	0.38	0.35		0.38	0.43	
Uniform Delay, d1	7.9	7.9		4.8	4.9	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.1		0.1	0.1	
Delay (s)	8.0	8.0		4.8	4.9	
Level of Service	A	A		A	A	
Approach Delay (s)	8.0			4.8	4.9	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	6.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	25.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	727	235	151	14	53	102	19	580	178	67	103	0
Future Volume (vph)	727	235	151	14	53	102	19	580	178	67	103	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.9	4.9	4.9	3.5	5.3		4.0	5.3	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1827	1538	1687	1681	1599	1719	3328		1719	3438	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1827	1538	1687	1681	1599	1719	3328		1719	3438	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	808	261	168	16	59	113	21	644	198	74	114	0
RTOR Reduction (vph)	0	0	121	0	0	44	0	27	0	0	0	0
Lane Group Flow (vph)	808	261	47	16	59	69	21	815	0	74	114	0
Confl. Peds. (#/hr)									4			
Heavy Vehicles (%)	2%	4%	5%	7%	13%	1%	5%	4%	4%	5%	5%	3%
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	7	7		8	8	8 1	5	2		1	6	
Permitted Phases			7									
Actuated Green, G (s)	29.4	29.4	29.4	14.0	14.0	28.2	3.2	34.6		9.3	41.2	
Effective Green, g (s)	29.4	29.4	29.4	14.0	14.0	28.2	3.2	34.6		9.3	41.2	
Actuated g/C Ratio	0.28	0.28	0.28	0.13	0.13	0.27	0.03	0.33		0.09	0.39	
Clearance Time (s)	3.5	3.5	3.5	4.9	4.9		3.5	5.3		4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	961	511	430	224	224	429	52	1096		152	1349	
v/s Ratio Prot	c0.24	0.14		0.01	c0.04	0.04	0.01	c0.24		c0.04	0.03	
v/s Ratio Perm			0.03									
v/c Ratio	0.84	0.51	0.11	0.07	0.26	0.16	0.40	0.74		0.49	0.08	
Uniform Delay, d1	35.6	31.8	28.1	39.8	40.9	29.4	50.0	31.3		45.6	20.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.51	1.00	
Incremental Delay, d2	6.7	0.9	0.1	0.1	0.6	0.2	5.1	4.6		2.4	0.1	
Delay (s)	42.3	32.6	28.2	39.9	41.5	29.5	55.0	35.8		25.7	20.1	
Level of Service	D	C	C	D	D	C	E	D		C	C	
Approach Delay (s)		38.4			34.2			36.3			22.3	
Approach LOS		D			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	36.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	49	5	446	0	1275	0	0	231	0
Future Volume (vph)	0	0	0	49	5	446	0	1275	0	0	231	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0	4.0		5.3			5.3	
Lane Util. Factor				0.95	0.95	0.88		0.95			0.91	
Frt				1.00	1.00	0.85		1.00			1.00	
Flt Protected				0.95	0.96	1.00		1.00			1.00	
Satd. Flow (prot)				1681	1646	2632		3539			4988	
Flt Permitted				0.95	0.96	1.00		1.00			1.00	
Satd. Flow (perm)				1681	1646	2632		3539			4988	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	0	0	0	57	6	519	0	1483	0	0	269	0
RTOR Reduction (vph)	0	0	0	0	0	68	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	31	32	451	0	1483	0	0	269	0
Heavy Vehicles (%)	0%	0%	0%	2%	20%	8%	0%	2%	6%	0%	4%	3%
Turn Type				Split	NA	custom		NA			NA	
Protected Phases				8	8	8 1		2			6	
Permitted Phases												
Actuated Green, G (s)				16.4	16.4	27.9		68.8			79.3	
Effective Green, g (s)				16.4	16.4	27.9		68.8			79.3	
Actuated g/C Ratio				0.16	0.16	0.27		0.66			0.76	
Clearance Time (s)				4.0	4.0			5.3			5.3	
Vehicle Extension (s)				3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)				262	257	699		2318			3767	
v/s Ratio Prot				0.02	0.02	c0.17		c0.42			0.05	
v/s Ratio Perm												
v/c Ratio				0.12	0.12	0.65		0.64			0.07	
Uniform Delay, d1				38.1	38.1	34.2		10.7			3.3	
Progression Factor				1.00	1.00	1.00		1.37			0.25	
Incremental Delay, d2				0.2	0.2	2.1		0.9			0.0	
Delay (s)				38.3	38.3	36.2		15.6			0.9	
Level of Service				D	D	D		B			A	
Approach Delay (s)		0.0			36.5			15.6			0.9	
Approach LOS		A			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	19.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.3
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	65	67	278	443	0	829	0	871	0	0	0
Future Volume (vph)	0	65	67	278	443	0	829	0	871	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0			4.2	4.2			
Lane Util. Factor		0.95	1.00	0.97	1.00			1.00	0.88			
Frt		1.00	0.85	1.00	1.00			1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (prot)		3312	1468	3367	1900			1787	2787			
Flt Permitted		1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (perm)		3312	1468	3367	1900			1787	2787			
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.92	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	0	77	80	331	527	0	987	0	1037	0	0	0
RTOR Reduction (vph)	0	0	65	0	0	0	0	0	228	0	0	0
Lane Group Flow (vph)	0	77	15	331	527	0	0	987	809	0	0	0
Heavy Vehicles (%)	0%	9%	10%	4%	0%	0%	1%	0%	2%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA	Perm	Split	NA	pt+ov			
Protected Phases		2		1	6		8	8	8 1		4	
Permitted Phases			2			6				4		
Actuated Green, G (s)		19.2	19.2	28.8	54.0			40.8	73.8			
Effective Green, g (s)		19.2	19.2	28.8	54.0			40.8	73.8			
Actuated g/C Ratio		0.18	0.18	0.27	0.51			0.39	0.70			
Clearance Time (s)		6.0	6.0	6.0	6.0			4.2				
Vehicle Extension (s)		3.0	3.0	3.0	3.0			3.0				
Lane Grp Cap (vph)		605	268	923	977			694	1958			
v/s Ratio Prot		0.02		0.10	c0.28			c0.55	0.29			
v/s Ratio Perm			0.01									
v/c Ratio		0.13	0.05	0.36	0.54			1.42	0.41			
Uniform Delay, d1		35.9	35.4	30.7	17.1			32.1	6.5			
Progression Factor		1.00	1.00	1.00	1.00			1.17	4.09			
Incremental Delay, d2		0.1	0.1	1.1	2.1			196.6	0.1			
Delay (s)		36.0	35.5	31.8	19.3			234.0	26.8			
Level of Service		D	D	C	B			F	C			
Approach Delay (s)		35.7			24.1			127.9			0.0	
Approach LOS		D			C			F			A	

Intersection Summary			
HCM 2000 Control Delay	93.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	20.2
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	103	0	21	1128	27	0	0	19	16	0	0
Future Volume (vph)	1	103	0	21	1128	27	0	0	19	16	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.86			1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.95	
Satd. Flow (prot)	1770	3539		1798	3525			1339			1608	
Flt Permitted	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (perm)	1770	3539		1798	3525			1339			1693	
Peak-hour factor, PHF	0.92	0.92	0.92	0.83	0.92	0.83	0.92	0.83	0.83	0.83	0.83	0.92
Adj. Flow (vph)	1	112	0	25	1226	33	0	0	23	19	0	0
RTOR Reduction (vph)	0	0	0	0	1	0	0	21	0	0	0	0
Lane Group Flow (vph)	1	112	0	25	1258	0	0	2	0	0	19	0
Confl. Peds. (#/hr)				3		1			3	3		
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	0%	21%	12%	0%	2%
Turn Type	Prot	NA		Prot	NA			NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	0.4	38.7		0.5	38.8			3.9			3.9	
Effective Green, g (s)	0.4	38.7		0.5	38.8			3.9			3.9	
Actuated g/C Ratio	0.01	0.70		0.01	0.70			0.07			0.07	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	12	2485		16	2482			94			119	
v/s Ratio Prot	0.00	0.03		c0.01	c0.36			0.00				
v/s Ratio Perm											c0.01	
v/c Ratio	0.08	0.05		1.56	0.51			0.02			0.16	
Uniform Delay, d1	27.2	2.5		27.3	3.7			23.8			24.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	3.0	0.0		435.0	0.2			0.1			0.6	
Delay (s)	30.1	2.5		462.3	3.9			23.9			24.7	
Level of Service	C	A		F	A			C			C	
Approach Delay (s)		2.8			12.8			23.9			24.7	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	55.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	154	246	436	531	166	599	498	44	44	142	0
Future Volume (vph)	5	154	246	436	531	166	599	498	44	44	142	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	
Lane Util. Factor	1.00	0.95	0.88	0.94	0.95		0.97	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3574	2779	4990	3454		3433	3574	1482	1656	3610	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1805	3574	2779	4990	3454		3433	3574	1482	1656	3610	
Peak-hour factor, PHF	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Adj. Flow (vph)	7	205	328	581	708	221	799	664	59	59	189	0
RTOR Reduction (vph)	0	0	250	0	20	0	0	0	41	0	0	0
Lane Group Flow (vph)	7	205	78	581	909	0	799	664	18	59	189	0
Confl. Peds. (#/hr)			1									
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	1%	1%	2%	0%	2%	2%	1%	9%	9%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	1.2	21.5	21.5	14.9	35.2		20.8	28.0	28.0	7.8	15.4	
Effective Green, g (s)	1.2	21.5	21.5	14.9	35.2		20.8	28.0	28.0	7.8	15.4	
Actuated g/C Ratio	0.01	0.24	0.24	0.16	0.39		0.23	0.31	0.31	0.09	0.17	
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	23	846	658	818	1338		786	1102	457	142	612	
v/s Ratio Prot	0.00	0.06		c0.12	c0.26		c0.23	c0.19		0.04	0.05	
v/s Ratio Perm			0.03						0.01			
v/c Ratio	0.30	0.24	0.12	0.71	0.68		1.02	0.60	0.04	0.42	0.31	
Uniform Delay, d1	44.4	28.1	27.2	35.9	23.1		35.0	26.7	22.0	39.3	33.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.7	0.1	0.1	2.4	1.4		36.3	0.9	0.0	0.7	0.3	
Delay (s)	47.1	28.2	27.3	38.3	24.5		71.3	27.6	22.0	40.1	33.3	
Level of Service	D	C	C	D	C		E	C	C	D	C	
Approach Delay (s)		27.9			29.8			50.3			34.9	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	38.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	18.6
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	1069	0	526	0	490	0	0	429	461
Future Volume (vph)	0	0	0	1069	0	526	0	490	0	0	429	461
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.7		4.7		6.3			5.7	5.7
Lane Util. Factor				0.97		1.00		0.95			0.95	1.00
Frpb, ped/bikes				1.00		1.00		1.00			1.00	1.00
Flpb, ped/bikes				1.00		1.00		1.00			1.00	1.00
Frt				1.00		0.85		1.00			1.00	1.00
Flt Protected				0.95		1.00		1.00			1.00	1.00
Satd. Flow (prot)				3242		1599		3539			3539	1863
Flt Permitted				0.95		1.00		1.00			1.00	1.00
Satd. Flow (perm)				3242		1599		3539			3539	1863
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	0	0	0	1304	0	641	0	598	0	0	523	562
RTOR Reduction (vph)	0	0	0	0	0	38	0	0	0	0	0	356
Lane Group Flow (vph)	0	0	0	1304	0	603	0	598	0	0	523	206
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	8%	0%	1%	0%	2%	6%	0%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	2	0	0
Turn Type				Prot		custom		NA			NA	Perm
Protected Phases				8		8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				35.2		45.4		15.6			26.4	26.4
Effective Green, g (s)				35.2		45.4		15.6			26.4	26.4
Actuated g/C Ratio				0.49		0.63		0.22			0.37	0.37
Clearance Time (s)				4.7				6.3			5.7	5.7
Vehicle Extension (s)				0.2				0.2			0.2	0.2
Lane Grp Cap (vph)				1584		1008		766			1297	683
v/s Ratio Prot				c0.40		c0.38		c0.17			0.15	
v/s Ratio Perm												0.11
v/c Ratio				0.82		0.60		0.78			0.40	0.30
Uniform Delay, d1				15.7		7.9		26.6			16.9	16.2
Progression Factor				1.00		1.00		1.00			1.00	1.00
Incremental Delay, d2				3.4		0.6		4.8			0.1	0.1
Delay (s)				19.2		8.5		31.4			17.0	16.3
Level of Service				B		A		C			B	B
Approach Delay (s)		0.0			15.7			31.4			16.7	
Approach LOS		A			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	72.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	195	518	0	823	1348	0
Future Volume (vph)	195	518	0	823	1348	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	4.7		5.8	6.8	
Lane Util. Factor	0.97	0.88		0.95	0.95	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3433	2632		3471	3406	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3433	2632		3471	3406	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	219	582	0	925	1515	0
RTOR Reduction (vph)	0	1	0	0	0	0
Lane Group Flow (vph)	219	581	0	925	1515	0
Heavy Vehicles (%)	2%	8%	0%	4%	6%	6%
Turn Type	Prot	custom		NA	NA	
Protected Phases	4	4 5		2	6	
Permitted Phases						
Actuated Green, G (s)	8.8	34.7		77.1	50.2	
Effective Green, g (s)	8.8	28.9		77.1	50.2	
Actuated g/C Ratio	0.09	0.30		0.80	0.52	
Clearance Time (s)	4.7			5.8	6.8	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	313	789		2776	1773	
v/s Ratio Prot	0.06	c0.22		0.27	c0.44	
v/s Ratio Perm						
v/c Ratio	0.70	0.74		0.33	0.85	
Uniform Delay, d1	42.5	30.3		2.6	19.9	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.4	3.1		0.0	4.1	
Delay (s)	48.0	33.4		2.7	24.0	
Level of Service	D	C		A	C	
Approach Delay (s)	37.4			2.7	24.0	
Approach LOS	D			A	C	

Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	96.4	Sum of lost time (s)	17.3
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	295	85	268	1115	3	158	0	206	1	0	3
Future Volume (vph)	6	295	85	268	1115	3	158	0	206	1	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95	1.00		1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.98		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Frt	1.00	0.97		1.00	1.00		1.00	1.00	0.85		0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.95	1.00		0.99	
Satd. Flow (prot)	1805	3363		1752	3535		1698	1698	1539		1653	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.95	1.00		1.00	
Satd. Flow (perm)	1805	3363		1752	3535		1698	1698	1539		1674	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	7	324	93	295	1225	3	174	0	226	1	0	3
RTOR Reduction (vph)	0	15	0	0	0	0	0	0	202	0	4	0
Lane Group Flow (vph)	7	402	0	295	1228	0	87	87	24	0	0	0
Confl. Peds. (#/hr)			4						5			
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	4%	0%	3%	2%	33%	1%	0%	3%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA		Split	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		8	8			4	
Permitted Phases									8	4		
Actuated Green, G (s)	1.2	59.7		23.6	82.1		12.3	12.3	12.3		0.9	
Effective Green, g (s)	1.2	59.7		23.6	82.1		12.3	12.3	12.3		0.9	
Actuated g/C Ratio	0.01	0.52		0.21	0.72		0.11	0.11	0.11		0.01	
Clearance Time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)	19	1761		362	2545		183	183	166		13	
v/s Ratio Prot	0.00	0.12		c0.17	c0.35		c0.05	0.05				
v/s Ratio Perm									0.02		c0.00	
v/c Ratio	0.37	0.23		0.81	0.48		0.48	0.48	0.15		0.00	
Uniform Delay, d1	56.0	14.7		43.1	6.8		47.8	47.8	46.1		56.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	4.4	0.3		12.5	0.7		0.7	0.7	0.1		0.0	
Delay (s)	60.4	15.0		55.6	7.5		48.5	48.5	46.2		56.1	
Level of Service	E	B		E	A		D	D	D		E	
Approach Delay (s)		15.7			16.8			47.2			56.1	
Approach LOS		B			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	114.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	58	7	5	1089	27	1	0	0	56	0	177
Future Volume (vph)	54	58	7	5	1089	27	1	0	0	56	0	177
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0			4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00			1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00			1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95			0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770			1770	1583	
Flt Permitted	0.95	1.00	1.00	0.71	1.00	1.00	0.53			0.76	1.00	
Satd. Flow (perm)	1770	3539	1583	1330	3539	1583	980			1410	1583	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	59	63	8	5	1184	29	1	0	0	61	0	192
RTOR Reduction (vph)	0	0	2	0	0	13	0	0	0	0	141	0
Lane Group Flow (vph)	59	63	6	5	1184	16	1	0	0	61	51	0
Turn Type	Prot	NA	Perm	Perm	NA	Perm	Perm			Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases			2	6		6	8			4		
Actuated Green, G (s)	3.2	40.2	40.2	33.0	33.0	33.0	10.1			10.1	10.1	
Effective Green, g (s)	3.2	40.2	40.2	33.0	33.0	33.0	10.1			10.1	10.1	
Actuated g/C Ratio	0.05	0.69	0.69	0.57	0.57	0.57	0.17			0.17	0.17	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0			4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0	
Lane Grp Cap (vph)	97	2440	1091	752	2003	896	169			244	274	
v/s Ratio Prot	c0.03	0.02			c0.33						0.03	
v/s Ratio Perm			0.00	0.00		0.01	0.00			c0.04		
v/c Ratio	0.61	0.03	0.01	0.01	0.59	0.02	0.01			0.25	0.19	
Uniform Delay, d1	26.9	2.9	2.8	5.5	8.3	5.5	19.9			20.8	20.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00	
Incremental Delay, d2	10.3	0.0	0.0	0.0	0.5	0.0	0.0			0.5	0.3	
Delay (s)	37.3	2.9	2.8	5.5	8.7	5.6	20.0			21.4	20.9	
Level of Service	D	A	A	A	A	A	B			C	C	
Approach Delay (s)		18.5			8.6			20.0			21.0	
Approach LOS		B			A			B			C	

Intersection Summary			
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	58.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	449	454	173	1331	125	16
Future Volume (vph)	449	454	173	1331	125	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frt	0.92		1.00	1.00	0.98	
Flt Protected	1.00		0.95	1.00	0.96	
Satd. Flow (prot)	4702		1770	5085	1757	
Flt Permitted	1.00		0.95	1.00	0.96	
Satd. Flow (perm)	4702		1770	5085	1757	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	488	493	188	1447	136	17
RTOR Reduction (vph)	265	0	0	0	10	0
Lane Group Flow (vph)	716	0	188	1447	143	0
Turn Type	NA		Prot	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases						
Actuated Green, G (s)	17.6		6.2	27.8	9.2	
Effective Green, g (s)	17.6		6.2	27.8	9.2	
Actuated g/C Ratio	0.39		0.14	0.62	0.20	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	1839		243	3141	359	
v/s Ratio Prot	0.15		c0.11	c0.28	c0.08	
v/s Ratio Perm						
v/c Ratio	0.39		0.77	0.46	0.40	
Uniform Delay, d1	9.8		18.7	4.6	15.5	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.1		14.2	0.1	0.7	
Delay (s)	10.0		32.9	4.7	16.2	
Level of Service	A		C	A	B	
Approach Delay (s)	10.0			7.9	16.2	
Approach LOS	A			A	B	

Intersection Summary			
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	1051	204	222	511	28	205	524	479	88	557	69
Future Volume (vph)	170	1051	204	222	511	28	205	524	479	88	557	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91		0.94	0.95	0.88	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3467	5136	2751	3502	5082		5040	3610	2800	3502	5136	1553
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3467	5136	2751	3502	5082		5040	3610	2800	3502	5136	1553
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)	185	1142	222	241	555	30	223	570	521	96	605	75
RTOR Reduction (vph)	0	0	141	0	4	0	0	0	380	0	0	56
Lane Group Flow (vph)	185	1142	81	241	581	0	223	570	141	96	605	19
Confl. Peds. (#/hr)			1			3			3			
Heavy Vehicles (%)	1%	1%	2%	0%	1%	5%	1%	0%	0%	0%	1%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	10.1	33.7	33.7	11.7	35.3		9.1	26.9	26.9	7.4	25.2	25.2
Effective Green, g (s)	10.1	33.7	33.7	11.7	35.3		9.1	26.9	26.9	7.4	25.2	25.2
Actuated g/C Ratio	0.10	0.34	0.34	0.12	0.35		0.09	0.27	0.27	0.07	0.25	0.25
Clearance Time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Vehicle Extension (s)	2.0	3.5	3.5	2.0	3.5		2.0	3.5	3.5	2.0	3.5	3.5
Lane Grp Cap (vph)	351	1736	929	410	1799		460	974	755	259	1298	392
v/s Ratio Prot	0.05	c0.22		c0.07	0.11		c0.04	c0.16		0.03	0.12	
v/s Ratio Perm			0.03						0.05			0.01
v/c Ratio	0.53	0.66	0.09	0.59	0.32		0.48	0.59	0.19	0.37	0.47	0.05
Uniform Delay, d1	42.5	28.1	22.5	41.7	23.5		43.1	31.6	28.0	43.9	31.6	28.2
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	0.7	1.0	0.0	1.4	0.1		0.3	1.0	0.1	0.3	0.3	0.1
Delay (s)	43.2	29.0	22.6	43.1	23.6		43.4	32.5	28.1	44.3	31.9	28.2
Level of Service	D	C	C	D	C		D	C	C	D	C	C
Approach Delay (s)		29.8			29.3			32.6			33.0	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	99.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	310	882	496	540	278	65	419	645	477	94	714	125
Future Volume (vph)	310	882	496	540	278	65	419	645	477	94	714	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Lane Util. Factor	0.97	0.95	0.88	0.94	0.95		0.94	0.95	1.00	0.97	0.86	0.88
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3502	3574	2814	5090	3443		5090	3610	1599	3502	6408	2774
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3502	3574	2814	5090	3443		5090	3610	1599	3502	6408	2774
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	323	919	517	562	290	68	436	672	497	98	744	130
RTOR Reduction (vph)	0	0	301	0	14	0	0	0	304	0	0	101
Lane Group Flow (vph)	323	919	216	563	344	0	436	672	193	98	744	29
Confl. Peds. (#/hr)						1						2
Heavy Vehicles (%)	0%	1%	1%	0%	2%	0%	0%	0%	1%	0%	2%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases			2						4			8
Actuated Green, G (s)	14.8	35.2	35.2	16.5	36.9		14.2	31.3	31.3	7.7	24.8	24.8
Effective Green, g (s)	14.8	35.2	35.2	16.5	36.9		14.2	31.3	31.3	7.7	24.8	24.8
Actuated g/C Ratio	0.13	0.31	0.31	0.15	0.33		0.13	0.28	0.28	0.07	0.22	0.22
Clearance Time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	461	1120	882	747	1131		643	1006	445	240	1415	612
v/s Ratio Prot	0.09	c0.26		c0.11	0.10		c0.09	c0.19		0.03	0.12	
v/s Ratio Perm			0.08						0.12			0.01
v/c Ratio	0.70	0.82	0.25	0.75	0.30		0.68	0.67	0.43	0.41	0.53	0.05
Uniform Delay, d1	46.6	35.6	28.7	46.0	28.1		46.9	35.9	33.2	50.1	38.6	34.4
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	3.9	4.9	0.1	3.8	0.2		2.2	1.9	0.9	0.4	0.5	0.0
Delay (s)	50.5	40.6	28.8	49.8	28.3		49.1	37.8	34.1	50.5	39.0	34.5
Level of Service	D	D	C	D	C		D	D	C	D	D	C
Approach Delay (s)		38.9			41.4			39.7			39.6	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	39.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	112.3	Sum of lost time (s)	21.6
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	222	604	120	114	16	6	212	782	107	83	643	95
Future Volume (vph)	222	604	120	114	16	6	212	782	107	83	643	95
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	4.0	4.0		5.3	4.9		5.3	4.9	4.9
Lane Util. Factor	0.97	1.00	0.88	1.00	1.00		0.97	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	1900	2760	1770	1785		3400	3514		1805	3539	1615
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	1900	2760	1770	1785		3400	3514		1805	3539	1615
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	244	664	132	125	18	7	233	859	118	91	707	104
RTOR Reduction (vph)	0	0	49	0	6	0	0	7	0	0	0	72
Lane Group Flow (vph)	244	664	83	125	19	0	233	970	0	91	707	32
Heavy Vehicles (%)	0%	0%	3%	2%	2%	2%	3%	1%	0%	0%	2%	0%
Turn Type	Prot	NA	pt+ov	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2	2 3	1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	32.6	31.9	45.7	11.8	11.1		8.5	36.6		4.0	32.1	32.1
Effective Green, g (s)	32.6	31.9	45.7	11.8	11.1		8.5	36.6		4.0	32.1	32.1
Actuated g/C Ratio	0.31	0.31	0.44	0.11	0.11		0.08	0.35		0.04	0.31	0.31
Clearance Time (s)	5.3	5.3		4.0	4.0		5.3	4.9		5.3	4.9	4.9
Vehicle Extension (s)	2.0	4.0		2.0	2.0		2.0	4.0		2.0	4.0	4.0
Lane Grp Cap (vph)	1099	583	1215	201	190		278	1239		69	1094	499
v/s Ratio Prot	0.07	c0.35	0.03	c0.07	0.01		c0.07	c0.28		0.05	0.20	
v/s Ratio Perm												0.02
v/c Ratio	0.22	1.14	0.07	0.62	0.10		0.84	0.78		1.32	0.65	0.06
Uniform Delay, d1	26.2	36.0	16.8	43.9	41.8		47.0	30.0		49.9	30.9	25.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.0	81.9	0.0	4.3	0.1		18.5	3.5		215.4	1.5	0.1
Delay (s)	26.3	117.8	16.8	48.1	41.9		65.5	33.5		265.3	32.4	25.3
Level of Service	C	F	B	D	D		E	C		F	C	C
Approach Delay (s)		83.5			47.1			39.7			55.1	
Approach LOS		F			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	58.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	103.8	Sum of lost time (s)	19.5
Intersection Capacity Utilization	84.0%	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 (vph)	0	0	0	315	2	455	0	652	0	0	519	406
Future Volume (vph)	0	0	0	315	2	455	0	652	0	0	519	406
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.7	3.7	3.7		4.8			4.8	4.8
Lane Util. Factor				0.95	0.95	0.88		1.00			0.95	1.00
Frpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	1.00
Flpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	0.95	1.00		1.00			1.00	1.00
Satd. Flow (prot)				1715	1720	2814		1900			3539	1599
Flt Permitted				0.95	0.95	1.00		1.00			1.00	1.00
Satd. Flow (perm)				1715	1720	2814		1900			3539	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	332	2	479	0	686	0	0	546	427
RTOR Reduction (vph)	0	0	0	0	0	124	0	0	0	0	0	179
Lane Group Flow (vph)	0	0	0	166	168	355	0	686	0	0	546	248
Confl. Peds. (#/hr)			1									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	0%	3%	0%	2%	1%
Turn Type				Split	NA	custom		NA			NA	Perm
Protected Phases				8	8	8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				11.5	11.5	19.3		19.8			27.6	27.6
Effective Green, g (s)				11.5	11.5	19.3		19.8			27.6	27.6
Actuated g/C Ratio				0.24	0.24	0.41		0.42			0.58	0.58
Clearance Time (s)				3.7	3.7			4.8			4.8	4.8
Vehicle Extension (s)				4.0	4.0			4.0			2.5	2.5
Lane Grp Cap (vph)				414	415	1140		790			2052	927
v/s Ratio Prot				0.10	c0.10	c0.13		c0.36			0.15	
v/s Ratio Perm												0.15
v/c Ratio				0.40	0.40	0.31		0.87			0.27	0.27
Uniform Delay, d1				15.2	15.2	9.6		12.7			5.0	5.0
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.9	0.9	0.2		10.3			0.1	0.1
Delay (s)				16.0	16.1	9.8		23.0			5.0	5.1
Level of Service				B	B	A		C			A	A
Approach Delay (s)		0.0			12.4			23.0			5.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	47.6	Sum of lost time (s)	12.2
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	517	351	0	982	809	0
Future Volume (vph)	517	351	0	982	809	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.88		0.95	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3502	2787		3610	3430	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3502	2787		3610	3430	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	568	386	0	1079	889	0
RTOR Reduction (vph)	0	157	0	0	0	0
Lane Group Flow (vph)	568	229	0	1079	889	0
Confl. Bikes (#/hr)						3
Heavy Vehicles (%)	0%	2%	0%	0%	0%	3%
Parking (#/hr)					0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	10.3	10.3		18.1	18.1	
Effective Green, g (s)	10.3	10.3		18.1	18.1	
Actuated g/C Ratio	0.28	0.28		0.50	0.50	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	
Lane Grp Cap (vph)	990	788		1795	1705	
v/s Ratio Prot	c0.16			c0.30	0.26	
v/s Ratio Perm		0.08				
v/c Ratio	0.57	0.29		0.60	0.52	
Uniform Delay, d1	11.2	10.2		6.6	6.2	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.1		0.4	0.1	
Delay (s)	11.7	10.3		7.0	6.3	
Level of Service	B	B		A	A	
Approach Delay (s)	11.1			7.0	6.3	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	8.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	36.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	352	187	270	24	120	195	40	161	101	135	172	0
Future Volume (vph)	352	187	270	24	120	195	40	161	101	135	172	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.9	4.9	4.9	3.5	5.3		4.0	5.3	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1900	1599	1805	1863	1568	1805	3310		1736	3396	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1900	1599	1805	1863	1568	1805	3310		1736	3396	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	371	197	284	25	126	205	42	169	106	142	181	0
RTOR Reduction (vph)	0	0	230	0	0	143	0	65	0	0	0	0
Lane Group Flow (vph)	371	197	54	25	126	62	42	210	0	142	181	0
Confl. Peds. (#/hr)									2			
Heavy Vehicles (%)	2%	0%	1%	0%	2%	3%	0%	3%	0%	4%	1%	1%
Parking (#/hr)											0	
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	7	7		8	8	8 1	5	2		1	6	
Permitted Phases			7									
Actuated Green, G (s)	19.8	19.8	19.8	14.3	14.3	32.0	5.4	40.4		12.8	48.3	
Effective Green, g (s)	19.8	19.8	19.8	14.3	14.3	32.0	5.4	40.4		12.8	48.3	
Actuated g/C Ratio	0.19	0.19	0.19	0.14	0.14	0.30	0.05	0.38		0.12	0.46	
Clearance Time (s)	3.5	3.5	3.5	4.9	4.9		3.5	5.3		4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	647	358	301	245	253	477	92	1273		211	1562	
v/s Ratio Prot	c0.11	0.10		0.01	c0.07	0.04	0.02	c0.06		c0.08	0.05	
v/s Ratio Perm			0.03									
v/c Ratio	0.57	0.55	0.18	0.10	0.50	0.13	0.46	0.16		0.67	0.12	
Uniform Delay, d1	38.8	38.6	35.8	39.7	42.0	26.4	48.4	21.2		44.1	16.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.67	0.74	
Incremental Delay, d2	1.2	1.8	0.3	0.2	1.5	0.1	3.6	0.3		8.2	0.2	
Delay (s)	40.0	40.4	36.1	39.9	43.6	26.6	51.9	21.5		37.8	12.1	
Level of Service	D	D	D	D	D	C	D	C		D	B	
Approach Delay (s)		38.8			33.5			25.5			23.4	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	42	2	190	0	508	0	0	436	0
Future Volume (vph)	0	0	0	42	2	190	0	508	0	0	436	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0	4.0		5.3			5.3	
Lane Util. Factor				0.95	0.95	0.88		0.95			0.91	
Frpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	
Flpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	
Frt				1.00	1.00	0.85		1.00			1.00	
Flt Protected				0.95	0.96	1.00		1.00			1.00	
Satd. Flow (prot)				1715	1726	2814		3539			4893	
Flt Permitted				0.95	0.96	1.00		1.00			1.00	
Satd. Flow (perm)				1715	1726	2814		3539			4893	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	0	46	2	209	0	558	0	0	479	0
RTOR Reduction (vph)	0	0	0	0	0	176	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	24	24	33	0	558	0	0	479	0
Confl. Peds. (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	2%	3%	0%	6%	2%
Turn Type				Split	NA	custom		NA			NA	
Protected Phases				8	8	8 1		2			6	
Permitted Phases												
Actuated Green, G (s)				7.1	7.1	16.6		80.1			88.6	
Effective Green, g (s)				7.1	7.1	16.6		80.1			88.6	
Actuated g/C Ratio				0.07	0.07	0.16		0.76			0.84	
Clearance Time (s)				4.0	4.0			5.3			5.3	
Vehicle Extension (s)				3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)				115	116	444		2699			4128	
v/s Ratio Prot				c0.01	0.01	0.01		c0.16			c0.10	
v/s Ratio Perm												
v/c Ratio				0.21	0.21	0.07		0.21			0.12	
Uniform Delay, d1				46.3	46.3	37.7		3.5			1.4	
Progression Factor				1.00	1.00	1.00		0.75			0.22	
Incremental Delay, d2				0.9	0.9	0.1		0.2			0.0	
Delay (s)				47.2	47.2	37.7		2.8			0.3	
Level of Service				D	D	D		A			A	
Approach Delay (s)		0.0			39.5			2.8			0.3	
Approach LOS		A			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.3
Intersection Capacity Utilization	32.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	470	277	854	29	1	192	0	477	0	1	0
Future Volume (vph)	0	470	277	854	29	1	192	0	477	0	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0	6.0		4.2	4.2		4.0	
Lane Util. Factor		0.95	1.00	0.97	1.00	1.00		1.00	0.88		1.00	
Frpb, ped/bikes		1.00	0.99	1.00	1.00	1.00		1.00	1.00		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt		1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	
Flt Protected		1.00	1.00	0.95	1.00	1.00		0.95	1.00		1.00	
Satd. Flow (prot)		3167	1548	3467	1900	1615		1752	2814		1900	
Flt Permitted		1.00	1.00	0.95	1.00	1.00		0.95	1.00		1.00	
Satd. Flow (perm)		3167	1548	3467	1900	1615		1752	2814		1900	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	516	304	938	32	1	211	0	524	0	1	0
RTOR Reduction (vph)	0	0	226	0	0	0	0	0	221	0	0	0
Lane Group Flow (vph)	0	516	78	938	32	1	0	211	303	0	1	0
Confl. Peds. (#/hr)			1									
Heavy Vehicles (%)	0%	14%	3%	1%	0%	0%	3%	0%	1%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA	Perm	Split	NA	pt+ov		NA	
Protected Phases		2		1	6		8	8	8 1		4	
Permitted Phases			2			6				4		
Actuated Green, G (s)		27.0	27.0	36.8	69.8	69.8		19.8	60.8		1.2	
Effective Green, g (s)		27.0	27.0	36.8	69.8	69.8		19.8	60.8		1.2	
Actuated g/C Ratio		0.26	0.26	0.35	0.66	0.66		0.19	0.58		0.01	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0		4.2			4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		814	398	1215	1263	1073		330	1629		21	
v/s Ratio Prot		c0.16		c0.27	0.02			c0.12	0.11		c0.00	
v/s Ratio Perm			0.05			0.00						
v/c Ratio		0.63	0.20	0.77	0.03	0.00		0.64	0.19		0.05	
Uniform Delay, d1		34.6	30.5	30.4	6.0	5.9		39.3	10.4		51.3	
Progression Factor		1.00	1.00	1.00	1.00	1.00		1.05	4.63		1.00	
Incremental Delay, d2		1.6	0.2	4.8	0.0	0.0		4.0	0.1		0.9	
Delay (s)		36.2	30.8	35.2	6.0	5.9		45.1	48.4		52.3	
Level of Service		D	C	D	A	A		D	D		D	
Approach Delay (s)		34.2			34.2			47.4			52.3	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	38.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	20.2
Intersection Capacity Utilization	68.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	662	0	45	69	21	2	2	27	16	0	0
Future Volume (vph)	1	662	0	45	69	21	2	2	27	16	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.96			0.88			1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.95	
Satd. Flow (prot)	1770	3539		1805	3405			1386			1609	
Flt Permitted	0.95	1.00		0.95	1.00			0.98			1.00	
Satd. Flow (perm)	1770	3539		1805	3405			1360			1694	
Peak-hour factor, PHF	0.92	0.92	0.92	0.83	0.92	0.83	0.92	0.83	0.83	0.83	0.83	0.92
Adj. Flow (vph)	1	720	0	54	75	25	2	2	33	19	0	0
RTOR Reduction (vph)	0	0	0	0	10	0	0	30	0	0	0	0
Lane Group Flow (vph)	1	720	0	54	90	0	0	7	0	0	19	0
Confl. Peds. (#/hr)				3		1			3	3		
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	0%	21%	12%	0%	2%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	0.5	25.9		1.2	26.6			4.0			4.0	
Effective Green, g (s)	0.5	25.9		1.2	26.6			4.0			4.0	
Actuated g/C Ratio	0.01	0.60		0.03	0.62			0.09			0.09	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	20	2126		50	2101			126			157	
v/s Ratio Prot	0.00	c0.20		c0.03	0.03							
v/s Ratio Perm								0.01			c0.01	
v/c Ratio	0.05	0.34		1.08	0.04			0.06			0.12	
Uniform Delay, d1	21.1	4.3		20.9	3.2			17.8			17.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1.0	0.1		151.5	0.0			0.2			0.3	
Delay (s)	22.1	4.4		172.4	3.3			18.0			18.3	
Level of Service	C	A		F	A			B			B	
Approach Delay (s)		4.4			62.6			18.0			18.3	
Approach LOS		A			E			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	43.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	38.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	503	620	249	145	138	329	336	84	118	244	14
Future Volume (vph)	10	503	620	249	145	138	329	336	84	118	244	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	4.9
Lane Util. Factor	1.00	0.95	0.88	0.94	0.95		0.97	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	3610	2814	5090	3260		3433	3610	1583	1736	3610	1615
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1805	3610	2814	5090	3260		3433	3610	1583	1736	3610	1615
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)	11	547	674	271	158	150	358	365	91	128	265	15
RTOR Reduction (vph)	0	0	454	0	85	0	0	0	74	0	0	12
Lane Group Flow (vph)	11	547	220	271	223	0	358	365	17	128	265	3
Confl. Peds. (#/hr)						1						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	0%	1%	0%	1%	3%	2%	0%	2%	4%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	1.4	26.9	26.9	10.0	35.5		13.2	15.3	15.3	11.5	14.0	14.0
Effective Green, g (s)	1.4	26.9	26.9	10.0	35.5		13.2	15.3	15.3	11.5	14.0	14.0
Actuated g/C Ratio	0.02	0.33	0.33	0.12	0.43		0.16	0.19	0.19	0.14	0.17	0.17
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	4.9
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	3.0	3.0	2.0	3.0	3.0
Lane Grp Cap (vph)	30	1179	919	618	1406		550	671	294	242	614	274
v/s Ratio Prot	0.01	c0.15		c0.05	0.07		c0.10	c0.10		0.07	0.07	
v/s Ratio Perm			0.08						0.01			0.00
v/c Ratio	0.37	0.46	0.24	0.44	0.16		0.65	0.54	0.06	0.53	0.43	0.01
Uniform Delay, d1	40.0	22.0	20.2	33.5	14.3		32.4	30.3	27.6	32.9	30.6	28.4
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	2.8	0.3	0.1	0.2	0.1		2.1	0.9	0.1	1.0	0.5	0.0
Delay (s)	42.8	22.3	20.4	33.7	14.3		34.5	31.2	27.6	33.8	31.1	28.4
Level of Service	D	C	C	C	B		C	C	C	C	C	C
Approach Delay (s)		21.4			23.4			32.3			31.8	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	82.3	Sum of lost time (s)	18.6
Intersection Capacity Utilization	56.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	1038	0	302	0	533	0	0	776	366
Future Volume (vph)	0	0	0	1038	0	302	0	533	0	0	776	366
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.7		4.7		6.3			5.7	5.7
Lane Util. Factor				0.97		1.00		0.95			0.95	1.00
Frpb, ped/bikes				1.00		1.00		1.00			1.00	1.00
Flpb, ped/bikes				1.00		1.00		1.00			1.00	1.00
Frt				1.00		0.85		1.00			1.00	1.00
Flt Protected				0.95		1.00		1.00			1.00	1.00
Satd. Flow (prot)				3335		1599		3574			3574	1863
Flt Permitted				0.95		1.00		1.00			1.00	1.00
Satd. Flow (perm)				3335		1599		3574			3574	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.93	0.92	0.93	0.92	0.93	0.93	0.93	0.93	0.92
Adj. Flow (vph)	0	0	0	1116	0	325	0	573	0	0	834	398
RTOR Reduction (vph)	0	0	0	0	0	42	0	0	0	0	0	260
Lane Group Flow (vph)	0	0	0	1116	0	283	0	573	0	0	834	138
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	2%	2%	2%	5%	2%	1%	2%	1%	2%	0%	1%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	2	0	0
Turn Type				Prot		custom		NA			NA	Perm
Protected Phases				8		8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				33.9		42.6		14.1			23.4	23.4
Effective Green, g (s)				33.9		42.6		14.1			23.4	23.4
Actuated g/C Ratio				0.50		0.63		0.21			0.35	0.35
Clearance Time (s)				4.7				6.3			5.7	5.7
Vehicle Extension (s)				0.2				0.2			0.2	0.2
Lane Grp Cap (vph)				1669		1006		744			1235	643
v/s Ratio Prot				c0.33		0.18		0.16			c0.23	
v/s Ratio Perm												0.07
v/c Ratio				0.67		0.28		0.77			0.68	0.21
Uniform Delay, d1				12.7		5.7		25.3			18.9	15.7
Progression Factor				1.00		1.00		1.00			1.00	1.00
Incremental Delay, d2				0.8		0.1		4.5			1.2	0.1
Delay (s)				13.5		5.7		29.8			20.1	15.7
Level of Service				B		A		C			C	B
Approach Delay (s)		0.0			11.7			29.8			18.7	
Approach LOS		A			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	67.7	Sum of lost time (s)	15.7
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	156	438	0	1139	1508	0
Future Volume (vph)	156	438	0	1139	1508	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	4.7		5.8	6.8	
Lane Util. Factor	0.97	0.88		0.95	0.95	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3467	2733		3539	3505	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3467	2733		3539	3505	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	159	447	0	1162	1539	0
RTOR Reduction (vph)	0	1	0	0	0	0
Lane Group Flow (vph)	159	446	0	1162	1539	0
Heavy Vehicles (%)	1%	4%	0%	2%	3%	1%
Turn Type	Prot	custom		NA	NA	
Protected Phases	4	4 5		2	6	
Permitted Phases						
Actuated Green, G (s)	7.0	27.4		71.5	50.1	
Effective Green, g (s)	7.0	21.6		71.5	50.1	
Actuated g/C Ratio	0.08	0.24		0.80	0.56	
Clearance Time (s)	4.7			5.8	6.8	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	272	663		2843	1973	
v/s Ratio Prot	0.05	c0.16		0.33	c0.44	
v/s Ratio Perm						
v/c Ratio	0.58	0.67		0.41	0.78	
Uniform Delay, d1	39.6	30.5		2.6	15.2	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.1	2.1		0.0	1.9	
Delay (s)	41.7	32.6		2.6	17.1	
Level of Service	D	C		A	B	
Approach Delay (s)	35.0			2.6	17.1	
Approach LOS	C			A	B	

Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	89.0	Sum of lost time (s)	17.3
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	999	114	295	415	0	112	2	332	6	1	2
Future Volume (vph)	2	999	114	295	415	0	112	2	332	6	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Frt	1.00	0.98		1.00	1.00		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (prot)	1805	3509		1787	3539		1681	1689	1565		1784	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.95	1.00		1.00	
Satd. Flow (perm)	1805	3509		1787	3539		1681	1689	1565		1843	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	2	1052	120	311	437	0	118	2	349	6	1	2
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	318	0	2	0
Lane Group Flow (vph)	2	1168	0	311	437	0	60	60	31	0	7	0
Confl. Peds. (#/hr)			8			3			6			
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	1%	0%	1%	2%	0%	2%	0%	1%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		8	8			4	
Permitted Phases									8	4		
Actuated Green, G (s)	1.1	72.5		27.0	98.4		11.4	11.4	11.4		1.6	
Effective Green, g (s)	1.1	72.5		27.0	98.4		11.4	11.4	11.4		1.6	
Actuated g/C Ratio	0.01	0.56		0.21	0.76		0.09	0.09	0.09		0.01	
Clearance Time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)	15	1956		371	2678		147	148	137		22	
v/s Ratio Prot	0.00	c0.33		c0.17	0.12		c0.04	0.04				
v/s Ratio Perm									0.02		c0.00	
v/c Ratio	0.13	0.60		0.84	0.16		0.41	0.41	0.22		0.32	
Uniform Delay, d1	64.0	19.1		49.4	4.4		56.1	56.1	55.2		63.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	1.5	1.4		14.5	0.1		0.7	0.7	0.3		3.0	
Delay (s)	65.4	20.4		64.0	4.5		56.8	56.8	55.5		66.7	
Level of Service	E	C		E	A		E	E	E		E	
Approach Delay (s)		20.5			29.2			55.8			66.7	
Approach LOS		C			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	30.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	176	614	4	2	15	57	9	0	5	42	0	101
Future Volume (vph)	176	614	4	2	15	57	9	0	5	42	0	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1583		1770	1583	
Flt Permitted	0.95	1.00	1.00	0.40	1.00	1.00	0.69	1.00		0.75	1.00	
Satd. Flow (perm)	1770	3539	1583	742	3539	1583	1278	1583		1405	1583	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	191	667	4	2	16	62	10	0	5	46	0	110
RTOR Reduction (vph)	0	0	2	0	0	44	0	4	0	0	92	0
Lane Group Flow (vph)	191	667	2	2	16	18	10	1	0	46	18	0
Turn Type	Prot	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases			2	6		6	8			4		
Actuated Green, G (s)	7.9	22.9	22.9	11.0	11.0	11.0	6.1	6.1		6.1	6.1	
Effective Green, g (s)	7.9	22.9	22.9	11.0	11.0	11.0	6.1	6.1		6.1	6.1	
Actuated g/C Ratio	0.21	0.62	0.62	0.30	0.30	0.30	0.16	0.16		0.16	0.16	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	377	2190	979	220	1052	470	210	260		231	260	
v/s Ratio Prot	c0.11	c0.19			0.00			0.00			0.01	
v/s Ratio Perm			0.00	0.00		0.01	0.01			c0.03		
v/c Ratio	0.51	0.30	0.00	0.01	0.02	0.04	0.05	0.00		0.20	0.07	
Uniform Delay, d1	12.8	3.3	2.7	9.2	9.2	9.2	13.0	12.9		13.3	13.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0		0.4	0.1	
Delay (s)	13.9	3.4	2.7	9.2	9.2	9.3	13.1	12.9		13.8	13.2	
Level of Service	B	A	A	A	A	A	B	B		B	B	
Approach Delay (s)		5.7			9.3			13.0			13.3	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	7.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	37.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	32.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1341	98	38	452	201	91
Future Volume (vph)	1341	98	38	452	201	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frt	0.99		1.00	1.00	0.96	
Flt Protected	1.00		0.95	1.00	0.97	
Satd. Flow (prot)	5033		1770	5085	1725	
Flt Permitted	1.00		0.95	1.00	0.97	
Satd. Flow (perm)	5033		1770	5085	1725	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1458	107	41	491	218	99
RTOR Reduction (vph)	8	0	0	0	23	0
Lane Group Flow (vph)	1557	0	41	491	294	0
Turn Type	NA		Prot	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases						
Actuated Green, G (s)	32.8		2.1	38.9	16.4	
Effective Green, g (s)	32.8		2.1	38.9	16.4	
Actuated g/C Ratio	0.52		0.03	0.61	0.26	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	2607		58	3124	446	
v/s Ratio Prot	c0.31		c0.02	0.10	c0.17	
v/s Ratio Perm						
v/c Ratio	0.60		0.71	0.16	0.66	
Uniform Delay, d1	10.6		30.3	5.2	21.0	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.4		32.4	0.0	3.5	
Delay (s)	11.0		62.7	5.2	24.5	
Level of Service	B		E	A	C	
Approach Delay (s)	11.0			9.7	24.5	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	63.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Appendix 5
2025 Near-Term 95th Percentile Queue Lengths

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	138	388	133	288	593	173	716	169	20	453	82
v/c Ratio	0.38	0.36	0.20	0.54	0.46	0.35	0.55	0.15	0.09	0.37	0.19
Control Delay	42.1	28.3	6.6	38.8	24.7	40.9	24.0	4.6	47.4	26.4	5.8
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	42.1	28.3	6.6	38.8	24.7	40.9	24.0	4.6	47.4	26.4	5.8
Queue Length 50th (ft)	25	47	0	53	67	22	108	0	3	56	0
Queue Length 95th (ft)	92	117	26	166	157	76	335	27	22	142	29
Internal Link Dist (ft)		589			719		560			779	
Turn Bay Length (ft)	270		240	260		250		240	280		215
Base Capacity (vph)	958	2514	1354	977	2516	1353	1789	1463	873	2532	789
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	0.14	0.15	0.10	0.29	0.24	0.13	0.40	0.12	0.02	0.18	0.10

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	113	194	138	604	535	265	521	422	59	1071	94
v/c Ratio	0.39	0.36	0.25	0.70	0.62	0.50	0.40	0.50	0.27	0.54	0.10
Control Delay	46.7	36.5	7.4	41.5	33.4	43.7	24.3	4.9	47.8	28.1	5.1
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	46.7	36.5	7.4	41.5	33.4	43.7	24.3	4.9	47.8	28.1	5.1
Queue Length 50th (ft)	29	50	0	107	135	47	108	0	15	134	0
Queue Length 95th (ft)	73	96	27	204	224	100	221	72	45	245	18
Internal Link Dist (ft)		661			907		451			715	
Turn Bay Length (ft)	250		300	380		355			280		250
Base Capacity (vph)	782	1358	1193	1147	1426	1125	1424	890	706	2579	1163
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	0.14	0.14	0.12	0.53	0.38	0.24	0.37	0.47	0.08	0.42	0.08

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	72	13	178	97	156	343	724	4	1089	171
v/c Ratio	0.31	0.04	0.18	0.65	0.40	0.73	0.37	0.04	0.78	0.24
Control Delay	47.2	32.6	11.6	64.4	36.7	49.6	12.6	47.0	29.6	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.2	32.6	11.6	64.4	36.7	49.6	12.6	47.0	29.6	6.2
Queue Length 50th (ft)	21	7	22	56	85	98	91	2	269	9
Queue Length 95th (ft)	48	22	45	#155	144	#193	237	14	456	58
Internal Link Dist (ft)		734			1365		641		612	
Turn Bay Length (ft)	340		340	250		380		130		215
Base Capacity (vph)	278	634	1010	157	636	506	1967	178	1552	767
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.02	0.18	0.62	0.25	0.68	0.37	0.02	0.70	0.22

Intersection Summary

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

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	164	164	674	620	702	512
v/c Ratio	0.49	0.47	0.53	0.74	0.33	0.43
Control Delay	24.7	24.1	7.3	16.9	4.8	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.7	24.1	7.3	16.9	4.8	1.7
Queue Length 50th (ft)	44	44	30	133	41	0
Queue Length 95th (ft)	104	104	80	228	61	23
Internal Link Dist (ft)		377		311	651	
Turn Bay Length (ft)	140		140			220
Base Capacity (vph)	354	366	1250	1109	2677	1342
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.45	0.54	0.56	0.26	0.38

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	301	516	585	640
v/c Ratio	0.37	0.58	0.41	0.43
Control Delay	9.6	5.2	6.1	6.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	9.6	5.2	6.1	6.1
Queue Length 50th (ft)	13	5	20	22
Queue Length 95th (ft)	35	28	46	51
Internal Link Dist (ft)	429		834	429
Turn Bay Length (ft)	275	275		
Base Capacity (vph)	3255	2342	3223	3406
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	0.09	0.22	0.18	0.19

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	871	264	172	16	60	100	21	501	71	102
v/c Ratio	0.78	0.44	0.28	0.07	0.27	0.20	0.19	0.49	0.47	0.08
Control Delay	37.8	30.6	5.3	40.9	44.5	7.0	49.7	23.8	43.2	17.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.8	30.6	5.3	40.9	44.5	7.0	49.7	23.8	43.2	17.1
Queue Length 50th (ft)	258	132	0	10	37	0	14	105	47	24
Queue Length 95th (ft)	#397	229	49	30	78	39	38	145	93	54
Internal Link Dist (ft)		425			472			683		834
Turn Bay Length (ft)	575		380	250		250	360			
Base Capacity (vph)	1129	601	621	245	244	455	163	1132	171	1310
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.44	0.28	0.07	0.25	0.22	0.13	0.44	0.42	0.08

Intersection Summary

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

Lane Group	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	31	32	107	1142	223
v/c Ratio	0.26	0.27	0.22	0.43	0.05
Control Delay	50.6	51.1	8.6	1.0	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	50.6	51.1	8.6	1.0	0.4
Queue Length 50th (ft)	21	22	0	12	0
Queue Length 95th (ft)	49	50	23	16	0
Internal Link Dist (ft)		679		834	527
Turn Bay Length (ft)	115		475		
Base Capacity (vph)	192	188	637	2683	4187
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.16	0.17	0.17	0.43	0.05

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBT	NBR
Lane Group Flow (vph)	13	37	636	21	164	1086
v/c Ratio	0.02	0.10	0.36	0.02	0.43	0.44
Control Delay	31.9	0.6	20.8	7.1	42.2	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.9	0.6	20.8	7.1	42.2	6.6
Queue Length 50th (ft)	3	0	158	4	114	2
Queue Length 95th (ft)	11	0	223	14	167	228
Internal Link Dist (ft)	552			505	527	
Turn Bay Length (ft)						
Base Capacity (vph)	757	425	1749	1313	413	2449
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.09	0.36	0.02	0.40	0.44

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	7	205	328	647	732	791	667	59	59	191
v/c Ratio	0.04	0.30	0.41	0.70	0.52	0.97	0.58	0.11	0.31	0.31
Control Delay	45.2	31.5	5.2	39.1	19.7	59.5	30.8	3.1	45.9	35.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.2	31.5	5.2	39.1	19.7	59.5	30.8	3.1	45.9	35.6
Queue Length 50th (ft)	3	47	0	102	125	189	146	0	27	43
Queue Length 95th (ft)	18	78	11	180	200	#455	278	3	77	90
Internal Link Dist (ft)		924			708		1923			661
Turn Bay Length (ft)			350	420		300		300	195	
Base Capacity (vph)	538	1345	1250	1488	1439	819	1333	609	395	1309
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.15	0.26	0.43	0.51	0.97	0.50	0.10	0.15	0.15

Intersection Summary

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

Lane Group	WBL	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	1335	634	596	535	621
v/c Ratio	0.84	0.61	0.78	0.42	0.58
Control Delay	23.4	10.2	34.3	17.9	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	23.4	10.2	34.3	17.9	3.8
Queue Length 50th (ft)	239	112	131	90	0
Queue Length 95th (ft)	#362	225	167	114	33
Internal Link Dist (ft)			1423	1923	
Turn Bay Length (ft)		460			
Base Capacity (vph)	1589	1458	1883	3367	1802
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	0.84	0.43	0.32	0.16	0.34

Intersection Summary

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

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	226	591	1058	1554
v/c Ratio	0.71	0.62	0.38	0.88
Control Delay	55.9	28.1	3.4	29.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	55.9	28.1	3.4	29.4
Queue Length 50th (ft)	70	166	75	425
Queue Length 95th (ft)	114	222	116	#685
Internal Link Dist (ft)	342		409	1423
Turn Bay Length (ft)	255	255		
Base Capacity (vph)	1775	2073	3471	1761
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	0.13	0.29	0.30	0.88

Intersection Summary

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

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	7	422	303	1052	94	94	226	4
v/c Ratio	0.09	0.23	0.82	0.38	0.50	0.50	0.61	0.02
Control Delay	54.2	15.9	60.3	6.9	54.8	54.8	12.7	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.2	15.9	60.3	6.9	54.8	54.8	12.7	0.2
Queue Length 50th (ft)	5	68	213	77	70	70	0	0
Queue Length 95th (ft)	20	164	290	319	111	111	64	0
Internal Link Dist (ft)		594		855		459		223
Turn Bay Length (ft)	75		360		175			
Base Capacity (vph)	142	1845	491	2733	393	393	530	246
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.23	0.62	0.38	0.24	0.24	0.43	0.02

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	184	1043	232	241	585	223	568	501	90	611	75
v/c Ratio	0.52	0.61	0.22	0.58	0.33	0.48	0.54	0.43	0.35	0.48	0.17
Control Delay	50.5	30.2	4.2	49.6	24.8	48.8	33.4	4.1	52.1	33.8	4.8
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	50.5	30.2	4.2	49.6	24.8	48.8	33.4	4.1	52.1	33.8	4.8
Queue Length 50th (ft)	59	200	0	77	97	49	166	0	28	122	0
Queue Length 95th (ft)	110	298	30	136	154	88	262	43	63	188	24
Internal Link Dist (ft)		589			719		560			779	
Turn Bay Length (ft)	270		240	260		250		240	280		215
Base Capacity (vph)	734	1961	1194	741	1994	1067	1337	1352	741	1903	636
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	0.25	0.53	0.19	0.33	0.29	0.21	0.42	0.37	0.12	0.32	0.12

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	323	770	547	573	358	436	675	445	97	750	130
v/c Ratio	0.68	0.74	0.46	0.74	0.33	0.66	0.66	0.59	0.40	0.52	0.18
Control Delay	54.6	40.6	4.5	52.0	29.3	51.9	39.0	7.4	57.2	39.7	7.3
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	54.6	40.6	4.5	52.0	29.3	51.9	39.0	7.4	57.2	39.7	7.3
Queue Length 50th (ft)	117	261	3	142	96	108	226	8	35	139	0
Queue Length 95th (ft)	183	376	49	209	160	161	327	97	70	196	28
Internal Link Dist (ft)		661			907		451			715	
Turn Bay Length (ft)	250		300	380		355			280		250
Base Capacity (vph)	659	1206	1290	959	1197	959	1210	821	659	2113	1001
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	0.49	0.64	0.42	0.60	0.30	0.45	0.56	0.54	0.15	0.35	0.13

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	243	162	407	180	18	233	974	3	764	104
v/c Ratio	0.25	0.43	0.33	0.63	0.07	0.70	0.60	0.04	0.69	0.18
Control Delay	32.3	37.0	3.2	47.6	26.5	54.3	21.8	50.7	31.1	3.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.3	37.0	3.2	47.6	26.5	54.3	21.8	50.7	31.1	3.3
Queue Length 50th (ft)	42	78	0	91	7	63	188	2	187	0
Queue Length 95th (ft)	132	166	35	201	26	#174	413	13	327	23
Internal Link Dist (ft)		734			1365		641		612	
Turn Bay Length (ft)	340		340	250		380		130		215
Base Capacity (vph)	1250	648	1268	913	925	335	1814	84	1619	801
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.25	0.32	0.20	0.02	0.70	0.54	0.04	0.47	0.13

Intersection Summary

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

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	165	168	546	620	921	425
v/c Ratio	0.39	0.39	0.41	0.82	0.46	0.39
Control Delay	18.2	18.2	6.1	24.4	7.1	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.2	18.2	6.1	24.4	7.1	1.9
Queue Length 50th (ft)	41	42	28	151	72	0
Queue Length 95th (ft)	85	86	58	#309	106	28
Internal Link Dist (ft)		377		311	651	
Turn Bay Length (ft)	140		140			220
Base Capacity (vph)	493	494	1297	838	2158	1141
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.34	0.42	0.74	0.43	0.37

Intersection Summary

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

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	568	282	1020	1020
v/c Ratio	0.58	0.32	0.58	0.61
Control Delay	14.7	6.8	8.3	8.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	14.7	6.8	8.3	8.8
Queue Length 50th (ft)	47	10	62	63
Queue Length 95th (ft)	108	39	133	137
Internal Link Dist (ft)	429		834	429
Turn Bay Length (ft)	275	275		
Base Capacity (vph)	2615	2121	3440	3268
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	0.22	0.13	0.30	0.31

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	628	207	315	23	124	205	43	272	124	107
v/c Ratio	0.71	0.43	0.49	0.09	0.49	0.34	0.32	0.24	0.64	0.08
Control Delay	40.3	35.0	6.3	40.6	49.1	5.5	51.8	17.2	37.0	19.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.3	35.0	6.3	40.6	49.1	5.5	51.8	17.2	37.0	19.6
Queue Length 50th (ft)	192	113	0	14	78	0	28	42	67	34
Queue Length 95th (ft)	261	186	66	37	136	52	62	75	150	68
Internal Link Dist (ft)		425			472			683		834
Turn Bay Length (ft)	575		380	250		250	360			
Base Capacity (vph)	934	517	664	263	271	577	171	1193	220	1403
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.40	0.47	0.09	0.46	0.36	0.25	0.23	0.56	0.08

Intersection Summary

Lane Group	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	24	25	178	814	266
v/c Ratio	0.21	0.22	0.31	0.30	0.06
Control Delay	49.9	50.1	7.4	4.0	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	49.9	50.1	7.4	4.0	0.3
Queue Length 50th (ft)	16	16	0	102	0
Queue Length 95th (ft)	44	45	32	46	m1
Internal Link Dist (ft)		679		834	527
Turn Bay Length (ft)	115		475		
Base Capacity (vph)	294	295	732	2699	4129
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	0.08	0.08	0.24	0.30	0.06

Intersection Summary

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

Lane Group	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	8	109	945	12	1	168	780	1
v/c Ratio	0.01	0.23	0.70	0.01	0.00	0.53	0.38	0.01
Control Delay	29.1	6.4	32.7	7.9	0.0	44.5	10.1	47.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.1	6.4	32.7	7.9	0.0	44.5	10.1	47.0
Queue Length 50th (ft)	2	0	260	2	0	115	110	1
Queue Length 95th (ft)	8	38	#518	12	0	181	207	7
Internal Link Dist (ft)	552			505		527		495
Turn Bay Length (ft)					200			
Base Capacity (vph)	814	484	1344	1334	1149	346	2046	289
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	0.01	0.23	0.70	0.01	0.00	0.49	0.38	0.00

Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	339	665	279	310	362	373	132	132	264	15
v/c Ratio	0.05	0.38	0.56	0.41	0.22	0.61	0.51	0.31	0.50	0.39	0.04
Control Delay	36.9	24.7	4.1	33.8	8.7	34.6	30.5	8.2	38.7	30.3	0.2
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	36.9	24.7	4.1	33.8	8.7	34.6	30.5	8.2	38.7	30.3	0.2
Queue Length 50th (ft)	4	62	0	39	20	73	74	0	52	52	0
Queue Length 95th (ft)	24	124	42	89	67	159	162	49	140	120	0
Internal Link Dist (ft)		924			708		1923			661	
Turn Bay Length (ft)			350	420		300		300	195		190
Base Capacity (vph)	630	1538	1565	1779	1525	959	1514	740	485	1534	738
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	0.02	0.22	0.42	0.16	0.20	0.38	0.25	0.18	0.27	0.17	0.02

Intersection Summary

Lane Group	WBL	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	1108	324	629	820	407
v/c Ratio	0.68	0.32	0.80	0.64	0.44
Control Delay	16.4	5.8	33.4	20.9	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	16.4	5.8	33.4	20.9	3.4
Queue Length 50th (ft)	170	38	127	141	0
Queue Length 95th (ft)	266	89	191	209	50
Internal Link Dist (ft)			1423	1923	
Turn Bay Length (ft)		460			
Base Capacity (vph)	1706	1453	1985	3517	1840
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	0.65	0.22	0.32	0.23	0.22

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	193	480	1189	1528
v/c Ratio	0.65	0.54	0.42	0.79
Control Delay	51.3	27.6	3.4	21.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	51.3	27.6	3.4	21.1
Queue Length 50th (ft)	56	127	80	343
Queue Length 95th (ft)	95	178	123	522
Internal Link Dist (ft)	342		409	1423
Turn Bay Length (ft)	255	255		
Base Capacity (vph)	1908	2151	3539	1929
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	0.10	0.22	0.34	0.79

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	2	1012	311	446	61	61	384	9
v/c Ratio	0.03	0.50	0.84	0.16	0.41	0.40	0.78	0.11
Control Delay	61.0	20.6	68.5	5.0	61.1	61.0	16.8	53.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.0	20.6	68.5	5.0	61.1	61.0	16.8	53.7
Queue Length 50th (ft)	2	224	253	23	53	53	0	6
Queue Length 95th (ft)	11	499	336	122	90	90	93	25
Internal Link Dist (ft)		594		855		459		223
Turn Bay Length (ft)	75		360		175			
Base Capacity (vph)	138	2031	482	2846	354	355	632	115
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	0.01	0.50	0.65	0.16	0.17	0.17	0.61	0.08

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	138	389	133	359	822	169	713	169	20	452	83
v/c Ratio	0.39	0.32	0.19	0.62	0.55	0.36	0.57	0.16	0.10	0.38	0.20
Control Delay	44.5	28.2	6.3	41.1	25.8	43.1	26.4	4.8	49.4	28.5	6.1
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	44.5	28.2	6.3	41.1	25.8	43.1	26.4	4.8	49.4	28.5	6.1
Queue Length 50th (ft)	29	51	0	75	105	24	128	0	4	65	0
Queue Length 95th (ft)	92	118	25	205	227	74	336	28	23	143	30
Internal Link Dist (ft)		589			719		560			779	
Turn Bay Length (ft)	270		240	260		250		240	280		215
Base Capacity (vph)	890	2338	1269	907	2358	1257	1664	1373	811	2353	740
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	0.16	0.17	0.10	0.40	0.35	0.13	0.43	0.12	0.02	0.19	0.11

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	113	195	138	652	854	235	519	422	60	1060	102
v/c Ratio	0.42	0.26	0.19	0.75	0.77	0.50	0.44	0.52	0.30	0.58	0.12
Control Delay	51.7	34.1	6.6	46.3	36.6	49.0	28.9	5.4	52.5	32.7	6.0
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	51.7	34.1	6.6	46.3	36.6	49.0	28.9	5.4	52.5	32.7	6.0
Queue Length 50th (ft)	36	54	0	140	250	51	142	0	19	171	0
Queue Length 95th (ft)	73	96	27	219	382	90	221	73	45	240	21
Internal Link Dist (ft)		661			907		451			715	
Turn Bay Length (ft)	250		300	380		355			280		250
Base Capacity (vph)	696	1208	1077	1021	1278	1001	1268	838	628	2297	1048
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	0.16	0.16	0.13	0.64	0.67	0.23	0.41	0.50	0.10	0.46	0.10

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	72	31	164	47	1278	525	953	34	1066	169
v/c Ratio	0.35	0.06	0.13	0.42	2.35	1.21	0.58	0.30	0.85	0.26
Control Delay	54.0	29.9	3.1	60.6	633.8	153.2	18.6	55.8	39.5	6.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.0	29.9	3.1	60.6	633.8	153.2	18.6	55.8	39.5	6.8
Queue Length 50th (ft)	25	16	0	32	~1510	~239	206	23	357	10
Queue Length 95th (ft)	49	40	21	71	#1783	#349	290	55	449	56
Internal Link Dist (ft)		734			1066		641		612	
Turn Bay Length (ft)	340		340	250		380		130		215
Base Capacity (vph)	240	549	1281	135	544	435	1641	154	1336	682
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.06	0.13	0.35	2.35	1.21	0.58	0.22	0.80	0.25

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	157	161	674	415	612	518
v/c Ratio	0.41	0.41	0.43	0.60	0.31	0.46
Control Delay	19.0	18.8	2.2	14.5	5.3	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.0	18.8	2.2	14.5	5.3	2.0
Queue Length 50th (ft)	33	33	0	76	34	0
Queue Length 95th (ft)	89	90	28	136	53	24
Internal Link Dist (ft)		377		311	651	
Turn Bay Length (ft)	140		140			220
Base Capacity (vph)	406	420	1535	1269	3022	1450
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.38	0.44	0.33	0.20	0.36

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	310	516	540	637
v/c Ratio	0.38	0.58	0.38	0.43
Control Delay	9.6	5.1	5.9	6.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	9.6	5.1	5.9	6.1
Queue Length 50th (ft)	14	5	18	22
Queue Length 95th (ft)	36	28	43	50
Internal Link Dist (ft)	429		834	429
Turn Bay Length (ft)	275	275		
Base Capacity (vph)	3256	2343	3223	3406
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	0.10	0.22	0.17	0.19

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	808	261	168	16	59	113	21	842	74	114
v/c Ratio	0.84	0.51	0.30	0.07	0.26	0.25	0.19	0.75	0.49	0.08
Control Delay	44.6	35.6	6.1	40.9	44.4	16.5	49.7	35.6	33.7	21.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.6	35.6	6.1	40.9	44.4	16.5	49.7	35.6	33.7	21.0
Queue Length 50th (ft)	260	146	0	10	36	27	14	255	49	36
Queue Length 95th (ft)	336	226	49	30	76	71	38	338	95	69
Internal Link Dist (ft)		425			472			683		834
Turn Bay Length (ft)	575		380	250		250	360			
Base Capacity (vph)	987	526	562	245	244	425	163	1121	171	1415
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.82	0.50	0.30	0.07	0.24	0.27	0.13	0.75	0.43	0.08

Intersection Summary

Lane Group	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	31	32	519	1483	269
v/c Ratio	0.12	0.12	0.70	0.64	0.07
Control Delay	40.4	40.5	34.4	16.2	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	40.4	40.5	34.4	16.2	0.9
Queue Length 50th (ft)	17	18	140	536	3
Queue Length 95th (ft)	48	49	200	588	2
Internal Link Dist (ft)		679		834	527
Turn Bay Length (ft)	115		475		
Base Capacity (vph)	263	257	852	2345	3976
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	0.12	0.12	0.61	0.63	0.07

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBT	NBR
Lane Group Flow (vph)	77	80	331	527	987	1037
v/c Ratio	0.12	0.21	0.34	0.54	1.42	0.46
Control Delay	32.9	3.7	33.6	19.7	227.6	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.9	3.7	33.6	19.7	227.6	7.7
Queue Length 50th (ft)	21	0	98	228	~899	194
Queue Length 95th (ft)	38	12	130	293	#1068	185
Internal Link Dist (ft)	552			505	527	
Turn Bay Length (ft)						
Base Capacity (vph)	757	425	961	977	694	2261
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.19	0.34	0.54	1.42	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.

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	1	112	25	1259	23	19
v/c Ratio	0.01	0.04	0.12	0.42	0.02	0.06
Control Delay	34.0	4.4	31.5	5.2	0.1	22.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.0	4.4	31.5	5.2	0.1	22.0
Queue Length 50th (ft)	0	0	5	0	0	3
Queue Length 95th (ft)	6	27	36	310	0	23
Internal Link Dist (ft)		1242		627	261	357
Turn Bay Length (ft)	150		135			
Base Capacity (vph)	167	3141	213	3150	1129	957
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.04	0.12	0.40	0.02	0.02

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	7	205	328	581	929	799	664	59	59	189
v/c Ratio	0.04	0.28	0.39	0.68	0.66	0.98	0.58	0.11	0.32	0.31
Control Delay	44.2	30.2	4.9	39.5	23.1	61.0	30.3	3.1	45.2	35.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.2	30.2	4.9	39.5	23.1	61.0	30.3	3.1	45.2	35.2
Queue Length 50th (ft)	3	46	0	91	179	187	142	0	26	42
Queue Length 95th (ft)	18	76	11	162	274	#450	271	3	75	88
Internal Link Dist (ft)		924			708		1923			661
Turn Bay Length (ft)			350	420		300		300	195	
Base Capacity (vph)	538	1347	1251	1488	1414	819	1332	609	395	1309
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.15	0.26	0.39	0.66	0.98	0.50	0.10	0.15	0.14

Intersection Summary

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

Lane Group	WBL	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	1304	641	598	523	562
v/c Ratio	0.82	0.61	0.78	0.40	0.54
Control Delay	22.8	10.4	34.3	17.7	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	22.8	10.4	34.3	17.7	3.6
Queue Length 50th (ft)	230	115	131	88	0
Queue Length 95th (ft)	352	233	168	111	33
Internal Link Dist (ft)			1423	1923	
Turn Bay Length (ft)		460			
Base Capacity (vph)	1583	1453	1876	3357	1796
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	0.82	0.44	0.32	0.16	0.31

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	219	582	925	1515
v/c Ratio	0.70	0.61	0.33	0.85
Control Delay	55.5	28.1	3.1	27.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	55.5	28.1	3.1	27.3
Queue Length 50th (ft)	68	163	61	401
Queue Length 95th (ft)	110	218	95	#647
Internal Link Dist (ft)	342		409	1423
Turn Bay Length (ft)	255	255		
Base Capacity (vph)	1786	2076	3471	1772
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	0.12	0.28	0.27	0.85

Intersection Summary

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

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	7	417	295	1228	87	87	226	4
v/c Ratio	0.09	0.22	0.81	0.45	0.48	0.48	0.62	0.02
Control Delay	54.2	15.5	60.3	7.5	54.3	54.3	13.0	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.2	15.5	60.3	7.5	54.3	54.3	13.0	0.2
Queue Length 50th (ft)	5	65	208	94	65	65	0	0
Queue Length 95th (ft)	20	161	284	397	104	104	64	0
Internal Link Dist (ft)		594		855		459		223
Turn Bay Length (ft)	75		360		175			
Base Capacity (vph)	142	1871	491	2744	393	393	530	246
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.22	0.60	0.45	0.22	0.22	0.43	0.02

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	SBL	SBT
Lane Group Flow (vph)	59	63	8	5	1184	29	1	61	192
v/c Ratio	0.30	0.03	0.01	0.01	0.58	0.03	0.01	0.24	0.46
Control Delay	34.7	4.1	2.3	8.6	11.0	0.9	23.0	25.0	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.7	4.1	2.3	8.6	11.0	0.9	23.0	25.0	9.9
Queue Length 50th (ft)	17	2	0	1	130	0	0	17	6
Queue Length 95th (ft)	#79	13	4	7	309	4	4	58	59
Internal Link Dist (ft)		598			4088				1450
Turn Bay Length (ft)	210		250	150		250	150	150	
Base Capacity (vph)	202	3248	1454	1116	2971	1338	465	670	841
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.02	0.01	0.00	0.40	0.02	0.00	0.09	0.23

Intersection Summary

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

Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	981	188	1447	153
v/c Ratio	0.46	0.76	0.44	0.36
Control Delay	7.5	46.9	6.7	15.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.5	46.9	6.7	15.1
Queue Length 50th (ft)	32	42	55	28
Queue Length 95th (ft)	91	#186	175	66
Internal Link Dist (ft)	1066		843	293
Turn Bay Length (ft)		150		
Base Capacity (vph)	2350	247	3576	988
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	0.42	0.76	0.40	0.15

Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	185	1142	222	241	585	223	570	521	96	605	75
v/c Ratio	0.53	0.66	0.21	0.59	0.33	0.49	0.59	0.46	0.37	0.47	0.16
Control Delay	51.3	31.4	4.8	50.6	25.0	49.6	35.5	4.2	52.5	34.0	4.7
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	51.3	31.4	4.8	50.6	25.0	49.6	35.5	4.2	52.5	34.0	4.7
Queue Length 50th (ft)	59	226	2	77	97	49	167	0	30	121	0
Queue Length 95th (ft)	110	333	32	136	154	88	263	44	66	186	24
Internal Link Dist (ft)		589			719		560			779	
Turn Bay Length (ft)	270		240	260		250		240	280		215
Base Capacity (vph)	711	1902	1153	718	1936	1034	1296	1338	718	1844	619
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	0.26	0.60	0.19	0.34	0.30	0.22	0.44	0.39	0.13	0.33	0.12

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	323	919	517	563	358	436	672	497	98	744	130
v/c Ratio	0.70	0.82	0.44	0.75	0.31	0.68	0.67	0.66	0.41	0.53	0.18
Control Delay	56.6	44.2	7.1	54.1	28.9	53.8	40.3	11.2	58.1	40.8	7.2
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	56.6	44.2	7.1	54.1	28.9	53.8	40.3	11.2	58.1	40.8	7.2
Queue Length 50th (ft)	117	327	23	140	96	109	227	41	36	139	0
Queue Length 95th (ft)	183	466	75	205	160	161	326	166	71	195	28
Internal Link Dist (ft)		661			907		451			715	
Turn Bay Length (ft)	250		300	380		355			280		250
Base Capacity (vph)	630	1152	1204	915	1162	915	1154	798	630	2017	962
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	0.51	0.80	0.43	0.62	0.31	0.48	0.58	0.62	0.16	0.37	0.14

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	244	664	132	125	25	233	977	91	707	104
v/c Ratio	0.22	1.21	0.11	0.61	0.10	0.82	0.77	1.28	0.63	0.17
Control Delay	32.7	144.1	8.6	56.6	27.0	71.0	33.0	239.1	32.4	3.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.7	144.1	8.6	56.6	27.0	71.0	33.0	239.1	32.4	3.0
Queue Length 50th (ft)	47	~532	9	78	11	78	285	~75	203	0
Queue Length 95th (ft)	127	#860	34	146	31	#164	387	#197	281	23
Internal Link Dist (ft)		734			1066		641		612	
Turn Bay Length (ft)	340		340	250		380		130		215
Base Capacity (vph)	1318	549	1224	774	779	283	1522	71	1371	706
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	1.21	0.11	0.16	0.03	0.82	0.64	1.28	0.52	0.15

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	166	168	479	686	546	427
v/c Ratio	0.40	0.41	0.38	0.87	0.27	0.39
Control Delay	18.5	18.6	6.4	29.0	5.7	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.5	18.6	6.4	29.0	5.7	1.9
Queue Length 50th (ft)	41	42	27	176	37	0
Queue Length 95th (ft)	85	86	54	#358	58	28
Internal Link Dist (ft)		377		311	651	
Turn Bay Length (ft)	140		140			220
Base Capacity (vph)	482	484	1249	820	2111	1126
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.35	0.38	0.84	0.26	0.38

Intersection Summary

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

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	568	386	1079	889
v/c Ratio	0.58	0.41	0.61	0.53
Control Delay	14.9	7.0	8.7	7.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	14.9	7.0	8.7	7.9
Queue Length 50th (ft)	47	13	67	52
Queue Length 95th (ft)	111	50	145	115
Internal Link Dist (ft)	429		834	429
Turn Bay Length (ft)	275	275		
Base Capacity (vph)	2600	2125	3424	3253
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	0.22	0.18	0.32	0.27

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	371	197	284	25	126	205	42	275	142	181
v/c Ratio	0.57	0.55	0.53	0.10	0.50	0.34	0.31	0.21	0.67	0.11
Control Delay	41.6	43.6	7.9	40.7	49.3	5.4	51.6	15.0	46.0	13.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.6	43.6	7.9	40.7	49.3	5.4	51.6	15.0	46.0	13.8
Queue Length 50th (ft)	118	122	0	15	80	0	27	38	63	35
Queue Length 95th (ft)	151	177	63	40	138	52	61	76	#180	97
Internal Link Dist (ft)		425			472			683		834
Turn Bay Length (ft)	575		380	250		250	360			
Base Capacity (vph)	882	488	622	263	271	584	171	1338	228	1608
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.40	0.46	0.10	0.46	0.35	0.25	0.21	0.62	0.11

Intersection Summary

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

Lane Group	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	24	24	209	558	479
v/c Ratio	0.21	0.21	0.35	0.21	0.12
Control Delay	49.9	49.8	7.2	2.9	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	49.9	49.8	7.2	2.9	0.4
Queue Length 50th (ft)	16	16	0	20	3
Queue Length 95th (ft)	44	43	34	52	3
Internal Link Dist (ft)		679		834	527
Turn Bay Length (ft)	115		475		
Base Capacity (vph)	294	295	756	2699	4129
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	0.08	0.08	0.28	0.21	0.12

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	516	304	938	32	1	211	524	1
v/c Ratio	0.63	0.49	0.71	0.02	0.00	0.64	0.27	0.01
Control Delay	38.8	6.6	33.4	7.7	0.0	49.0	4.6	47.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.8	6.6	33.4	7.7	0.0	49.0	4.6	47.0
Queue Length 50th (ft)	162	0	262	5	0	131	0	1
Queue Length 95th (ft)	220	66	#516	23	0	216	111	7
Internal Link Dist (ft)	552			505		527		495
Turn Bay Length (ft)					200			
Base Capacity (vph)	814	623	1321	1321	1139	355	1947	289
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	0.63	0.49	0.71	0.02	0.00	0.59	0.27	0.00

Intersection Summary

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

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	1	720	54	100	37	19
v/c Ratio	0.00	0.27	0.25	0.04	0.11	0.05
Control Delay	23.0	7.0	25.3	5.2	7.2	13.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.0	7.0	25.3	5.2	7.2	13.1
Queue Length 50th (ft)	0	0	8	0	1	2
Queue Length 95th (ft)	5	160	#55	23	15	15
Internal Link Dist (ft)		1242		627	261	357
Turn Bay Length (ft)	150		135			
Base Capacity (vph)	212	2784	217	2682	991	1222
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.26	0.25	0.04	0.04	0.02

Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	547	674	271	308	358	365	91	128	265	15
v/c Ratio	0.05	0.51	0.52	0.42	0.20	0.62	0.52	0.24	0.51	0.42	0.04
Control Delay	38.9	25.4	3.5	36.6	8.3	37.3	33.2	9.3	41.8	33.4	0.2
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	38.9	25.4	3.5	36.6	8.3	37.3	33.2	9.3	41.8	33.4	0.2
Queue Length 50th (ft)	5	108	0	42	20	80	82	0	57	60	0
Queue Length 95th (ft)	24	197	42	87	66	157	158	41	135	121	0
Internal Link Dist (ft)		924			708		1923			661	
Turn Bay Length (ft)			350	420		300		300	195		190
Base Capacity (vph)	585	1431	1522	1651	1562	891	1405	671	450	1424	692
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	0.02	0.38	0.44	0.16	0.20	0.40	0.26	0.14	0.28	0.19	0.02

Intersection Summary

Lane Group	WBL	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	1116	325	573	834	398
v/c Ratio	0.67	0.31	0.77	0.68	0.44
Control Delay	15.6	4.8	33.0	22.0	3.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	15.6	4.8	33.0	22.0	3.6
Queue Length 50th (ft)	163	32	114	145	0
Queue Length 95th (ft)	257	77	173	214	51
Internal Link Dist (ft)			1423	1923	
Turn Bay Length (ft)		460			
Base Capacity (vph)	1727	1472	2009	3532	1846
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	0.65	0.22	0.29	0.24	0.22

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	159	447	1162	1539
v/c Ratio	0.58	0.53	0.41	0.78
Control Delay	49.1	27.8	3.1	19.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	49.1	27.8	3.1	19.5
Queue Length 50th (ft)	45	117	71	327
Queue Length 95th (ft)	79	166	109	497
Internal Link Dist (ft)	342		409	1423
Turn Bay Length (ft)	255	255		
Base Capacity (vph)	1949	2163	3539	1970
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	0.08	0.21	0.33	0.78

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	2	1172	311	437	60	60	349	9
v/c Ratio	0.03	0.57	0.84	0.15	0.41	0.41	0.77	0.11
Control Delay	61.0	21.8	68.5	4.9	61.6	61.5	16.8	53.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.0	21.8	68.5	4.9	61.6	61.5	16.8	53.7
Queue Length 50th (ft)	2	277	253	23	52	52	0	6
Queue Length 95th (ft)	11	#662	336	120	88	88	88	25
Internal Link Dist (ft)		594		855		459		223
Turn Bay Length (ft)	75		360		175			
Base Capacity (vph)	138	2047	482	2852	354	355	605	115
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	0.01	0.57	0.65	0.15	0.17	0.17	0.58	0.08

Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	191	667	4	2	16	62	10	5	46	110
v/c Ratio	0.49	0.27	0.00	0.01	0.02	0.12	0.03	0.01	0.13	0.09
Control Delay	24.5	5.7	1.2	14.0	13.7	3.3	10.3	0.0	11.1	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	5.7	1.2	14.0	13.7	3.3	10.3	0.0	11.1	0.2
Queue Length 50th (ft)	27	25	0	0	1	0	1	0	6	0
Queue Length 95th (ft)	#177	118	2	5	8	15	9	0	26	0
Internal Link Dist (ft)		598			4088			531		1450
Turn Bay Length (ft)	210		250	150		250	150		150	
Base Capacity (vph)	389	3041	1363	391	1870	879	948	1215	1043	1441
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.22	0.00	0.01	0.01	0.07	0.01	0.00	0.04	0.08

Intersection Summary

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

Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	1565	41	491	317
v/c Ratio	0.58	0.34	0.16	0.66
Control Delay	12.1	41.8	6.0	26.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.1	41.8	6.0	26.7
Queue Length 50th (ft)	152	17	26	106
Queue Length 95th (ft)	243	#57	51	192
Internal Link Dist (ft)	1066		843	293
Turn Bay Length (ft)		150		
Base Capacity (vph)	3187	120	3883	1102
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	0.49	0.34	0.13	0.29

Intersection Summary

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

Appendix 6
2040 Cumulative Level of Service Worksheets

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	440	166	268	466	109	197	724	162	21	421	72
Future Volume (vph)	125	440	166	268	466	109	197	724	162	21	421	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91		0.94	0.95	0.88	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3400	4988	2564	3467	4844		4802	3539	2738	3099	5085	1489
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3400	4988	2564	3467	4844		4802	3539	2738	3099	5085	1489
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	134	473	178	288	501	117	212	778	174	23	453	77
RTOR Reduction (vph)	0	0	138	0	30	0	0	0	110	0	0	55
Lane Group Flow (vph)	134	473	40	288	588	0	212	778	64	23	453	22
Confl. Peds. (#/hr)			8			14			7			2
Heavy Vehicles (%)	3%	4%	9%	1%	4%	2%	6%	2%	2%	13%	2%	7%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	8.6	18.7	18.7	12.6	22.7		9.0	30.8	30.8	1.9	23.7	23.7
Effective Green, g (s)	8.6	18.7	18.7	12.6	22.7		9.0	30.8	30.8	1.9	23.7	23.7
Actuated g/C Ratio	0.10	0.22	0.22	0.15	0.27		0.11	0.37	0.37	0.02	0.28	0.28
Clearance Time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Vehicle Extension (s)	2.0	3.5	3.5	2.0	3.5		2.0	3.5	3.5	2.0	3.5	3.5
Lane Grp Cap (vph)	348	1110	570	520	1309		514	1297	1003	70	1434	420
v/s Ratio Prot	0.04	0.09		c0.08	c0.12		c0.04	c0.22		0.01	0.09	
v/s Ratio Perm			0.02						0.02			0.01
v/c Ratio	0.39	0.43	0.07	0.55	0.45		0.41	0.60	0.06	0.33	0.32	0.05
Uniform Delay, d1	35.2	28.0	25.8	33.1	25.5		35.0	21.6	17.2	40.4	23.8	22.0
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	0.3	0.3	0.1	0.7	0.3		0.2	0.8	0.0	1.0	0.2	0.1
Delay (s)	35.5	28.4	25.8	33.8	25.7		35.2	22.4	17.3	41.4	23.9	22.0
Level of Service	D	C	C	C	C		D	C	B	D	C	C
Approach Delay (s)		29.0			28.3			24.0			24.4	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	63.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	244	147	544	460	47	249	490	294	48	1007	88
Future Volume (vph)	107	244	147	544	460	47	249	490	294	48	1007	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Lane Util. Factor	0.97	0.86	0.88	0.94	0.91		0.94	0.86	1.00	0.97	0.86	0.88
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3400	6108	2760	4990	4973		4894	6285	1563	3072	6408	2733
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3400	6108	2760	4990	4973		4894	6285	1563	3072	6408	2733
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	114	260	156	579	489	50	265	521	313	51	1071	94
RTOR Reduction (vph)	0	0	132	0	10	0	0	0	194	0	0	63
Lane Group Flow (vph)	114	260	24	579	529	0	265	521	119	51	1071	31
Confl. Peds. (#/hr)						4			1			
Heavy Vehicles (%)	3%	7%	3%	2%	3%	0%	4%	4%	2%	14%	2%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases			2						4			8
Actuated Green, G (s)	7.8	13.7	13.7	14.9	20.8		9.7	33.8	33.8	5.0	29.1	29.1
Effective Green, g (s)	7.8	13.7	13.7	14.9	20.8		9.7	33.8	33.8	5.0	29.1	29.1
Actuated g/C Ratio	0.09	0.15	0.15	0.17	0.23		0.11	0.38	0.38	0.06	0.33	0.33
Clearance Time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	297	940	424	835	1162		533	2386	593	172	2095	893
v/s Ratio Prot	0.03	0.04		c0.12	c0.11		c0.05	c0.08		0.02	c0.17	
v/s Ratio Perm			0.01						0.08			0.01
v/c Ratio	0.38	0.28	0.06	0.69	0.46		0.50	0.22	0.20	0.30	0.51	0.03
Uniform Delay, d1	38.3	33.3	32.1	34.9	29.2		37.4	18.7	18.5	40.3	24.2	20.4
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	0.3	0.2	0.1	2.0	0.3		0.3	0.1	0.2	0.4	0.3	0.0
Delay (s)	38.6	33.4	32.2	36.9	29.5		37.6	18.7	18.8	40.7	24.5	20.4
Level of Service	D	C	C	D	C		D	B	B	D	C	C
Approach Delay (s)		34.2			33.4			23.3			24.8	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	89.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	56.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	187	179	223	233	5	326	651	807	53	1133	162
Future Volume (vph)	72	187	179	223	233	5	326	651	807	53	1133	162
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	4.0	4.0	4.0	5.3	4.9	4.0	5.3	4.9	4.9
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91	1.00	0.94	0.86	0.88	0.97	0.86	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5187	2608	3433	5085	1583	4894	6285	2842	3502	6471	1579
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5187	2608	3433	5085	1583	4894	6285	2842	3502	6471	1579
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	76	197	188	235	245	5	343	685	849	56	1193	171
RTOR Reduction (vph)	0	0	37	0	0	4	0	0	358	0	0	107
Lane Group Flow (vph)	76	197	151	235	245	1	343	685	491	56	1193	64
Confl. Peds. (#/hr)												1
Heavy Vehicles (%)	2%	0%	9%	2%	2%	2%	4%	4%	0%	0%	1%	1%
Turn Type	Prot	NA	pt+ov	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	5	2	2 3	1	6		3	8	1	7	4	
Permitted Phases						6			8			4
Actuated Green, G (s)	5.0	16.2	31.7	8.2	19.4	19.4	10.2	37.6	45.8	4.8	32.2	32.2
Effective Green, g (s)	5.0	16.2	31.7	8.2	19.4	19.4	10.2	37.6	45.8	4.8	32.2	32.2
Actuated g/C Ratio	0.06	0.19	0.37	0.10	0.22	0.22	0.12	0.44	0.53	0.06	0.37	0.37
Clearance Time (s)	5.3	5.3		4.0	4.0	4.0	5.3	4.9	4.0	5.3	4.9	4.9
Vehicle Extension (s)	2.0	4.0		2.0	2.0	2.0	2.0	4.0	2.0	2.0	4.0	4.0
Lane Grp Cap (vph)	198	973	957	326	1143	355	578	2738	1508	194	2414	589
v/s Ratio Prot	0.02	0.04	0.06	c0.07	c0.05		c0.07	0.11	0.03	0.02	c0.18	
v/s Ratio Perm						0.00			0.14			0.04
v/c Ratio	0.38	0.20	0.16	0.72	0.21	0.00	0.59	0.25	0.33	0.29	0.49	0.11
Uniform Delay, d1	39.2	29.6	18.3	37.9	27.2	25.9	36.1	15.4	11.5	39.1	20.8	17.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.1	0.1	6.5	0.0	0.0	1.1	0.1	0.0	0.3	0.2	0.1
Delay (s)	39.6	29.7	18.4	44.4	27.3	26.0	37.2	15.5	11.5	39.4	21.0	17.8
Level of Service	D	C	B	D	C	C	D	B	B	D	C	B
Approach Delay (s)		26.8			35.6			17.7			21.3	
Approach LOS		C			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	86.3	Sum of lost time (s)	19.5
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	231	62	658	0	1348	0	0	888	497
Future Volume (vph)	0	0	0	231	62	658	0	1348	0	0	888	497
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.7	3.7	3.7		4.8			4.8	4.8
Lane Util. Factor				0.95	0.95	0.88		0.91			0.91	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	0.97	1.00		1.00			1.00	1.00
Satd. Flow (prot)				1633	1691	2760		5036			5036	1599
Flt Permitted				0.95	0.97	1.00		1.00			1.00	1.00
Satd. Flow (perm)				1633	1691	2760		5036			5036	1599
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	0	238	64	678	0	1390	0	0	915	512
RTOR Reduction (vph)	0	0	0	0	0	34	0	0	0	0	0	181
Lane Group Flow (vph)	0	0	0	150	152	644	0	1390	0	0	915	331
Heavy Vehicles (%)	0%	0%	0%	5%	2%	3%	0%	3%	20%	0%	3%	1%
Turn Type				Split	NA	custom		NA			NA	Perm
Protected Phases				8	8	8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				10.3	10.3	18.0		26.7			34.4	34.4
Effective Green, g (s)				10.3	10.3	18.0		26.7			34.4	34.4
Actuated g/C Ratio				0.19	0.19	0.34		0.50			0.65	0.65
Clearance Time (s)				3.7	3.7			4.8			4.8	4.8
Vehicle Extension (s)				4.0	4.0			4.0			2.5	2.5
Lane Grp Cap (vph)				316	327	933		2527			3256	1033
v/s Ratio Prot				0.09	0.09	c0.23		c0.28			0.18	
v/s Ratio Perm												0.21
v/c Ratio				0.47	0.46	0.69		0.55			0.28	0.32
Uniform Delay, d1				19.0	19.0	15.2		9.1			4.1	4.2
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				1.5	1.4	2.4		0.3			0.0	0.1
Delay (s)				20.6	20.4	17.6		9.4			4.1	4.3
Level of Service				C	C	B		A			A	A
Approach Delay (s)		0.0			18.5			9.4			4.2	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	53.2	Sum of lost time (s)	12.2
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	495	667	0	1356	674	0
Future Volume (vph)	495	667	0	1356	674	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.88		0.91	0.91	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3367	2409		4631	4893	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3367	2409		4631	4893	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	532	717	0	1458	725	0
RTOR Reduction (vph)	0	234	0	0	0	0
Lane Group Flow (vph)	532	483	0	1458	725	0
Confl. Bikes (#/hr)						3
Heavy Vehicles (%)	4%	18%	0%	12%	6%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	13.3	13.3		23.9	23.9	
Effective Green, g (s)	13.3	13.3		23.9	23.9	
Actuated g/C Ratio	0.29	0.29		0.53	0.53	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	
Lane Grp Cap (vph)	990	708		2448	2587	
v/s Ratio Prot	0.16			c0.31	0.15	
v/s Ratio Perm		c0.20				
v/c Ratio	0.54	0.68		0.60	0.28	
Uniform Delay, d1	13.4	14.1		7.3	5.9	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	2.2		0.3	0.0	
Delay (s)	13.7	16.3		7.6	5.9	
Level of Service	B	B		A	A	
Approach Delay (s)	15.2			7.6	5.9	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	45.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	767	248	287	14	54	90	52	271	204	64	111	0
Future Volume (vph)	767	248	287	14	54	90	52	271	204	64	111	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.9	4.9	4.9	3.5	5.3		4.0	5.3	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1827	1538	1687	1681	1599	1719	3210		1719	3438	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1827	1538	1687	1681	1599	1719	3210		1719	3438	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	852	276	319	16	60	100	58	301	227	71	123	0
RTOR Reduction (vph)	0	0	214	0	0	73	0	134	0	0	0	0
Lane Group Flow (vph)	852	276	105	16	60	27	58	394	0	71	123	0
Confl. Peds. (#/hr)									4			
Heavy Vehicles (%)	2%	4%	5%	7%	13%	1%	5%	4%	4%	5%	5%	3%
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	7	7		8	8	8 1	5	2		1	6	
Permitted Phases			7									
Actuated Green, G (s)	34.6	34.6	34.6	14.0	14.0	28.1	7.6	29.5		9.2	31.6	
Effective Green, g (s)	34.6	34.6	34.6	14.0	14.0	28.1	7.6	29.5		9.2	31.6	
Actuated g/C Ratio	0.33	0.33	0.33	0.13	0.13	0.27	0.07	0.28		0.09	0.30	
Clearance Time (s)	3.5	3.5	3.5	4.9	4.9		3.5	5.3		4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	1131	602	506	224	224	427	124	901		150	1034	
v/s Ratio Prot	c0.25	0.15		0.01	c0.04	0.02	0.03	c0.12		c0.04	0.04	
v/s Ratio Perm			0.07									
v/c Ratio	0.75	0.46	0.21	0.07	0.27	0.06	0.47	0.44		0.47	0.12	
Uniform Delay, d1	31.4	27.8	25.3	39.8	40.9	28.6	46.8	30.9		45.6	26.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.69	0.77	
Incremental Delay, d2	2.9	0.6	0.2	0.1	0.6	0.1	2.8	1.5		2.3	0.2	
Delay (s)	34.3	28.4	25.5	39.9	41.5	28.7	49.5	32.5		33.9	20.7	
Level of Service	C	C	C	D	D	C	D	C		C	C	
Approach Delay (s)		31.2			34.1			34.2			25.5	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	49	5	92	0	1083	0	0	201	0
Future Volume (vph)	0	0	0	49	5	92	0	1083	0	0	201	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0	4.0		5.3			5.3	
Lane Util. Factor				0.95	0.95	0.88		0.95			0.91	
Frt				1.00	1.00	0.85		1.00			1.00	
Flt Protected				0.95	0.96	1.00		1.00			1.00	
Satd. Flow (prot)				1681	1646	2632		3539			4988	
Flt Permitted				0.95	0.96	1.00		1.00			1.00	
Satd. Flow (perm)				1681	1646	2632		3539			4988	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	0	0	0	57	6	107	0	1259	0	0	234	0
RTOR Reduction (vph)	0	0	0	0	0	90	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	31	32	17	0	1259	0	0	234	0
Heavy Vehicles (%)	0%	0%	0%	2%	20%	8%	0%	2%	6%	0%	4%	3%
Turn Type				Split	NA	custom		NA			NA	
Protected Phases				8	8	8 1		2			6	
Permitted Phases												
Actuated Green, G (s)				7.6	7.6	17.1		79.6			88.1	
Effective Green, g (s)				7.6	7.6	17.1		79.6			88.1	
Actuated g/C Ratio				0.07	0.07	0.16		0.76			0.84	
Clearance Time (s)				4.0	4.0			5.3			5.3	
Vehicle Extension (s)				3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)				121	119	428		2682			4185	
v/s Ratio Prot				0.02	c0.02	0.01		c0.36			c0.05	
v/s Ratio Perm												
v/c Ratio				0.26	0.27	0.04		0.47			0.06	
Uniform Delay, d1				46.0	46.1	37.0		4.8			1.4	
Progression Factor				1.00	1.00	1.00		0.23			0.24	
Incremental Delay, d2				1.1	1.2	0.0		0.5			0.0	
Delay (s)				47.2	47.3	37.1		1.6			0.4	
Level of Service				D	D	D		A			A	
Approach Delay (s)		0.0			40.8			1.6			0.4	
Approach LOS		A			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.3
Intersection Capacity Utilization	41.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	11	30	553	19	0	119	0	1012	0	0	0
Future Volume (vph)	0	11	30	553	19	0	119	0	1012	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0			4.2	4.2			
Lane Util. Factor		0.95	1.00	0.97	1.00			1.00	0.88			
Frt		1.00	0.85	1.00	1.00			1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (prot)		3312	1468	3367	1900			1787	2787			
Flt Permitted		1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (perm)		3312	1468	3367	1900			1787	2787			
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.92	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	0	13	36	658	23	0	142	0	1205	0	0	0
RTOR Reduction (vph)	0	0	31	0	0	0	0	0	303	0	0	0
Lane Group Flow (vph)	0	13	5	658	23	0	0	142	902	0	0	0
Heavy Vehicles (%)	0%	9%	10%	4%	0%	0%	1%	0%	2%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA	Perm	Split	NA	pt+ov			
Protected Phases		2		1	6		8	8	8 1		4	
Permitted Phases			2			6				4		
Actuated Green, G (s)		14.4	14.4	52.0	72.4			22.4	78.6			
Effective Green, g (s)		14.4	14.4	52.0	72.4			22.4	78.6			
Actuated g/C Ratio		0.14	0.14	0.50	0.69			0.21	0.75			
Clearance Time (s)		6.0	6.0	6.0	6.0			4.2				
Vehicle Extension (s)		3.0	3.0	3.0	3.0			3.0				
Lane Grp Cap (vph)		454	201	1667	1310			381	2086			
v/s Ratio Prot		c0.00		0.20	0.01			0.08	c0.32			
v/s Ratio Perm			0.00									
v/c Ratio		0.03	0.02	0.39	0.02			0.37	0.43			
Uniform Delay, d1		39.2	39.2	16.6	5.1			35.3	4.9			
Progression Factor		1.00	1.00	1.00	1.00			1.17	16.81			
Incremental Delay, d2		0.0	0.0	0.7	0.0			0.6	0.1			
Delay (s)		39.3	39.3	17.3	5.1			41.8	82.6			
Level of Service		D	D	B	A			D	F			
Approach Delay (s)		39.3			16.9			78.3			0.0	
Approach LOS		D			B			E			A	

Intersection Summary			
HCM 2000 Control Delay	57.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	20.2
Intersection Capacity Utilization	52.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	21	11	0	19	16	0
Future Volume (Veh/h)	21	11	0	19	16	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	25	13	0	23	19	0
Pedestrians	3		3			1
Lane Width (ft)	12.0		12.0			12.0
Walking Speed (ft/s)	4.0		4.0			4.0
Percent Blockage	0		0			0
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	56	16			26	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	56	16			26	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	97	99			99	
cM capacity (veh/h)	941	1066			1522	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	25	13	23	19
Volume Left	25	0	0	19
Volume Right	0	13	23	0
cSH	941	1066	1700	1522
Volume to Capacity	0.03	0.01	0.01	0.01
Queue Length 95th (ft)	2	1	0	1
Control Delay (s)	8.9	8.4	0.0	7.4
Lane LOS	A	A		A
Approach Delay (s)	8.8		0.0	7.4
Approach LOS	A			

Intersection Summary			
Average Delay	5.9		
Intersection Capacity Utilization	17.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	154	209	789	477	176	474	500	59	74	182	0
Future Volume (vph)	5	154	209	789	477	176	474	500	59	74	182	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	
Lane Util. Factor	1.00	0.95	0.88	0.94	0.95		0.97	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3574	2778	4990	3434		3433	3574	1482	1656	3610	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1805	3574	2778	4990	3434		3433	3574	1482	1656	3610	
Peak-hour factor, PHF	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Adj. Flow (vph)	7	205	279	1052	636	235	632	667	79	99	243	0
RTOR Reduction (vph)	0	0	223	0	23	0	0	0	57	0	0	0
Lane Group Flow (vph)	7	205	56	1052	848	0	632	667	22	99	243	0
Confl. Peds. (#/hr)			1									
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	1%	1%	2%	0%	2%	2%	1%	9%	9%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	1.3	20.4	20.4	25.7	44.8		20.5	28.4	28.4	9.3	17.6	
Effective Green, g (s)	1.3	20.4	20.4	25.7	44.8		20.5	28.4	28.4	9.3	17.6	
Actuated g/C Ratio	0.01	0.20	0.20	0.25	0.44		0.20	0.28	0.28	0.09	0.17	
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	22	712	553	1252	1502		687	991	411	150	620	
v/s Ratio Prot	0.00	0.06		c0.21	c0.25		c0.18	c0.19		0.06	0.07	
v/s Ratio Perm			0.02						0.01			
v/c Ratio	0.32	0.29	0.10	0.84	0.56		0.92	0.67	0.05	0.66	0.39	
Uniform Delay, d1	50.1	34.8	33.5	36.4	21.5		40.1	32.9	27.1	45.0	37.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.0	0.2	0.1	5.0	0.5		17.1	1.8	0.1	8.1	0.4	
Delay (s)	53.1	35.1	33.6	41.4	22.0		57.3	34.7	27.2	53.2	38.1	
Level of Service	D	D	C	D	C		E	C	C	D	D	
Approach Delay (s)		34.5			32.6			44.6			42.4	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	37.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	102.4	Sum of lost time (s)	18.6
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	1160	0	625	0	600	0	0	650	381
Future Volume (vph)	0	0	0	1160	0	625	0	600	0	0	650	381
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.7		4.7		6.3			5.7	5.7
Lane Util. Factor				0.97		1.00		0.95			0.95	1.00
Frpb, ped/bikes				1.00		1.00		1.00			1.00	1.00
Flpb, ped/bikes				1.00		1.00		1.00			1.00	1.00
Frt				1.00		0.85		1.00			1.00	1.00
Flt Protected				0.95		1.00		1.00			1.00	1.00
Satd. Flow (prot)				3242		1599		3539			3539	1863
Flt Permitted				0.95		1.00		1.00			1.00	1.00
Satd. Flow (perm)				3242		1599		3539			3539	1863
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	0	0	0	1415	0	762	0	732	0	0	793	465
RTOR Reduction (vph)	0	0	0	0	0	22	0	0	0	0	0	257
Lane Group Flow (vph)	0	0	0	1415	0	740	0	732	0	0	793	208
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	8%	0%	1%	0%	2%	6%	0%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	2	0	0
Turn Type				Prot		custom		NA			NA	Perm
Protected Phases				8		8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				35.8		51.6		21.0			37.4	37.4
Effective Green, g (s)				35.8		51.6		21.0			37.4	37.4
Actuated g/C Ratio				0.43		0.62		0.25			0.45	0.45
Clearance Time (s)				4.7				6.3			5.7	5.7
Vehicle Extension (s)				0.2				0.2			0.2	0.2
Lane Grp Cap (vph)				1388		986		888			1583	833
v/s Ratio Prot				c0.44		c0.46		c0.21			0.22	
v/s Ratio Perm												0.11
v/c Ratio				1.02		0.75		0.82			0.50	0.25
Uniform Delay, d1				23.9		11.4		29.6			16.5	14.4
Progression Factor				1.00		1.00		1.00			1.00	1.00
Incremental Delay, d2				29.2		2.9		6.0			0.1	0.1
Delay (s)				53.1		14.3		35.5			16.5	14.4
Level of Service				D		B		D			B	B
Approach Delay (s)		0.0			39.5			35.5			15.8	
Approach LOS		A			D			D			B	

Intersection Summary			
HCM 2000 Control Delay	31.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	83.6	Sum of lost time (s)	15.7
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	369	419	0	842	1473	0
Future Volume (vph)	369	419	0	842	1473	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	4.7		5.8	6.8	
Lane Util. Factor	0.97	0.88		0.95	0.95	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3433	2632		3471	3406	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3433	2632		3471	3406	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	415	471	0	946	1655	0
RTOR Reduction (vph)	0	1	0	0	0	0
Lane Group Flow (vph)	415	470	0	946	1655	0
Heavy Vehicles (%)	2%	8%	0%	4%	6%	6%
Turn Type	Prot	custom		NA	NA	
Protected Phases	4	4 5		2	6	
Permitted Phases						
Actuated Green, G (s)	14.5	36.3		73.0	50.2	
Effective Green, g (s)	14.5	30.5		73.0	50.2	
Actuated g/C Ratio	0.15	0.31		0.74	0.51	
Clearance Time (s)	4.7			5.8	6.8	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	507	819		2585	1744	
v/s Ratio Prot	c0.12	c0.18		0.27	c0.49	
v/s Ratio Perm						
v/c Ratio	0.82	0.57		0.37	0.95	
Uniform Delay, d1	40.5	28.3		4.4	22.7	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.4	0.6		0.0	11.4	
Delay (s)	49.9	28.9		4.4	34.1	
Level of Service	D	C		A	C	
Approach Delay (s)	38.8			4.4	34.1	
Approach LOS	D			A	C	

Intersection Summary			
HCM 2000 Control Delay	27.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	98.0	Sum of lost time (s)	17.3
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	333	105	304	1174	3	287	0	207	1	0	3
Future Volume (vph)	6	333	105	304	1174	3	287	0	207	1	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95	1.00		1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.98		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Frt	1.00	0.96		1.00	1.00		1.00	1.00	0.85		0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.95	1.00		0.99	
Satd. Flow (prot)	1805	3355		1752	3535		1698	1698	1539		1653	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.95	1.00		1.00	
Satd. Flow (perm)	1805	3355		1752	3535		1698	1698	1539		1674	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	7	366	115	334	1290	3	315	0	227	1	0	3
RTOR Reduction (vph)	0	19	0	0	0	0	0	0	195	0	4	0
Lane Group Flow (vph)	7	462	0	334	1293	0	157	158	32	0	0	0
Confl. Peds. (#/hr)			4						5			
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	4%	0%	3%	2%	33%	1%	0%	3%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA		Split	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		8	8			4	
Permitted Phases									8	4		
Actuated Green, G (s)	1.2	53.7		26.0	78.5		15.9	15.9	15.9		0.9	
Effective Green, g (s)	1.2	53.7		26.0	78.5		15.9	15.9	15.9		0.9	
Actuated g/C Ratio	0.01	0.47		0.23	0.69		0.14	0.14	0.14		0.01	
Clearance Time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)	19	1580		399	2434		236	236	214		13	
v/s Ratio Prot	0.00	0.14		c0.19	c0.37		0.09	c0.09				
v/s Ratio Perm									0.02		c0.00	
v/c Ratio	0.37	0.29		0.84	0.53		0.67	0.67	0.15		0.00	
Uniform Delay, d1	56.0	18.5		42.0	8.7		46.5	46.6	43.1		56.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	4.4	0.5		13.6	0.8		5.4	5.5	0.1		0.0	
Delay (s)	60.4	19.0		55.6	9.6		51.9	52.0	43.2		56.1	
Level of Service	E	B		E	A		D	D	D		E	
Approach Delay (s)		19.6			19.0			48.3			56.1	
Approach LOS		B			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	114.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	169	960	269	228	628	38	390	579	482	103	633	74
Future Volume (vph)	169	960	269	228	628	38	390	579	482	103	633	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91		0.94	0.95	0.88	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3467	5136	2751	3502	5076		5040	3610	2800	3502	5136	1553
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3467	5136	2751	3502	5076		5040	3610	2800	3502	5136	1553
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)	184	1043	292	248	683	41	424	629	524	112	688	80
RTOR Reduction (vph)	0	0	198	0	5	0	0	0	372	0	0	61
Lane Group Flow (vph)	184	1043	94	248	719	0	424	629	152	112	688	19
Confl. Peds. (#/hr)			1			3			3			
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	1%	1%	2%	0%	1%	5%	1%	0%	0%	0%	1%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	10.2	33.3	33.3	12.1	35.2		13.5	29.9	29.9	8.0	24.4	24.4
Effective Green, g (s)	10.2	33.3	33.3	12.1	35.2		13.5	29.9	29.9	8.0	24.4	24.4
Actuated g/C Ratio	0.10	0.32	0.32	0.12	0.34		0.13	0.29	0.29	0.08	0.24	0.24
Clearance Time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Vehicle Extension (s)	2.0	3.5	3.5	2.0	3.5		2.0	3.5	3.5	2.0	3.5	3.5
Lane Grp Cap (vph)	342	1655	886	410	1729		658	1044	810	271	1213	366
v/s Ratio Prot	0.05	c0.20		c0.07	0.14		c0.08	c0.17		0.03	0.13	
v/s Ratio Perm			0.03						0.05			0.01
v/c Ratio	0.54	0.63	0.11	0.60	0.42		0.64	0.60	0.19	0.41	0.57	0.05
Uniform Delay, d1	44.3	29.8	24.6	43.3	26.2		42.6	31.6	27.6	45.4	34.8	30.5
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	0.8	0.8	0.1	1.7	0.2		1.6	1.0	0.1	0.4	0.7	0.1
Delay (s)	45.1	30.6	24.6	45.1	26.3		44.3	32.6	27.7	45.8	35.5	30.6
Level of Service	D	C	C	D	C		D	C	C	D	D	C
Approach Delay (s)		31.2			31.1			34.1			36.3	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	33.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	103.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	283	739	505	364	327	61	468	674	514	97	732	144
Future Volume (vph)	283	739	505	364	327	61	468	674	514	97	732	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Lane Util. Factor	0.97	0.86	0.88	0.94	0.91		0.94	0.86	1.00	0.97	0.86	0.88
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3502	6471	2776	5090	4969		5090	6536	1599	3502	6408	2775
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3502	6471	2776	5090	4969		5090	6536	1599	3502	6408	2775
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	295	770	526	379	341	64	488	702	535	101	762	150
RTOR Reduction (vph)	0	0	387	0	21	0	0	0	293	0	0	114
Lane Group Flow (vph)	295	770	139	379	384	0	488	702	242	101	763	36
Confl. Peds. (#/hr)						1						2
Confl. Bikes (#/hr)			2			2						
Heavy Vehicles (%)	0%	1%	1%	0%	2%	0%	0%	0%	1%	0%	2%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases			2						4			8
Actuated Green, G (s)	13.0	25.5	25.5	12.1	24.6		14.1	29.7	29.7	7.5	23.1	23.1
Effective Green, g (s)	13.0	25.5	25.5	12.1	24.6		14.1	29.7	29.7	7.5	23.1	23.1
Actuated g/C Ratio	0.13	0.26	0.26	0.13	0.26		0.15	0.31	0.31	0.08	0.24	0.24
Clearance Time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	472	1711	734	638	1268		744	2013	492	272	1535	664
v/s Ratio Prot	c0.08	c0.12		0.07	0.08		c0.10	0.11		0.03	0.12	
v/s Ratio Perm			0.05						c0.15			0.01
v/c Ratio	0.62	0.45	0.19	0.59	0.30		0.66	0.35	0.49	0.37	0.50	0.05
Uniform Delay, d1	39.4	29.6	27.4	39.8	29.0		38.9	25.9	27.2	42.2	31.6	28.2
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	1.9	0.2	0.1	1.0	0.1		1.6	0.1	1.1	0.3	0.3	0.0
Delay (s)	41.3	29.8	27.6	40.8	29.1		40.5	26.0	28.2	42.5	32.0	28.3
Level of Service	D	C	C	D	C		D	C	C	D	C	C
Approach Delay (s)		31.2			34.8			30.8			32.5	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	96.4	Sum of lost time (s)	21.6
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	221	277	370	964	79	53	163	980	386	13	706	98
Future Volume (vph)	221	277	370	964	79	53	163	980	386	13	706	98
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	4.0	4.0	4.0	5.3	4.9	4.0	5.3	4.9	4.9
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91	1.00	0.94	0.86	0.88	0.97	0.86	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3502	5187	2760	3433	5085	1583	4942	6471	2842	3502	6408	1594
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3502	5187	2760	3433	5085	1583	4942	6471	2842	3502	6408	1594
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	243	304	407	1059	87	58	179	1077	424	14	776	108
RTOR Reduction (vph)	0	0	62	0	0	39	0	0	131	0	0	82
Lane Group Flow (vph)	243	304	345	1059	87	19	179	1077	293	14	776	26
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	0%	0%	3%	2%	2%	2%	3%	1%	0%	0%	2%	0%
Turn Type	Prot	NA	pt+ov	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	5	2	2 3	1	6		3	8	1	7	4	
Permitted Phases						6			8			4
Actuated Green, G (s)	23.5	21.4	34.6	41.6	39.5	39.5	7.9	35.8	77.4	1.4	29.3	29.3
Effective Green, g (s)	23.5	21.4	34.6	41.6	39.5	39.5	7.9	35.8	77.4	1.4	29.3	29.3
Actuated g/C Ratio	0.20	0.18	0.29	0.35	0.33	0.33	0.07	0.30	0.65	0.01	0.24	0.24
Clearance Time (s)	5.3	5.3		4.0	4.0	4.0	5.3	4.9	4.0	5.3	4.9	4.9
Vehicle Extension (s)	2.0	4.0		2.0	2.0	2.0	2.0	4.0	2.0	2.0	4.0	4.0
Lane Grp Cap (vph)	687	927	797	1193	1678	522	326	1935	1837	40	1568	390
v/s Ratio Prot	0.07	0.06	c0.13	c0.31	0.02		0.04	c0.17	0.06	0.00	0.12	
v/s Ratio Perm						0.01			0.05			0.02
v/c Ratio	0.35	0.33	0.43	0.89	0.05	0.04	0.55	0.56	0.16	0.35	0.49	0.07
Uniform Delay, d1	41.5	42.9	34.6	36.8	27.3	27.2	54.2	35.3	8.3	58.7	38.8	34.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.3	0.5	8.1	0.0	0.0	1.0	0.4	0.0	1.9	0.3	0.1
Delay (s)	41.7	43.2	35.1	44.9	27.3	27.2	55.2	35.7	8.3	60.6	39.2	34.8
Level of Service	D	D	D	D	C	C	E	D	A	E	D	C
Approach Delay (s)		39.3			42.8			30.9			39.0	
Approach LOS		D			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	37.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	119.7	Sum of lost time (s)	19.5
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	603	2	715	0	813	0	0	1342	757
Future Volume (vph)	0	0	0	603	2	715	0	813	0	0	1342	757
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.7	3.7	3.7		4.8			4.8	4.8
Lane Util. Factor				0.95	0.95	0.88		0.91			0.91	1.00
Frpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	1.00
Flpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	0.95	1.00		1.00			1.00	1.00
Satd. Flow (prot)				1715	1720	2814		5187			5085	1599
Flt Permitted				0.95	0.95	1.00		1.00			1.00	1.00
Satd. Flow (perm)				1715	1720	2814		5187			5085	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	635	2	753	0	856	0	0	1413	797
RTOR Reduction (vph)	0	0	0	0	0	66	0	0	0	0	0	360
Lane Group Flow (vph)	0	0	0	317	320	687	0	856	0	0	1413	437
Confl. Peds. (#/hr)			1									
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	0%	3%	0%	2%	1%
Turn Type				Split	NA	custom		NA			NA	Perm
Protected Phases				8	8	8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				13.2	13.2	21.0		18.6			26.4	26.4
Effective Green, g (s)				13.2	13.2	21.0		18.6			26.4	26.4
Actuated g/C Ratio				0.27	0.27	0.44		0.39			0.55	0.55
Clearance Time (s)				3.7	3.7			4.8			4.8	4.8
Vehicle Extension (s)				4.0	4.0			4.0			2.5	2.5
Lane Grp Cap (vph)				470	472	1228		2005			2790	877
v/s Ratio Prot				0.18	c0.19	c0.24		0.17			c0.28	
v/s Ratio Perm												0.27
v/c Ratio				0.67	0.68	0.56		0.43			0.51	0.50
Uniform Delay, d1				15.5	15.6	10.1		10.8			6.8	6.7
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				4.2	4.2	0.7		0.2			0.1	0.3
Delay (s)				19.7	19.8	10.8		11.0			6.9	7.1
Level of Service				B	B	B		B			A	A
Approach Delay (s)		0.0			14.9			11.0			7.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	48.1	Sum of lost time (s)	12.2
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	517	257	0	1521	1753	0
Future Volume (vph)	517	257	0	1521	1753	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.88		0.91	0.91	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3502	2787		5187	5014	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3502	2787		5187	5014	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	568	282	0	1671	1926	0
RTOR Reduction (vph)	0	11	0	0	0	0
Lane Group Flow (vph)	568	271	0	1671	1926	0
Heavy Vehicles (%)	0%	2%	0%	0%	0%	3%
Parking (#/hr)					0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	12.7	12.7		31.3	31.3	
Effective Green, g (s)	12.7	12.7		31.3	31.3	
Actuated g/C Ratio	0.24	0.24		0.60	0.60	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	
Lane Grp Cap (vph)	855	680		3122	3018	
v/s Ratio Prot	c0.16			0.32	c0.38	
v/s Ratio Perm		0.10				
v/c Ratio	0.66	0.40		0.54	0.64	
Uniform Delay, d1	17.7	16.5		6.1	6.7	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	0.1		0.1	0.3	
Delay (s)	19.2	16.6		6.2	7.0	
Level of Service	B	B		A	A	
Approach Delay (s)	18.4			6.2	7.0	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	52.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	616	201	299	33	140	212	201	364	132	114	277	0
Future Volume (vph)	616	201	299	33	140	212	201	364	132	114	277	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.9	4.9	4.9	3.5	5.3		4.0	5.3	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1900	1599	1805	1863	1568	1805	3370		1736	3396	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1900	1599	1805	1863	1568	1805	3370		1736	3396	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	648	212	315	35	147	223	212	383	139	120	292	0
RTOR Reduction (vph)	0	0	233	0	0	91	0	34	0	0	0	0
Lane Group Flow (vph)	648	212	83	35	147	132	212	488	0	120	292	0
Confl. Peds. (#/hr)									2			
Heavy Vehicles (%)	2%	0%	1%	0%	2%	3%	0%	3%	0%	4%	1%	1%
Parking (#/hr)											0	
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	7	7		8	8	8 1	5	2		1	6	
Permitted Phases			7									
Actuated Green, G (s)	27.5	27.5	27.5	14.7	14.7	31.1	18.3	33.6		11.5	27.3	
Effective Green, g (s)	27.5	27.5	27.5	14.7	14.7	31.1	18.3	33.6		11.5	27.3	
Actuated g/C Ratio	0.26	0.26	0.26	0.14	0.14	0.30	0.17	0.32		0.11	0.26	
Clearance Time (s)	3.5	3.5	3.5	4.9	4.9		3.5	5.3		4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	899	497	418	252	260	464	314	1078		190	882	
v/s Ratio Prot	c0.19	0.11		0.02	c0.08	0.08	c0.12	c0.14		0.07	0.09	
v/s Ratio Perm			0.05									
v/c Ratio	0.72	0.43	0.20	0.14	0.57	0.28	0.68	0.45		0.63	0.33	
Uniform Delay, d1	35.3	32.2	30.2	39.6	42.2	28.4	40.6	28.4		44.7	31.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.48	1.16	
Incremental Delay, d2	2.9	0.6	0.2	0.3	2.8	0.3	5.6	1.4		6.6	1.0	
Delay (s)	38.1	32.8	30.4	39.9	45.0	28.7	46.2	29.8		27.9	37.4	
Level of Service	D	C	C	D	D	C	D	C		C	D	
Approach Delay (s)		35.1			35.6			34.5			34.7	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	34.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	77.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	166	2	162	0	849	0	0	378	0
Future Volume (vph)	0	0	0	166	2	162	0	849	0	0	378	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0	4.0		5.3			5.3	
Lane Util. Factor				0.95	0.95	0.88		0.95			0.91	
Frpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	
Flpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	
Frt				1.00	1.00	0.85		1.00			1.00	
Flt Protected				0.95	0.95	1.00		1.00			1.00	
Satd. Flow (prot)				1715	1721	2814		3539			4893	
Flt Permitted				0.95	0.95	1.00		1.00			1.00	
Satd. Flow (perm)				1715	1721	2814		3539			4893	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	0	182	2	178	0	933	0	0	415	0
RTOR Reduction (vph)	0	0	0	0	0	143	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	93	91	35	0	933	0	0	415	0
Confl. Peds. (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	2%	3%	0%	6%	2%
Turn Type				Split	NA	custom		NA			NA	
Protected Phases				8	8	8 1		2			6	
Permitted Phases												
Actuated Green, G (s)				11.2	11.2	20.7		76.0			84.5	
Effective Green, g (s)				11.2	11.2	20.7		76.0			84.5	
Actuated g/C Ratio				0.11	0.11	0.20		0.72			0.80	
Clearance Time (s)				4.0	4.0			5.3			5.3	
Vehicle Extension (s)				3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)				182	183	554		2561			3937	
v/s Ratio Prot				c0.05	0.05	0.01		c0.26			c0.08	
v/s Ratio Perm												
v/c Ratio				0.51	0.50	0.06		0.36			0.11	
Uniform Delay, d1				44.3	44.2	34.3		5.4			2.2	
Progression Factor				1.00	1.00	1.00		1.18			0.79	
Incremental Delay, d2				2.4	2.1	0.0		0.3			0.0	
Delay (s)				46.7	46.4	34.3		6.7			1.8	
Level of Service				D	D	C		A			A	
Approach Delay (s)		0.0			40.5			6.7			1.8	
Approach LOS		A			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.3
Intersection Capacity Utilization	36.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	7	99	1122	11	1	151	0	813	0	1	0
Future Volume (vph)	0	7	99	1122	11	1	151	0	813	0	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0	6.0		4.2	4.2		4.0	
Lane Util. Factor		0.95	1.00	0.97	1.00	1.00		1.00	0.88		1.00	
Frpb, ped/bikes		1.00	0.99	1.00	1.00	1.00		1.00	1.00		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt		1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	
Flt Protected		1.00	1.00	0.95	1.00	1.00		0.95	1.00		1.00	
Satd. Flow (prot)		3167	1548	3467	1900	1615		1752	2814		1900	
Flt Permitted		1.00	1.00	0.95	1.00	1.00		0.95	1.00		1.00	
Satd. Flow (perm)		3167	1548	3467	1900	1615		1752	2814		1900	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	8	109	1233	12	1	166	0	893	0	1	0
RTOR Reduction (vph)	0	0	81	0	0	0	0	0	376	0	0	0
Lane Group Flow (vph)	0	8	28	1233	12	1	0	166	517	0	1	0
Confl. Peds. (#/hr)			1									
Confl. Bikes (#/hr)									2			
Heavy Vehicles (%)	0%	14%	3%	1%	0%	0%	3%	0%	1%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA	Perm	Split	NA	pt+ov		NA	
Protected Phases		2		1	6		8	8	8 1		4	
Permitted Phases			2			6				4		
Actuated Green, G (s)		27.0	27.0	36.8	69.8	69.8		19.8	60.8		1.2	
Effective Green, g (s)		27.0	27.0	36.8	69.8	69.8		19.8	60.8		1.2	
Actuated g/C Ratio		0.26	0.26	0.35	0.66	0.66		0.19	0.58		0.01	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0		4.2			4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		814	398	1215	1263	1073		330	1629		21	
v/s Ratio Prot		0.00		c0.36	0.01			c0.09	0.18		c0.00	
v/s Ratio Perm			c0.02			0.00						
v/c Ratio		0.01	0.07	1.01	0.01	0.00		0.50	0.32		0.05	
Uniform Delay, d1		29.0	29.5	34.1	5.9	5.9		38.2	11.4		51.3	
Progression Factor		1.00	1.00	1.00	1.00	1.00		0.95	13.75		1.00	
Incremental Delay, d2		0.0	0.1	29.6	0.0	0.0		1.2	0.1		0.9	
Delay (s)		29.0	29.6	63.7	6.0	5.9		37.4	156.8		52.3	
Level of Service		C	C	E	A	A		D	F		D	
Approach Delay (s)		29.5			63.1			138.1			52.3	
Approach LOS		C			E			F			D	

Intersection Summary			
HCM 2000 Control Delay	94.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	20.2
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	45	22	2	27	15	0
Future Volume (Veh/h)	45	22	2	27	15	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76
Hourly flow rate (vph)	59	29	3	36	20	0
Pedestrians	3		1			
Lane Width (ft)	12.0		12.0			
Walking Speed (ft/s)	4.0		4.0			
Percent Blockage	0		0			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	65	24			42	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	65	24			42	
tC, single (s)	6.4	6.2			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	94	97			99	
cM capacity (veh/h)	920	1044			1532	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	59	29	39	20
Volume Left	59	0	0	20
Volume Right	0	29	36	0
cSH	920	1044	1700	1532
Volume to Capacity	0.06	0.03	0.02	0.01
Queue Length 95th (ft)	5	2	0	1
Control Delay (s)	9.2	8.5	0.0	7.4
Lane LOS	A	A		A
Approach Delay (s)	9.0		0.0	7.4
Approach LOS	A			

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	17.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	376	411	427	154	202	239	423	503	185	281	14
Future Volume (vph)	10	376	411	427	154	202	239	423	503	185	281	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	4.9
Lane Util. Factor	1.00	0.95	0.88	0.94	0.95		0.97	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	3610	2778	5090	3209		3433	3610	1583	1736	3610	1615
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1805	3610	2778	5090	3209		3433	3610	1583	1736	3610	1615
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)	11	409	447	464	167	220	260	460	547	201	305	15
RTOR Reduction (vph)	0	0	336	0	137	0	0	0	359	0	0	11
Lane Group Flow (vph)	11	409	111	464	250	0	260	460	188	201	305	4
Confl. Peds. (#/hr)						1						
Confl. Bikes (#/hr)			1			1						
Heavy Vehicles (%)	0%	0%	1%	0%	1%	3%	2%	0%	2%	4%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	1.4	22.4	22.4	13.1	34.1		12.0	20.9	20.9	14.9	24.2	24.2
Effective Green, g (s)	1.4	22.4	22.4	13.1	34.1		12.0	20.9	20.9	14.9	24.2	24.2
Actuated g/C Ratio	0.02	0.25	0.25	0.15	0.38		0.13	0.23	0.23	0.17	0.27	0.27
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	4.9
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	3.0	3.0	2.0	3.0	3.0
Lane Grp Cap (vph)	28	899	692	741	1217		458	839	368	287	971	434
v/s Ratio Prot	0.01	c0.11		c0.09	0.08		0.08	c0.13		c0.12	c0.08	
v/s Ratio Perm			0.04						0.12			0.00
v/c Ratio	0.39	0.45	0.16	0.63	0.21		0.57	0.55	0.51	0.70	0.31	0.01
Uniform Delay, d1	43.8	28.6	26.4	36.1	18.8		36.5	30.3	30.0	35.4	26.2	24.1
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	3.3	0.4	0.1	1.2	0.1		1.0	0.7	1.2	6.2	0.2	0.0
Delay (s)	47.1	28.9	26.5	37.3	18.9		37.5	31.1	31.2	41.6	26.4	24.1
Level of Service	D	C	C	D	B		D	C	C	D	C	C
Approach Delay (s)		27.9			28.9			32.5			32.2	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	30.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	89.9	Sum of lost time (s)	18.6
Intersection Capacity Utilization	64.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	698	0	424	0	608	0	0	774	586
Future Volume (vph)	0	0	0	698	0	424	0	608	0	0	774	586
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.7		4.7		6.3			5.7	5.7
Lane Util. Factor				0.97		1.00		0.95			0.95	1.00
Frt				1.00		0.85		1.00			1.00	1.00
Flt Protected				0.95		1.00		1.00			1.00	1.00
Satd. Flow (prot)				3335		1599		3574			3574	1863
Flt Permitted				0.95		1.00		1.00			1.00	1.00
Satd. Flow (perm)				3335		1599		3574			3574	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.93	0.92	0.93	0.92	0.93	0.93	0.93	0.93	0.92
Adj. Flow (vph)	0	0	0	751	0	456	0	654	0	0	832	637
RTOR Reduction (vph)	0	0	0	0	0	42	0	0	0	0	0	325
Lane Group Flow (vph)	0	0	0	751	0	414	0	654	0	0	832	312
Heavy Vehicles (%)	2%	2%	2%	5%	2%	1%	2%	1%	2%	0%	1%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	2	0	0
Turn Type				Prot		custom		NA			NA	Perm
Protected Phases				8		8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				15.3		24.4		14.9			24.6	24.6
Effective Green, g (s)				15.3		24.4		14.9			24.6	24.6
Actuated g/C Ratio				0.30		0.49		0.30			0.49	0.49
Clearance Time (s)				4.7				6.3			5.7	5.7
Vehicle Extension (s)				0.2				0.2			0.2	0.2
Lane Grp Cap (vph)				1014		775		1058			1747	911
v/s Ratio Prot				c0.23		c0.26		c0.18			0.23	
v/s Ratio Perm												0.17
v/c Ratio				0.74		0.53		0.62			0.48	0.34
Uniform Delay, d1				15.7		9.0		15.2			8.6	7.9
Progression Factor				1.00		1.00		1.00			1.00	1.00
Incremental Delay, d2				2.6		0.4		0.8			0.1	0.1
Delay (s)				18.3		9.4		16.0			8.6	8.0
Level of Service				B		A		B			A	A
Approach Delay (s)		0.0			14.9			16.0			8.3	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	50.3	Sum of lost time (s)	15.7
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	201	384	0	811	1041	0
Future Volume (vph)	201	384	0	811	1041	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	4.7		5.8	6.8	
Lane Util. Factor	0.97	0.88		0.95	0.95	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3467	2733		3539	3505	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3467	2733		3539	3505	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	205	392	0	828	1062	0
RTOR Reduction (vph)	0	10	0	0	0	0
Lane Group Flow (vph)	205	382	0	828	1062	0
Heavy Vehicles (%)	1%	4%	0%	2%	3%	1%
Turn Type	Prot	custom		NA	NA	
Protected Phases	4	4 5		2	6	
Permitted Phases						
Actuated Green, G (s)	7.9	23.0		46.0	29.9	
Effective Green, g (s)	7.9	17.2		46.0	29.9	
Actuated g/C Ratio	0.12	0.27		0.71	0.46	
Clearance Time (s)	4.7			5.8	6.8	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	425	729		2527	1627	
v/s Ratio Prot	0.06	c0.14		0.23	c0.30	
v/s Ratio Perm						
v/c Ratio	0.48	0.52		0.33	0.65	
Uniform Delay, d1	26.3	20.1		3.4	13.3	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.3		0.0	0.7	
Delay (s)	26.7	20.4		3.5	14.0	
Level of Service	C	C		A	B	
Approach Delay (s)	22.6			3.5	14.0	
Approach LOS	C			A	B	

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	64.4	Sum of lost time (s)	17.3
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	1029	394	305	610	0	171	2	652	6	1	2
Future Volume (vph)	2	1029	394	305	610	0	171	2	652	6	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95	1.00		1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.98		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Frt	1.00	0.96		1.00	1.00		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (prot)	1805	3397		1787	3539		1681	1688	1565		1784	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.95	1.00		1.00	
Satd. Flow (perm)	1805	3397		1787	3539		1681	1688	1565		1843	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	2	1083	415	321	642	0	180	2	686	6	1	2
RTOR Reduction (vph)	0	26	0	0	0	0	0	0	411	0	2	0
Lane Group Flow (vph)	2	1472	0	321	642	0	92	90	275	0	7	0
Confl. Peds. (#/hr)			8			3			6			
Confl. Bikes (#/hr)			3			4						
Heavy Vehicles (%)	0%	1%	0%	1%	2%	0%	2%	0%	1%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		8	8			4	
Permitted Phases									8	4		
Actuated Green, G (s)	1.1	56.7		27.5	83.1		26.7	26.7	26.7		1.6	
Effective Green, g (s)	1.1	56.7		27.5	83.1		26.7	26.7	26.7		1.6	
Actuated g/C Ratio	0.01	0.44		0.21	0.64		0.21	0.21	0.21		0.01	
Clearance Time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)	15	1481		378	2262		345	346	321		22	
v/s Ratio Prot	0.00	c0.43		c0.18	0.18		0.05	0.05				
v/s Ratio Perm									c0.18		c0.00	
v/c Ratio	0.13	0.99		0.85	0.28		0.27	0.26	0.86		0.32	
Uniform Delay, d1	64.0	36.5		49.3	10.3		43.4	43.4	49.8		63.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	1.5	22.0		15.5	0.3		0.2	0.1	19.0		3.0	
Delay (s)	65.4	58.5		64.8	10.7		43.6	43.5	68.8		66.7	
Level of Service	E	E		E	B		D	D	E		E	
Approach Delay (s)		58.5			28.7			63.5			66.7	
Approach LOS		E			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	51.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	96.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	126	391	166	360	741	107	200	727	162	21	397	89
Future Volume (vph)	126	391	166	360	741	107	200	727	162	21	397	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91		0.94	0.95	0.88	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3400	4988	2563	3467	4891		4802	3539	2737	3099	5085	1489
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3400	4988	2563	3467	4891		4802	3539	2737	3099	5085	1489
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	135	420	178	387	797	115	215	782	174	23	427	96
RTOR Reduction (vph)	0	0	134	0	14	0	0	0	114	0	0	71
Lane Group Flow (vph)	135	420	44	387	898	0	215	782	60	23	427	25
Confl. Peds. (#/hr)			8			14			7			2
Heavy Vehicles (%)	3%	4%	9%	1%	4%	2%	6%	2%	2%	13%	2%	7%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	8.7	22.3	22.3	15.1	28.7		9.2	31.2	31.2	1.9	23.9	23.9
Effective Green, g (s)	8.7	22.3	22.3	15.1	28.7		9.2	31.2	31.2	1.9	23.9	23.9
Actuated g/C Ratio	0.10	0.25	0.25	0.17	0.32		0.10	0.34	0.34	0.02	0.26	0.26
Clearance Time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Vehicle Extension (s)	2.0	3.5	3.5	2.0	3.5		2.0	3.5	3.5	2.0	3.5	3.5
Lane Grp Cap (vph)	326	1229	631	578	1551		488	1220	943	65	1342	393
v/s Ratio Prot	0.04	0.08		c0.11	c0.18		c0.04	c0.22		0.01	0.08	
v/s Ratio Perm			0.02						0.02			0.02
v/c Ratio	0.41	0.34	0.07	0.67	0.58		0.44	0.64	0.06	0.35	0.32	0.06
Uniform Delay, d1	38.5	28.1	26.1	35.4	25.8		38.2	24.9	19.9	43.7	26.8	24.9
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	0.3	0.2	0.1	2.3	0.6		0.2	1.2	0.0	1.2	0.2	0.1
Delay (s)	38.8	28.3	26.2	37.6	26.4		38.5	26.2	19.9	44.9	26.9	25.0
Level of Service	D	C	C	D	C		D	C	B	D	C	C
Approach Delay (s)		29.7			29.8			27.5			27.3	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	90.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	197	147	596	858	46	247	491	294	55	1031	62
Future Volume (vph)	107	197	147	596	858	46	247	491	294	55	1031	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Lane Util. Factor	0.97	0.86	0.88	0.94	0.91		0.94	0.86	1.00	0.97	0.86	0.88
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3400	6108	2760	4990	5001		4894	6285	1563	3072	6408	2733
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3400	6108	2760	4990	5001		4894	6285	1563	3072	6408	2733
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	114	210	156	634	913	49	263	522	313	59	1097	66
RTOR Reduction (vph)	0	0	127	0	4	0	0	0	201	0	0	46
Lane Group Flow (vph)	114	210	29	634	958	0	263	522	112	59	1097	20
Confl. Peds. (#/hr)						4			1			
Heavy Vehicles (%)	3%	7%	3%	2%	3%	0%	4%	4%	2%	14%	2%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases			2						4			8
Actuated Green, G (s)	8.0	17.9	17.9	16.9	26.8		10.0	34.6	34.6	5.3	29.9	29.9
Effective Green, g (s)	8.0	17.9	17.9	16.9	26.8		10.0	34.6	34.6	5.3	29.9	29.9
Actuated g/C Ratio	0.08	0.19	0.19	0.18	0.28		0.10	0.36	0.36	0.06	0.31	0.31
Clearance Time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	282	1135	513	875	1391		508	2258	561	169	1989	848
v/s Ratio Prot	0.03	0.03		c0.13	c0.19		c0.05	c0.08		0.02	c0.17	
v/s Ratio Perm			0.01						0.07			0.01
v/c Ratio	0.40	0.19	0.06	0.72	0.69		0.52	0.23	0.20	0.35	0.55	0.02
Uniform Delay, d1	41.9	33.1	32.3	37.5	31.0		40.9	21.6	21.3	43.8	27.6	23.1
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	0.3	0.1	0.0	2.5	1.4		0.4	0.1	0.2	0.5	0.4	0.0
Delay (s)	42.2	33.1	32.3	40.0	32.5		41.2	21.6	21.5	44.3	28.0	23.1
Level of Service	D	C	C	D	C		D	C	C	D	C	C
Approach Delay (s)		35.0			35.5			26.3			28.6	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	96.3	Sum of lost time (s)	21.6
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	75	163	156	1206	111	423	545	1014	132	1076	159
Future Volume (vph)	67	75	163	156	1206	111	423	545	1014	132	1076	159
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	4.0	4.0	4.0	5.3	4.9	4.0	5.3	4.9	4.9
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91	1.00	0.94	0.86	0.88	0.97	0.86	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5187	2608	3433	5085	1583	4894	6285	2842	3502	6471	1579
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5187	2608	3433	5085	1583	4894	6285	2842	3502	6471	1579
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	71	79	172	164	1269	117	445	574	1067	139	1133	167
RTOR Reduction (vph)	0	0	32	0	0	81	0	0	597	0	0	115
Lane Group Flow (vph)	71	79	140	164	1269	36	445	574	470	139	1133	52
Confl. Peds. (#/hr)												1
Heavy Vehicles (%)	2%	0%	9%	2%	2%	2%	4%	4%	0%	0%	1%	1%
Turn Type	Prot	NA	pt+ov	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	5	2	2 3	1	6		3	8	1	7	4	
Permitted Phases						6			8			4
Actuated Green, G (s)	5.0	26.5	44.0	7.7	29.2	29.2	12.2	34.4	42.1	7.8	30.0	30.0
Effective Green, g (s)	5.0	26.5	44.0	7.7	29.2	29.2	12.2	34.4	42.1	7.8	30.0	30.0
Actuated g/C Ratio	0.05	0.28	0.46	0.08	0.30	0.30	0.13	0.36	0.44	0.08	0.31	0.31
Clearance Time (s)	5.3	5.3		4.0	4.0	4.0	5.3	4.9	4.0	5.3	4.9	4.9
Vehicle Extension (s)	2.0	4.0		2.0	2.0	2.0	2.0	4.0	2.0	2.0	4.0	4.0
Lane Grp Cap (vph)	178	1433	1196	275	1548	481	622	2254	1247	284	2024	493
v/s Ratio Prot	0.02	0.02	0.05	c0.05	c0.25		c0.09	0.09	c0.03	0.04	c0.18	
v/s Ratio Perm						0.02			0.14			0.03
v/c Ratio	0.40	0.06	0.12	0.60	0.82	0.07	0.72	0.25	0.38	0.49	0.56	0.11
Uniform Delay, d1	44.0	25.5	14.8	42.6	30.9	23.7	40.2	21.7	18.1	42.1	27.4	23.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.0	0.1	2.3	3.3	0.0	3.3	0.1	0.1	0.5	0.4	0.1
Delay (s)	44.5	25.5	14.9	44.9	34.3	23.8	43.4	21.8	18.2	42.6	27.9	23.5
Level of Service	D	C	B	D	C	C	D	C	B	D	C	C
Approach Delay (s)		24.0			34.6			24.5			28.8	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	95.9	Sum of lost time (s)	19.5
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	257	62	658	0	1241	0	0	732	512
Future Volume (vph)	0	0	0	257	62	658	0	1241	0	0	732	512
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.7	3.7	3.7		4.8			4.8	4.8
Lane Util. Factor				0.95	0.95	0.88		0.91			0.91	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	0.97	1.00		1.00			1.00	1.00
Satd. Flow (prot)				1633	1687	2760		5036			5036	1599
Flt Permitted				0.95	0.97	1.00		1.00			1.00	1.00
Satd. Flow (perm)				1633	1687	2760		5036			5036	1599
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	0	265	64	678	0	1279	0	0	755	528
RTOR Reduction (vph)	0	0	0	0	0	45	0	0	0	0	0	192
Lane Group Flow (vph)	0	0	0	164	165	633	0	1279	0	0	755	336
Heavy Vehicles (%)	0%	0%	0%	5%	2%	3%	0%	3%	20%	0%	3%	1%
Turn Type				Split	NA	custom		NA			NA	Perm
Protected Phases				8	8	8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				10.4	10.4	18.1		25.5			33.2	33.2
Effective Green, g (s)				10.4	10.4	18.1		25.5			33.2	33.2
Actuated g/C Ratio				0.20	0.20	0.35		0.49			0.64	0.64
Clearance Time (s)				3.7	3.7			4.8			4.8	4.8
Vehicle Extension (s)				4.0	4.0			4.0			2.5	2.5
Lane Grp Cap (vph)				325	336	958		2464			3209	1018
v/s Ratio Prot				0.10	0.10	c0.23		c0.25			0.15	
v/s Ratio Perm												0.21
v/c Ratio				0.50	0.49	0.66		0.52			0.24	0.33
Uniform Delay, d1				18.6	18.5	14.4		9.1			4.0	4.3
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				1.7	1.5	1.9		0.2			0.0	0.1
Delay (s)				20.2	20.0	16.3		9.4			4.1	4.5
Level of Service				C	C	B		A			A	A
Approach Delay (s)		0.0			17.5			9.4			4.2	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	52.1	Sum of lost time (s)	12.2
Intersection Capacity Utilization	54.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	665	668	0	1051	705	0
Future Volume (vph)	665	668	0	1051	705	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.88		0.91	0.91	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3367	2409		4631	4893	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3367	2409		4631	4893	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	715	718	0	1130	758	0
RTOR Reduction (vph)	0	206	0	0	0	0
Lane Group Flow (vph)	715	512	0	1130	758	0
Confl. Bikes (#/hr)						3
Heavy Vehicles (%)	4%	18%	0%	12%	6%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	12.5	12.5		17.9	17.9	
Effective Green, g (s)	12.5	12.5		17.9	17.9	
Actuated g/C Ratio	0.33	0.33		0.47	0.47	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	
Lane Grp Cap (vph)	1096	784		2158	2280	
v/s Ratio Prot	0.21			c0.24	0.15	
v/s Ratio Perm		c0.21				
v/c Ratio	0.65	0.65		0.52	0.33	
Uniform Delay, d1	11.1	11.1		7.2	6.5	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	1.5		0.1	0.0	
Delay (s)	12.2	12.6		7.3	6.5	
Level of Service	B	B		A	A	
Approach Delay (s)	12.4			7.3	6.5	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	9.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	38.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	45.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	694	244	252	13	54	103	58	581	210	72	130	0
Future Volume (vph)	694	244	252	13	54	103	58	581	210	72	130	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.9	4.9	4.9	3.5	5.3		4.0	5.3	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1827	1538	1687	1681	1599	1719	3310		1719	3438	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1827	1538	1687	1681	1599	1719	3310		1719	3438	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	771	271	280	14	60	114	64	646	233	80	144	0
RTOR Reduction (vph)	0	0	202	0	0	44	0	33	0	0	0	0
Lane Group Flow (vph)	771	271	78	14	60	70	64	846	0	80	144	0
Confl. Peds. (#/hr)									4			
Heavy Vehicles (%)	2%	4%	5%	7%	13%	1%	5%	4%	4%	5%	5%	3%
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	7	7		8	8	8 1	5	2		1	6	
Permitted Phases			7									
Actuated Green, G (s)	29.1	29.1	29.1	14.0	14.0	28.4	7.8	34.7		9.5	36.9	
Effective Green, g (s)	29.1	29.1	29.1	14.0	14.0	28.4	7.8	34.7		9.5	36.9	
Actuated g/C Ratio	0.28	0.28	0.28	0.13	0.13	0.27	0.07	0.33		0.09	0.35	
Clearance Time (s)	3.5	3.5	3.5	4.9	4.9		3.5	5.3		4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	951	506	426	224	224	432	127	1093		155	1208	
v/s Ratio Prot	c0.22	0.15		0.01	c0.04	0.04	0.04	c0.26		c0.05	0.04	
v/s Ratio Perm			0.05									
v/c Ratio	0.81	0.54	0.18	0.06	0.27	0.16	0.50	0.77		0.52	0.12	
Uniform Delay, d1	35.4	32.2	28.9	39.8	40.9	29.2	46.7	31.6		45.6	23.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.57	0.99	
Incremental Delay, d2	5.3	1.1	0.2	0.1	0.6	0.2	3.1	5.3		2.9	0.2	
Delay (s)	40.7	33.3	29.1	39.9	41.5	29.4	49.9	37.0		28.7	23.0	
Level of Service	D	C	C	D	D	C	D	D		C	C	
Approach Delay (s)		36.7			34.1			37.8			25.0	
Approach LOS		D			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	35.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	58	5	471	0	1201	0	0	259	0
Future Volume (vph)	0	0	0	58	5	471	0	1201	0	0	259	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0	4.0		5.3			5.3	
Lane Util. Factor				0.95	0.95	0.88		0.95			0.91	
Frt				1.00	1.00	0.85		1.00			1.00	
Flt Protected				0.95	0.96	1.00		1.00			1.00	
Satd. Flow (prot)				1681	1651	2632		3539			4988	
Flt Permitted				0.95	0.96	1.00		1.00			1.00	
Satd. Flow (perm)				1681	1651	2632		3539			4988	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	0	0	0	67	6	548	0	1397	0	0	301	0
RTOR Reduction (vph)	0	0	0	0	0	81	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	36	37	467	0	1397	0	0	301	0
Heavy Vehicles (%)	0%	0%	0%	2%	20%	8%	0%	2%	6%	0%	4%	3%
Turn Type				Split	NA	custom		NA			NA	
Protected Phases				8	8	8 1		2			6	
Permitted Phases												
Actuated Green, G (s)				17.2	17.2	28.6		68.1			78.5	
Effective Green, g (s)				17.2	17.2	28.6		68.1			78.5	
Actuated g/C Ratio				0.16	0.16	0.27		0.65			0.75	
Clearance Time (s)				4.0	4.0			5.3			5.3	
Vehicle Extension (s)				3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)				275	270	716		2295			3729	
v/s Ratio Prot				0.02	0.02	c0.18		c0.39			0.06	
v/s Ratio Perm												
v/c Ratio				0.13	0.14	0.65		0.61			0.08	
Uniform Delay, d1				37.5	37.6	33.8		10.7			3.6	
Progression Factor				1.00	1.00	1.00		1.17			0.20	
Incremental Delay, d2				0.2	0.2	2.1		0.8			0.0	
Delay (s)				37.7	37.8	35.9		13.3			0.8	
Level of Service				D	D	D		B			A	
Approach Delay (s)		0.0			36.2			13.3			0.8	
Approach LOS		A			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	17.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.3
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	144	89	283	905	0	608	0	1022	0	0	0
Future Volume (vph)	0	144	89	283	905	0	608	0	1022	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0			4.2	4.2			
Lane Util. Factor		0.95	1.00	0.97	1.00			1.00	0.88			
Frt		1.00	0.85	1.00	1.00			1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (prot)		3312	1468	3367	1900			1787	2787			
Flt Permitted		1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (perm)		3312	1468	3367	1900			1787	2787			
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.92	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	0	171	106	337	1077	0	724	0	1217	0	0	0
RTOR Reduction (vph)	0	0	82	0	0	0	0	0	414	0	0	0
Lane Group Flow (vph)	0	171	24	337	1077	0	0	724	803	0	0	0
Heavy Vehicles (%)	0%	9%	10%	4%	0%	0%	1%	0%	2%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA	Perm	Split	NA	pt+ov			
Protected Phases		2		1	6		8	8	8 1		4	
Permitted Phases			2			6				4		
Actuated Green, G (s)		24.0	24.0	24.0	54.0			40.8	69.0			
Effective Green, g (s)		24.0	24.0	24.0	54.0			40.8	69.0			
Actuated g/C Ratio		0.23	0.23	0.23	0.51			0.39	0.66			
Clearance Time (s)		6.0	6.0	6.0	6.0			4.2				
Vehicle Extension (s)		3.0	3.0	3.0	3.0			3.0				
Lane Grp Cap (vph)		757	335	769	977			694	1831			
v/s Ratio Prot		0.05		0.10	c0.57			c0.41	0.29			
v/s Ratio Perm			0.02									
v/c Ratio		0.23	0.07	0.44	1.10			1.04	0.44			
Uniform Delay, d1		32.9	31.8	34.7	25.5			32.1	8.7			
Progression Factor		1.00	1.00	1.00	1.00			1.15	13.06			
Incremental Delay, d2		0.2	0.1	1.8	61.0			42.4	0.1			
Delay (s)		33.1	31.9	36.5	86.5			79.3	113.4			
Level of Service		C	C	D	F			E	F			
Approach Delay (s)		32.6			74.6			100.7			0.0	
Approach LOS		C			E			F			A	

Intersection Summary			
HCM 2000 Control Delay	85.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	20.2
Intersection Capacity Utilization	89.8%	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 (vph)	0	206	0	21	1485	11	0	0	19	16	0	0
Future Volume (vph)	0	206	0	21	1485	11	0	0	19	16	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor		0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00		1.00	1.00			0.99			1.00	
Flpb, ped/bikes		1.00		1.00	1.00			1.00			1.00	
Frt		1.00		1.00	1.00			0.86			1.00	
Flt Protected		1.00		0.95	1.00			1.00			0.95	
Satd. Flow (prot)		3539		1805	3535			1339			1608	
Flt Permitted		1.00		0.95	1.00			1.00			0.91	
Satd. Flow (perm)		3539		1805	3535			1339			1539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.83	0.92	0.83	0.92	0.83	0.83	0.83	0.83	0.92
Adj. Flow (vph)	0	224	0	25	1614	13	0	0	23	19	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	21	0	0	0	0
Lane Group Flow (vph)	0	224	0	25	1627	0	0	2	0	0	19	0
Confl. Peds. (#/hr)				3		1			3	3		
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	0%	21%	12%	0%	2%
Turn Type	Prot	NA		Prot	NA			NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		41.4		1.5	46.9			4.4			4.4	
Effective Green, g (s)		41.4		1.5	46.9			4.4			4.4	
Actuated g/C Ratio		0.70		0.03	0.79			0.07			0.07	
Clearance Time (s)		4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)		2470		45	2795			99			114	
v/s Ratio Prot		0.06		0.01	c0.46			0.00				
v/s Ratio Perm											c0.01	
v/c Ratio		0.09		0.56	0.58			0.02			0.17	
Uniform Delay, d1		2.9		28.6	2.4			25.4			25.7	
Progression Factor		1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2		0.0		14.0	0.3			0.1			0.7	
Delay (s)		2.9		42.6	2.7			25.5			26.4	
Level of Service		A		D	A			C			C	
Approach Delay (s)		2.9			3.3			25.5			26.4	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	3.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	59.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	153	208	593	987	93	501	502	59	68	178	0
Future Volume (vph)	5	153	208	593	987	93	501	502	59	68	178	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	
Lane Util. Factor	1.00	0.95	0.88	0.94	0.95		0.97	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3574	2779	4990	3553		3433	3574	1482	1656	3610	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1805	3574	2779	4990	3553		3433	3574	1482	1656	3610	
Peak-hour factor, PHF	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Adj. Flow (vph)	7	204	277	791	1316	124	668	669	79	91	237	0
RTOR Reduction (vph)	0	0	217	0	5	0	0	0	55	0	0	0
Lane Group Flow (vph)	7	204	60	791	1435	0	668	669	24	91	237	0
Confl. Peds. (#/hr)			1									
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	1%	1%	2%	0%	2%	2%	1%	9%	9%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	1.2	20.6	20.6	18.7	38.1		20.8	28.8	28.8	8.9	17.3	
Effective Green, g (s)	1.2	20.6	20.6	18.7	38.1		20.8	28.8	28.8	8.9	17.3	
Actuated g/C Ratio	0.01	0.22	0.22	0.20	0.40		0.22	0.30	0.30	0.09	0.18	
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	3.0	3.0	2.0	3.0	
Lane Grp Cap (vph)	22	770	598	976	1415		746	1076	446	154	653	
v/s Ratio Prot	0.00	0.06		c0.16	c0.40		c0.19	c0.19		0.05	0.07	
v/s Ratio Perm			0.02						0.02			
v/c Ratio	0.32	0.26	0.10	0.81	1.01		0.90	0.62	0.05	0.59	0.36	
Uniform Delay, d1	46.8	31.2	30.1	36.8	28.7		36.3	28.7	23.7	41.6	34.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.0	0.2	0.1	4.9	27.5		13.0	1.1	0.1	4.0	0.3	
Delay (s)	49.8	31.4	30.1	41.7	56.3		49.3	29.8	23.8	45.6	34.7	
Level of Service	D	C	C	D	E		D	C	C	D	C	
Approach Delay (s)		30.9			51.1			38.7			37.7	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	44.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	95.6	Sum of lost time (s)	18.6
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	1129	0	719	0	580	0	0	447	372
Future Volume (vph)	0	0	0	1129	0	719	0	580	0	0	447	372
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.7		4.7		6.3			5.7	5.7
Lane Util. Factor				0.97		1.00		0.95			0.95	1.00
Frpb, ped/bikes				1.00		1.00		1.00			1.00	1.00
Flpb, ped/bikes				1.00		1.00		1.00			1.00	1.00
Frt				1.00		0.85		1.00			1.00	1.00
Flt Protected				0.95		1.00		1.00			1.00	1.00
Satd. Flow (prot)				3242		1599		3539			3539	1863
Flt Permitted				0.95		1.00		1.00			1.00	1.00
Satd. Flow (perm)				3242		1599		3539			3539	1863
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	0	0	0	1377	0	877	0	707	0	0	545	454
RTOR Reduction (vph)	0	0	0	0	0	23	0	0	0	0	0	224
Lane Group Flow (vph)	0	0	0	1377	0	854	0	707	0	0	545	230
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	8%	0%	1%	0%	2%	6%	0%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	2	0	0
Turn Type				Prot		custom		NA			NA	Perm
Protected Phases				8		8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				35.4		60.0		21.7			46.9	46.9
Effective Green, g (s)				35.4		60.0		21.7			46.9	46.9
Actuated g/C Ratio				0.38		0.65		0.23			0.51	0.51
Clearance Time (s)				4.7				6.3			5.7	5.7
Vehicle Extension (s)				0.2				0.2			0.2	0.2
Lane Grp Cap (vph)				1238		1034		828			1790	942
v/s Ratio Prot				c0.42		c0.53		c0.20			0.15	
v/s Ratio Perm												0.12
v/c Ratio				1.11		0.83		0.85			0.30	0.24
Uniform Delay, d1				28.7		12.4		34.0			13.4	12.9
Progression Factor				1.00		1.00		1.00			1.00	1.00
Incremental Delay, d2				62.2		5.2		8.2			0.0	0.0
Delay (s)				90.9		17.6		42.2			13.4	13.0
Level of Service				F		B		D			B	B
Approach Delay (s)		0.0			62.4			42.2			13.2	
Approach LOS		A			E			D			B	

Intersection Summary			
HCM 2000 Control Delay	46.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	92.7	Sum of lost time (s)	15.7
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	329	449	0	857	1416	0
Future Volume (vph)	329	449	0	857	1416	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	4.7		5.8	6.8	
Lane Util. Factor	0.97	0.88		0.95	0.95	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3433	2632		3471	3406	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3433	2632		3471	3406	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	370	504	0	963	1591	0
RTOR Reduction (vph)	0	1	0	0	0	0
Lane Group Flow (vph)	370	503	0	963	1591	0
Heavy Vehicles (%)	2%	8%	0%	4%	6%	6%
Turn Type	Prot	custom		NA	NA	
Protected Phases	4	4 5		2	6	
Permitted Phases						
Actuated Green, G (s)	13.2	36.2		74.2	50.2	
Effective Green, g (s)	13.2	30.4		74.2	50.2	
Actuated g/C Ratio	0.13	0.31		0.76	0.51	
Clearance Time (s)	4.7			5.8	6.8	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	462	817		2630	1746	
v/s Ratio Prot	c0.11	c0.19		0.28	c0.47	
v/s Ratio Perm						
v/c Ratio	0.80	0.62		0.37	0.91	
Uniform Delay, d1	41.1	28.8		4.0	21.8	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.1	1.0		0.0	7.5	
Delay (s)	50.2	29.8		4.0	29.3	
Level of Service	D	C		A	C	
Approach Delay (s)	38.4			4.0	29.3	
Approach LOS	D			A	C	

Intersection Summary			
HCM 2000 Control Delay	24.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	97.9	Sum of lost time (s)	17.3
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	336	98	124	1360	3	222	0	207	1	0	3
Future Volume (vph)	6	336	98	124	1360	3	222	0	207	1	0	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95	1.00		1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.98		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Frt	1.00	0.97		1.00	1.00		1.00	1.00	0.85		0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.95	1.00		0.99	
Satd. Flow (prot)	1805	3362		1752	3536		1698	1698	1539		1653	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.95	1.00		1.00	
Satd. Flow (perm)	1805	3362		1752	3536		1698	1698	1539		1674	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	7	369	108	136	1495	3	244	0	227	1	0	3
RTOR Reduction (vph)	0	13	0	0	0	0	0	0	199	0	4	0
Lane Group Flow (vph)	7	464	0	136	1498	0	122	122	28	0	0	0
Confl. Peds. (#/hr)			4						5			
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	4%	0%	3%	2%	33%	1%	0%	3%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA		Split	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		8	8			4	
Permitted Phases									8	4		
Actuated Green, G (s)	1.2	68.1		13.3	80.2		14.2	14.2	14.2		0.9	
Effective Green, g (s)	1.2	68.1		13.3	80.2		14.2	14.2	14.2		0.9	
Actuated g/C Ratio	0.01	0.60		0.12	0.70		0.12	0.12	0.12		0.01	
Clearance Time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)	19	2008		204	2487		211	211	191		13	
v/s Ratio Prot	0.00	0.14		c0.08	c0.42		c0.07	0.07				
v/s Ratio Perm									0.02		c0.00	
v/c Ratio	0.37	0.23		0.67	0.60		0.58	0.58	0.15		0.00	
Uniform Delay, d1	56.0	10.7		48.2	8.7		47.1	47.1	44.5		56.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	4.4	0.3		6.2	1.1		2.4	2.4	0.1		0.0	
Delay (s)	60.4	11.0		54.5	9.8		49.5	49.5	44.6		56.1	
Level of Service	E	B		D	A		D	D	D		E	
Approach Delay (s)		11.7			13.5			47.1			56.1	
Approach LOS		B			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	114.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	126	162	186	104	1296	67	55	1	20	60	2	177
Future Volume (vph)	126	162	186	104	1296	67	55	1	20	60	2	177
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1595		1770	1586	
Flt Permitted	0.95	1.00	1.00	0.64	1.00	1.00	0.47	1.00		0.74	1.00	
Satd. Flow (perm)	1770	3539	1583	1194	3539	1583	882	1595		1383	1586	
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)	137	176	202	113	1409	73	60	1	22	65	2	192
RTOR Reduction (vph)	0	0	57	0	0	32	0	18	0	0	124	0
Lane Group Flow (vph)	137	176	145	113	1409	41	60	5	0	65	70	0
Turn Type	Prot	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases			2	6		6	8			4		
Actuated Green, G (s)	6.3	48.8	48.8	38.5	38.5	38.5	11.2	11.2		11.2	11.2	
Effective Green, g (s)	6.3	48.8	48.8	38.5	38.5	38.5	11.2	11.2		11.2	11.2	
Actuated g/C Ratio	0.09	0.72	0.72	0.57	0.57	0.57	0.16	0.16		0.16	0.16	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	163	2539	1136	676	2003	896	145	262		227	261	
v/s Ratio Prot	c0.08	0.05			c0.40			0.00			0.04	
v/s Ratio Perm			0.09	0.09		0.03	c0.07			0.05		
v/c Ratio	0.84	0.07	0.13	0.17	0.70	0.05	0.41	0.02		0.29	0.27	
Uniform Delay, d1	30.4	2.9	3.0	7.1	10.6	6.6	25.5	23.8		24.9	24.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	30.4	0.0	0.1	0.1	1.1	0.0	1.9	0.0		0.7	0.6	
Delay (s)	60.8	2.9	3.0	7.2	11.8	6.6	27.4	23.8		25.6	25.4	
Level of Service	E	A	A	A	B	A	C	C		C	C	
Approach Delay (s)		18.3			11.2			26.4			25.4	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	68.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	449	454	173	1331	125	16
Future Volume (vph)	449	454	173	1331	125	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frt	0.92		1.00	1.00	0.98	
Flt Protected	1.00		0.95	1.00	0.96	
Satd. Flow (prot)	4702		1770	5085	1757	
Flt Permitted	1.00		0.95	1.00	0.96	
Satd. Flow (perm)	4702		1770	5085	1757	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	488	493	188	1447	136	17
RTOR Reduction (vph)	265	0	0	0	10	0
Lane Group Flow (vph)	716	0	188	1447	143	0
Turn Type	NA		Prot	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases						
Actuated Green, G (s)	17.6		6.2	27.8	9.2	
Effective Green, g (s)	17.6		6.2	27.8	9.2	
Actuated g/C Ratio	0.39		0.14	0.62	0.20	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	1839		243	3141	359	
v/s Ratio Prot	0.15		c0.11	c0.28	c0.08	
v/s Ratio Perm						
v/c Ratio	0.39		0.77	0.46	0.40	
Uniform Delay, d1	9.8		18.7	4.6	15.5	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.1		14.2	0.1	0.7	
Delay (s)	10.0		32.9	4.7	16.2	
Level of Service	A		C	A	B	
Approach Delay (s)	10.0			7.9	16.2	
Approach LOS	A			A	B	

Intersection Summary			
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	1258	254	227	636	38	390	584	507	117	622	74
Future Volume (vph)	165	1258	254	227	636	38	390	584	507	117	622	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91		0.94	0.95	0.88	0.97	0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3467	5136	2751	3502	5077		5040	3610	2800	3502	5136	1553
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3467	5136	2751	3502	5077		5040	3610	2800	3502	5136	1553
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)	179	1367	276	247	691	41	424	635	551	127	676	80
RTOR Reduction (vph)	0	0	145	0	4	0	0	0	397	0	0	61
Lane Group Flow (vph)	179	1367	131	247	728	0	424	635	154	127	676	19
Confl. Peds. (#/hr)			1			3			3			
Heavy Vehicles (%)	1%	1%	2%	0%	1%	5%	1%	0%	0%	0%	1%	4%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	10.1	36.7	36.7	12.1	38.7		13.6	30.0	30.0	8.4	24.8	24.8
Effective Green, g (s)	10.1	36.7	36.7	12.1	38.7		13.6	30.0	30.0	8.4	24.8	24.8
Actuated g/C Ratio	0.09	0.34	0.34	0.11	0.36		0.13	0.28	0.28	0.08	0.23	0.23
Clearance Time (s)	4.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5	4.5	5.5	5.5
Vehicle Extension (s)	2.0	3.5	3.5	2.0	3.5		2.0	3.5	3.5	2.0	3.5	3.5
Lane Grp Cap (vph)	326	1758	941	395	1832		639	1010	783	274	1188	359
v/s Ratio Prot	0.05	c0.27		c0.07	0.14		c0.08	c0.18		0.04	0.13	
v/s Ratio Perm			0.05						0.06			0.01
v/c Ratio	0.55	0.78	0.14	0.63	0.40		0.66	0.63	0.20	0.46	0.57	0.05
Uniform Delay, d1	46.4	31.6	24.3	45.4	25.5		44.6	33.7	29.4	47.2	36.5	32.1
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	1.0	2.3	0.1	2.2	0.2		2.0	1.3	0.1	0.5	0.7	0.1
Delay (s)	47.4	33.9	24.4	47.6	25.7		46.6	35.0	29.6	47.7	37.2	32.1
Level of Service	D	C	C	D	C		D	D	C	D	D	C
Approach Delay (s)		33.8			31.2			36.2			38.2	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	34.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	107.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	68.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	275	1055	542	358	333	61	468	687	570	105	695	142
Future Volume (vph)	275	1055	542	358	333	61	468	687	570	105	695	142
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Lane Util. Factor	0.97	0.86	0.88	0.94	0.91		0.94	0.86	1.00	0.97	0.86	0.88
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3502	6471	2814	5090	4972		5090	6536	1599	3502	6408	2774
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3502	6471	2814	5090	4972		5090	6536	1599	3502	6408	2774
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	286	1099	565	373	347	64	488	716	594	109	724	148
RTOR Reduction (vph)	0	0	384	0	19	0	0	0	290	0	0	115
Lane Group Flow (vph)	286	1099	181	373	392	0	488	716	304	109	724	33
Confl. Peds. (#/hr)						1						2
Heavy Vehicles (%)	0%	1%	1%	0%	2%	0%	0%	0%	1%	0%	2%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		7	4		3	8	
Permitted Phases			2						4			8
Actuated Green, G (s)	13.2	31.5	31.5	12.4	30.7		14.6	29.8	29.8	7.9	23.1	23.1
Effective Green, g (s)	13.2	31.5	31.5	12.4	30.7		14.6	29.8	29.8	7.9	23.1	23.1
Actuated g/C Ratio	0.13	0.31	0.31	0.12	0.30		0.14	0.29	0.29	0.08	0.22	0.22
Clearance Time (s)	5.0	5.8	5.8	5.0	5.8		5.0	5.8	5.8	5.0	5.8	5.8
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	447	1975	858	611	1479		720	1887	461	268	1434	620
v/s Ratio Prot	c0.08	c0.17		0.07	0.08		c0.10	0.11		0.03	0.11	
v/s Ratio Perm			0.06						c0.19			0.01
v/c Ratio	0.64	0.56	0.21	0.61	0.27		0.68	0.38	0.66	0.41	0.50	0.05
Uniform Delay, d1	42.7	30.0	26.6	43.1	27.6		42.1	29.3	32.2	45.4	35.0	31.5
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	2.2	0.3	0.1	1.3	0.1		2.0	0.2	3.8	0.4	0.4	0.0
Delay (s)	45.0	30.3	26.7	44.4	27.7		44.1	29.5	36.0	45.8	35.4	31.5
Level of Service	D	C	C	D	C		D	C	D	D	D	C
Approach Delay (s)		31.4			35.7			35.6			36.0	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	34.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	103.2	Sum of lost time (s)	21.6
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	221	878	167	677	95	73	159	956	424	137	673	98
Future Volume (vph)	221	878	167	677	95	73	159	956	424	137	673	98
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	4.0	4.0	4.0	5.3	4.9	4.0	5.3	4.9	4.9
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91	1.00	0.94	0.86	0.88	0.97	0.86	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3502	5187	2760	3433	5085	1583	4942	6471	2842	3502	6408	1615
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3502	5187	2760	3433	5085	1583	4942	6471	2842	3502	6408	1615
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	243	965	184	744	104	80	175	1051	466	151	740	108
RTOR Reduction (vph)	0	0	55	0	0	47	0	0	27	0	0	82
Lane Group Flow (vph)	243	965	129	744	104	33	175	1051	439	151	740	26
Heavy Vehicles (%)	0%	0%	3%	2%	2%	2%	3%	1%	0%	0%	2%	0%
Turn Type	Prot	NA	pt+ov	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	5	2	2 3	1	6		3	8	1	7	4	
Permitted Phases						6			8			4
Actuated Green, G (s)	12.5	28.4	41.5	29.7	45.6	45.6	7.8	30.1	59.8	4.1	26.4	26.4
Effective Green, g (s)	12.5	28.4	41.5	29.7	45.6	45.6	7.8	30.1	59.8	4.1	26.4	26.4
Actuated g/C Ratio	0.11	0.25	0.37	0.27	0.41	0.41	0.07	0.27	0.53	0.04	0.24	0.24
Clearance Time (s)	5.3	5.3		4.0	4.0	4.0	5.3	4.9	4.0	5.3	4.9	4.9
Vehicle Extension (s)	2.0	4.0		2.0	2.0	2.0	2.0	4.0	2.0	2.0	4.0	4.0
Lane Grp Cap (vph)	391	1317	1024	911	2074	645	344	1742	1520	128	1513	381
v/s Ratio Prot	0.07	c0.19	0.05	c0.22	0.02		0.04	c0.16	0.08	c0.04	0.12	
v/s Ratio Perm						0.02			0.08			0.02
v/c Ratio	0.62	0.73	0.13	0.82	0.05	0.05	0.51	0.60	0.29	1.18	0.49	0.07
Uniform Delay, d1	47.4	38.2	23.2	38.5	20.0	20.0	50.2	35.6	14.3	53.9	36.9	33.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.2	2.3	0.1	5.4	0.0	0.0	0.4	0.7	0.0	135.8	0.3	0.1
Delay (s)	49.6	40.5	23.3	43.9	20.0	20.0	50.6	36.3	14.3	189.7	37.2	33.2
Level of Service	D	D	C	D	C	C	D	D	B	F	D	C
Approach Delay (s)		39.8			39.2			31.7			59.8	
Approach LOS		D			D			C			E	

Intersection Summary			
HCM 2000 Control Delay	41.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	111.8	Sum of lost time (s)	19.5
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	698	2	561	0	977	0	0	832	742
Future Volume (vph)	0	0	0	698	2	561	0	977	0	0	832	742
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.7	3.7	3.7		4.8			4.8	4.8
Lane Util. Factor				0.95	0.95	0.88		0.91			0.91	1.00
Frpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	1.00
Flpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	0.95	1.00		1.00			1.00	1.00
Satd. Flow (prot)				1715	1719	2814		5187			5085	1599
Flt Permitted				0.95	0.95	1.00		1.00			1.00	1.00
Satd. Flow (perm)				1715	1719	2814		5187			5085	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	735	2	591	0	1028	0	0	876	781
RTOR Reduction (vph)	0	0	0	0	0	36	0	0	0	0	0	353
Lane Group Flow (vph)	0	0	0	367	370	555	0	1028	0	0	876	428
Confl. Peds. (#/hr)			1									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	0%	3%	0%	2%	1%
Turn Type				Split	NA	custom		NA			NA	Perm
Protected Phases				8	8	8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				13.3	13.3	21.1		18.7			26.5	26.5
Effective Green, g (s)				13.3	13.3	21.1		18.7			26.5	26.5
Actuated g/C Ratio				0.28	0.28	0.44		0.39			0.55	0.55
Clearance Time (s)				3.7	3.7			4.8			4.8	4.8
Vehicle Extension (s)				4.0	4.0			4.0			2.5	2.5
Lane Grp Cap (vph)				472	473	1229		2008			2789	877
v/s Ratio Prot				0.21	c0.22	c0.20		0.20			0.17	
v/s Ratio Perm												c0.27
v/c Ratio				0.78	0.78	0.45		0.51			0.31	0.49
Uniform Delay, d1				16.1	16.2	9.5		11.3			5.9	6.7
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				8.3	8.7	0.4		0.3			0.0	0.3
Delay (s)				24.5	24.9	9.9		11.6			6.0	7.0
Level of Service				C	C	A		B			A	A
Approach Delay (s)		0.0			18.1			11.6			6.5	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	48.3	Sum of lost time (s)	12.2
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	520	408	0	1663	1532	0
Future Volume (vph)	520	408	0	1663	1532	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.88		0.91	0.91	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3502	2787		5187	5014	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3502	2787		5187	5014	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	571	448	0	1827	1684	0
RTOR Reduction (vph)	0	20	0	0	0	0
Lane Group Flow (vph)	571	428	0	1827	1684	0
Confl. Bikes (#/hr)						3
Heavy Vehicles (%)	0%	2%	0%	0%	0%	3%
Parking (#/hr)					0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	12.4	12.4		28.7	28.7	
Effective Green, g (s)	12.4	12.4		28.7	28.7	
Actuated g/C Ratio	0.25	0.25		0.58	0.58	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	1.0	1.0		2.0	2.0	
Lane Grp Cap (vph)	884	703		3031	2930	
v/s Ratio Prot	c0.16			c0.35	0.34	
v/s Ratio Perm		0.15				
v/c Ratio	0.65	0.61		0.60	0.57	
Uniform Delay, d1	16.4	16.2		6.5	6.4	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	1.0		0.2	0.2	
Delay (s)	17.6	17.2		6.8	6.6	
Level of Service	B	B		A	A	
Approach Delay (s)	17.4			6.8	6.6	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	49.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	345	187	221	40	133	215	136	362	133	152	423	0
Future Volume (vph)	345	187	221	40	133	215	136	362	133	152	423	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	4.9	4.9	4.9	3.5	5.3		4.0	5.3	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1900	1599	1805	1863	1568	1805	3369		1736	3396	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1900	1599	1805	1863	1568	1805	3369		1736	3396	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	363	197	233	42	140	226	143	381	140	160	445	0
RTOR Reduction (vph)	0	0	190	0	0	130	0	32	0	0	0	0
Lane Group Flow (vph)	363	197	43	42	140	96	143	489	0	160	445	0
Confl. Peds. (#/hr)									2			
Heavy Vehicles (%)	2%	0%	1%	0%	2%	3%	0%	3%	0%	4%	1%	1%
Parking (#/hr)											0	
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	7	7		8	8	8 1	5	2		1	6	
Permitted Phases			7									
Actuated Green, G (s)	19.2	19.2	19.2	14.7	14.7	33.5	12.8	39.5		13.9	41.1	
Effective Green, g (s)	19.2	19.2	19.2	14.7	14.7	33.5	12.8	39.5		13.9	41.1	
Actuated g/C Ratio	0.18	0.18	0.18	0.14	0.14	0.32	0.12	0.38		0.13	0.39	
Clearance Time (s)	3.5	3.5	3.5	4.9	4.9		3.5	5.3		4.0	5.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	627	347	292	252	260	500	220	1267		229	1329	
v/s Ratio Prot	c0.11	0.10		0.02	c0.08	0.06	0.08	c0.15		c0.09	0.13	
v/s Ratio Perm			0.03									
v/c Ratio	0.58	0.57	0.15	0.17	0.54	0.19	0.65	0.39		0.70	0.33	
Uniform Delay, d1	39.2	39.1	36.0	39.8	42.0	25.9	44.0	23.9		43.5	22.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.74	0.94	
Incremental Delay, d2	1.3	2.1	0.2	0.3	2.1	0.2	6.7	0.9		8.8	0.7	
Delay (s)	40.5	41.2	36.2	40.1	44.1	26.1	50.7	24.8		41.1	21.7	
Level of Service	D	D	D	D	D	C	D	C		D	C	
Approach Delay (s)		39.4			33.7			30.4			26.9	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	33.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	141	2	233	0	580	0	0	829	0
Future Volume (vph)	0	0	0	141	2	233	0	580	0	0	829	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0	4.0		5.3			5.3	
Lane Util. Factor				0.95	0.95	0.88		0.95			0.91	
Frpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	
Flpb, ped/bikes				1.00	1.00	1.00		1.00			1.00	
Frt				1.00	1.00	0.85		1.00			1.00	
Flt Protected				0.95	0.95	1.00		1.00			1.00	
Satd. Flow (prot)				1715	1721	2814		3539			4893	
Flt Permitted				0.95	0.95	1.00		1.00			1.00	
Satd. Flow (perm)				1715	1721	2814		3539			4893	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	0	0	155	2	256	0	637	0	0	911	0
RTOR Reduction (vph)	0	0	0	0	0	207	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	79	78	49	0	637	0	0	911	0
Confl. Peds. (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	2%	3%	0%	6%	2%
Turn Type				Split	NA	custom		NA			NA	
Protected Phases				8	8	8 1		2			6	
Permitted Phases												
Actuated Green, G (s)				10.7	10.7	20.2		76.5			85.0	
Effective Green, g (s)				10.7	10.7	20.2		76.5			85.0	
Actuated g/C Ratio				0.10	0.10	0.19		0.73			0.81	
Clearance Time (s)				4.0	4.0			5.3			5.3	
Vehicle Extension (s)				3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)				174	175	541		2578			3961	
v/s Ratio Prot				c0.05	0.05	0.02		c0.18			c0.19	
v/s Ratio Perm												
v/c Ratio				0.45	0.45	0.09		0.25			0.23	
Uniform Delay, d1				44.4	44.4	34.9		4.7			2.3	
Progression Factor				1.00	1.00	1.00		1.24			0.21	
Incremental Delay, d2				1.9	1.8	0.1		0.2			0.0	
Delay (s)				46.3	46.2	34.9		6.1			0.5	
Level of Service				D	D	C		A			A	
Approach Delay (s)		0.0			39.2			6.1			0.5	
Approach LOS		A			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	10.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.3
Intersection Capacity Utilization	34.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	846	471	1158	71	1	257	0	531	0	1	0
Future Volume (vph)	0	846	471	1158	71	1	257	0	531	0	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0	6.0		4.2	4.2		4.0	
Lane Util. Factor		0.95	1.00	0.97	1.00	1.00		1.00	0.88		1.00	
Frpb, ped/bikes		1.00	0.99	1.00	1.00	1.00		1.00	1.00		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt		1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	
Flt Protected		1.00	1.00	0.95	1.00	1.00		0.95	1.00		1.00	
Satd. Flow (prot)		3167	1548	3467	1900	1615		1752	2814		1900	
Flt Permitted		1.00	1.00	0.95	1.00	1.00		0.95	1.00		1.00	
Satd. Flow (perm)		3167	1548	3467	1900	1615		1752	2814		1900	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	930	518	1273	78	1	282	0	584	0	1	0
RTOR Reduction (vph)	0	0	385	0	0	0	0	0	246	0	0	0
Lane Group Flow (vph)	0	930	133	1273	78	1	0	282	338	0	1	0
Confl. Peds. (#/hr)			1									
Heavy Vehicles (%)	0%	14%	3%	1%	0%	0%	3%	0%	1%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA	Perm	Split	NA	pt+ov		NA	
Protected Phases		2		1	6		8	8	8 1		4	
Permitted Phases			2			6				4		
Actuated Green, G (s)		27.0	27.0	31.0	64.0	64.0		25.6	60.8		1.2	
Effective Green, g (s)		27.0	27.0	31.0	64.0	64.0		25.6	60.8		1.2	
Actuated g/C Ratio		0.26	0.26	0.30	0.61	0.61		0.24	0.58		0.01	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0		4.2			4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		814	398	1023	1158	984		427	1629		21	
v/s Ratio Prot		c0.29		c0.37	0.04			c0.16	0.12		c0.00	
v/s Ratio Perm			0.09			0.00						
v/c Ratio		1.14	0.33	1.24	0.07	0.00		0.66	0.21		0.05	
Uniform Delay, d1		39.0	31.7	37.0	8.3	8.0		35.8	10.6		51.3	
Progression Factor		1.00	1.00	1.00	1.00	1.00		1.06	8.44		1.00	
Incremental Delay, d2		78.6	0.5	118.3	0.1	0.0		3.7	0.1		0.9	
Delay (s)		117.6	32.2	155.3	8.5	8.0		41.5	89.3		52.3	
Level of Service		F	C	F	A	A		D	F		D	
Approach Delay (s)		87.0			146.7			73.7			52.3	
Approach LOS		F			F			E			D	

Intersection Summary			
HCM 2000 Control Delay	105.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	20.2
Intersection Capacity Utilization	91.0%	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 (vph)	0	1242	0	45	183	22	2	2	27	15	0	0
Future Volume (vph)	0	1242	0	45	183	22	2	2	27	15	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor		0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00		1.00	1.00			0.99			1.00	
Flpb, ped/bikes		1.00		1.00	1.00			1.00			1.00	
Frt		1.00		1.00	0.98			0.88			1.00	
Flt Protected		1.00		0.95	1.00			1.00			0.95	
Satd. Flow (prot)		3539		1805	3475			1385			1609	
Flt Permitted		1.00		0.95	1.00			0.98			0.80	
Satd. Flow (perm)		3539		1805	3475			1363			1355	
Peak-hour factor, PHF	0.92	0.92	0.92	0.83	0.92	0.83	0.92	0.83	0.83	0.83	0.83	0.92
Adj. Flow (vph)	0	1350	0	54	199	27	2	2	33	18	0	0
RTOR Reduction (vph)	0	0	0	0	6	0	0	30	0	0	0	0
Lane Group Flow (vph)	0	1350	0	54	220	0	0	7	0	0	18	0
Confl. Peds. (#/hr)				3		1			3	3		
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	2%	0%	21%	12%	0%	2%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		33.7		2.2	39.9			5.0			5.0	
Effective Green, g (s)		33.7		2.2	39.9			5.0			5.0	
Actuated g/C Ratio		0.64		0.04	0.75			0.09			0.09	
Clearance Time (s)		4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)		2254		75	2621			128			128	
v/s Ratio Prot		c0.38		c0.03	0.06							
v/s Ratio Perm								0.01			c0.01	
v/c Ratio		0.60		0.72	0.08			0.06			0.14	
Uniform Delay, d1		5.6		25.0	1.7			21.8			22.0	
Progression Factor		1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2		0.4		28.0	0.0			0.2			0.5	
Delay (s)		6.1		53.0	1.7			22.0			22.5	
Level of Service		A		D	A			C			C	
Approach Delay (s)		6.1			11.6			22.0			22.5	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	52.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	50.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	827	423	386	140	189	243	422	403	162	271	14
Future Volume (vph)	10	827	423	386	140	189	243	422	403	162	271	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	4.9
Lane Util. Factor	1.00	0.95	0.88	0.94	0.95		0.97	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	3610	2814	5090	3205		3433	3610	1583	1736	3610	1615
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1805	3610	2814	5090	3205		3433	3610	1583	1736	3610	1615
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)	11	899	460	420	152	205	264	459	438	176	295	15
RTOR Reduction (vph)	0	0	273	0	113	0	0	0	345	0	0	12
Lane Group Flow (vph)	11	899	187	420	244	0	264	459	93	176	295	3
Confl. Peds. (#/hr)						1						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	0%	1%	0%	1%	3%	2%	0%	2%	4%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	1.5	33.8	33.8	12.7	45.0		12.3	21.1	21.1	14.2	23.4	23.4
Effective Green, g (s)	1.5	33.8	33.8	12.7	45.0		12.3	21.1	21.1	14.2	23.4	23.4
Actuated g/C Ratio	0.01	0.34	0.34	0.13	0.45		0.12	0.21	0.21	0.14	0.23	0.23
Clearance Time (s)	4.0	5.3	5.3	4.0	5.3		4.0	5.3	5.3	4.0	4.9	4.9
Vehicle Extension (s)	2.0	3.0	3.0	2.0	3.0		2.0	3.0	3.0	2.0	3.0	3.0
Lane Grp Cap (vph)	26	1215	947	643	1436		420	758	332	245	841	376
v/s Ratio Prot	0.01	c0.25		c0.08	0.08		0.08	c0.13		c0.10	0.08	
v/s Ratio Perm			0.07						0.06			0.00
v/c Ratio	0.42	0.74	0.20	0.65	0.17		0.63	0.61	0.28	0.72	0.35	0.01
Uniform Delay, d1	49.0	29.4	23.7	41.8	16.5		41.9	35.9	33.3	41.2	32.2	29.6
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	4.0	2.4	0.1	1.8	0.1		2.1	1.4	0.5	8.1	0.3	0.0
Delay (s)	53.0	31.8	23.8	43.6	16.6		44.0	37.3	33.7	49.3	32.4	29.6
Level of Service	D	C	C	D	B		D	D	C	D	C	C
Approach Delay (s)		29.3			31.2			37.5			38.4	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	33.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	100.4	Sum of lost time (s)	18.6
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	721	0	427	0	532	0	0	761	584
Future Volume (vph)	0	0	0	721	0	427	0	532	0	0	761	584
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.7		4.7		6.3			5.7	5.7
Lane Util. Factor				0.97		1.00		0.95			0.95	1.00
Frpb, ped/bikes				1.00		1.00		1.00			1.00	1.00
Flpb, ped/bikes				1.00		1.00		1.00			1.00	1.00
Frt				1.00		0.85		1.00			1.00	1.00
Flt Protected				0.95		1.00		1.00			1.00	1.00
Satd. Flow (prot)				3335		1599		3574			3574	1863
Flt Permitted				0.95		1.00		1.00			1.00	1.00
Satd. Flow (perm)				3335		1599		3574			3574	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.93	0.92	0.93	0.92	0.93	0.93	0.93	0.93	0.92
Adj. Flow (vph)	0	0	0	775	0	459	0	572	0	0	818	635
RTOR Reduction (vph)	0	0	0	0	0	57	0	0	0	0	0	333
Lane Group Flow (vph)	0	0	0	775	0	402	0	572	0	0	818	302
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	2%	2%	2%	5%	2%	1%	2%	1%	2%	0%	1%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	2	0	0
Turn Type				Prot		custom		NA			NA	Perm
Protected Phases				8		8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				15.4		24.4		13.8			23.4	23.4
Effective Green, g (s)				15.4		24.4		13.8			23.4	23.4
Actuated g/C Ratio				0.31		0.50		0.28			0.48	0.48
Clearance Time (s)				4.7				6.3			5.7	5.7
Vehicle Extension (s)				0.2				0.2			0.2	0.2
Lane Grp Cap (vph)				1043		793		1002			1699	886
v/s Ratio Prot				c0.23		c0.25		0.16			c0.23	
v/s Ratio Perm												0.16
v/c Ratio				0.74		0.51		0.57			0.48	0.34
Uniform Delay, d1				15.1		8.3		15.2			8.8	8.1
Progression Factor				1.00		1.00		1.00			1.00	1.00
Incremental Delay, d2				2.5		0.2		0.5			0.1	0.1
Delay (s)				17.7		8.5		15.7			8.9	8.2
Level of Service				B		A		B			A	A
Approach Delay (s)		0.0			14.3			15.7			8.5	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	49.2	Sum of lost time (s)	15.7
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	116	381	0	834	1053	0
Future Volume (vph)	116	381	0	834	1053	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.7	4.7		5.8	6.8	
Lane Util. Factor	0.97	0.88		0.95	0.95	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3467	2733		3539	3505	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3467	2733		3539	3505	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	118	389	0	851	1074	0
RTOR Reduction (vph)	0	10	0	0	0	0
Lane Group Flow (vph)	118	379	0	851	1074	0
Heavy Vehicles (%)	1%	4%	0%	2%	3%	1%
Turn Type	Prot	custom		NA	NA	
Protected Phases	4	4 5		2	6	
Permitted Phases						
Actuated Green, G (s)	6.3	21.4		46.0	29.9	
Effective Green, g (s)	6.3	15.6		46.0	29.9	
Actuated g/C Ratio	0.10	0.25		0.73	0.48	
Clearance Time (s)	4.7			5.8	6.8	
Vehicle Extension (s)	0.2			0.2	0.2	
Lane Grp Cap (vph)	347	678		2592	1668	
v/s Ratio Prot	0.03	c0.14		0.24	c0.31	
v/s Ratio Perm						
v/c Ratio	0.34	0.56		0.33	0.64	
Uniform Delay, d1	26.3	20.6		3.0	12.4	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.6		0.0	0.6	
Delay (s)	26.5	21.2		3.0	13.1	
Level of Service	C	C		A	B	
Approach Delay (s)	22.4			3.0	13.1	
Approach LOS	C			A	B	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	62.8	Sum of lost time (s)	17.3
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	1260	209	306	583	0	148	2	414	6	1	2
Future Volume (vph)	2	1260	209	306	583	0	148	2	414	6	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95	1.00		1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.98		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Frt	1.00	0.98		1.00	1.00		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.95	1.00		0.97	
Satd. Flow (prot)	1805	3484		1787	3539		1681	1688	1565		1784	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.95	1.00		1.00	
Satd. Flow (perm)	1805	3484		1787	3539		1681	1688	1565		1843	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	2	1326	220	322	614	0	156	2	436	6	1	2
RTOR Reduction (vph)	0	7	0	0	0	0	0	0	393	0	2	0
Lane Group Flow (vph)	2	1539	0	322	614	0	80	78	43	0	7	0
Confl. Peds. (#/hr)			8			3			6			
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	1%	0%	1%	2%	0%	2%	0%	1%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA	Perm	Perm	NA	
Protected Phases	5	2		1	6		8	8			4	
Permitted Phases									8	4		
Actuated Green, G (s)	1.1	70.2		27.8	96.9		12.9	12.9	12.9		1.6	
Effective Green, g (s)	1.1	70.2		27.8	96.9		12.9	12.9	12.9		1.6	
Actuated g/C Ratio	0.01	0.54		0.21	0.75		0.10	0.10	0.10		0.01	
Clearance Time (s)	4.0	4.9		4.0	4.9		4.6	4.6	4.6		4.0	
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0		2.0	
Lane Grp Cap (vph)	15	1881		382	2637		166	167	155		22	
v/s Ratio Prot	0.00	c0.44		c0.18	0.17		c0.05	0.05				
v/s Ratio Perm									0.03		c0.00	
v/c Ratio	0.13	0.82		0.84	0.23		0.48	0.47	0.28		0.32	
Uniform Delay, d1	64.0	24.6		49.0	5.1		55.4	55.3	54.2		63.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	1.5	4.1		14.9	0.2		0.8	0.8	0.4		3.0	
Delay (s)	65.4	28.7		63.9	5.3		56.2	56.1	54.6		66.7	
Level of Service	E	C		E	A		E	E	D		E	
Approach Delay (s)		28.8			25.5			55.0			66.7	
Approach LOS		C			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	32.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	82.5%	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 (vph)	175	1064	98	38	116	63	201	3	91	75	2	173
Future Volume (vph)	175	1064	98	38	116	63	201	3	91	75	2	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1592		1770	1586	
Flt Permitted	0.95	1.00	1.00	0.32	1.00	1.00	0.64	1.00		0.69	1.00	
Satd. Flow (perm)	1770	3539	1583	596	3539	1583	1188	1592		1287	1586	
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)	190	1157	107	41	126	68	218	3	99	82	2	188
RTOR Reduction (vph)	0	0	47	0	0	49	0	25	0	0	139	0
Lane Group Flow (vph)	190	1157	60	41	126	19	218	77	0	82	51	0
Turn Type	Prot	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases			2	6		6	8			4		
Actuated Green, G (s)	8.0	24.5	24.5	12.5	12.5	12.5	11.5	11.5		11.5	11.5	
Effective Green, g (s)	8.0	24.5	24.5	12.5	12.5	12.5	11.5	11.5		11.5	11.5	
Actuated g/C Ratio	0.18	0.56	0.56	0.28	0.28	0.28	0.26	0.26		0.26	0.26	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	321	1970	881	169	1005	449	310	416		336	414	
v/s Ratio Prot	0.11	c0.33			0.04			0.05			0.03	
v/s Ratio Perm			0.04	0.07		0.01	c0.18			0.06		
v/c Ratio	0.59	0.59	0.07	0.24	0.13	0.04	0.70	0.18		0.24	0.12	
Uniform Delay, d1	16.5	6.4	4.5	12.1	11.7	11.4	14.7	12.6		12.8	12.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.9	0.5	0.0	0.7	0.1	0.0	7.1	0.2		0.4	0.1	
Delay (s)	19.4	6.9	4.5	12.9	11.7	11.5	21.8	12.8		13.2	12.5	
Level of Service	B	A	A	B	B	B	C	B		B	B	
Approach Delay (s)		8.3			11.9			18.9			12.7	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	44.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1341	98	38	452	201	91
Future Volume (vph)	1341	98	38	452	201	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frt	0.99		1.00	1.00	0.96	
Flt Protected	1.00		0.95	1.00	0.97	
Satd. Flow (prot)	5033		1770	5085	1725	
Flt Permitted	1.00		0.95	1.00	0.97	
Satd. Flow (perm)	5033		1770	5085	1725	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1458	107	41	491	218	99
RTOR Reduction (vph)	8	0	0	0	23	0
Lane Group Flow (vph)	1557	0	41	491	294	0
Turn Type	NA		Prot	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases						
Actuated Green, G (s)	32.8		2.1	38.9	16.4	
Effective Green, g (s)	32.8		2.1	38.9	16.4	
Actuated g/C Ratio	0.52		0.03	0.61	0.26	
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	2607		58	3124	446	
v/s Ratio Prot	c0.31		c0.02	0.10	c0.17	
v/s Ratio Perm						
v/c Ratio	0.60		0.71	0.16	0.66	
Uniform Delay, d1	10.6		30.3	5.2	21.0	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.4		32.4	0.0	3.5	
Delay (s)	11.0		62.7	5.2	24.5	
Level of Service	B		E	A	C	
Approach Delay (s)	11.0			9.7	24.5	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	63.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Appendix 7
2040 Cumulative 95th Percentile Queue Lengths

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	134	473	178	288	618	212	778	174	23	453	77
v/c Ratio	0.38	0.42	0.25	0.55	0.45	0.40	0.59	0.15	0.11	0.37	0.18
Control Delay	44.3	29.4	5.9	40.6	24.6	41.9	25.5	4.6	48.8	27.6	5.2
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	44.3	29.4	5.9	40.6	24.6	41.9	25.5	4.6	48.8	27.6	5.2
Queue Length 50th (ft)	28	65	0	60	76	31	136	0	5	63	0
Queue Length 95th (ft)	91	144	29	168	164	90	371	28	25	144	25
Internal Link Dist (ft)		589			719		560			779	
Turn Bay Length (ft)	270		240	260		250		240	280		215
Base Capacity (vph)	913	2399	1322	932	2400	1290	1712	1411	833	2415	757
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	0.15	0.20	0.13	0.31	0.26	0.16	0.45	0.12	0.03	0.19	0.10

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	114	260	156	579	539	265	521	313	51	1071	94
v/c Ratio	0.38	0.28	0.28	0.69	0.46	0.49	0.22	0.40	0.24	0.53	0.10
Control Delay	45.7	34.5	7.2	40.9	29.8	42.8	20.7	4.6	46.9	27.1	5.1
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	45.7	34.5	7.2	40.9	29.8	42.8	20.7	4.6	46.9	27.1	5.1
Queue Length 50th (ft)	29	37	0	102	91	47	53	0	13	128	0
Queue Length 95th (ft)	74	65	28	196	145	100	110	63	41	245	18
Internal Link Dist (ft)		661			907		451			715	
Turn Bay Length (ft)	250		300	380		355			280		250
Base Capacity (vph)	796	2502	1222	1168	2085	1145	2629	835	718	2625	1182
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	0.14	0.10	0.13	0.50	0.26	0.23	0.20	0.37	0.07	0.41	0.08

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	76	197	188	235	245	5	343	685	849	56	1193	171
v/c Ratio	0.30	0.21	0.19	0.71	0.21	0.01	0.58	0.24	0.42	0.23	0.50	0.25
Control Delay	44.0	31.0	13.2	52.1	29.2	0.0	40.8	15.8	2.1	43.1	21.9	4.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.0	31.0	13.2	52.1	29.2	0.0	40.8	15.8	2.1	43.1	21.9	4.5
Queue Length 50th (ft)	19	34	26	62	41	0	60	61	9	14	128	0
Queue Length 95th (ft)	50	59	53	#162	71	0	113	113	48	40	224	45
Internal Link Dist (ft)		734			1365			641			612	
Turn Bay Length (ft)	340		410	485		250	380		400	450		290
Base Capacity (vph)	304	1892	1072	333	1898	660	803	3344	2018	378	3068	838
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.10	0.18	0.71	0.13	0.01	0.43	0.20	0.42	0.15	0.39	0.20

Intersection Summary

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

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	150	152	678	1390	915	512
v/c Ratio	0.47	0.46	0.70	0.55	0.28	0.42
Control Delay	25.7	25.2	19.3	10.0	4.3	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.7	25.2	19.3	10.0	4.3	1.6
Queue Length 50th (ft)	46	47	100	100	36	0
Queue Length 95th (ft)	96	96	158	133	50	23
Internal Link Dist (ft)		377		311	651	
Turn Bay Length (ft)	140		140			220
Base Capacity (vph)	316	327	969	2702	3432	1252
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.46	0.70	0.51	0.27	0.41

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	532	717	1458	725
v/c Ratio	0.55	0.77	0.61	0.29
Control Delay	16.8	14.8	9.4	7.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	16.8	14.8	9.4	7.0
Queue Length 50th (ft)	54	43	76	30
Queue Length 95th (ft)	132	142	190	81
Internal Link Dist (ft)	429		834	429
Turn Bay Length (ft)	275	275		
Base Capacity (vph)	2110	1633	3951	4174
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	0.25	0.44	0.37	0.17

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	852	276	319	16	60	100	58	528	71	123
v/c Ratio	0.75	0.46	0.44	0.07	0.27	0.20	0.41	0.51	0.47	0.12
Control Delay	36.5	30.7	5.2	40.9	44.5	7.0	53.6	22.7	41.5	22.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.5	30.7	5.2	40.9	44.5	7.0	53.6	22.7	41.5	22.2
Queue Length 50th (ft)	244	136	0	10	37	0	38	105	47	35
Queue Length 95th (ft)	#382	239	64	30	78	39	77	145	87	63
Internal Link Dist (ft)		425			472			683		834
Turn Bay Length (ft)	575		380	250		250	360			
Base Capacity (vph)	1142	608	724	245	244	455	168	1149	171	1172
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.45	0.44	0.07	0.25	0.22	0.35	0.46	0.42	0.10

Intersection Summary

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

Lane Group	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	31	32	107	1259	234
v/c Ratio	0.26	0.27	0.22	0.47	0.06
Control Delay	50.6	51.1	8.6	1.6	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	50.6	51.1	8.6	1.6	0.4
Queue Length 50th (ft)	21	22	0	15	0
Queue Length 95th (ft)	49	50	23	16	0
Internal Link Dist (ft)		679		834	527
Turn Bay Length (ft)	115		475		
Base Capacity (vph)	192	188	637	2683	4187
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.16	0.17	0.17	0.47	0.06

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBT	NBR
Lane Group Flow (vph)	13	36	658	23	142	1205
v/c Ratio	0.02	0.10	0.38	0.02	0.37	0.49
Control Delay	31.9	0.6	21.3	7.3	41.6	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.9	0.6	21.3	7.3	41.6	7.3
Queue Length 50th (ft)	3	0	163	4	102	9
Queue Length 95th (ft)	11	0	236	16	148	239
Internal Link Dist (ft)	552			505	527	
Turn Bay Length (ft)						
Base Capacity (vph)	757	425	1745	1310	418	2473
Starvation Cap Reductn	0	0	0	0	0	11
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.08	0.38	0.02	0.34	0.49

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	7	205	279	1052	871	632	667	79	99	243
v/c Ratio	0.04	0.33	0.39	0.81	0.55	0.88	0.65	0.16	0.52	0.40
Control Delay	49.6	36.8	5.7	41.5	21.1	54.6	36.9	6.9	54.0	39.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.6	36.8	5.7	41.5	21.1	54.6	36.9	6.9	54.0	39.1
Queue Length 50th (ft)	4	56	0	190	169	174	178	0	53	65
Queue Length 95th (ft)	19	82	13	#337	267	#350	291	17	115	111
Internal Link Dist (ft)		924			708		1923			661
Turn Bay Length (ft)			350	420		300		300	195	
Base Capacity (vph)	470	1180	1104	1299	1584	715	1162	543	344	1142
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.17	0.25	0.81	0.55	0.88	0.57	0.15	0.29	0.21

Intersection Summary

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

Lane Group	WBL	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	1415	762	732	793	465
v/c Ratio	1.02	0.76	0.83	0.50	0.43
Control Delay	57.0	17.5	39.4	16.9	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	57.0	17.5	39.4	16.9	2.4
Queue Length 50th (ft)	340	235	176	147	0
Queue Length 95th (ft)	#673	402	268	166	25
Internal Link Dist (ft)			1423	1923	
Turn Bay Length (ft)		460			
Base Capacity (vph)	1385	1275	1641	2950	1630
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	1.02	0.60	0.45	0.27	0.29

Intersection Summary

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

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	415	471	946	1655
v/c Ratio	0.82	0.48	0.37	0.95
Control Delay	54.7	25.1	5.1	37.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	54.7	25.1	5.1	37.0
Queue Length 50th (ft)	130	125	90	491
Queue Length 95th (ft)	189	171	141	#775
Internal Link Dist (ft)	342		409	1423
Turn Bay Length (ft)	255	255		
Base Capacity (vph)	1757	1933	3466	1743
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	0.24	0.24	0.27	0.95

Intersection Summary

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

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	7	481	334	1293	157	158	227	4
v/c Ratio	0.09	0.28	0.84	0.49	0.66	0.67	0.55	0.02
Control Delay	54.2	18.9	59.9	8.9	58.9	59.1	10.6	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.2	18.9	59.9	8.9	58.9	59.1	10.6	0.2
Queue Length 50th (ft)	5	91	235	138	117	118	0	0
Queue Length 95th (ft)	20	193	314	429	174	175	63	0
Internal Link Dist (ft)		594		855		459		223
Turn Bay Length (ft)	75		360		175			
Base Capacity (vph)	142	1692	497	2632	393	393	530	246
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.28	0.67	0.49	0.40	0.40	0.43	0.02

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	184	1043	292	248	724	424	629	524	112	688	80
v/c Ratio	0.54	0.63	0.27	0.61	0.42	0.65	0.61	0.44	0.42	0.57	0.18
Control Delay	53.7	33.1	4.1	52.8	28.0	49.8	35.5	4.0	54.7	38.2	6.0
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	53.7	33.1	4.1	52.8	28.0	49.8	35.5	4.0	54.7	38.2	6.0
Queue Length 50th (ft)	62	215	0	83	133	98	192	0	38	150	0
Queue Length 95th (ft)	115	324	35	146	208	157	297	43	78	230	29
Internal Link Dist (ft)		589			719		560			779	
Turn Bay Length (ft)	270		240	260		250		240	280		215
Base Capacity (vph)	687	1838	1172	695	1881	1000	1280	1330	695	1783	602
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	0.27	0.57	0.25	0.36	0.38	0.42	0.49	0.39	0.16	0.39	0.13

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	295	770	526	379	405	488	702	535	101	763	150
v/c Ratio	0.63	0.46	0.47	0.60	0.32	0.66	0.35	0.68	0.37	0.50	0.19
Control Delay	48.8	31.4	4.2	46.9	29.0	46.2	27.9	12.3	51.8	34.7	6.7
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	48.8	31.4	4.2	46.9	29.0	46.2	27.9	12.3	51.8	34.7	6.7
Queue Length 50th (ft)	87	113	0	77	67	98	93	49	29	113	0
Queue Length 95th (ft)	172	179	43	146	120	181	166	210	73	201	31
Internal Link Dist (ft)		661			907		451			715	
Turn Bay Length (ft)	250		300	380		355			280		250
Base Capacity (vph)	751	2499	1394	1091	1919	1091	2510	875	751	2405	1134
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	0.39	0.31	0.38	0.35	0.21	0.45	0.28	0.61	0.13	0.32	0.13

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	243	304	407	1059	87	58	179	1077	424	14	776	108
v/c Ratio	0.34	0.34	0.47	0.86	0.05	0.09	0.53	0.54	0.20	0.11	0.54	0.24
Control Delay	49.8	43.7	28.9	43.7	22.3	1.3	61.3	35.3	1.5	63.3	41.5	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.8	43.7	28.9	43.7	22.3	1.3	61.3	35.3	1.5	63.3	41.5	4.7
Queue Length 50th (ft)	91	73	110	363	13	0	46	189	5	5	154	0
Queue Length 95th (ft)	154	116	188	#640	30	7	85	273	28	19	202	30
Internal Link Dist (ft)		734			1365			641			612	
Turn Bay Length (ft)	340		410	485		250	380		400	450		290
Base Capacity (vph)	1073	1337	896	1338	2235	750	367	2487	2208	124	2213	637
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.23	0.45	0.79	0.04	0.08	0.49	0.43	0.19	0.11	0.35	0.17

Intersection Summary

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

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	317	320	753	856	1413	797
v/c Ratio	0.68	0.68	0.58	0.43	0.51	0.64
Control Delay	25.9	26.1	11.2	11.5	7.5	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.9	26.1	11.2	11.5	7.5	3.4
Queue Length 50th (ft)	87	88	75	61	78	0
Queue Length 95th (ft)	#189	#191	123	87	106	37
Internal Link Dist (ft)		377		311	651	
Turn Bay Length (ft)	140		140			220
Base Capacity (vph)	477	478	1257	2211	2996	1269
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.67	0.60	0.39	0.47	0.63

Intersection Summary

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

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	568	282	1671	1926
v/c Ratio	0.67	0.41	0.54	0.64
Control Delay	23.3	19.1	7.1	8.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	23.3	19.1	7.1	8.2
Queue Length 50th (ft)	82	39	95	121
Queue Length 95th (ft)	148	82	158	200
Internal Link Dist (ft)	429		834	429
Turn Bay Length (ft)	275	275		
Base Capacity (vph)	1825	1459	4037	3903
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	0.31	0.19	0.41	0.49

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	648	212	315	35	147	223	212	522	120	292
v/c Ratio	0.72	0.43	0.48	0.14	0.56	0.41	0.68	0.47	0.63	0.33
Control Delay	40.1	34.6	6.2	40.7	51.0	14.6	55.6	28.7	35.9	37.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.1	34.6	6.2	40.7	51.0	14.6	55.6	28.7	35.9	37.0
Queue Length 50th (ft)	196	114	0	21	94	48	131	138	72	111
Queue Length 95th (ft)	270	190	66	51	159	111	#324	187	147	155
Internal Link Dist (ft)		425			472			683		834
Turn Bay Length (ft)	575		380	250		250	360			
Base Capacity (vph)	946	524	669	267	275	537	314	1173	217	1148
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.40	0.47	0.13	0.53	0.42	0.68	0.45	0.55	0.25

Intersection Summary

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

Lane Group	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	93	91	178	933	415
v/c Ratio	0.51	0.50	0.26	0.36	0.11
Control Delay	53.3	52.7	6.1	7.2	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	53.3	52.7	6.1	7.2	2.0
Queue Length 50th (ft)	63	62	0	69	16
Queue Length 95th (ft)	111	110	29	248	m12
Internal Link Dist (ft)		679		834	527
Turn Bay Length (ft)	115		475		
Base Capacity (vph)	294	294	824	2561	3938
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	0.32	0.31	0.22	0.36	0.11

Intersection Summary

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

Lane Group	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	8	109	1233	12	1	166	893	1
v/c Ratio	0.01	0.23	0.93	0.01	0.00	0.50	0.43	0.01
Control Delay	29.1	6.4	46.3	8.2	0.0	40.1	10.8	47.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.1	6.4	46.3	8.2	0.0	40.1	10.8	47.0
Queue Length 50th (ft)	2	0	389	2	0	115	157	1
Queue Length 95th (ft)	8	38	#736	12	0	181	232	7
Internal Link Dist (ft)	552			505		527		495
Turn Bay Length (ft)					200			
Base Capacity (vph)	814	484	1322	1321	1139	356	2086	289
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	0.01	0.23	0.93	0.01	0.00	0.47	0.43	0.00

Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	409	447	464	387	260	460	547	201	305	15
v/c Ratio	0.06	0.53	0.47	0.61	0.28	0.55	0.53	0.74	0.68	0.30	0.03
Control Delay	45.3	34.6	5.1	40.4	9.7	42.8	32.7	13.1	49.3	26.8	0.1
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	45.3	34.6	5.1	40.4	9.7	42.8	32.7	13.1	49.3	26.8	0.1
Queue Length 50th (ft)	6	105	0	85	29	70	114	34	103	67	0
Queue Length 95th (ft)	27	185	43	150	84	135	203	177	222	130	0
Internal Link Dist (ft)		924			708		1923			661	
Turn Bay Length (ft)			350	420		300		300	195		190
Base Capacity (vph)	542	1301	1287	1529	1437	825	1301	869	417	1344	658
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	0.02	0.31	0.35	0.30	0.27	0.32	0.35	0.63	0.48	0.23	0.02

Intersection Summary

Lane Group	WBL	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	751	456	654	832	637
v/c Ratio	0.74	0.56	0.63	0.48	0.52
Control Delay	21.2	10.7	19.2	10.4	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	21.2	10.7	19.2	10.4	2.7
Queue Length 50th (ft)	95	63	84	77	0
Queue Length 95th (ft)	175	163	157	150	46
Internal Link Dist (ft)			1423	1923	
Turn Bay Length (ft)		460			
Base Capacity (vph)	2365	1454	2752	3574	1863
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	0.32	0.31	0.24	0.23	0.34

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	205	392	828	1062
v/c Ratio	0.48	0.40	0.33	0.65
Control Delay	30.7	16.1	4.0	16.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	30.7	16.1	4.0	16.3
Queue Length 50th (ft)	38	59	48	157
Queue Length 95th (ft)	73	100	81	256
Internal Link Dist (ft)	342		409	1423
Turn Bay Length (ft)	255	255		
Base Capacity (vph)	2696	2706	3539	2725
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	0.08	0.14	0.23	0.39

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	2	1498	321	642	92	90	686	9
v/c Ratio	0.03	0.94	0.85	0.26	0.27	0.26	0.94	0.11
Control Delay	61.0	46.7	69.4	9.9	43.3	43.2	33.1	53.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.0	46.7	69.4	9.9	43.3	43.2	33.1	53.7
Queue Length 50th (ft)	2	~652	261	103	65	63	153	6
Queue Length 95th (ft)	11	#992	348	189	123	121	#427	25
Internal Link Dist (ft)		594		855		459		223
Turn Bay Length (ft)	75		360		175			
Base Capacity (vph)	138	1591	481	2438	399	400	765	115
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	0.01	0.94	0.67	0.26	0.23	0.23	0.90	0.08

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	135	420	178	387	912	215	782	174	23	427	96
v/c Ratio	0.41	0.33	0.23	0.66	0.57	0.43	0.63	0.16	0.12	0.36	0.23
Control Delay	47.3	29.3	5.7	43.8	26.7	44.8	28.6	4.7	51.3	30.1	8.1
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	47.3	29.3	5.7	43.8	26.7	44.8	28.6	4.7	51.3	30.1	8.1
Queue Length 50th (ft)	34	65	0	94	135	37	165	0	5	69	0
Queue Length 95th (ft)	92	130	29	223	260	91	375	28	25	138	42
Internal Link Dist (ft)		589			719		560			779	
Turn Bay Length (ft)	270		240	260		250		240	280		215
Base Capacity (vph)	830	2183	1219	846	2204	1172	1561	1301	756	2195	697
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	0.16	0.19	0.15	0.46	0.41	0.18	0.50	0.13	0.03	0.19	0.14

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	114	210	156	634	962	263	522	313	59	1097	66
v/c Ratio	0.40	0.18	0.24	0.72	0.68	0.52	0.23	0.41	0.28	0.57	0.07
Control Delay	49.5	34.1	6.7	43.9	33.6	46.6	23.5	4.9	50.7	30.6	1.8
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	49.5	34.1	6.7	43.9	33.6	46.6	23.5	4.9	50.7	30.6	1.8
Queue Length 50th (ft)	33	31	0	123	184	52	63	0	17	157	0
Queue Length 95th (ft)	74	54	28	214	272	99	111	63	45	252	6
Internal Link Dist (ft)		661			907		451			715	
Turn Bay Length (ft)	250		300	380		355			280		250
Base Capacity (vph)	731	2298	1136	1073	1926	1052	2435	797	660	2411	1094
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	0.16	0.09	0.14	0.59	0.50	0.25	0.21	0.39	0.09	0.45	0.06

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	71	79	172	164	1269	117	445	574	1067	139	1133	167
v/c Ratio	0.31	0.06	0.14	0.59	0.81	0.21	0.71	0.25	0.55	0.49	0.55	0.27
Control Delay	50.5	27.5	11.0	55.0	37.0	6.7	48.5	22.1	2.1	51.1	28.6	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.5	27.5	11.0	55.0	37.0	6.7	48.5	22.1	2.1	51.1	28.6	5.2
Queue Length 50th (ft)	22	13	21	53	272	0	97	75	0	44	177	0
Queue Length 95th (ft)	48	28	48	#100	#385	43	146	98	34	81	214	45
Internal Link Dist (ft)		734			1066			641			612	
Turn Bay Length (ft)	340		410	485		250	405		400	450		290
Base Capacity (vph)	271	1687	1215	297	1692	605	716	2971	1956	338	2736	763
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.05	0.14	0.55	0.75	0.19	0.62	0.19	0.55	0.41	0.41	0.22

Intersection Summary

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

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	164	165	678	1279	755	528
v/c Ratio	0.51	0.49	0.68	0.52	0.24	0.44
Control Delay	26.1	25.6	17.8	9.8	4.1	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.1	25.6	17.8	9.8	4.1	1.7
Queue Length 50th (ft)	51	51	96	89	28	0
Queue Length 95th (ft)	104	104	154	120	41	23
Internal Link Dist (ft)		377		311	651	
Turn Bay Length (ft)	140		140			220
Base Capacity (vph)	324	335	1003	2770	3518	1275
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.49	0.68	0.46	0.21	0.41

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	715	718	1130	758
v/c Ratio	0.66	0.73	0.53	0.34
Control Delay	15.2	12.1	8.9	7.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	15.2	12.1	8.9	7.5
Queue Length 50th (ft)	62	38	52	31
Queue Length 95th (ft)	138	113	120	75
Internal Link Dist (ft)	429		834	429
Turn Bay Length (ft)	275	275		
Base Capacity (vph)	2389	1797	4306	4549
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	0.40	0.26	0.17

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	771	271	280	14	60	114	64	879	80	144
v/c Ratio	0.81	0.54	0.45	0.06	0.27	0.25	0.44	0.78	0.52	0.12
Control Delay	43.0	36.4	6.0	40.7	44.5	16.6	54.4	36.4	37.3	24.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.0	36.4	6.0	40.7	44.5	16.6	54.4	36.4	37.3	24.6
Queue Length 50th (ft)	245	153	0	8	37	28	41	270	53	45
Queue Length 95th (ft)	317	235	61	27	78	72	84	#360	103	80
Internal Link Dist (ft)		425			472			683		834
Turn Bay Length (ft)	575		380	250		250	360			
Base Capacity (vph)	984	524	640	245	244	425	170	1126	172	1230
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.52	0.44	0.06	0.25	0.27	0.38	0.78	0.47	0.12

Intersection Summary

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

Lane Group	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	36	37	548	1397	301
v/c Ratio	0.13	0.14	0.71	0.61	0.08
Control Delay	39.6	39.7	33.3	13.8	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	39.6	39.7	33.3	13.8	0.8
Queue Length 50th (ft)	21	21	144	232	4
Queue Length 95th (ft)	53	54	203	553	2
Internal Link Dist (ft)		679		834	527
Turn Bay Length (ft)	115		475		
Base Capacity (vph)	275	270	884	2339	3976
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	0.13	0.14	0.62	0.60	0.08

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBT	NBR
Lane Group Flow (vph)	171	106	337	1077	724	1217
v/c Ratio	0.23	0.25	0.44	1.10	1.04	0.54
Control Delay	33.9	6.9	36.9	87.4	79.0	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	33.9	6.9	36.9	87.4	79.0	6.4
Queue Length 50th (ft)	49	0	100	~826	~522	135
Queue Length 95th (ft)	73	30	132	#956	#698	189
Internal Link Dist (ft)	552			505	527	
Turn Bay Length (ft)						
Base Capacity (vph)	757	425	769	977	694	2272
Starvation Cap Reductn	0	0	0	0	0	203
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.25	0.44	1.10	1.04	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.

Lane Group	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	224	25	1627	23	19
v/c Ratio	0.08	0.14	0.53	0.03	0.07
Control Delay	5.2	32.3	5.0	0.1	22.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	5.2	32.3	5.0	0.1	22.5
Queue Length 50th (ft)	0	6	0	0	4
Queue Length 95th (ft)	49	34	372	0	21
Internal Link Dist (ft)	1242		627	261	357
Turn Bay Length (ft)		135			
Base Capacity (vph)	3090	182	3107	996	743
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	0.07	0.14	0.52	0.02	0.03

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	7	204	277	791	1440	668	669	79	91	237
v/c Ratio	0.04	0.31	0.37	0.78	0.97	0.86	0.60	0.15	0.46	0.37
Control Delay	47.8	33.8	5.5	42.0	45.1	48.3	33.1	6.8	49.8	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.8	33.8	5.5	42.0	45.1	48.3	33.1	6.8	49.8	36.5
Queue Length 50th (ft)	3	50	0	132	361	164	157	0	44	57
Queue Length 95th (ft)	19	81	13	228	524	#375	289	17	107	108
Internal Link Dist (ft)		924			708		1923			661
Turn Bay Length (ft)			350	420		300		300	195	
Base Capacity (vph)	512	1281	1173	1416	1479	779	1269	585	375	1245
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.16	0.24	0.56	0.97	0.86	0.53	0.14	0.24	0.19

Intersection Summary

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

Lane Group	WBL	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	1377	877	707	545	454
v/c Ratio	1.11	0.83	0.86	0.30	0.39
Control Delay	92.7	21.2	45.6	13.4	2.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	92.7	21.2	45.6	13.4	2.1
Queue Length 50th (ft)	~513	334	217	92	0
Queue Length 95th (ft)	#637	518	258	110	25
Internal Link Dist (ft)			1423	1923	
Turn Bay Length (ft)		460			
Base Capacity (vph)	1236	1146	1465	2634	1502
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	1.11	0.77	0.48	0.21	0.30

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	370	504	963	1591
v/c Ratio	0.80	0.52	0.37	0.91
Control Delay	55.0	25.8	4.7	32.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	55.0	25.8	4.7	32.5
Queue Length 50th (ft)	116	136	86	455
Queue Length 95th (ft)	171	184	135	#726
Internal Link Dist (ft)	342		409	1423
Turn Bay Length (ft)	255	255		
Base Capacity (vph)	1758	1966	3467	1744
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	0.21	0.26	0.28	0.91

Intersection Summary

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

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	7	477	136	1498	122	122	227	4
v/c Ratio	0.09	0.23	0.67	0.56	0.58	0.58	0.58	0.02
Control Delay	54.2	11.2	63.4	9.4	56.5	56.5	11.6	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.2	11.2	63.4	9.4	56.5	56.5	11.6	0.2
Queue Length 50th (ft)	5	62	97	153	91	91	0	0
Queue Length 95th (ft)	20	153	156	544	138	138	63	0
Internal Link Dist (ft)		594		855		459		223
Turn Bay Length (ft)	75		360		175			
Base Capacity (vph)	142	2114	491	2686	393	393	530	246
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.23	0.28	0.56	0.31	0.31	0.43	0.02

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	137	176	202	113	1409	73	60	23	65	194
v/c Ratio	0.85	0.07	0.17	0.17	0.71	0.08	0.42	0.08	0.29	0.51
Control Delay	79.0	3.9	1.2	9.2	14.0	2.8	36.3	12.2	29.8	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.0	3.9	1.2	9.2	14.0	2.8	36.3	12.2	29.8	13.5
Queue Length 50th (ft)	57	7	0	19	185	0	23	0	24	17
Queue Length 95th (ft)	#208	30	23	63	404	20	61	19	61	72
Internal Link Dist (ft)		598			4088			531		1450
Turn Bay Length (ft)	210		250	150		250	150		150	
Base Capacity (vph)	162	2988	1368	855	2536	1155	335	622	526	697
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.06	0.15	0.13	0.56	0.06	0.18	0.04	0.12	0.28

Intersection Summary

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

Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	981	188	1447	153
v/c Ratio	0.46	0.76	0.44	0.36
Control Delay	7.5	46.9	6.7	15.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.5	46.9	6.7	15.1
Queue Length 50th (ft)	32	42	55	28
Queue Length 95th (ft)	91	#186	175	66
Internal Link Dist (ft)	1066		843	293
Turn Bay Length (ft)		150		
Base Capacity (vph)	2350	247	3576	988
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	0.42	0.76	0.40	0.15

Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	179	1367	276	247	732	424	635	551	127	676	80
v/c Ratio	0.55	0.78	0.25	0.63	0.40	0.67	0.63	0.47	0.46	0.57	0.19
Control Delay	55.2	37.0	7.7	54.5	27.5	51.5	37.5	4.1	55.5	39.2	5.9
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	55.2	37.0	7.7	54.5	27.5	51.5	37.5	4.1	55.5	39.2	5.9
Queue Length 50th (ft)	60	309	14	84	136	98	195	0	43	147	0
Queue Length 95th (ft)	112	447	53	145	208	157	303	44	86	225	30
Internal Link Dist (ft)		589			719		560			779	
Turn Bay Length (ft)	270		240	260		250		240	280		215
Base Capacity (vph)	655	1754	1085	661	1834	952	1214	1306	661	1698	578
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	0.27	0.78	0.25	0.37	0.40	0.45	0.52	0.42	0.19	0.40	0.14

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	286	1099	565	373	411	488	716	594	109	724	148
v/c Ratio	0.64	0.56	0.46	0.62	0.28	0.68	0.38	0.79	0.41	0.51	0.20
Control Delay	52.2	32.3	4.2	50.1	27.9	49.2	31.0	19.9	54.5	37.8	6.9
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	52.2	32.3	4.2	50.1	27.9	49.2	31.0	19.9	54.5	37.8	6.9
Queue Length 50th (ft)	94	180	3	85	72	110	108	110	36	121	0
Queue Length 95th (ft)	164	255	48	141	119	178	169	314	76	190	30
Internal Link Dist (ft)		661			907		451			715	
Turn Bay Length (ft)	250		300	380		355			280		250
Base Capacity (vph)	695	2317	1362	1010	1783	1010	2304	827	695	2226	1059
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	0.41	0.47	0.41	0.37	0.23	0.48	0.31	0.72	0.16	0.33	0.14

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	243	965	184	744	104	80	175	1051	466	151	740	108
v/c Ratio	0.62	0.73	0.17	0.82	0.05	0.11	0.51	0.61	0.28	1.19	0.49	0.23
Control Delay	56.9	44.0	15.0	47.4	22.0	3.7	58.8	37.8	10.3	186.9	38.8	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.9	44.0	15.0	47.4	22.0	3.7	58.8	37.8	10.3	186.9	38.8	4.6
Queue Length 50th (ft)	86	227	24	255	15	0	42	192	78	~66	135	0
Queue Length 95th (ft)	153	#375	68	378	35	24	82	262	106	#172	190	29
Internal Link Dist (ft)		734			1066			641			612	
Turn Bay Length (ft)	340		410	485		250	405		400	450		290
Base Capacity (vph)	936	1372	1096	1373	2157	727	377	2553	2043	127	2272	657
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.70	0.17	0.54	0.05	0.11	0.46	0.41	0.23	1.19	0.33	0.16

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	367	370	591	1028	876	781
v/c Ratio	0.78	0.78	0.47	0.51	0.31	0.64
Control Delay	31.5	31.8	10.4	12.3	6.3	3.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.5	31.8	10.4	12.3	6.3	3.3
Queue Length 50th (ft)	105	106	58	76	42	0
Queue Length 95th (ft)	#230	#232	97	107	60	36
Internal Link Dist (ft)		377		311	651	
Turn Bay Length (ft)	140		140			220
Base Capacity (vph)	473	474	1267	2195	2975	1259
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.78	0.47	0.47	0.29	0.62

Intersection Summary

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

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	571	448	1827	1684
v/c Ratio	0.65	0.62	0.61	0.58
Control Delay	21.6	20.9	7.9	7.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	21.6	20.9	7.9	7.7
Queue Length 50th (ft)	74	59	103	93
Queue Length 95th (ft)	149	129	181	164
Internal Link Dist (ft)	429		834	429
Turn Bay Length (ft)	275	275		
Base Capacity (vph)	1942	1557	4225	4083
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	0.29	0.29	0.43	0.41

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	363	197	233	42	140	226	143	521	160	445
v/c Ratio	0.58	0.57	0.48	0.17	0.54	0.37	0.65	0.40	0.70	0.34
Control Delay	42.2	44.6	7.9	41.2	50.1	7.7	59.2	24.2	49.6	23.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.2	44.6	7.9	41.2	50.1	7.7	59.2	24.2	49.6	23.3
Queue Length 50th (ft)	116	122	0	25	89	16	91	120	83	141
Queue Length 95th (ft)	148	178	59	58	151	74	#205	186	#212	210
Internal Link Dist (ft)		425			472			683		834
Turn Bay Length (ft)	575		380	250		250	360			
Base Capacity (vph)	882	488	584	266	274	598	220	1302	239	1341
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.40	0.40	0.16	0.51	0.38	0.65	0.40	0.67	0.33

Intersection Summary

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

Lane Group	WBL	WBT	WBR	NBT	SBT
Lane Group Flow (vph)	79	78	256	637	911
v/c Ratio	0.45	0.44	0.35	0.25	0.23
Control Delay	51.4	51.1	5.7	6.6	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	51.4	51.1	5.7	6.6	0.6
Queue Length 50th (ft)	53	52	0	33	9
Queue Length 95th (ft)	98	97	34	143	m9
Internal Link Dist (ft)		679		834	527
Turn Bay Length (ft)	115		475		
Base Capacity (vph)	294	295	873	2576	3959
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	0.27	0.26	0.29	0.25	0.23

Intersection Summary

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

Lane Group	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	930	518	1273	78	1	282	584	1
v/c Ratio	1.14	0.66	1.13	0.06	0.00	0.66	0.29	0.01
Control Delay	115.2	7.5	102.8	8.8	0.0	45.3	7.8	47.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	115.2	7.5	102.8	8.8	0.0	45.3	7.8	47.0
Queue Length 50th (ft)	~386	0	~505	18	0	165	9	1
Queue Length 95th (ft)	#513	89	#765	47	0	280	144	7
Internal Link Dist (ft)	552			505		527		495
Turn Bay Length (ft)					200			
Base Capacity (vph)	814	782	1131	1216	1053	426	1981	289
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	1.14	0.66	1.13	0.06	0.00	0.66	0.29	0.00

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	1350	54	226	37	18
v/c Ratio	0.52	0.36	0.08	0.14	0.07
Control Delay	10.6	32.6	3.4	8.4	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	32.6	3.4	8.4	16.4
Queue Length 50th (ft)	47	15	0	1	5
Queue Length 95th (ft)	#419	#55	36	15	15
Internal Link Dist (ft)	1242		627	261	357
Turn Bay Length (ft)		135			
Base Capacity (vph)	2591	152	2923	708	687
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.52	0.36	0.08	0.05	0.03

Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	899	460	420	357	264	459	438	176	295	15
v/c Ratio	0.07	0.80	0.40	0.63	0.22	0.61	0.59	0.64	0.69	0.34	0.03
Control Delay	47.5	39.0	6.0	46.0	8.8	48.2	38.0	8.1	55.9	31.8	0.1
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	47.5	39.0	6.0	46.0	8.8	48.2	38.0	8.1	55.9	31.8	0.1
Queue Length 50th (ft)	6	265	11	88	25	80	133	1	104	78	0
Queue Length 95th (ft)	26	#480	60	139	78	138	205	84	197	127	0
Internal Link Dist (ft)		924			708		1923			661	
Turn Bay Length (ft)			350	420		300		300	195		190
Base Capacity (vph)	471	1130	1163	1328	1592	716	1130	795	362	1165	582
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	0.02	0.80	0.40	0.32	0.22	0.37	0.41	0.55	0.49	0.25	0.03

Intersection Summary

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

Lane Group	WBL	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	775	459	572	818	635
v/c Ratio	0.75	0.54	0.58	0.48	0.52
Control Delay	20.3	9.1	18.8	10.7	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	20.3	9.1	18.8	10.7	2.8
Queue Length 50th (ft)	93	53	72	76	0
Queue Length 95th (ft)	170	139	136	148	47
Internal Link Dist (ft)			1423	1923	
Turn Bay Length (ft)		460			
Base Capacity (vph)	2410	1513	2804	3574	1863
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	0.32	0.30	0.20	0.23	0.34

Intersection Summary

Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	118	389	851	1074
v/c Ratio	0.34	0.41	0.33	0.64
Control Delay	29.1	16.5	3.4	15.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	29.1	16.5	3.4	15.1
Queue Length 50th (ft)	21	58	43	150
Queue Length 95th (ft)	45	95	68	237
Internal Link Dist (ft)	342		409	1423
Turn Bay Length (ft)	255	255		
Base Capacity (vph)	2760	2724	3539	2790
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	0.04	0.14	0.24	0.38

Intersection Summary

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	2	1546	322	614	80	78	436	9
v/c Ratio	0.03	0.78	0.85	0.22	0.48	0.47	0.80	0.11
Control Delay	61.0	27.8	68.3	5.5	62.8	62.1	16.0	53.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.0	27.8	68.3	5.5	62.8	62.1	16.0	53.7
Queue Length 50th (ft)	2	471	262	41	69	67	0	6
Queue Length 95th (ft)	11	#1025	345	172	111	109	99	25
Internal Link Dist (ft)		594		855		459		223
Turn Bay Length (ft)	75		360		175			
Base Capacity (vph)	138	1974	484	2812	354	355	673	115
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	0.01	0.78	0.67	0.22	0.23	0.22	0.65	0.08

Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	190	1157	107	41	126	68	218	102	82	190
v/c Ratio	0.58	0.54	0.11	0.25	0.13	0.14	0.55	0.18	0.20	0.30
Control Delay	33.9	10.0	2.7	19.9	14.6	3.9	19.3	9.4	13.2	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.9	10.0	2.7	19.9	14.6	3.9	19.3	9.4	13.2	3.8
Queue Length 50th (ft)	51	100	0	8	12	0	51	14	17	0
Queue Length 95th (ft)	#176	237	22	36	36	18	106	39	41	31
Internal Link Dist (ft)		598			4088			531		1450
Turn Bay Length (ft)	210		250	150		250	150		150	
Base Capacity (vph)	326	2300	1066	251	1493	720	732	994	793	1050
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.50	0.10	0.16	0.08	0.09	0.30	0.10	0.10	0.18

Intersection Summary

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

Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	1565	41	491	317
v/c Ratio	0.58	0.34	0.16	0.66
Control Delay	12.1	41.8	6.0	26.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.1	41.8	6.0	26.7
Queue Length 50th (ft)	152	17	26	106
Queue Length 95th (ft)	243	#57	51	192
Internal Link Dist (ft)	1066		843	293
Turn Bay Length (ft)		150		
Base Capacity (vph)	3187	120	3883	1102
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	0.49	0.34	0.13	0.29

Intersection Summary

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

Appendix 8
Existing LOS Worksheets (Mitigated)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	17	127	45	968	98	499	431	315	28	938	161
Future Volume (vph)	68	17	127	45	968	98	499	431	315	28	938	161
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	4.0	4.0		5.3	4.9	4.0	5.3	4.9	4.9
Lane Util. Factor	0.97	0.95	0.88	1.00	0.91		0.97	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3610	2608	1770	5015		3367	3471	1615	1805	3574	1578
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3610	2608	1770	5015		3367	3471	1615	1805	3574	1578
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	72	18	134	47	1019	103	525	454	332	29	987	169
RTOR Reduction (vph)	0	0	71	0	10	0	0	0	146	0	0	110
Lane Group Flow (vph)	72	18	63	47	1112	0	525	454	186	29	987	59
Confl. Peds. (#/hr)												1
Heavy Vehicles (%)	2%	0%	9%	2%	2%	2%	4%	4%	0%	0%	1%	1%
Turn Type	Prot	NA	pt+ov	Prot	NA		Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	5	2	2 3	1	6		3	8	1	7	4	
Permitted Phases									8			4
Actuated Green, G (s)	4.1	30.1	57.4	7.6	33.6		22.0	60.2	67.8	3.8	42.0	42.0
Effective Green, g (s)	4.1	30.1	57.4	7.6	33.6		22.0	60.2	67.8	3.8	42.0	42.0
Actuated g/C Ratio	0.03	0.25	0.47	0.06	0.28		0.18	0.50	0.56	0.03	0.35	0.35
Clearance Time (s)	5.3	5.3		4.0	4.0		5.3	4.9	4.0	5.3	4.9	4.9
Vehicle Extension (s)	2.0	4.0		2.0	2.0		2.0	4.0	2.0	2.0	4.0	4.0
Lane Grp Cap (vph)	116	896	1235	110	1390		611	1724	903	56	1238	546
v/s Ratio Prot	0.02	0.00	0.02	c0.03	c0.22		c0.16	0.13	0.01	0.02	c0.28	
v/s Ratio Perm									0.10			0.04
v/c Ratio	0.62	0.02	0.05	0.43	0.80		0.86	0.26	0.21	0.52	0.80	0.11
Uniform Delay, d1	57.8	34.4	17.2	54.7	40.7		48.1	17.7	13.3	57.8	35.8	26.9
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	7.2	0.0	0.0	1.0	3.1		11.2	0.1	0.0	3.3	3.9	0.1
Delay (s)	65.0	34.4	17.2	55.7	43.8		59.3	17.8	13.3	61.1	39.6	27.0
Level of Service	E	C	B	E	D		E	B	B	E	D	C
Approach Delay (s)		34.0			44.3			33.3			38.4	
Approach LOS		C			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	38.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	121.2	Sum of lost time (s)	19.5
Intersection Capacity Utilization	80.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	65	66	230	439	0	810	0	871	0	0	0
Future Volume (vph)	0	65	66	230	439	0	810	0	871	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0		4.2	4.2	4.2			
Lane Util. Factor		0.95	1.00	0.97	1.00		0.95	0.95	0.88			
Frt		1.00	0.85	1.00	1.00		1.00	1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00		0.95	0.95	1.00			
Satd. Flow (prot)		3312	1468	3367	1900		1698	1698	2787			
Flt Permitted		1.00	1.00	0.95	1.00		0.95	0.95	1.00			
Satd. Flow (perm)		3312	1468	3367	1900		1698	1698	2787			
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.92	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	0	77	79	274	523	0	964	0	1037	0	0	0
RTOR Reduction (vph)	0	0	65	0	0	0	0	0	308	0	0	0
Lane Group Flow (vph)	0	77	14	274	523	0	482	482	729	0	0	0
Heavy Vehicles (%)	0%	9%	10%	4%	0%	0%	1%	0%	2%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA	Perm	Split	NA	pt+ov			
Protected Phases		2		1	6		8	8	8 1		4	
Permitted Phases			2			6				4		
Actuated Green, G (s)		19.2	19.2	28.8	54.0		40.8	40.8	73.8			
Effective Green, g (s)		19.2	19.2	28.8	54.0		40.8	40.8	73.8			
Actuated g/C Ratio		0.18	0.18	0.27	0.51		0.39	0.39	0.70			
Clearance Time (s)		6.0	6.0	6.0	6.0		4.2	4.2				
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)		605	268	923	977		659	659	1958			
v/s Ratio Prot		0.02		0.08	c0.28		c0.28	0.28	0.26			
v/s Ratio Perm			0.01									
v/c Ratio		0.13	0.05	0.30	0.54		0.73	0.73	0.37			
Uniform Delay, d1		35.9	35.4	30.1	17.1		27.4	27.4	6.3			
Progression Factor		1.00	1.00	1.00	1.00		1.18	1.18	11.44			
Incremental Delay, d2		0.1	0.1	0.8	2.1		3.4	3.4	0.1			
Delay (s)		36.0	35.5	30.9	19.2		35.7	35.7	71.9			
Level of Service		D	D	C	B		D	D	E			
Approach Delay (s)		35.7			23.2			54.5			0.0	
Approach LOS		D			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	45.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	20.2
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	222	458	120	114	4	2	130	782	3	80	601	94
Future Volume (vph)	222	458	120	114	4	2	130	782	3	80	601	94
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	4.0	4.0		5.3	4.9	4.9	5.3	4.9	4.9
Lane Util. Factor	0.97	0.95	0.88	1.00	0.91		0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3502	3610	2760	1770	4831		3400	3574	1615	1805	3539	1615
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3502	3610	2760	1770	4831		3400	3574	1615	1805	3539	1615
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	244	503	132	125	4	2	143	859	3	88	660	103
RTOR Reduction (vph)	0	0	78	0	6	0	0	0	2	0	0	66
Lane Group Flow (vph)	244	503	54	125	0	0	143	859	1	88	660	37
Heavy Vehicles (%)	0%	0%	3%	2%	2%	2%	3%	1%	0%	0%	2%	0%
Turn Type	Prot	NA	pt+ov	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2	2 3	1	6		3	8		7	4	
Permitted Phases									8			4
Actuated Green, G (s)	23.6	23.0	34.2	5.2	4.6		5.9	28.5	28.5	6.9	29.5	29.5
Effective Green, g (s)	23.6	23.0	34.2	5.2	4.6		5.9	28.5	28.5	6.9	29.5	29.5
Actuated g/C Ratio	0.28	0.28	0.41	0.06	0.06		0.07	0.34	0.34	0.08	0.35	0.35
Clearance Time (s)	5.3	5.3		4.0	4.0		5.3	4.9	4.9	5.3	4.9	4.9
Vehicle Extension (s)	2.0	4.0		2.0	2.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	994	999	1135	110	267		241	1225	553	149	1256	573
v/s Ratio Prot	0.07	c0.14	0.02	c0.07	0.00		0.04	c0.24		c0.05	0.19	
v/s Ratio Perm									0.00			0.02
v/c Ratio	0.25	0.50	0.05	1.14	0.00		0.59	0.70	0.00	0.59	0.53	0.06
Uniform Delay, d1	22.9	25.3	14.7	38.9	37.1		37.4	23.6	17.9	36.7	21.3	17.7
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	0.0	0.5	0.0	127.2	0.0		2.6	2.0	0.0	4.1	0.5	0.1
Delay (s)	22.9	25.8	14.7	166.1	37.1		40.0	25.6	18.0	40.9	21.8	17.8
Level of Service	C	C	B	F	D		D	C	B	D	C	B
Approach Delay (s)		23.3			160.2			27.6			23.3	
Approach LOS		C			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	83.1	Sum of lost time (s)	19.5
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	470	277	836	29	1	190	0	412	0	1	0
Future Volume (vph)	0	470	277	836	29	1	190	0	412	0	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0	6.0	4.2	4.2	4.2		4.0	
Lane Util. Factor		0.95	1.00	0.97	1.00	1.00	0.95	0.95	0.88		1.00	
Frpb, ped/bikes		1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00		1.00	
Satd. Flow (prot)		3167	1548	3467	1900	1615	1665	1665	2814		1900	
Flt Permitted		1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00		1.00	
Satd. Flow (perm)		3167	1548	3467	1900	1615	1665	1665	2814		1900	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	516	304	919	32	1	209	0	453	0	1	0
RTOR Reduction (vph)	0	0	226	0	0	0	0	0	191	0	0	0
Lane Group Flow (vph)	0	516	78	919	32	1	104	105	262	0	1	0
Confl. Peds. (#/hr)			1									
Heavy Vehicles (%)	0%	14%	3%	1%	0%	0%	3%	0%	1%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA	Perm	Split	NA	pt+ov		NA	
Protected Phases		2		1	6		8	8	8 1		4	
Permitted Phases			2			6				4		
Actuated Green, G (s)		27.0	27.0	42.9	75.9	75.9	13.7	13.7	60.8		1.2	
Effective Green, g (s)		27.0	27.0	42.9	75.9	75.9	13.7	13.7	60.8		1.2	
Actuated g/C Ratio		0.26	0.26	0.41	0.72	0.72	0.13	0.13	0.58		0.01	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	4.2	4.2			4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	
Lane Grp Cap (vph)		814	398	1416	1373	1167	217	217	1629		21	
v/s Ratio Prot		c0.16		c0.27	0.02		0.06	c0.06	0.09		c0.00	
v/s Ratio Perm			0.05			0.00						
v/c Ratio		0.63	0.20	0.65	0.02	0.00	0.48	0.48	0.16		0.05	
Uniform Delay, d1		34.6	30.5	25.0	4.1	4.0	42.3	42.4	10.3		51.3	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.04	1.04	3.81		1.00	
Incremental Delay, d2		1.6	0.2	2.3	0.0	0.0	1.6	1.7	0.0		0.9	
Delay (s)		36.2	30.8	27.3	4.1	4.0	45.6	45.7	39.2		52.3	
Level of Service		D	C	C	A	A	D	D	D		D	
Approach Delay (s)		34.2			26.5			41.2			52.3	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	33.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	20.2
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Appendix 9
Existing Queue Worksheets (Mitigated)

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	72	18	134	47	1122	525	454	332	29	987	169
v/c Ratio	0.61	0.02	0.10	0.42	0.79	0.84	0.26	0.30	0.32	0.83	0.26
Control Delay	80.4	34.6	3.2	66.8	43.5	61.3	18.9	2.1	67.1	44.1	5.3
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	80.4	34.6	3.2	66.8	43.5	61.3	18.9	2.1	67.1	44.1	5.3
Queue Length 50th (ft)	29	5	0	36	295	208	111	0	22	366	0
Queue Length 95th (ft)	#69	16	19	78	349	#330	167	41	57	494	48
Internal Link Dist (ft)		734			1066		641			612	
Turn Bay Length (ft)	340		340	250		380		250	130		215
Base Capacity (vph)	119	1328	1328	194	2230	623	1755	1175	103	1272	673
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	0.61	0.01	0.10	0.24	0.50	0.84	0.26	0.28	0.28	0.78	0.25

Intersection Summary

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

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR
Lane Group Flow (vph)	77	79	274	523	482	482	1037
v/c Ratio	0.12	0.20	0.29	0.54	0.73	0.73	0.44
Control Delay	32.9	3.6	32.9	19.6	39.0	39.0	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.9	3.6	32.9	19.6	39.0	39.0	5.2
Queue Length 50th (ft)	21	0	79	225	297	297	103
Queue Length 95th (ft)	38	12	109	291	441	441	118
Internal Link Dist (ft)	552			505		527	
Turn Bay Length (ft)							
Base Capacity (vph)	757	425	961	977	659	659	2331
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.19	0.29	0.54	0.73	0.73	0.44

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	244	503	132	125	6	143	859	3	88	660	103
v/c Ratio	0.23	0.56	0.11	1.08	0.01	0.57	0.67	0.00	0.47	0.53	0.16
Control Delay	28.9	29.3	3.8	148.8	0.0	49.5	26.1	0.0	45.7	21.8	2.9
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	28.9	29.3	3.8	148.8	0.0	49.5	26.1	0.0	45.7	21.8	2.9
Queue Length 50th (ft)	42	115	0	~73	0	36	191	0	42	129	0
Queue Length 95th (ft)	#175	184	18	#221	0	#93	317	0	101	211	22
Internal Link Dist (ft)		734			1066		641			612	
Turn Bay Length (ft)	340		340	250		380		250	130		215
Base Capacity (vph)	1049	1464	1246	116	2021	255	1562	809	273	1817	891
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	0.23	0.34	0.11	1.08	0.00	0.56	0.55	0.00	0.32	0.36	0.12

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	516	304	919	32	1	104	105	453	1
v/c Ratio	0.63	0.49	0.60	0.02	0.00	0.48	0.48	0.23	0.01
Control Delay	38.8	6.6	26.5	5.2	0.0	49.8	50.0	4.1	47.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.8	6.6	26.5	5.2	0.0	49.8	50.0	4.1	47.0
Queue Length 50th (ft)	162	0	228	4	0	67	68	0	1
Queue Length 95th (ft)	220	66	#408	19	0	130	131	88	7
Internal Link Dist (ft)	552			505			527		495
Turn Bay Length (ft)					200				
Base Capacity (vph)	814	623	1521	1431	1229	289	289	1918	289
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.49	0.60	0.02	0.00	0.36	0.36	0.24	0.00

Intersection Summary

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

Appendix 10
2025 Near-Term LOS Worksheets (Mitigated)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	29	156	45	1114	100	499	492	413	32	1013	161
Future Volume (vph)	68	29	156	45	1114	100	499	492	413	32	1013	161
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	4.0	4.0		5.3	4.9	4.0	5.3	4.9	4.9
Lane Util. Factor	0.97	0.95	0.88	1.00	0.91		0.97	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3610	2608	1770	5023		3367	3471	1615	1805	3574	1578
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3610	2608	1770	5023		3367	3471	1615	1805	3574	1578
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	72	31	164	47	1173	105	525	518	435	34	1066	169
RTOR Reduction (vph)	0	0	84	0	8	0	0	0	200	0	0	111
Lane Group Flow (vph)	72	31	80	47	1270	0	525	518	235	34	1066	58
Confl. Peds. (#/hr)												1
Heavy Vehicles (%)	2%	0%	9%	2%	2%	2%	4%	4%	0%	0%	1%	1%
Turn Type	Prot	NA	pt+ov	Prot	NA		Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	5	2	2 3	1	6		3	8	1	7	4	
Permitted Phases									8			4
Actuated Green, G (s)	4.1	36.2	63.5	7.8	39.9		22.0	62.5	70.3	3.9	44.4	44.4
Effective Green, g (s)	4.1	36.2	63.5	7.8	39.9		22.0	62.5	70.3	3.9	44.4	44.4
Actuated g/C Ratio	0.03	0.28	0.49	0.06	0.31		0.17	0.48	0.54	0.03	0.34	0.34
Clearance Time (s)	5.3	5.3		4.0	4.0		5.3	4.9	4.0	5.3	4.9	4.9
Vehicle Extension (s)	2.0	4.0		2.0	2.0		2.0	4.0	2.0	2.0	4.0	4.0
Lane Grp Cap (vph)	108	1006	1274	106	1542		570	1670	874	54	1221	539
v/s Ratio Prot	0.02	0.01	0.03	c0.03	c0.25		c0.16	0.15	0.02	0.02	c0.30	
v/s Ratio Perm									0.13			0.04
v/c Ratio	0.67	0.03	0.06	0.44	0.82		0.92	0.31	0.27	0.63	0.87	0.11
Uniform Delay, d1	62.2	34.1	17.5	59.0	41.7		53.1	20.6	16.0	62.3	40.1	29.2
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	11.4	0.0	0.0	1.1	3.5		20.1	0.1	0.1	15.4	7.3	0.1
Delay (s)	73.6	34.1	17.5	60.0	45.3		73.2	20.7	16.1	77.6	47.5	29.3
Level of Service	E	C	B	E	D		E	C	B	E	D	C
Approach Delay (s)		34.6			45.8			38.0			45.8	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	42.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	129.9	Sum of lost time (s)	19.5
Intersection Capacity Utilization	84.1%	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 (vph)	0	65	67	278	443	0	829	0	871	0	0	0
Future Volume (vph)	0	65	67	278	443	0	829	0	871	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0		4.2	4.2	4.2			
Lane Util. Factor		0.95	1.00	0.97	1.00		0.95	0.95	0.88			
Frt		1.00	0.85	1.00	1.00		1.00	1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00		0.95	0.95	1.00			
Satd. Flow (prot)		3312	1468	3367	1900		1698	1698	2787			
Flt Permitted		1.00	1.00	0.95	1.00		0.95	0.95	1.00			
Satd. Flow (perm)		3312	1468	3367	1900		1698	1698	2787			
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.92	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	0	77	80	331	527	0	987	0	1037	0	0	0
RTOR Reduction (vph)	0	0	65	0	0	0	0	0	308	0	0	0
Lane Group Flow (vph)	0	77	15	331	527	0	493	494	729	0	0	0
Heavy Vehicles (%)	0%	9%	10%	4%	0%	0%	1%	0%	2%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA	Perm	Split	NA	pt+ov			
Protected Phases		2		1	6		8	8	8 1		4	
Permitted Phases			2			6				4		
Actuated Green, G (s)		19.2	19.2	28.8	54.0		40.8	40.8	73.8			
Effective Green, g (s)		19.2	19.2	28.8	54.0		40.8	40.8	73.8			
Actuated g/C Ratio		0.18	0.18	0.27	0.51		0.39	0.39	0.70			
Clearance Time (s)		6.0	6.0	6.0	6.0		4.2	4.2				
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)		605	268	923	977		659	659	1958			
v/s Ratio Prot		0.02		0.10	c0.28		0.29	c0.29	0.26			
v/s Ratio Perm			0.01									
v/c Ratio		0.13	0.05	0.36	0.54		0.75	0.75	0.37			
Uniform Delay, d1		35.9	35.4	30.7	17.1		27.7	27.7	6.3			
Progression Factor		1.00	1.00	1.00	1.00		1.18	1.18	12.04			
Incremental Delay, d2		0.1	0.1	1.1	2.1		3.7	3.7	0.1			
Delay (s)		36.0	35.5	31.8	19.3		36.2	36.3	75.7			
Level of Service		D	D	C	B		D	D	E			
Approach Delay (s)		35.7			24.1			56.4			0.0	
Approach LOS		D			C			E			A	

Intersection Summary			
HCM 2000 Control Delay	46.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	20.2
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	222	604	120	114	16	6	212	782	107	83	643	95
Future Volume (vph)	222	604	120	114	16	6	212	782	107	83	643	95
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	4.0	4.0		5.3	4.9	4.9	5.3	4.9	4.9
Lane Util. Factor	0.97	0.95	0.88	1.00	0.91		0.97	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3502	3610	2760	1770	4872		3400	3574	1615	1805	3539	1615
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3502	3610	2760	1770	4872		3400	3574	1615	1805	3539	1615
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	244	664	132	125	18	7	233	859	118	91	707	104
RTOR Reduction (vph)	0	0	76	0	6	0	0	0	78	0	0	67
Lane Group Flow (vph)	244	664	56	125	19	0	233	859	40	91	707	37
Heavy Vehicles (%)	0%	0%	3%	2%	2%	2%	3%	1%	0%	0%	2%	0%
Turn Type	Prot	NA	pt+ov	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2	2 3	1	6		3	8		7	4	
Permitted Phases									8			4
Actuated Green, G (s)	16.4	25.9	37.1	5.2	14.7		5.9	30.1	30.1	7.2	31.4	31.4
Effective Green, g (s)	16.4	25.9	37.1	5.2	14.7		5.9	30.1	30.1	7.2	31.4	31.4
Actuated g/C Ratio	0.19	0.29	0.42	0.06	0.17		0.07	0.34	0.34	0.08	0.36	0.36
Clearance Time (s)	5.3	5.3		4.0	4.0		5.3	4.9	4.9	5.3	4.9	4.9
Vehicle Extension (s)	2.0	4.0		2.0	2.0		2.0	4.0	4.0	2.0	4.0	4.0
Lane Grp Cap (vph)	653	1063	1164	104	814		228	1223	553	147	1264	576
v/s Ratio Prot	0.07	c0.18	0.02	c0.07	0.00		c0.07	c0.24		0.05	0.20	
v/s Ratio Perm									0.03			0.02
v/c Ratio	0.37	0.62	0.05	1.20	0.02		1.02	0.70	0.07	0.62	0.56	0.06
Uniform Delay, d1	31.3	26.8	15.0	41.4	30.6		41.0	25.0	19.5	39.0	22.7	18.6
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	0.1	1.3	0.0	152.3	0.0		65.4	2.0	0.1	5.4	0.7	0.1
Delay (s)	31.4	28.1	15.0	193.7	30.6		106.4	27.0	19.6	44.4	23.4	18.7
Level of Service	C	C	B	F	C		F	C	B	D	C	B
Approach Delay (s)		27.2			166.5			41.6			24.9	
Approach LOS		C			F			D			C	

Intersection Summary			
HCM 2000 Control Delay	38.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	87.9	Sum of lost time (s)	19.5
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	470	277	854	29	1	192	0	477	0	1	0
Future Volume (vph)	0	470	277	854	29	1	192	0	477	0	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0	6.0	4.2	4.2	4.2		4.0	
Lane Util. Factor		0.95	1.00	0.97	1.00	1.00	0.95	0.95	0.88		1.00	
Frpb, ped/bikes		1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00		1.00	
Satd. Flow (prot)		3167	1548	3467	1900	1615	1665	1665	2814		1900	
Flt Permitted		1.00	1.00	0.95	1.00	1.00	0.95	0.95	1.00		1.00	
Satd. Flow (perm)		3167	1548	3467	1900	1615	1665	1665	2814		1900	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	516	304	938	32	1	211	0	524	0	1	0
RTOR Reduction (vph)	0	0	226	0	0	0	0	0	221	0	0	0
Lane Group Flow (vph)	0	516	78	938	32	1	105	106	303	0	1	0
Confl. Peds. (#/hr)			1									
Heavy Vehicles (%)	0%	14%	3%	1%	0%	0%	3%	0%	1%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA	Perm	Split	NA	pt+ov		NA	
Protected Phases		2		1	6		8	8	8 1		4	
Permitted Phases			2			6				4		
Actuated Green, G (s)		27.0	27.0	42.6	75.6	75.6	14.0	14.0	60.8		1.2	
Effective Green, g (s)		27.0	27.0	42.6	75.6	75.6	14.0	14.0	60.8		1.2	
Actuated g/C Ratio		0.26	0.26	0.41	0.72	0.72	0.13	0.13	0.58		0.01	
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	4.2	4.2			4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	
Lane Grp Cap (vph)		814	398	1406	1368	1162	222	222	1629		21	
v/s Ratio Prot		c0.16		c0.27	0.02		0.06	c0.06	0.11		c0.00	
v/s Ratio Perm			0.05			0.00						
v/c Ratio		0.63	0.20	0.67	0.02	0.00	0.47	0.48	0.19		0.05	
Uniform Delay, d1		34.6	30.5	25.4	4.2	4.1	42.1	42.1	10.4		51.3	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.03	1.03	4.63		1.00	
Incremental Delay, d2		1.6	0.2	2.5	0.0	0.0	1.6	1.6	0.1		0.9	
Delay (s)		36.2	30.8	27.9	4.2	4.1	44.8	44.9	48.4		52.3	
Level of Service		D	C	C	A	A	D	D	D		D	
Approach Delay (s)		34.2			27.1			47.3			52.3	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	35.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	20.2
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Appendix 11
2025 Near-Term Queue Worksheets (Mitigated)

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	72	31	164	47	1278	525	518	435	34	1066	169
v/c Ratio	0.65	0.03	0.12	0.44	0.81	0.91	0.31	0.39	0.40	0.90	0.27
Control Delay	89.3	33.2	2.7	71.6	44.4	73.0	22.2	2.4	74.7	52.9	5.6
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	89.3	33.2	2.7	71.6	44.4	73.0	22.2	2.4	74.7	52.9	5.6
Queue Length 50th (ft)	30	10	0	38	352	221	143	0	28	441	0
Queue Length 95th (ft)	#74	23	20	84	407	#361	212	50	68	#644	50
Internal Link Dist (ft)		734			1066		641			612	
Turn Bay Length (ft)	340		340	250		380		250	130		215
Base Capacity (vph)	110	1232	1360	180	2073	579	1697	1178	96	1181	637
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	0.65	0.03	0.12	0.26	0.62	0.91	0.31	0.37	0.35	0.90	0.27

Intersection Summary

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

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR
Lane Group Flow (vph)	77	80	331	527	493	494	1037
v/c Ratio	0.12	0.21	0.34	0.54	0.75	0.75	0.44
Control Delay	32.9	3.7	33.6	19.7	39.6	39.7	5.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.9	3.7	33.6	19.7	39.6	39.7	5.5
Queue Length 50th (ft)	21	0	98	228	337	338	156
Queue Length 95th (ft)	38	12	130	293	447	449	102
Internal Link Dist (ft)	552			505		527	
Turn Bay Length (ft)							
Base Capacity (vph)	757	425	961	977	659	659	2331
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.19	0.34	0.54	0.75	0.75	0.44

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	244	664	132	125	25	233	859	118	91	707	104
v/c Ratio	0.36	0.65	0.11	1.17	0.03	0.99	0.68	0.17	0.50	0.57	0.16
Control Delay	42.5	31.0	3.6	180.2	19.5	101.8	28.5	1.3	49.7	24.2	3.0
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	42.5	31.0	3.6	180.2	19.5	101.8	28.5	1.3	49.7	24.2	3.0
Queue Length 50th (ft)	~79	171	0	~88	2	~74	216	0	49	158	0
Queue Length 95th (ft)	#177	247	18	#224	9	#171	323	8	105	232	23
Internal Link Dist (ft)		734			1066		641			612	
Turn Bay Length (ft)	340		340	250		380		250	130		215
Base Capacity (vph)	674	1350	1246	107	1786	235	1441	761	252	1677	832
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	0.36	0.49	0.11	1.17	0.01	0.99	0.60	0.16	0.36	0.42	0.13

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	516	304	938	32	1	105	106	524	1
v/c Ratio	0.63	0.49	0.62	0.02	0.00	0.48	0.48	0.27	0.01
Control Delay	38.8	6.6	27.1	5.4	0.0	48.8	49.0	4.6	47.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.8	6.6	27.1	5.4	0.0	48.8	49.0	4.6	47.0
Queue Length 50th (ft)	162	0	235	4	0	70	71	0	1
Queue Length 95th (ft)	220	66	#435	20	0	131	132	111	7
Internal Link Dist (ft)	552			505			527		495
Turn Bay Length (ft)					200				
Base Capacity (vph)	814	623	1514	1427	1226	292	292	1945	289
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.49	0.62	0.02	0.00	0.36	0.36	0.27	0.00

Intersection Summary

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

Appendix 12
2040 Cumulative LOS Worksheets (Mitigated)

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	144	89	283	905	0	608	0	1022	0	0	0
Future Volume (vph)	0	144	89	283	905	0	608	0	1022	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0		4.2	4.2	4.2			
Lane Util. Factor		0.95	1.00	0.97	0.95		0.95	0.95	0.88			
Frt		1.00	0.85	1.00	1.00		1.00	1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00		0.95	0.95	1.00			
Satd. Flow (prot)		3312	1468	3367	3610		1698	1698	2787			
Flt Permitted		1.00	1.00	0.95	1.00		0.95	0.95	1.00			
Satd. Flow (perm)		3312	1468	3367	3610		1698	1698	2787			
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.92	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	0	171	106	337	1077	0	724	0	1217	0	0	0
RTOR Reduction (vph)	0	0	65	0	0	0	0	0	636	0	0	0
Lane Group Flow (vph)	0	171	41	337	1077	0	362	362	581	0	0	0
Heavy Vehicles (%)	0%	9%	10%	4%	0%	0%	1%	0%	2%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA		Split	NA	pt+ov			
Protected Phases		2		1	6		8	8	8 1		4	
Permitted Phases			2							4		
Actuated Green, G (s)		34.0	34.0	12.0	52.0		25.8	25.8	42.0			
Effective Green, g (s)		34.0	34.0	12.0	52.0		25.8	25.8	42.0			
Actuated g/C Ratio		0.39	0.39	0.14	0.59		0.29	0.29	0.48			
Clearance Time (s)		6.0	6.0	6.0	6.0		4.2	4.2				
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0				
Lane Grp Cap (vph)		1279	567	459	2133		497	497	1330			
v/s Ratio Prot		0.05		c0.10	c0.30		c0.21	0.21	0.21			
v/s Ratio Perm			0.03									
v/c Ratio		0.13	0.07	0.73	0.50		0.73	0.73	0.44			
Uniform Delay, d1		17.5	17.0	36.5	10.5		28.0	28.0	15.2			
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00			
Incremental Delay, d2		0.0	0.1	10.0	0.9		5.3	5.3	0.2			
Delay (s)		17.5	17.1	46.5	11.4		33.2	33.2	15.4			
Level of Service		B	B	D	B		C	C	B			
Approach Delay (s)		17.4			19.7			22.1			0.0	
Approach LOS		B			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	88.0	Sum of lost time (s)	20.2
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	1129	0	719	0	580	0	0	447	372
Future Volume (vph)	0	0	0	1129	0	719	0	580	0	0	447	372
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.7		4.7		6.3			5.7	5.7
Lane Util. Factor				0.97		1.00		0.95			0.95	1.00
Frpb, ped/bikes				1.00		1.00		1.00			1.00	1.00
Flpb, ped/bikes				1.00		1.00		1.00			1.00	1.00
Frt				1.00		0.85		1.00			1.00	1.00
Flt Protected				0.95		1.00		1.00			1.00	1.00
Satd. Flow (prot)				3242		1599		3539			3539	1863
Flt Permitted				0.95		1.00		1.00			1.00	1.00
Satd. Flow (perm)				3242		1599		3539			3539	1863
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	0	0	0	1377	0	877	0	707	0	0	545	454
RTOR Reduction (vph)	0	0	0	0	0	19	0	0	0	0	0	282
Lane Group Flow (vph)	0	0	0	1377	0	858	0	707	0	0	545	172
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	8%	0%	1%	0%	2%	6%	0%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	2	0	0
Turn Type				Prot		custom		NA			NA	Perm
Protected Phases				8		8 1		2			6	
Permitted Phases												6
Actuated Green, G (s)				32.1		40.9		16.6			26.0	26.0
Effective Green, g (s)				32.1		40.9		16.6			26.0	26.0
Actuated g/C Ratio				0.47		0.60		0.24			0.38	0.38
Clearance Time (s)				4.7				6.3			5.7	5.7
Vehicle Extension (s)				0.2				0.2			0.2	0.2
Lane Grp Cap (vph)				1519		954		857			1343	707
v/s Ratio Prot				0.42		c0.54		c0.20			0.15	
v/s Ratio Perm												0.09
v/c Ratio				0.91		0.90		0.82			0.41	0.24
Uniform Delay, d1				16.8		12.0		24.6			15.6	14.5
Progression Factor				1.00		1.00		1.00			1.00	1.00
Incremental Delay, d2				7.9		10.9		6.2			0.1	0.1
Delay (s)				24.7		22.9		30.8			15.7	14.6
Level of Service				C		C		C			B	B
Approach Delay (s)		0.0			24.0			30.8			15.2	
Approach LOS		A			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	23.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	68.5	Sum of lost time (s)	15.7
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	221	878	167	677	95	73	159	956	424	137	673	98
Future Volume (vph)	221	878	167	677	95	73	159	956	424	137	673	98
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	4.0	4.0	4.0	5.3	4.9	4.0	5.3	4.9	4.9
Lane Util. Factor	0.97	0.91	0.88	0.97	0.91	1.00	0.94	0.86	0.88	0.97	0.86	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3502	5187	2760	3433	5085	1583	4942	6471	2842	3502	6408	1615
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3502	5187	2760	3433	5085	1583	4942	6471	2842	3502	6408	1615
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	243	965	184	744	104	80	175	1051	466	151	740	108
RTOR Reduction (vph)	0	0	78	0	0	53	0	0	71	0	0	74
Lane Group Flow (vph)	243	965	106	744	104	27	175	1051	395	151	740	34
Heavy Vehicles (%)	0%	0%	3%	2%	2%	2%	3%	1%	0%	0%	2%	0%
Turn Type	Prot	NA	pt+ov	Prot	NA	Perm	Prot	NA	pm+ov	Prot	NA	Perm
Protected Phases	5	2	2 3	1	6		3	8	1	7	4	
Permitted Phases						6			8			4
Actuated Green, G (s)	10.8	27.5	36.8	17.1	33.8	33.8	4.0	26.9	44.0	8.1	31.0	31.0
Effective Green, g (s)	10.8	27.5	36.8	17.1	33.8	33.8	4.0	26.9	44.0	8.1	31.0	31.0
Actuated g/C Ratio	0.11	0.28	0.37	0.17	0.34	0.34	0.04	0.27	0.44	0.08	0.31	0.31
Clearance Time (s)	5.3	5.3		4.0	4.0	4.0	5.3	4.9	4.0	5.3	4.9	4.9
Vehicle Extension (s)	2.0	4.0		2.0	2.0	2.0	2.0	4.0	2.0	2.0	4.0	4.0
Lane Grp Cap (vph)	381	1439	1024	592	1734	539	199	1756	1261	286	2004	505
v/s Ratio Prot	0.07	c0.19	0.04	c0.22	0.02		0.04	c0.16	0.05	c0.04	c0.12	
v/s Ratio Perm						0.02			0.08			0.02
v/c Ratio	0.64	0.67	0.10	1.26	0.06	0.05	0.88	0.60	0.31	0.53	0.37	0.07
Uniform Delay, d1	42.3	31.8	20.4	41.0	22.0	21.9	47.3	31.4	17.8	43.7	26.5	23.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.6	1.4	0.1	128.9	0.0	0.0	31.8	0.6	0.1	0.8	0.2	0.1
Delay (s)	44.8	33.1	20.4	169.9	22.0	21.9	79.2	32.1	17.8	44.5	26.6	24.0
Level of Service	D	C	C	F	C	C	E	C	B	D	C	C
Approach Delay (s)		33.5			140.5			33.0			29.0	
Approach LOS		C			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	52.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	99.1	Sum of lost time (s)	19.5
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	846	471	1158	71	1	257	0	531	0	1	0
Future Volume (vph)	0	846	471	1158	71	1	257	0	531	0	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0		4.2	4.2	4.2		4.0	
Lane Util. Factor		0.95	1.00	0.97	0.95		0.95	0.95	0.88		1.00	
Frpb, ped/bikes		1.00	0.99	1.00	1.00		1.00	1.00	1.00		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Frt		1.00	0.85	1.00	1.00		1.00	1.00	0.85		1.00	
Flt Protected		1.00	1.00	0.95	1.00		0.95	0.95	1.00		1.00	
Satd. Flow (prot)		3167	1548	3467	3603		1665	1665	2814		1900	
Flt Permitted		1.00	1.00	0.95	1.00		0.95	0.95	1.00		1.00	
Satd. Flow (perm)		3167	1548	3467	3603		1665	1665	2814		1900	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	930	518	1273	78	1	282	0	584	0	1	0
RTOR Reduction (vph)	0	0	261	0	0	0	0	0	279	0	0	0
Lane Group Flow (vph)	0	930	257	1273	79	0	141	141	305	0	1	0
Confl. Peds. (#/hr)			1									
Heavy Vehicles (%)	0%	14%	3%	1%	0%	0%	3%	0%	1%	0%	0%	0%
Turn Type		NA	Perm	Prot	NA		Split	NA	pt+ov		NA	
Protected Phases		2		1	6		8	8	8 1		4	
Permitted Phases			2							4		
Actuated Green, G (s)		37.0	37.0	44.1	87.1		10.8	10.8	59.1		1.1	
Effective Green, g (s)		37.0	37.0	44.1	87.1		10.8	10.8	59.1		1.1	
Actuated g/C Ratio		0.33	0.33	0.39	0.77		0.10	0.10	0.52		0.01	
Clearance Time (s)		6.0	6.0	6.0	6.0		4.2	4.2			4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		1035	505	1350	2772		158	158	1469		18	
v/s Ratio Prot		c0.29		c0.37	0.02		c0.08	0.08	0.11		c0.00	
v/s Ratio Perm			0.17									
v/c Ratio		0.90	0.51	0.94	0.03		0.89	0.89	0.21		0.06	
Uniform Delay, d1		36.3	30.8	33.3	3.1		50.6	50.6	14.5		55.5	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2		10.3	0.8	14.2	0.0		41.8	41.8	0.1		1.3	
Delay (s)		46.7	31.6	47.5	3.1		92.4	92.4	14.6		56.8	
Level of Service		D	C	D	A		F	F	B		E	
Approach Delay (s)		41.3			44.9			39.9			56.8	
Approach LOS		D			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	42.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	113.2	Sum of lost time (s)	20.2
Intersection Capacity Utilization	83.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Appendix 13
2040 Cumulative Queue Worksheets (Mitigated)

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR
Lane Group Flow (vph)	171	106	337	1077	362	362	1217
v/c Ratio	0.13	0.17	0.73	0.50	0.73	0.73	0.61
Control Delay	17.9	4.5	47.1	11.5	38.0	38.0	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.9	4.5	47.1	11.5	38.0	38.0	2.3
Queue Length 50th (ft)	31	0	93	168	189	189	0
Queue Length 95th (ft)	49	26	128	195	268	268	18
Internal Link Dist (ft)	552			505		527	
Turn Bay Length (ft)							
Base Capacity (vph)	1279	632	459	2133	497	497	1998
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.17	0.73	0.50	0.73	0.73	0.61

Intersection Summary

Lane Group	WBL	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	1377	877	707	545	454
v/c Ratio	0.91	0.90	0.83	0.41	0.46
Control Delay	27.4	26.6	35.4	17.6	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	27.4	26.6	35.4	17.6	3.5
Queue Length 50th (ft)	268	284	161	95	0
Queue Length 95th (ft)	318	#439	197	122	36
Internal Link Dist (ft)			1423	1923	
Turn Bay Length (ft)		460			
Base Capacity (vph)	1748	1011	999	1488	1046
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	0.79	0.87	0.71	0.37	0.43

Intersection Summary

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	243	965	184	744	104	80	175	1051	466	151	740	108
v/c Ratio	0.64	0.67	0.17	1.26	0.06	0.12	0.88	0.60	0.32	0.53	0.37	0.18
Control Delay	51.7	35.1	8.6	165.1	24.1	0.4	88.0	33.3	11.6	52.4	27.1	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.7	35.1	8.6	165.1	24.1	0.4	88.0	33.3	11.6	52.4	27.1	3.8
Queue Length 50th (ft)	78	199	13	~319	16	0	40	174	71	48	108	0
Queue Length 95th (ft)	127	270	42	#482	32	0	#93	213	111	87	136	27
Internal Link Dist (ft)		734			1066			641			612	
Turn Bay Length (ft)	340		410	485		250	405		400	450		290
Base Capacity (vph)	458	1605	1076	592	1791	672	200	2207	1466	334	2536	716
Starvation Cap Reductn	0	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	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.60	0.17	1.26	0.06	0.12	0.88	0.48	0.32	0.45	0.29	0.15

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBT
Lane Group Flow (vph)	930	518	1273	79	141	141	584	1
v/c Ratio	0.87	0.67	0.92	0.03	0.87	0.87	0.32	0.01
Control Delay	45.0	12.7	43.1	2.8	92.0	92.0	1.6	52.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.0	12.7	43.1	2.8	92.0	92.0	1.6	52.0
Queue Length 50th (ft)	313	64	417	4	103	103	0	1
Queue Length 95th (ft)	#490	211	#644	13	#246	#246	29	7
Internal Link Dist (ft)	552			505		527		495
Turn Bay Length (ft)								
Base Capacity (vph)	1066	778	1388	2853	163	163	1818	570
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	0.87	0.67	0.92	0.03	0.87	0.87	0.32	0.00

Intersection Summary

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

Appendix 14
Model Validation/Land Use

Dublin Ext - 2017
Turning Movements
AM Peak Hour

2017 Count AM Peak

	Intersection		Northbound			Southbound			Eastbound			Westbound			
No.	N/S Street	E/W Street	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum
1	Hacienda	Dublin	136	620	151	15	421	72	116	309	102	268	466	55	2731
2	Tassajara	Dublin	249	490	128	21	1007	88	101	135	130	471	460	29	3309
3	Fallon	Dublin	326	529	0	0	960	162	68	0	140	0	0	0	2185
4	Fallon	I580 WB	0	477	292	0	545	497	0	0	0	230	62	654	2757
5	El Charro	I580 EB	0	463	92	0	539	445	246	0	256	0	0	0	2041
6	Airway	I580 EB	19	271	180	64	92	78	666	230	155	14	53	90	1912
7	Airway	I-580 WB	0	922	196	0	189	412	0	0	0	49	5	92	1865
8	Airway	N Canyons	119	0	912	0	0	0	0	11	30	486	14	0	1572
9	Doolan	N Canyons	0	0	19	16	0	0	0	2	0	21	1	11	70
10	Isabel	Portola	474	500	32	44	110	0	5	154	209	305	374	168	2375
11	Isabel	I-580 WB	0	489	534	0	327	303	0	0	0	1066	0	520	3239
12	Isabel	I-580 EB	0	842	498	0	1298	96	201	3	346	0	0	0	3284
13	Murrieta	Portola	171	0	203	1	0	3	6	297	87	276	955	3	2002
14	Cross st West	Dublin Ext	0	0	0	0	0	0	0	0	0	0	0	0	0
		sum	1494	5603	3237	161	5488	2156	1409	1141	1455	3186	2390	1622	29342

2013 Model AM Peak

	Intersection		Northbound			Southbound			Eastbound			Westbound			
No.	N/S Street	E/W Street	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum
1	Hacienda	Dublin	38	169	12	4	325	129	25	50	16	308	2240	57	3373
2	Tassajara	Dublin	566	235	45	5	565	260	18	16	67	181	1676	15	3649
3	Fallon	Dublin	1551	66	0	0	124	131	4	0	64	0	0	0	1940
4	Fallon	I580 WB	570	284	0	0	221	158	0	0	0	214	0	1326	2773
5	El Charro	I580 EB	0	802	126	165	271	0	51	0	198	0	0	0	1613
6	Airway	I580 EB	17	947	26	20	66	35	387	70	169	40	0	268	2045
7	Airway	I-580 WB	0	583	1020	0	73	336	0	0	0	49	0	189	2250
8	Airway	N Canyons	58	0	688	0	0	0	0	16	8	400	7	0	1177
9	Doolan	N Canyons	0	0	4	10	0	0	0	1	0	0	0	0	15
10	Isabel	Portola	190	582	14	26	39	0	0	38	49	337	425	361	2061
11	Isabel	I-580 WB	147	496	0	1	152	334	0	0	0	545	0	287	1962
12	Isabel	I-580 EB	0	323	501	82	615	0	321	0	221	0	0	0	2063
13	Murrieta	Portola	63	0	63	0	0	0	0	189	12	279	1496	0	2102
14	Cross st West	Dublin Ext	0	0	0	0	0	0	0	0	0	0	0	0	0
		sum	3200	4487	2499	313	2451	1383	806	380	804	2353	5844	2503	27023

Dublin Ext - 2017
Turning Movements
PM Peak Hour

2017 Count PM Peak

	Intersection		Northbound			Southbound			Eastbound			Westbound			
No.	N/S Street	E/W Street	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum
1	Hacienda	Dublin	163	507	378	59	501	57	169	960	181	217	478	19	3689
2	Tassajara	Dublin	404	648	357	74	720	118	283	739	505	224	249	31	4352
3	Fallon	Dublin	130	783	0	0	653	94	221	1	370	0	1	0	2253
4	Fallon	I580 WB	0	589	306	0	835	371	0	0	0	209	2	462	2774
5	El Charro	I580 EB	0	611	313	0	562	503	517	0	257	0	0	0	2763
6	Airway	I580 EB	41	157	102	114	102	94	513	193	299	22	114	189	1940
7	Airway	I-580 WB	0	645	239	0	242	755	0	0	0	43	2	162	2088
8	Airway	N Canyons	151	0	645	0	1	0	0	7	99	842	11	1	1757
9	Doolan	N Canyons	2	2	27	15	0	0	0	0	0	45	0	22	113
10	Isabel	Portola	239	318	121	121	243	14	10	312	411	190	146	139	2264
11	Isabel	I-580 WB	0	438	578	0	552	295	0	0	0	698	0	248	2809
12	Isabel	I-580 EB	0	782	839	0	999	322	172	0	344	0	0	0	3458
13	Murrieta	Portola	114	2	317	6	1	2	2	843	119	294	407	0	2107
14	Cross st West	Dublin Ext	0	0	0	0	0	0	0	0	0	0	0	0	0
		sum	1244	5482	4222	389	5411	2625	1887	3055	2585	2784	1410	1273	32367

2013 Model PM Peak

	Intersection		Northbound			Southbound			Eastbound			Westbound			
No.	N/S Street	E/W Street	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum
1	Hacienda	Dublin	29	228	117	58	224	52	204	1288	59	24	35	9	2327
2	Tassajara	Dublin	67	587	193	26	421	15	218	821	353	87	10	4	2802
3	Fallon	Dublin	58	119	0	0	183	2	112	0	760	0	0	0	1234
4	Fallon	I580 WB	270	195	0	0	856	128	0	0	0	227	0	148	1824
5	El Charro	I580 EB	0	333	725	632	451	0	132	0	615	0	0	0	2888
6	Airway	I580 EB	78	399	39	28	309	136	306	53	538	74	0	116	2076
7	Airway	I-580 WB	0	456	364	0	396	516	0	0	0	76	0	165	1973
8	Airway	N Canyons	24	0	584	0	0	0	0	21	68	806	13	0	1516
9	Doolan	N Canyons	0	0	1	2	0	0	0	0	0	1	0	5	9
10	Isabel	Portola	118	111	262	244	166	0	0	550	236	39	159	129	2014
11	Isabel	I-580 WB	223	372	0	0	381	73	0	0	0	758	0	186	1993
12	Isabel	I-580 EB	12	347	782	277	841	21	249	0	171	0	0	0	2700
13	Murrieta	Portola	43	0	89	0	0	0	0	1411	101	111	596	0	2351
14	Cross st West	Dublin Ext	0	0	0	0	0	0	0	0	0	0	0	0	0
		sum	922	3147	3156	1267	4228	943	1221	4144	2901	2203	813	762	25707

Table: Dublin Extension/ABAG and Fallon Village Area Land Uses

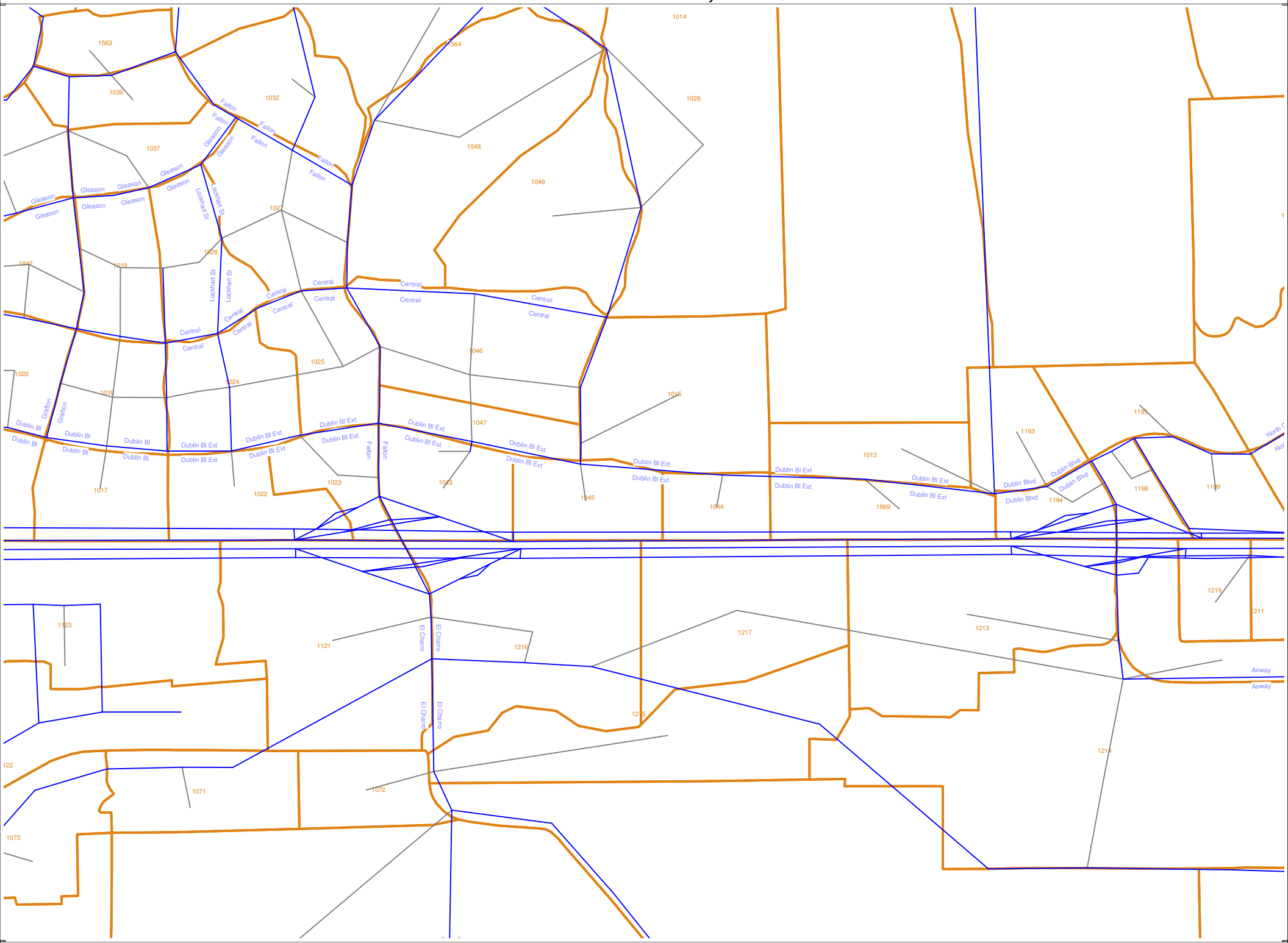
Comparison of 2040 ABAG Land Use (From ACTC Model) in the Dublin Externsion Corridor

	2013 ACTC Model (ABAG)		2025 ACTC Model (ABAG)		2040 ACTC Model (ABAG)			2025 Dublin Extension Project		2040 Dublin Extension Project	
TAZ	HH	Jobs	HH	Jobs	HH	Jobs		HH	Jobs	HH	Jobs
1013	0	0	0	0	0	0		0	0	0	0
1015	161	0	166	117	172	263		166	117	172	807
1022	0	0	0	0	0	0		0	408	0	9500
1043	0	17	0	101	0	205		0	101	98	2653
1044	0	0	0	76	0	170		0	76	49	539
1045	0	0	0	82	0	185		0	82	102	1648
1046	107	3	155	15	214	29		155	15	200	467
1047	0	0	0	28	0	64		0	28	43	1249
1569	0	0	0	0	0	0		0	0	0	0
Total	**268**	**20**	**321**	**419**	**386**	**916**		**321**	**827**	**664**	**16,863**

Source: ABAG Plan Bay Area and City of Dublin General Plan

Note: TAZ 1022 represents the Kaiser Medical Center

Dublin Blvd Ext - Traffic Analysis Zones



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Appendix 15
Model Forecasts

Dublin Ext - 2017
Turning Movements
AM Peak Hour

2025 No-Project Forecasts AM Peak

	Intersection		Northbound			Southbound			Eastbound			Westbound			
No.	N/S Street	E/W Street	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum
1	Hacienda	Dublin	161	666	157	19	421	76	128	361	124	268	466	86	2933
2	Tassajara	Dublin	249	490	397	55	1007	88	106	182	130	568	460	43	3775
3	Fallon	Dublin	326	590	98	4	1035	162	68	12	169	92	146	2	2704
4	Fallon	I580 WB	0	601	292	0	681	497	0	0	0	256	62	654	3043
5	El Charro	I580 EB	0	544	120	106	595	445	280	0	480	0	0	0	2570
6	Airway	I580 EB	19	271	180	64	92	78	784	238	155	14	54	90	2039
7	Airway	I-580 WB	0	982	196	0	192	459	0	0	0	49	5	92	1975
8	Airway	N Canyons	138	0	912	0	0	0	0	11	31	534	18	0	1644
9	Doolan	N Canyons	0	0	19	16	0	0	0	2	0	21	1	28	87
10	Isabel	Portola	593	500	44	44	143	0	5	154	246	485	381	168	2763
11	Isabel	I-580 WB	0	489	759	0	439	509	0	0	0	1095	0	520	3811
12	Isabel	I-580 EB	0	942	1044	0	1383	225	201	0	526	0	0	0	4321
13	Murrieta	Portola	171	0	206	1	0	3	6	297	87	276	955	3	2005
14	Cross st West	Dublin Ext	0	0	0	0	0	0	0	0	0	0	0	0	0
		sum	1657	6075	4424	309	5988	2542	1578	1257	1948	3658	2548	1686	33670

2025 Plus-Project Forecasts AM Peak

	Intersection		Northbound			Southbound			Eastbound			Westbound			
No.	N/S Street	E/W Street	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum
1	Hacienda	Dublin	157	663	157	19	420	77	128	362	124	334	675	89	3205
2	Tassajara	Dublin	221	488	397	56	996	96	106	183	130	613	759	44	4089
3	Fallon	Dublin	499	492	413	32	1013	161	68	29	156	45	1114	100	4122
4	Fallon	I580 WB	0	403	456	0	594	502	0	0	0	246	62	654	2917
5	El Charro	I580 EB	0	502	121	11	592	445	288	0	480	0	0	0	2439
6	Airway	I580 EB	19	580	178	67	103	102	727	235	151	14	53	102	2331
7	Airway	I-580 WB	0	1275	167	0	231	197	0	0	0	49	5	446	2370
8	Airway	N Canyons	829	0	871	0	0	0	0	65	67	278	443	0	2553
9	Doolan	N Canyons	0	0	19	16	0	0	1	103	0	21	1128	27	1315
10	Isabel	Portola	599	498	44	44	142	0	5	154	246	436	531	166	2865
11	Isabel	I-580 WB	0	490	633	0	429	461	0	0	0	1069	0	526	3608
12	Isabel	I-580 EB	0	823	1070	0	1348	225	195	0	518	0	0	0	4179
13	Murrieta	Portola	158	0	206	1	0	3	6	295	85	268	1115	3	2140
14	Cross st West	Dublin Ext	1	0	0	56	0	177	54	58	7	5	1089	27	1474
		sum	2483	6214	4732	302	5868	2446	1578	1484	1964	3378	6974	2184	39607

2025 Difference Forecasts AM Peak

	Intersection		Northbound			Southbound			Eastbound			Westbound			
No.	N/S Street	E/W Street	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum
1	Hacienda	Dublin	-4	-3	0	0	-1	1	0	1	0	66	209	3	272
2	Tassajara	Dublin	-28	-2	0	1	-11	8	0	1	0	45	299	1	314
3	Fallon	Dublin	173	-98	315	28	-22	-1	0	17	-13	-47	968	98	1418
4	Fallon	I580 WB	0	-198	164	0	-87	5	0	0	0	-10	0	0	-126
5	El Charro	I580 EB	0	-42	1	-95	-3	0	8	0	0	0	0	0	-131
6	Airway	I580 EB	0	309	-2	3	11	24	-57	-3	-4	0	-1	12	292
7	Airway	I-580 WB	0	293	-29	0	39	-262	0	0	0	0	0	354	395
8	Airway	N Canyons	691	0	-41	0	0	0	0	54	36	-256	425	0	909
9	Doolan	N Canyons	0	0	0	0	0	0	1	101	0	0	1127	-1	1228
10	Isabel	Portola	6	-2	0	0	-1	0	0	0	0	-49	150	-2	102
11	Isabel	I-580 WB	0	1	-126	0	-10	-48	0	0	0	-26	0	6	-203
12	Isabel	I-580 EB	0	-119	26	0	-35	0	-6	0	-8	0	0	0	-142
13	Murrieta	Portola	-13	0	0	0	0	0	0	-2	-2	-8	160	0	135
14	Cross st West	Dublin Ext	1	0	0	56	0	177	54	58	7	5	1089	27	1474
		sum	826	139	308	-7	-120	-96	0	227	16	-280	4426	498	5937

Dublin Ext - 2017
Turning Movements
PM Peak Hour

2025 No-Project Forecasts PM Peak

	Intersection		Northbound			Southbound			Eastbound			Westbound			
No.	N/S Street	E/W Street	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum
1	Hacienda	Dublin	205	523	461	83	562	69	169	960	213	222	511	28	4006
2	Tassajara	Dublin	419	648	427	93	720	125	310	739	525	550	278	65	4899
3	Fallon	Dublin	212	783	104	3	695	95	221	147	370	164	13	4	2811
4	Fallon	I580 WB	0	589	566	0	875	404	0	0	0	314	2	519	3269
5	El Charro	I580 EB	0	928	553	0	928	626	517	0	257	0	0	0	3809
6	Airway	I580 EB	41	157	102	118	102	103	597	197	299	22	118	195	2051
7	Airway	I-580 WB	0	741	239	0	242	807	0	0	0	43	2	162	2236
8	Airway	N Canyons	153	0	710	0	1	0	0	7	99	860	11	1	1842
9	Doolan	N Canyons	2	2	27	16	0	0	0	0	0	45	0	22	114
10	Isabel	Portola	333	343	121	121	243	14	10	312	612	257	146	139	2651
11	Isabel	I-580 WB	0	585	1030	0	763	374	0	0	0	1030	0	301	4083
12	Isabel	I-580 EB	0	1165	994	0	1497	614	189	0	470	0	0	0	4929
13	Murrieta	Portola	114	2	365	6	1	2	2	843	119	295	424	0	2173
14	Cross st West	Dublin Ext	0	0	0	0	0	0	0	0	0	0	0	0	0
		sum	1479	6466	5699	440	6629	3233	2015	3205	2964	3802	1505	1436	38873

2025 Plus-Project Forecasts PM Peak

	Intersection		Northbound			Southbound			Eastbound			Westbound			
No.	N/S Street	E/W Street	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum
1	Hacienda	Dublin	205	524	479	88	557	69	170	1051	204	222	511	28	4108
2	Tassajara	Dublin	419	645	477	94	714	125	310	882	496	540	278	65	5045
3	Fallon	Dublin	212	782	107	83	643	95	222	604	120	114	16	6	3004
4	Fallon	I580 WB	0	652	556	0	519	406	0	0	0	315	2	455	2905
5	El Charro	I580 EB	0	982	580	130	809	506	517	0	351	0	0	0	3875
6	Airway	I580 EB	40	161	101	135	172	210	352	187	270	24	120	195	1967
7	Airway	I-580 WB	0	508	231	0	436	784	0	0	0	42	2	190	2193
8	Airway	N Canyons	192	0	477	0	1	0	0	470	277	854	29	1	2301
9	Doolan	N Canyons	2	2	27	16	0	0	1	662	0	45	69	21	845
10	Isabel	Portola	329	336	84	118	244	14	10	503	620	249	145	138	2790
11	Isabel	I-580 WB	0	533	1023	0	776	366	0	0	0	1038	0	302	4038
12	Isabel	I-580 EB	0	1139	996	0	1508	624	156	0	438	0	0	0	4861
13	Murrieta	Portola	112	2	332	6	1	2	2	999	114	295	415	0	2280
14	Cross st West	Dublin Ext	9	0	5	42	0	101	176	614	4	2	15	57	1025
		sum	1520	6266	5475	712	6380	3302	1916	5972	2894	3740	1602	1458	41237

2025 Difference Forecasts PM Peak

	Intersection		Northbound			Southbound			Eastbound			Westbound			
No.	N/S Street	E/W Street	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum
1	Hacienda	Dublin	0	1	18	5	-5	0	1	91	-9	0	0	0	102
2	Tassajara	Dublin	0	-3	50	1	-6	0	0	143	-29	-10	0	0	146
3	Fallon	Dublin	0	-1	3	80	-52	0	1	457	-250	-50	3	2	193
4	Fallon	I580 WB	0	63	-10	0	-356	2	0	0	0	1	0	-64	-364
5	El Charro	I580 EB	0	54	27	130	-119	-120	0	0	94	0	0	0	66
6	Airway	I580 EB	-1	4	-1	17	70	107	-245	-10	-29	2	2	0	-84
7	Airway	I-580 WB	0	-233	-8	0	194	-23	0	0	0	-1	0	28	-43
8	Airway	N Canyons	39	0	-233	0	0	0	0	463	178	-6	18	0	459
9	Doolan	N Canyons	0	0	0	0	0	0	1	662	0	0	69	-1	731
10	Isabel	Portola	-4	-7	-37	-3	1	0	0	191	8	-8	-1	-1	139
11	Isabel	I-580 WB	0	-52	-7	0	13	-8	0	0	0	8	0	1	-45
12	Isabel	I-580 EB	0	-26	2	0	11	10	-33	0	-32	0	0	0	-68
13	Murrieta	Portola	-2	0	-33	0	0	0	0	156	-5	0	-9	0	107
14	Cross st West	Dublin Ext	9	0	5	42	0	101	176	614	4	2	15	57	1025
		sum	41	-200	-224	272	-249	69	-99	2767	-70	-62	97	22	2364

Dublin Ext - 2017
Turning Movements
AM Peak Hour

2040 No-Project Forecasts AM Peak

	Intersection		Northbound			Southbound			Eastbound			Westbound			
No.	N/S Street	E/W Street	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum
1	Hacienda	Dublin	197	724	162	21	421	72	125	440	166	268	466	109	3171
2	Tassajara	Dublin	249	490	294	48	1007	88	107	244	147	544	460	47	3725
3	Fallon	Dublin	326	651	807	53	1133	162	72	187	179	223	233	5	4031
4	Fallon	I580 WB	0	1348	562	0	888	497	0	0	0	231	62	658	4246
5	El Charro	I580 EB	0	1356	409	208	674	445	495	0	667	0	0	0	4254
6	Airway	I580 EB	52	271	204	64	111	79	767	248	287	14	54	90	2241
7	Airway	I-580 WB	0	1083	196	0	201	466	0	0	0	49	5	92	2092
8	Airway	N Canyons	119	0	1012	0	0	0	0	11	30	553	19	0	1744
9	Doolan	N Canyons	0	0	19	16	0	0	0	2	0	21	1	11	70
10	Isabel	Portola	474	500	59	74	182	0	5	154	209	789	477	176	3099
11	Isabel	I-580 WB	0	600	675	0	650	381	0	0	0	1160	0	625	4091
12	Isabel	I-580 EB	0	842	706	0	1473	237	369	0	419	0	0	0	4046
13	Murrieta	Portola	287	0	207	1	0	3	6	333	105	304	1174	3	2423
14	Cross st West	Dublin Ext	0	0	0	0	0	0	0	0	0	0	0	0	0
		sum	1704	7865	5312	485	6740	2430	1946	1619	2209	4156	2951	1816	39233

2040 Plus-Project Forecasts AM Peak

	Intersection		Northbound			Southbound			Eastbound			Westbound			
No.	N/S Street	E/W Street	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum
1	Hacienda	Dublin	200	727	162	21	397	89	126	391	166	360	741	107	3487
2	Tassajara	Dublin	247	491	294	55	1031	62	107	197	147	596	858	46	4131
3	Fallon	Dublin	423	545	1014	132	1076	159	67	75	163	156	1206	111	5127
4	Fallon	I580 WB	0	1241	534	0	732	512	0	0	0	257	62	658	3996
5	El Charro	I580 EB	0	1051	426	47	705	445	665	0	668	0	0	0	4007
6	Airway	I580 EB	58	581	210	72	130	119	694	244	252	13	54	103	2530
7	Airway	I-580 WB	0	1201	329	0	259	194	0	0	0	58	5	471	2517
8	Airway	N Canyons	608	0	1022	0	0	0	0	144	89	283	905	0	3051
9	Doolan	N Canyons	0	0	19	16	0	0	0	206	0	21	1485	11	1758
10	Isabel	Portola	501	502	59	68	178	0	5	153	208	593	987	93	3347
11	Isabel	I-580 WB	0	580	670	0	447	372	0	0	0	1129	0	719	3917
12	Isabel	I-580 EB	0	857	680	0	1416	234	329	0	449	0	0	0	3965
13	Murrieta	Portola	222	0	207	1	0	3	6	336	98	124	1360	3	2360
14	Cross st West	Dublin Ext	55	1	20	60	2	177	126	162	186	104	1296	67	2256
		sum	2314	7777	5646	472	6373	2366	2125	1908	2426	3694	8959	2389	46449

2040 Difference Forecasts AM Peak

	Intersection		Northbound			Southbound			Eastbound			Westbound			
No.	N/S Street	E/W Street	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum
1	Hacienda	Dublin	3	3	0	0	-24	17	1	-49	0	92	275	-2	316
2	Tassajara	Dublin	-2	1	0	7	24	-26	0	-47	0	52	398	-1	406
3	Fallon	Dublin	97	-106	207	79	-57	-3	-5	-112	-16	-67	973	106	1096
4	Fallon	I580 WB	0	-107	-28	0	-156	15	0	0	0	26	0	0	-250
5	El Charro	I580 EB	0	-305	17	-161	31	0	170	0	1	0	0	0	-247
6	Airway	I580 EB	6	310	6	8	19	40	-73	-4	-35	-1	0	13	289
7	Airway	I-580 WB	0	118	133	0	58	-272	0	0	0	9	0	379	425
8	Airway	N Canyons	489	0	10	0	0	0	0	133	59	-270	886	0	1307
9	Doolan	N Canyons	0	0	0	0	0	0	0	204	0	0	1484	0	1688
10	Isabel	Portola	27	2	0	-6	-4	0	0	-1	-1	-196	510	-83	248
11	Isabel	I-580 WB	0	-20	-5	0	-203	-9	0	0	0	-31	0	94	-174
12	Isabel	I-580 EB	0	15	-26	0	-57	-3	-40	0	30	0	0	0	-81
13	Murrieta	Portola	-65	0	0	0	0	0	0	3	-7	-180	186	0	-63
14	Cross st West	Dublin Ext	55	1	20	60	2	177	126	162	186	104	1296	67	2256
		sum	610	-88	334	-13	-367	-64	179	289	217	-462	6008	573	7216

Dublin Ext - 2017
Turning Movements
PM Peak Hour

2040 No-Project Forecasts PM Peak

	Intersection		Northbound			Southbound			Eastbound			Westbound			
No.	N/S Street	E/W Street	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum
1	Hacienda	Dublin	390	579	482	103	633	74	169	960	269	228	628	38	4553
2	Tassajara	Dublin	468	674	514	97	732	144	283	739	505	364	327	61	4908
3	Fallon	Dublin	163	980	386	13	706	98	221	277	370	964	79	53	4310
4	Fallon	I580 WB	0	813	937	0	1342	757	0	0	0	603	2	715	5169
5	El Charro	I580 EB	0	1521	551	0	1753	627	517	0	257	0	0	0	5226
6	Airway	I580 EB	201	364	132	114	277	177	616	201	299	33	140	212	2766
7	Airway	I-580 WB	0	849	370	0	378	949	0	0	0	166	2	162	2876
8	Airway	N Canyons	151	0	813	0	1	0	0	7	99	1122	11	1	2205
9	Doolan	N Canyons	2	2	27	15	0	0	0	0	0	45	0	22	113
10	Isabel	Portola	239	423	503	185	281	14	10	376	411	427	154	202	3225
11	Isabel	I-580 WB	0	608	666	0	774	586	0	0	0	698	0	424	3756
12	Isabel	I-580 EB	0	811	901	0	1041	712	201	0	384	0	0	0	4050
13	Murrieta	Portola	171	2	652	6	1	2	2	1029	394	305	610	0	3174
14	Cross st West	Dublin Ext	0	0	0	0	0	0	0	0	0	0	0	0	0
		sum	1785	7626	6934	533	7919	4140	2019	3589	2988	4955	1953	1890	46331

2040 Plus-Project Forecasts PM Peak

	Intersection		Northbound			Southbound			Eastbound			Westbound			
No.	N/S Street	E/W Street	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum
1	Hacienda	Dublin	390	584	507	117	622	74	165	1258	254	227	636	38	4872
2	Tassajara	Dublin	468	687	570	105	695	142	275	1055	542	358	333	61	5291
3	Fallon	Dublin	159	956	424	137	673	98	221	878	167	677	95	73	4558
4	Fallon	I580 WB	0	977	917	0	832	742	0	0	0	698	2	561	4729
5	El Charro	I580 EB	0	1663	656	85	1532	512	520	0	408	0	0	0	5376
6	Airway	I580 EB	136	362	133	152	423	419	345	187	221	40	133	215	2766
7	Airway	I-580 WB	0	580	370	0	829	897	0	0	0	141	2	233	3052
8	Airway	N Canyons	257	0	531	0	1	0	0	846	471	1158	71	1	3336
9	Doolan	N Canyons	2	2	27	15	0	0	0	1242	0	45	183	22	1538
10	Isabel	Portola	243	422	403	162	271	14	10	827	423	386	140	189	3490
11	Isabel	I-580 WB	0	532	680	0	761	584	0	0	0	721	0	427	3705
12	Isabel	I-580 EB	0	834	885	0	1053	709	116	0	381	0	0	0	3978
13	Murrieta	Portola	148	2	414	6	1	2	2	1260	209	306	583	0	2933
14	Cross st West	Dublin Ext	201	3	91	75	2	173	175	1064	98	38	116	63	2099
		sum	2004	7604	6608	854	7695	4366	1829	8617	3174	4795	2294	1883	51723

2040 Difference Forecasts PM Peak

	Intersection		Northbound			Southbound			Eastbound			Westbound			
No.	N/S Street	E/W Street	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	sum
1	Hacienda	Dublin	0	5	25	14	-11	0	-4	298	-15	-1	8	0	319
2	Tassajara	Dublin	0	13	56	8	-37	-2	-8	316	37	-6	6	0	383
3	Fallon	Dublin	-4	-24	38	124	-33	0	0	601	-203	-287	16	20	248
4	Fallon	I580 WB	0	164	-20	0	-510	-15	0	0	0	95	0	-154	-440
5	El Charro	I580 EB	0	142	105	85	-221	-115	3	0	151	0	0	0	150
6	Airway	I580 EB	-65	-2	1	38	146	242	-271	-14	-78	7	-7	3	0
7	Airway	I-580 WB	0	-269	0	0	451	-52	0	0	0	-25	0	71	176
8	Airway	N Canyons	106	0	-282	0	0	0	0	839	372	36	60	0	1131
9	Doolan	N Canyons	0	0	0	0	0	0	0	1242	0	0	183	0	1425
10	Isabel	Portola	4	-1	-100	-23	-10	0	0	451	12	-41	-14	-13	265
11	Isabel	I-580 WB	0	-76	14	0	-13	-2	0	0	0	23	0	3	-51
12	Isabel	I-580 EB	0	23	-16	0	12	-3	-85	0	-3	0	0	0	-72
13	Murrieta	Portola	-23	0	-238	0	0	0	0	231	-185	1	-27	0	-241
14	Cross st West	Dublin Ext	201	3	91	75	2	173	175	1064	98	38	116	63	2099
		sum	219	-22	-326	321	-224	226	-190	5028	186	-160	341	-7	5392

Appendix E: Biological Resources Report

H. T. HARVEY & ASSOCIATES
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Dublin Boulevard-North Canyons Parkway Extension Project
Biological Resources Report

Project #3922-01

Prepared for:

City of Dublin
Public Works Department
100 Civic Plaza
Dublin, California 94568

Prepared by:

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February 5, 2019

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Section 1. Introduction

1.1 Project Description

The City of Dublin (Dublin), in cooperation with the California Department of Transportation (Caltrans), City of Livermore (Livermore), Alameda County (County), and Federal Highway Administration (FHWA), proposes to extend Dublin Boulevard approximately 1.5 miles (mi) eastward through eastern Dublin and an unincorporated portion of the County, terminating at the boundary between the County and Livermore city limits (henceforth referred to as the Dublin Boulevard-North Canyons Parkway Extension Project or the "Project").

Dublin Boulevard is a major arterial facility connecting western parts of Dublin, Dublin's downtown area, and partially developed areas in the City's Eastern Extended Planning Area (EEPA); terminating at Fallon Road. North Canyons Parkway is a four-lane arterial facility in Livermore that provides access to commercial, industrial, residential development, and educational facilities in western Livermore and terminates at Doolan Road. I-580 is a major regional connector, beginning in Marin County in the North Bay Area, connecting through the cities of Berkeley and Oakland before traveling east through Dublin and Livermore, and ending in San Joaquin County south of Tracy.

Traffic congestion on I-580 is an ongoing issue throughout the region. The eastern extension of Dublin Boulevard from its current terminus at Fallon Road to the Doolan Road/North Canyons Parkway intersection has been planned since 1984 to provide capacity relief to I-580 and to provide access to potentially developed areas in Dublin, as described in Dublin's General Plan Environmental Impact Report (1984). The current Dublin General Plan and EIR (2016) describe the Project as a physical link connecting the EEPA to the rest of Dublin and Livermore. Livermore's General Plan Circulation Element (2014) also includes a roadway extension from North Canyons Parkway connecting Doolan Road with Fallon Road.

The Project is also described in various other regional and local land use planning documents which include Plan Bay Area (2035 update to 2040), Eastern Dublin Specific Plan (EDSP) and Fallon Village Supplemental Environmental Impact Report (2005). These planning documents anticipate new residential, commercial, office, and industrial development in the EEPA east of Fallon Road extending to the city limits, with up to 3,108 new dwelling units and over 2,500,000 square feet (sq ft) of new commercial, office, and industrial uses. However, the majority of this area is currently inaccessible from public roadways, with the exception of two private properties accessible from Croak Road and Collier Canyon Road. In order for planned development to occur, a major east-west roadway connection is needed and is anticipated to be provided through the extension of Dublin Boulevard.

The documents listed above describe a four to six lane roadway extension of Dublin Boulevard from Fallon Road to Doolan Road.

The Project would improve east-west local roadway connectivity between Dublin, County and Livermore and improve mobility, multimodal access and efficiency for all roadway users. The project would also support an integrated corridor management strategy.

Thus, the objectives for the project are as follows:

1. Eliminate a gap in local roadway network connectivity within the cities of Dublin and Livermore and the County, and improve interconnectivity between Dublin and Livermore PDAs.

2. Establish transportation facilities and other public infrastructure to serve planned development in the Dublin/Livermore/County General Plan(s), EDSP, and Plan Bay Area.

3. Reduce vehicle miles traveled (VMT) on the local highway system by providing local access to existing and planned land uses, including residential, commercial, industrial, and business uses, and local destinations on an alternate local route that is complementary to I-580.

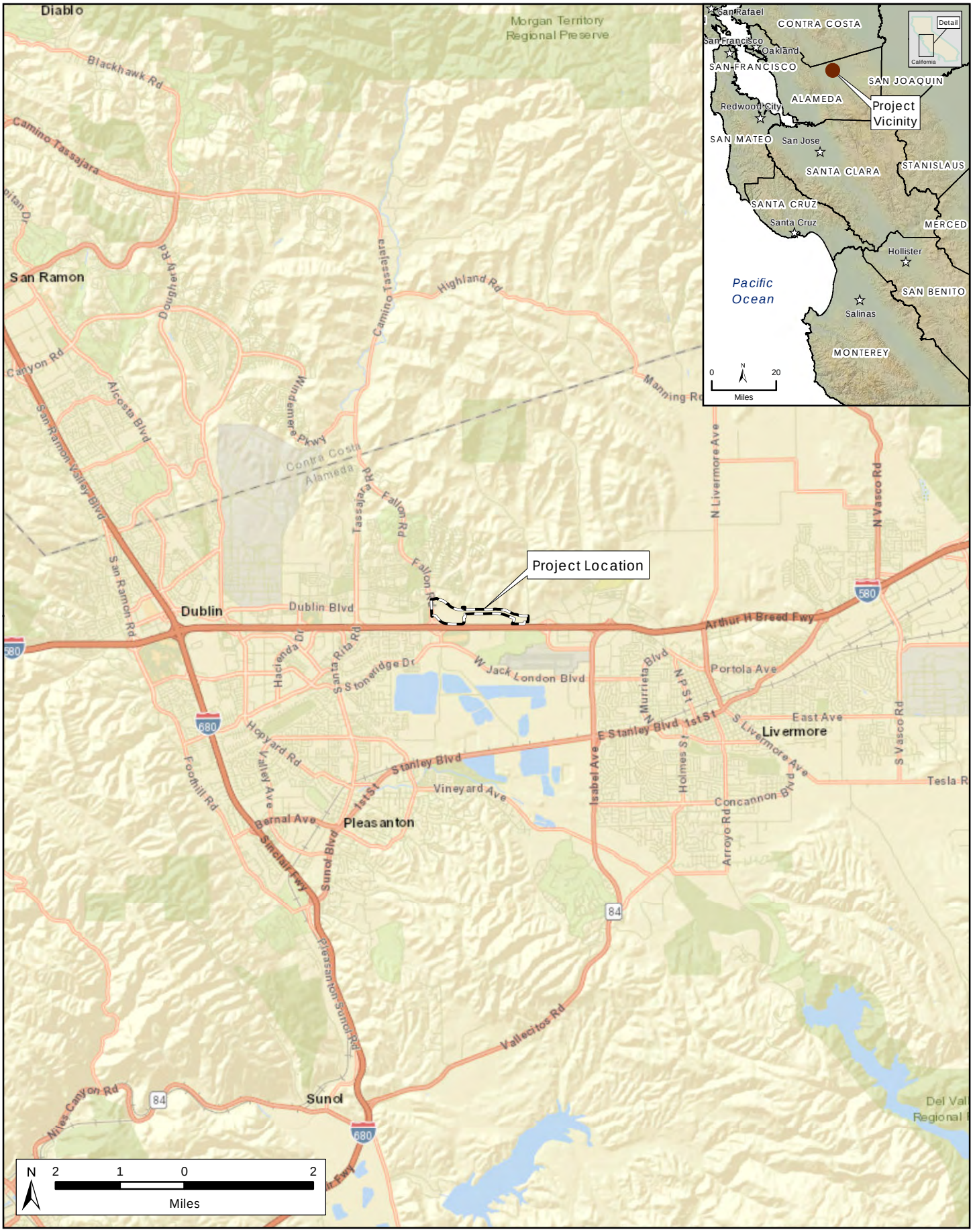
4. Reduce local trip lengths in Dublin and between Dublin and Livermore by diverting localized inter-city trips from I-580.

5. Provide complete streets and mutimodal access between Dublin and Livermore, particularly for key public facilities such as Las Positas College, consistent with the requirements of Senate Bill (SB) 375 and regional complete streets policies on multimodal roadways and sustainable transportation.

6. Indirectly relieve congestion on I-580 by providing a completed local route on the north side of I-580 between west of I-680 in Dublin to SR-84 in Livermore.

The Project area is within Dublin, the County, and Livermore, north of I-580 between the existing terminus of Dublin Boulevard to the west and terminus of North Canyons Parkway to the east (Figure 1). The Project Area contains or is adjacent to nine parcels described as Parcels A – I in this report (Figure 2). The roadway extension would start from the current terminus of Dublin Boulevard at the Dublin Boulevard/Fallon Road intersection in Dublin and would end at the Doolan Road/North Canyons Parkway intersection along the boundary of the County and Livermore (Figure 2). This roadway extension would provide four to six travel lanes and bicycle and pedestrian facilities (i.e., sidewalks and bike lanes). Beginning at Fallon Road, the roadway extension would have six travel lanes (three in each direction). Continuing eastward, the roadway extension would narrow to four travel lanes (two in each direction) at or before the intersection with Croak Road. From Croak road to Doolan Road, the roadway extension would remain in the four lane configuration.

The Project footprint and Biological Study Area (BSA) are shown on Figure 2. The Project footprint encompasses the maximum area of direct permanent and temporary impacts related to the Project and includes the proposed roadway, sidewalks, intersections, cut-and-fill areas, staging, and land acquired for right-of-way. The BSA is expanded around this area to evaluate resources that are outside work limits but may be indirectly impacted by the Project. The total area BSA is 141.39 acres (ac) and the total area of the Project footprint is 81.30 ac.



N:\Projects3900\3922-01\Reports\NES\Fig 1 Project Location Map.mxd mlagarde

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Figure 1. Project Location Map
Dublin Boulevard-North Canyons Parkway Extension Project
Biological Resources Report (3922-01)
February 2019

N:\Projects3900\3922-01\Reports\NES\Fig 2 Site Plan.mxd

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Figure 2, Site Plan over Aerial
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February 2019

Section 2. Methods

2.1 Background Review

Prior to field work several environmental documents relevant to the Project Site were reviewed. These included:

- East Alameda County Conservation Strategy EACCS (ICF International 2010)
- Eastern Dublin Specific Plan (City of Dublin 1994)
- Site Assessment for the California Red-legged Frog and Tiger Salamander Focused Surveys in Dublin Corporate Center Study Area, Dublin, Alameda County (Sycamore Associates, LLC 2002a and 2002b)
- The 404 (b)(1) Alternatives Analysis for the Dublin Ranch Project and Pao Yeh Lin Property, Dublin, Fairy Shrimp Surveys (H. T Harvey & Associates 2000a and 2000b)
- Biological Assessment for Fallon Village Project (H. T. Harvey & Associates 2006)

Maps and aerial imagery of the BSA were obtained from:

- USGS
- National Wetlands Inventory (NWI) (2018)
- Nationwide Environmental Title Research (NETR) (2018)
- Google Earth Pro software (Google Inc. 2018)

H. T. Harvey & Associates biologists collected and reviewed information concerning threatened, endangered, or other special-status species or habitats of concern from several sources to develop a list of species and habitats of concern that may occur in the Project vicinity. These sources included Rarefind (California Natural Diversity Database [CNDDB] 2018) for the *Livermore*, California USGS 7.5-minute quadrangle in which the BSA occurs, as well as the surrounding eight quadrangles: *Diablo, Tassajara, Byron Hot Springs, Dublin, Altamont, Niles, La Costa Valley, and Mendenhall Springs*. Records within the Project vicinity are shown in Figures 4 and 5. We also reviewed relevant information available through the USFWS, NMFS, CDFW, the California Native Plant Society (CNPS), and technical publications, as well as information gathered during prior H. T. Harvey & Associates projects in the vicinity.

H. T. Harvey & Associates biologists generated lists of USFWS-regulated federally threatened and endangered species potentially occurring in the region which is defined as the *Livermore*, California USGS 7.5-minute quadrangle and surrounding eight quadrangles (*Diablo, Tassajara, Byron Hot Springs, Dublin, Altamont, Niles, La*

Costa Valley, and Mendenhall Springs) via the USFWS Sacramento Fish & Wildlife Office website on April 16, 2018 (Appendix B).

H. T. Harvey & Associates biologists generated a list of NMFS-regulated federally threatened and endangered species potentially occurring in the region (i.e., within the *Livermore*, California USGS 7.5-minute quadrangle) via NMFS's California Species List Tool on August 24, 2018 (Appendix F).

2.2 Site Visits

H. T. Harvey & Associates biologists surveyed the BSA to describe biotic habitats within the Project site, identified plants and animals found or likely to be found on the site, and performed reconnaissance-level surveys for wildlife species and their habitats. In 2018, focused rare plant surveys were conducted on several different dates chosen to coincide with the blooming periods of all 22 rare plant species with some potential to occur in the BSA. All surveys included inspections of the Cottonwood Creek channel, perennial and ephemeral drainages, as well as the entire footprint of proposed road and surrounding areas as appropriate.

H. T. Harvey & Associates mapped all biotic habitats within the BSA onto an aerial photograph of the Project location. Where appropriate, plant communities were named according to Holland's system of classification (1986) and the EACCS (ICF International 2010). Habitat acreages were calculated for all habitat types within the BSA using GIS, on-site mapping with a submeter Trimble, and aerial photograph interpretation. Habitats may be considered to be sensitive if they are limited in distribution, are regulated (e.g., by the CWA), or provide habitat for a sensitive species in this region. Reconnaissance-level surveys, including a by-stem tree survey, were deemed adequate to assess the effects of the Project on biological resources for the purposes of this NES.

Maya Goklany, M.S. and Bridget Sousa, Ph.D., conducted reconnaissance-level surveys of the site on March 14 and 16, 2017. Reconnaissance-level surveys were conducted in March 2017 by walking the entire BSA and noting special-status species and habitats potentially suitable for these species. The purpose of these surveys was to: 1) assess existing biotic habitats, 2) assess the area for its potential to support special-status species and natural communities of concern, 3) identify potential jurisdictional habitats, including Waters of the U.S. and State, and 4) provide information for the initial Project impact assessment.

In addition to the reconnaissance surveys in 2017, rare plant surveys were conducted in the BSA by Elan Alford, Ph.D. on April 13 and 17, 2018, and by David Gallagher, M.S. on May 8, 10, and June 29, 2018. The purpose of these surveys was to identify the presence of special-status plants species in the BSA. Particular attention was paid to the suitability of habitat for special-status species known or expected to occur in the vicinity of the BSA. Though these surveys were not done to protocol level (which involves dedicated reference population tracking), they were targeted and all plant species within the BSA were identified to the level necessary to determine if a target rare plant species could be present.

On April 13 and April 17, 2018 Dr. Alford performed a formal wetland technical assessment of the BSA. On May 8 and 10, and June 29, 2018, Mr. Gallagher completed delineation of jurisdictional habitats in the BSA. Details regarding the delineation can be found in the Wetland Technical Assessment report provided in Appendix A.

Section 3. Regulatory Setting

Biological resources in the BSA are regulated by a number of federal, state, and local laws and ordinances, as described below.

3.1 Federal

3.1.1 Clean Water Act

Under Section 404 of the CWA, the USACE is responsible for regulating the discharge of fill material into Waters of the U.S (including wetlands and other waters). The USACE define wetlands in 33 CFR Part 323.2 as "areas defined as an area that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions." The boundaries of wetlands that fall under USACE jurisdiction are delineated using an approach that relies on identification of three parameters: hydrophytic vegetation, hydric soils, and wetland hydrology indicators.

In aquatic habitat, the USACE jurisdiction extends to the OHWM, which is defined in 33 CFR Part 328.3 as "the line on the shore established by the fluctuations of water and indicated by physical characteristics, such as a clear, natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation or the presence of litter and debris."

Project Applicability: Wetland delineation surveys conducted during March of 2017 and April and May of 2018 identified four biotic habitats which may be considered waters of the U.S. and may be claimed as waters of the U.S. by the USACE. Waters of the U.S. would include seasonal wetlands, perennial marsh, perennial streams, and ephemeral streams. Any placement of fill within waters of the U.S. would likely be considered a significant impact under CEQA unless mitigated and would require a Section 404 permit from the USACE.

3.1.2 Rivers and Harbors Act

Section 10 of the Rivers and Harbors Act of 1899 prohibits the creation of any obstruction to the navigable capacity of waters of the U.S., including discharge of fill and the building of any wharfs, piers, jetties, and other structures without Congressional approval or authorization by the Chief of Engineers and Secretary of the Army (33 U.S.C. 403).

Navigable waters of the U.S., which are defined in 33 CFR, Part 329.4, include all waters subject to the ebb and flow of the tide, and/or those which are presently or have historically been used to transport commerce. The shoreward jurisdictional limit of tidal waters is further defined in 33 CFR, Part 329.12 as "the line on the shore reached by the plane of the mean (average) high water." It is important to understand that the USACE does

not regulate wetlands under Section 10, only the aquatic or open waters component of bay habitat, and that there is overlap between Section 10 jurisdiction and Section 404 jurisdiction. According to 33 CFR, Part 329.9, a waterbody that was once navigable in its natural or improved state retains its character as "navigable in law" even though it is not presently used for commerce as a result of changed conditions and/or the presence of obstructions. Historical Section 10 waters may occur behind levees in areas that are not currently exposed to tidal or muted-tidal influence, and meet the following criteria: (1) the area is presently at or below the mean high water line; (2) the area was historically at or below mean high water in its "unobstructed, natural state"; and (3) there is no evidence that the area was ever above mean high water.

As mentioned above, Section 404 of the CWA authorizes the USACE to issue permits to regulate the discharge of dredged or fill material into waters of the U.S. If a project also proposes to discharge dredged or fill material and/or introduce other potential obstructions in navigable waters of the U.S., a Letter of Permission authorizing these impacts must be obtained from the USACE under Section 10 of the Rivers and Harbors Act.

Project Applicability: There are no historical or current Section 10 Waters present in the BSA.

3.1.3 Federal Endangered Species Act

The Federal Endangered Species Act (FESA) protects listed wildlife species from harm or "take" which is broadly defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. Take can also include habitat modification or degradation that directly results in death or injury to a listed wildlife species. An activity can be defined as "take" even if it is unintentional or accidental. Listed plant species are provided less protection than listed wildlife species. Listed plant species are legally protected from take under FESA if they occur on federal lands or if the project requires a federal action, such as a CWA Section 404 fill permit from the USACE.

The U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) have jurisdiction over federally listed, threatened and endangered species under the FESA. These agencies also maintain lists of proposed and candidate species. Species on these lists are not legally protected under the FESA, but may become listed in the near future and are often included in their review of a project.

Project Applicability: Federally listed species that may occur within the BSA include the federally endangered San Joaquin kit fox (*Vulpes macrotis mutica*) and the federally threatened California tiger salamander (*Ambystoma californiense*) and California red-legged frog (*Rana draytonii*).

Based on extensive prior surveys, the federally endangered conservancy fairy shrimp (*Branchinecta conservatio*), longhorn fairy shrimp (*Branchinecta longiantenna*), and vernal pool fairy shrimp (*Lepidurus packardi*) are considered absent from the BSA. Similarly, rare plant surveys conducted throughout the BSA did not detect Johnny jump-up (*Viola pedunculata*), the larval host plant of the federally endangered Callippe silverspot (*Speyeria callippe callippe*). Thus the Callippe silverspot is considered absent from the BSA. The host plants of the federally threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) and San Bruno elfin butterfly

(*Callophrys mossii bayensis*), or elderberry (*Sambucus* sp.) and broadleaf stonecrop (*Sedum spathulifolium*) respectively, are likewise absent and these species are thus also considered absent from the BSA.

Aquatic habitat in the BSA is not suitable for the federally threatened Central California coast steelhead (*Oncorhynchus mykiss*) or other anadromous fish (NMFS 2018), or delta smelt (*Hypomesus transpacificus*), and the BSA is inaccessible to these species due to downstream barriers; thus, these species are considered absent from the BSA. Likewise, the site lacks suitable open water foraging habitat or coastal flat nesting habitat to support the federally endangered least tern (*Sterna antillarum browni*), and this species is not expected to occur in the BSA. The BSA is outside the known range of the Alameda whipsnake (*Masticophis lateralis*), and suitable chaparral and scrub habitat are not present, so the species is considered absent from the BSA.

Only one federally listed plant species, the palmate-bracted bird's beak (*Chloropyron palmatum*), which is also a state listed endangered species is known to occur in the nine-quadrangle area encompassing the BSA (CNPS 2019, CNDDB 2019). No individuals of this endangered plant species were detected in the BSA during the surveys conducted during March 2017, or the follow up wetland delineation and rare plant surveys conducted in April - June of 2018. Therefore, this plant species is considered absent from the BSA.

It is expected that incidental take approval from the USFWS would be needed due to the potential for the Project to result in take of the California tiger salamander and California red-legged frog. Although the likelihood of the San Joaquin kit fox occurring in the BSA is extremely low, the East Alameda County Conservation Strategy (EACCS) models habitat in the BSA as being suitable for this species, and the USFWS and CDFW maintain that the BSA is within the range of the species. Implementation of avoidance and minimization measures will avoid take of individual kit foxes. Thus, take approval would not be sought for this species.

3.1.4 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act governs all fishery management activities that occur in federal waters within the United States' 200-nautical-mile limit. The Act establishes eight Regional Fishery Management Councils responsible for the preparation of fishery management plans to achieve the optimum yield from U.S. fisheries in their regions. These councils, with assistance from the NMFS, establish essential fish habitat (EFH) in fishery management plans for all managed species. Federal agencies that fund, permit, or implement activities that may adversely affect EFH are required to consult with the NMFS regarding potential adverse effects of their actions on EFH, and respond in writing to recommendations by the NMFS.

<u>Project Applicability</u>: A species list downloaded from NMFS's California Species List Tools website in August 2014 (Appendix F) suggested that EFH for the Coho salmon (*Oncorhynchus kisutch*) and Chinook salmon (*Oncorhynchus tshawytscha*) is potentially present in the Livermore, California U.S. Geological Survey (USGS) quadrangle (NMFS 2018). However, aquatic habitat in the BSA is not suitable for these or other anadromous fish, and the BSA is inaccessible to these species due to downstream barriers. Furthermore, NMFS's species

list indicates that the Coho and Chinook salmon are not present in this quadrangle (NMFS 2018). Therefore, no EFH for these or any other fish species is present in the BSA.

3.1.5 Federal Migratory Bird Treaty Act

The Federal Migratory Bird Treaty Act (MBTA), 16 U.S.C. § 703, prohibits killing, possessing, or trading of migratory birds except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, and bird nests and eggs. Most native bird species are covered by this Act. In addition, Title 50 CFR Part 10 protects nesting birds.

Project Applicability: All native bird species that occur in the BSA are protected under the MBTA.

3.2 State

3.2.1 Clean Water Act Section 401/Porter-Cologne Water Quality Control Act

The SWRCB works in coordination with the nine RWQCBs to preserve, protect, enhance, and restore water quality. Each RWQCB makes decisions related to water quality for its region, and may approve, with or without conditions, or deny projects that could affect waters of the State. Their authority comes from the CWA and the State's Porter-Cologne Water Quality Control Act (Porter-Cologne). Porter-Cologne broadly defines waters of the State as "any surface water or groundwater, including saline waters, within the boundaries of the state." Because Porter-Cologne applies to any water, whereas the CWA applies only to certain waters, California's jurisdictional reach overlaps and may exceed the boundaries of waters of the U.S. For example, Water Quality Order No. 2004-0004-DWQ states that "shallow" waters of the State include headwaters, wetlands, and riparian areas. Moreover, the San Francisco Bay Region RWQCB's Assistant Executive Director, has stated that, in practice, the RWQCBs claim jurisdiction over riparian areas. Where riparian habitat is not present, such as may be the case at headwaters, jurisdiction is taken to the top of bank.

Pursuant to the CWA, projects that are regulated by the USACE must also obtain a Section 401 Water Quality Certification permit from the RWQCB. This certification ensures that the proposed project will uphold state water quality standards. Because California's jurisdiction to regulate its water resources is much broader than that of the federal government, proposed impacts on waters of the State require Water Quality Certification even if the area occurs outside of USACE jurisdiction. Moreover, the RWQCB may impose mitigation requirements even if the USACE does not. Under the Porter-Cologne, the SWRCB and the nine regional boards also have the responsibility of granting CWA National Pollutant Discharge Elimination System (NPDES) permits and Waste Discharge Requirements for certain point-source and non-point discharges to waters. These regulations limit impacts on aquatic and riparian habitats from a variety of urban sources.

Project Applicability: Wetland delineation surveys conducted during April and May of 2018 identified six biotic habitats which may be considered waters of the U.S./state and may be claimed as waters of the U.S. by the

USACE and/or waters of the state by the RWQCB. Waters of the U.S./state would include seasonal wetlands, perennial marsh, perennial streams, and ephemeral streams. In addition, waters of the state that would not also be considered waters of the U.S. include riparian grassland and mixed riparian woodland.

3.2.2 California Endangered Species Act

The California Endangered Species Act (CESA), California Fish and Game Code, Chapter 1.5, §§ 2050-2116, prohibits the take of any plant or animal listed or proposed for listing as rare (plants only), threatened, or endangered. In accordance with the CESA, the CDFW has jurisdiction over state-listed species (Fish and Game Code § 2070). The CDFW regulates activities that may result in "take" of individuals listed under the Act (i.e., "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill"). Habitat degradation or modification is not expressly included in the definition of "take" under the Fish and Game Code. The CDFW, however, has interpreted "take" to include the "killing of a member of a species which is the proximate result of habitat modification."

Project Applicability: State listed species that may occur within the BSA include the state endangered California tiger salamander, and the state threatened tricolored blackbird (*Agelaius tricolor*) and San Joaquin kit fox.

Historical records indicate that the California tiger salamander occurs within the immediate vicinity of the BSA and there is some potential, albeit very low, that a San Joaquin kit fox may occur in the BSA. Implementation of avoidance and minimization measures will avoid take (as defined by the CESA) of individual kit foxes. Thus take approval would not be sought for this species. It is expected that incidental take approval from CDFW would be needed due to the potential for the Project to result in take of the California tiger salamander.

There is a low potential for a nesting colony of tricolored blackbirds, state listed as threatened, to occur immediately adjacent to the BSA. However, with avoidance and minimization measures described in this NES for avoiding and minimizing impacts to nesting birds, including tricolored blackbirds (e.g. no-activity buffers around active bird nests), take of nesting tricolored blackbirds as defined by the CESA is not expected to occur. Thus, take approval would not be sought for this species.

Two state-listed endangered plant species, palmate-bracted bird's beak, which is also a federally listed endangered plant species (see 3.1.3 above), and Livermore tarplant (*Deinandra bacigalupii*), are known to occur in the nine-quadrangle area encompassing the BSA (CNPS 2019, CNDDB 2019). No individuals of these state endangered plant species were detected in the BSA during the surveys conducted during March 2017, or the follow up wetland delineation and focused rare plant surveys conducted in April - June of 2018. Therefore, these two plant species are considered absent from the BSA.

3.2.3 California Environmental Quality Act

CEQA is a state law that requires state and local agencies to document and consider the environmental implications of their actions and 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. CEQA requires the full disclosure of the environmental effects of agency actions, such as approval of a general plan update or the projects covered by that plan, on resources such as air quality, water quality, cultural resources, and biological resources. The State Resources Agency promulgated guidelines for implementing CEQA are known as the State CEQA Guidelines.

Section 15380(b) of the State CEQA Guidelines provides that a species not listed on the federal or state lists of protected species may be considered rare if the species can be shown to meet certain specified criteria. These criteria have been modeled after the definitions in FESA and CESA and the section of the California Fish and Game Code dealing with rare or endangered plants and animals. This section was included in the guidelines primarily to deal with situations in which a public agency is reviewing a project that may have a significant effect on a species that has not yet been listed by either the USFWS or CDFW or species that are locally or regionally rare.

The CDFW has produced three lists (amphibians and reptiles, birds, and mammals) of "species of special concern" that serve as "watch lists". Species on these lists are of limited distribution or the extent of their habitats has been reduced substantially, such that threat to their populations may be imminent. Thus, their populations should be monitored. They may receive special attention during environmental review as potential rare species, but do not have specific statutory protection. All potentially rare or sensitive species, or habitats capable of supporting rare species, are considered for environmental review per the CEQA Section 15380(b).

The CNPS, a non-governmental conservation organization, has developed CRPRs for plant species of concern in California in the Inventory of Rare and Endangered Plants (CNPS 2019). The CRPRs include lichens, vascular, and non-vascular plants, and are defined as follows:

- CRPR 1A Plants considered extinct.
- CRPR 1B Plants rare, threatened, or endangered in California and elsewhere.
- CRPR 2A Plants considered extinct in California but more common elsewhere.
- CRPR 2B Plants rare, threatened, or endangered in California but more common elsewhere.
- CRPR 3 Plants about which more information is needed - review list.
- CRPR 4 Plants of limited distribution-watch list.

The CRPRs are further described by the following threat code extensions:

- .1—seriously endangered in California;
- .2—fairly endangered in California;
- .3—not very endangered in California.

Although the CNPS is not a regulatory agency and plants on these lists have no formal regulatory protection, plants appearing as CRPR 1B or 2 are, in general, considered to meet CEQA's Section 15380 criteria, and adverse effects on these species may be considered significant. Impacts on plants that are listed by the CNPS as CRPR 3 or 4 are also considered during CEQA review, although because these species are typically not as rare as those of CRPR 1B or 2, impacts on them are less frequently considered significant.

Compliance with CEQA Guidelines Section 15065(a) requires consideration of natural communities of special concern, in addition to plant and wildlife species. Vegetation types of "special concern" are tracked in Rarefind (CNDDB 2019). Further, the CDFW ranks sensitive vegetation alliances based on their global (G) and state (S) rankings analogous to those provided in the CNDDB. Global rankings (G1–G5) of natural communities reflect the overall condition (rarity and endangerment) of a habitat throughout its range, whereas S rankings reflect the condition of a habitat within California. If an alliance is marked as a G1–G3, all the associations within it would also be of high priority. The CDFW provides the Vegetation Classification and Mapping Program's currently accepted list of vegetation alliances and associations (CDFW 2019).All CNPS lists and applicable records were consulted to determine the probability of occurrence for all special-status plant species within the BSA. These lists were combined with the USFWS lists, the CNDDB records from within the nine-quadrangle area, records from the Consortium of California Herbaria (CCH 2019), and all other sources to create an initial list of species to consider for occurrence within the BSA.

Project Applicability: All potential impacts on biological resources will be considered during CEQA review of the project. This Biological Resources Report assesses these impacts to facilitate project planning and CEQA review of the project by the City of Dublin. Project impacts are discussed in Section 6 below.

3.2.4 California Fish and Game Code

Pursuant to Fish and Game Code, Section 1603, CDFW regulates any project proposed by any person that will "substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated by the department, or use any material from the streambeds." Fish and Game Code, Section 1602 requires an entity to notify CDFW of any proposed activity that may modify a river, stream, or lake. If CDFW determines that proposed activities may substantially adversely impact fish and wildlife resources, a Lake and Streambed Alteration Agreement (LSAA) must be prepared, which sets reasonable conditions necessary to protect fish and wildlife, and must comply with California Environmental Quality Act (CEQA).

Sections 1600-1607 of the California Fish and Game Code require that a Notification of Lake or Streambed Alteration Agreement (LSAA) application be submitted to CDFW for "any activity that may substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake." CDFW reviews the proposed actions in the application and, if necessary, prepares a LSAA that includes measures to protect affected fish and wildlife resources.

The notification requirement applies to any work undertaken in or near a river, stream, or lake that flows at least intermittently through a bed or channel. The CDFW typically considers a river, stream, or lake to include its riparian vegetation, but it may also extend to its floodplain. The term "stream", which includes creeks and rivers, is defined in the California Code of Regulations (CCR) as follows: "a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life". This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation (14 CCR 1.72). In addition, the term stream can include ephemeral streams, dry washes, watercourses with subsurface flows, canals, aqueducts, irrigation ditches, and other means of water conveyance if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife (CDFG 1994). Riparian is defined as "on, or pertaining to, the banks of a stream"; therefore, riparian vegetation is defined as, "vegetation which occurs in and/or adjacent to a stream and is dependent on, and occurs because of, the stream itself" (CDFG 1994).

Certain sections of California Fish and Game Code describe regulations pertaining to protection of certain wildlife species. For example, Fish and Game Code, Section 2000 prohibits take of any bird, mammal, fish, reptile, or amphibian except as provided by other sections of the code. Fish and Game Code, Sections 3503, 3513, and 3800 (and other sections and subsections) protects native birds, including their nests and eggs, from all forms of take. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered "take" by the CDFW. Raptors (i.e., eagles, hawks, and owls) and their nests are specifically protected in California under the Fish and Game Code, Section 3503.5. Section 3503.5 states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto."

Bats and other non-game mammals are protected by Fish and Game Code, Section 4150, which states that all non-game mammals or parts thereof may not be taken or possessed except as provided otherwise in the code or in accordance with regulations adopted by the commission. Activities resulting in mortality of non-game mammals (e.g., destruction of an occupied non-breeding bat roost, resulting in the death of bats) or disturbance that causes the loss of a maternity colony of bats (resulting in the death of young) may be considered "take" by the CDFW.

Project Applicability: The BSA supports four perennial streams, Cottonwood Creek and three unnamed perennial streams, as well as three unnamed ephemeral streams that are likely to be considered jurisdictional by CDFW per Fish and Game Code Section 1602. Therefore, work within the bed and banks of the unnamed streams and Cottonwood Creek is expected to require an LSAA from CDFW. In addition, CDFW may also impose compensatory mitigation requirements for permanent impacts to stream, in-channel wetlands, and riparian habitat in the BSA. Also, most native birds, mammals, reptiles, and amphibians in the BSA are protected by the Fish and Game Code. Section 6 describes measures that would be taken to avoid and minimize or mitigate impacts to animals protected by the California Fish and Game Code.

3.3 Local

3.3.1 East Alameda County Conservation Strategy

The EACCS (ICF International 2010) is designed to serve as a coordinated approach to conservation in the eastern portion of Alameda County, in which the County and the Cities of Dublin and Livermore are active participants. The City of Dublin adopted the EACCS as guidance for public infrastructure/capital improvement projects and uses the document to provide input on managing biological resources and conservation priorities during public project-level planning and environmental permitting.

Project Applicability: The BSA for the proposed Project overlaps with the study area for the EACCS, and occurs within Conservation Zone 4 (see Table 3-1, ICF International 2010). This conservation zone covers the northern-central portion of the Livermore Valley and includes land cover types that are of high conservation priority and require compensatory mitigation should any permanent impacts have the potential to occur as a result of proposed projects. Sensitive land cover types within Conservation Zone 4 include alkali meadows and scalds (Figure 3-1, ICF International 2010), California annual grasslands (Figure 3-2, ICF International 2010), mixed riparian forest and woodland (Figure 3-3, ICF International 2010), alkali wetlands (Figure 3-5, ICF International 2010), and seasonal wetlands (Figure 3-5, ICF International 2010). Focal plant and wildlife species of the EACCS are addressed below.

Three land cover types of high conservation priority in the EACCS were identified within the BSA: 1) seasonal wetlands, 2) California annual grasslands, and 3) mixed riparian woodland (Figure 3). As discussed in Section 4 below, several plant species known to be adapted to alkaline soils were recorded in the BSA's grasslands and seasonal wetlands, such as alkali barley (*Hordeum depressum*), alkali pepperweed (*Lepidium dictyotum*), California semaphore grass (*Pleuropogon californicus*), and Congdon's tarplant (*Centromadia parryi* spp. *congdonii*). However, there were no plant communities representative of Holland's (1986) definitions of alkali meadows or scalds, so we considered these land cover types to be absent from the BSA.

All non-developed portions of the BSA are considered to provide habitat for one or more EACCS focal species. Most often mitigation for impacts on land cover types that are considered high conservation priority by the EACCS is determined at the focal species level, but direct impacts on California annual grasslands as a result of the proposed Project must be avoided and minimized through the implementation of measures listed in Tables 3-2 and 3-3 of the EACCS (ICF International 2010). Moreover, compensatory mitigation will be required for the permanent loss of California annual grasslands.

Four of the six focal plant species covered by the EACCS were initially determined to have at least some potential to occur in the BSA, including the aforementioned state and federally endangered palmate-bracted bird's beak and Livermore tarplant, in addition to Congdon's tarplant and San Joaquin spearscale (*Extriplex joaquiniana*). Per the EACCS, any loss of habitat for these species must be mitigated. Congdon's tarplant and San Joaquin spearscale occur on the site and impacts to these species must be avoided, minimized, and if necessary, mitigated as per EACCS guidance for focal plant species. Palmate-bracted bird's beak and Livermore

tarplant were not detected in rare plant surveys conducted in March of 2017 or April – June of 2018 and are considered absent. The two remaining EACCS focal species, big tarplant (*Blepharizonia plumosa*) and recurved larkspur (*Delphinium recurvatum*), are not known from the Project region and were not detected in surveys of the BSA conducted during the species blooming period by a qualified botanist. Therefore, these species are also considered absent (EACCS 2010, CNDDB 2019).

Seven of the 13 focal wildlife species covered by the EACCS are known to occur, or have suitable habitat modelled by the EACCS, in the BSA and may be present within the BSA, including: California red-legged frog, California tiger salamander, San Joaquin kit fox, tricolored blackbird, western burrowing owl (*Athene cunicularia*), golden eagle (*Aquila chrysaetos*), and American badger (*Taxidea taxus*). Mitigation for impacts to these species and their habitats must conform to conditions required by the EACCS.

3.3.2 Alameda County Tree Ordinance

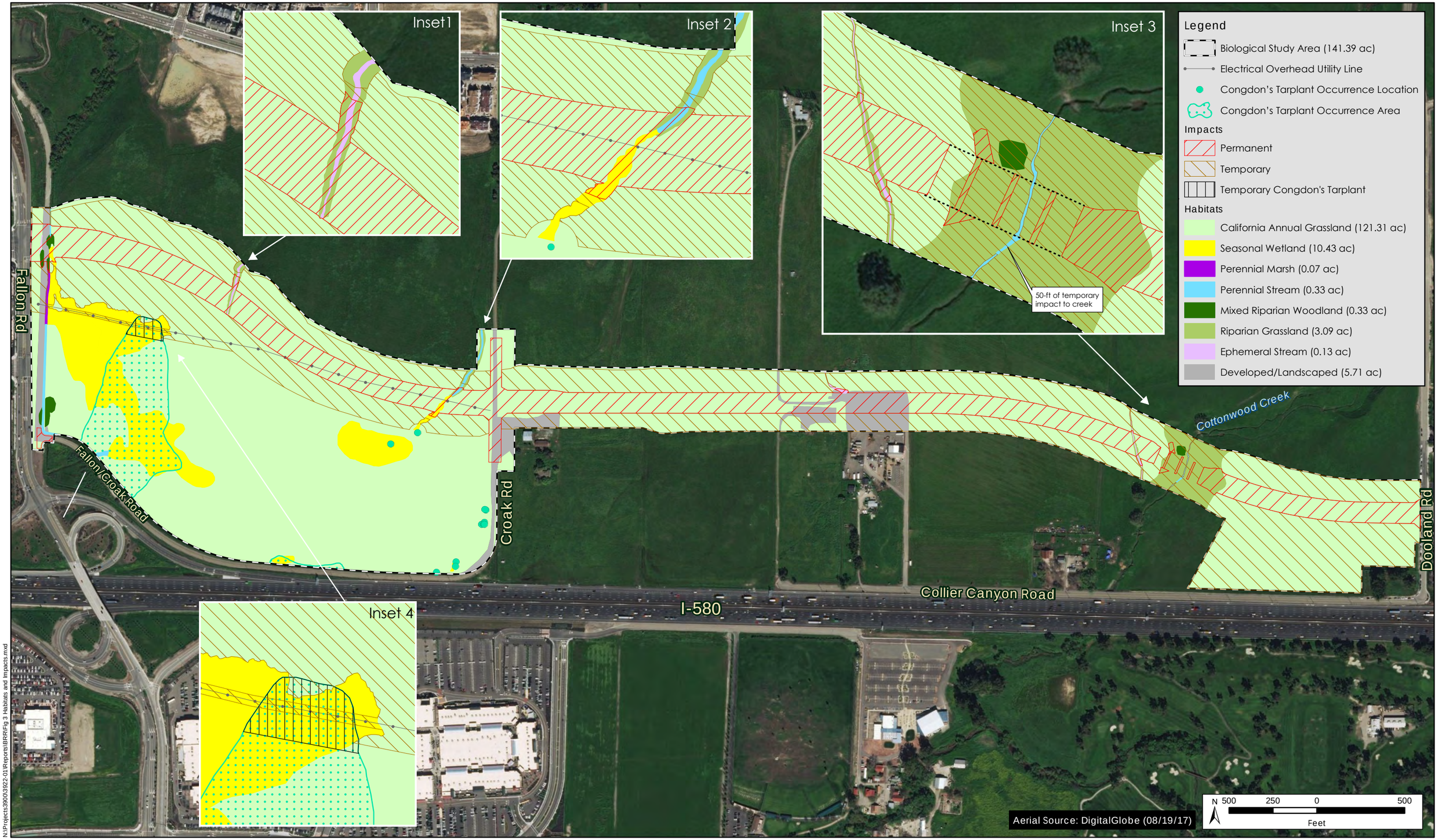
The County of Alameda protects trees within the County right-of-way that are at least 10 ft tall and 2-inches diameter at breast height (dbh) on the mainstem. Removal of such trees requires an encroachment permit from the County. Typically such a permit requires, if feasible, replacement of the ordinance tree (Alameda County General Code Chapter 12.11, inclusive).

Project Applicability: An ordinance-sized valley oak (*Quercus lobata*) tree present in unincorporated County lands will be preserved by the project and therefore no encroachment permit will be necessary.

3.3.3 City of Dublin Heritage Tree Ordinance

The City of Dublin defines heritage trees as any oak, bay, cypress, maple, redwood, buckeye and sycamore tree having a trunk or main stem of twenty-four inches or more in diameter measured at four feet six inches above natural grade. Additionally, any tree preserved as part of an approved development plan, zoning permit, use permit, site development review, or subdivision map is protected as a heritage tree as is any tree planted as a replacement for an unlawfully removed tree. Heritage trees may not be removed unless a tree removal permit is granted or the removal is approved as part of other approved development permits. If a development site contains heritage trees that are to be preserved under approved development plan, these trees must be protected during site development. A tree protection plan must be approved prior to commencement of work unless the Community Development Director of the City of Dublin has specifically waived this requirement (City of Dublin Municipal Code, Chapter 5.60, inclusive).

Project Applicability: A small number (approximately eight) of red willow (*Salix laevigata*) trees would be removed by the project from within the Dublin City limits. A eucalyptus (*Eucalyptus* sp.) tree may also be removed. These trees are not considered heritage tree species under the ordinance and also the red willows are all smaller than the 24-inch size requirement. Therefore, no tree removal permit will be needed. A heritage-sized valley oak tree to be preserved by the project is located in unincorporated Alameda County, and therefore does not trigger the requirement for a tree protection plan (but see Section 3.3.2). No trees occur in the small portion of the Project footprint that falls within the City of Livermore.



N:\Projects390\3922-01\Reports\BRR\Fig 3 Habitats and Impacts.mxd

H. T. HARVEY & ASSOCIATES
Ecological Consultants

Figure 3. Habitats and Impacts Map

Dublin Boulevard-North Can yo n s Parkw ay Exten sion Project - Biolog ical Resources Rep ort (3922-01)

February 2019

Section 4. Environmental Setting

4.1 General Project Area Description

The BSA is located in the *Livermore* U.S. Geological Survey (USGS) 7.5-minute quadrangle in Alameda County (Figure 1). The BSA, as shown in Figure 3, is 141.4 acres and is located immediately to the north of I-580 between the existing terminus of Dublin Boulevard to the west and terminus of North Canyons Parkway to the east. The BSA encompasses all areas and features that may be temporarily or permanently impacted by the Project, as well as surrounding areas that may be indirectly impacted, or where important biological resources occur and were considered in the CEQA analysis. The BSA was extended south to the full extent of parcel A (Figure 2) to observe a large wetland complex and rare plant habitat.

The land uses in the immediate vicinity of the BSA include residential, industrial, open space, and commercial uses in Dublin; resource management and large parcel agricultural uses in the County; and business and commercial uses in Livermore. In Dublin, residential, industrial, and commercial land uses have not yet been developed in the Project area, although these are planned to occur and discussed in the EDSP, and existing land uses are largely agricultural or rural-residential. Parcel F contains a landscaping business/commercial development (Figure 2).

The BSA consists of primarily undeveloped grazing ranchland and open space, with intermittent residences and outbuildings. Improvements to the agricultural lands generally consist of private paved and unpaved roads used to access private property, fences, barns, corrals, wells, water tanks, single-family homes and various outbuildings.

Elevations in the BSA range from approximately 380 ft to approximately 410 ft above sea level (Google 2018). The topography of the BSA ranges from relatively flat in the southern portion near I-580, to gently rolling hills to the north. The topography slopes slightly northward, and Cottonwood Creek drains from north to west in the eastern half of the BSA.

The BSA is underlain by five soil types: 1) CdB-Clear Lake clay, drained, 3 to 7 percent slopes; 2) DvC-Diablo clay, very deep, 3 to 15 percent slopes; 3) LaC-Linne clay loam, 3 to 15 percent slopes; 4) LaD-Linne clay loam, 15 to 30 percent slopes; and 5) RdA-Rincon clay loam, 0 to 3 percent slopes. The Clear Lake clay, drained, 3 to 7 percent slopes soil type is listed as a hydric soil (NRCS 2018). Soil properties, such as pH, landform position, drainage class, and frequency of ponding or flooding were taken into account when mapping biotic habitats in the BSA.

The NWI identifies five features in or adjacent to the BSA (also see Appendix A and Figures 2 and 3). From east to west:

- Cottonwood Creek crosses the BSA in a north-south direction in the east. It is mapped by NWI as freshwater emergent wetland—palustrine, emergent, persistent, temporary flooded.
- An unnamed ephemeral stream which originates to the north, and runs in north-south direction in the center of the Project area to terminate in parcel F is identified by NWI as freshwater emergent wetland—palustrine, emergent, persistent, temporary flooded.
- An unnamed perennial stream tributary to the west of the eastern portion of Croak Road originates in the north and runs diagonally into parcel A. It is identified as freshwater emergent wetland—palustrine, emergent, persistent, temporary flooded in the northern reach, and as it turns westward it is identified as riverine—intermittent, streambed, seasonally flooded.
- A mixed riparian woodland to the north of the BSA occurs to the east of the western portion of Croak Road and is identified by NWI as freshwater forested/shrub wetland—palustrine, scrub-shrub, seasonally flooded. This feature flows into a perennial stream that discharges onto the BSA.
- The unnamed perennial stream which flows parallel to western Croak Road along the western border of the BSA is identified by NWI as riverine, intermittent, streambed, seasonally flooded.

4.2 Biotic Habitats

Reconnaissance-level surveys identified eight biotic habitats within the BSA (Figure 3): perennial stream (0.33 ac), ephemeral stream (0.13 ac), perennial marsh (0.07 ac), seasonal wetland (10.43 ac), mixed riparian woodland (0.33 ac), riparian grassland (3.09 ac), California annual grassland (121.31 ac), and developed/landscaped habitat (5.71 ac). Appendix C provides a list of all plant species identified within or directly adjacent to the site.

4.2.1 Perennial Stream

Vegetation. Four perennial streams comprise the perennial stream habitat in the BSA (Figure 3). These are the existing floodplain of Cottonwood Creek in the east and three additional unnamed streams in the western half of the BSA.

Cottonwood Creek is a perennial stream with a connection to groundwater and flows overland through the eastern portion of the BSA (Photo 1). It originates 4 mi north of the BSA in the Diablo Mountains

Photo 1. Perennial stream habitat within Cottonwood Creek.

near Collier Canyon Road, and flows southward to exit the BSA through a double box culvert beneath I-580, and then empties to Arroyo Las Positas after just 0.15 mi. Arroyo Las Positas flows into Arroyo Mocho, and historically, this watercourse went underground shortly thereafter, exhibiting no overland connection to the San Francisco Bay. During the present day, Arroyo Mocho flows through an aboveground engineered channel, draining into Alameda Creek and ultimately reaching the Bay, a traditionally navigable water. The main stem of Cottonwood Creek is split into two low flow channels just upstream of the BSA, and these channels converge in the central portion of the BSA. Although historical aerial photos indicate that this section of Cottonwood Creek generally conveys water year-round, it is possible that in periods of drought, sections of the stream may dry up or retreat underground. The inner stream banks are sharply incised and generally lined with exposed soil, providing little stabilization. As a result, numerous erosional features, such as headcuts and gullies, were apparent during surveys.

A second, smaller perennial stream is located along the western portion of Croak Road along the western boundary of parcel A. A portion of this stream has been culverted and capped with concrete for roughly 350 ln ft. Substantial flows of water emanated from a culvert outlet in both 2017 and 2018 where the stream daylights, and a portion of the stream's water spills into the northern portion of the wetland complex to the south of the road alignment. Shortly thereafter, the aboveground, wetted streambed supports perennial marsh vegetation (described below) and continues to flow southward, parallel to western Croak Road.

To the west of the eastern portion of Croak Road, another small perennial stream emerges from the hills and flows into a seasonal wetland swale as the topography becomes less steep.

In the southwest corner of the BSA, an additional reach of perennial stream drains into the southern portion of the large wetland complex. This stream flows from parcel B to be conveyed under Fallon/Croak Road into parcel A. The stream then crosses to the west under Fallon Road and runs outside the BSA parallel to I-580 before discharging to a culvert under the highway and entering a flood control channel. This channel then drains to Arroyo Las Positas to the south.

The above discussed perennial streams generally convey water year round. Vegetation within perennial stream habitat is either consistent with that of the adjacent perennial marsh described below or absent due to ponding and flows.

Wildlife. Perennial streams in Alameda County can provide habitat for a variety of fish and wildlife species. However, the perennial stream habitat on the site provides limited habitat for fish and aquatic wildlife species for reasons discussed below.

The reach of Cottonwood Creek in the BSA is shallow, steeply incised, unshaded, and contains little to no instream vegetation, which limits its value for fish and aquatic wildlife. No fish were observed within Cottonwood Creek during reconnaissance surveys, and the creek's shallow waters and lack of large pools make it unsuitable for most fish species. Small fish adapted to warm waters, such as the native California roach

(*Hesperoleucus symmetricus*) and non-native mosquitofish (*Gambusia affinis*), may occur in limited numbers within the creek.

The unnamed tributaries in parcel A and along Fallon/Croak Road are shallow, generally holding no more than a few inches water. Nevertheless, instream vegetation along this tributary provides habitat for common amphibians and reptiles, as well as small numbers of non-native mosquitofish. Aquatic reptiles, such as the common garter snake (*Thamnophis sirtalis*) and western pond turtle, may forage and disperse along this stream. Common amphibians such as the native Pacific treefrog (*Hyliola regilla*), as well as the non-native bullfrog (*Lithobates catesbeianus*), were observed in shallow pools and may utilize these streams for breeding and dispersal.

Medium-sized mammals such as the raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), gray fox (*Urocyon cinereoargenteus*), and non-native Virginia opossum (*Didelphis virginiana*) may forage in this habitat. Several species of bats and insectivorous birds, including the Yuma bat (*Myotis yumanensis*), Mexican free-tailed bat (*Tadarida brasiliensis*), and barn swallow (*Hirundo rustica*) forage for insects over stream habitats.

4.2.2 Ephemeral Streams

Vegetation. Three ephemeral streams occur in the BSA (Figure 3). These streams convey water during and immediately following rain events, and dry out during the summer months. As a result of heavy rains occurring just prior to the March 2017 reconnaissance survey, flowing water was present in sections of all ephemeral streams. But, no flowing water was present in any of these ephemeral streams during the surveys conducted in April and May 2018 (Photo 2).

Photo 2. A typical ephemeral stream in the Study Area.

A rocked area occurs in one ephemeral stream in parcel F. Otherwise, the majority of the ephemeral stream banks were vegetated with plants found in the surrounding California annual grasslands described below.

Wildlife. The ephemeral nature of these drainages precludes the presence of fish. Similarly, aquatic wildlife species are not expected to occur regularly within these drainages, but may utilize this habitat for dispersal when water is present. Wildlife using adjacent habitats are expected to forage and take shelter in the vegetation within the drainage. However, due to the limited extent of this habitat type within the BSA, it is not expected to support wildlife species not found in the adjacent, more extensive, habitat types (i.e., California annual grassland and seasonal wetland).

4.2.3 Perennial Marsh

Vegetation. The perennial marsh habitat in the BSA supports strongly hydrophytic, emergent plants, and the marsh within the BSA is within the OHWMs of the perennial stream along Fallon/Croak Road. This features contained surface water and was codominated by Mexican rush (*Juncus mexicanus*) and iris-leaved rush (*Juncus xiphioides*), although some patches of hardstemmed bulrush (*Schoenoplectus acutus*) were also observed (Photo 3). Surface water was evident during all survey dates. Along the fenceline, dominant vegetation included alkali bulrush (*Bolboschoenus maritimus*), water parsnip (*Berula erecta*), creeping buttercup (*Ranunculus repens*), water speedwell (*Veronica anagallis-aquatica*), and hardstemmed bulrush

Photo 3. Dead narrowleaf cattails within the large perennial freshwater marsh in parcel A.

Wildlife. The perennial marsh habitat within the BSA is confined to a narrow roadside channel. Thus, many wildlife species that inhabit more extensive marshes, such as the Virginia rail (*Rallus limicola*), are not expected to be present. Nevertheless, the presence of water in the marsh and existing vegetation support a diverse and abundant invertebrate fauna, which provides ample foraging opportunities for insectivores. Aerial insectivores such as the cliff swallow (*Petrochelidon pyrrhonota*), violet-green swallow (*Tachycineta thalassina*), and free-tailed bat frequently forage over marsh habitats.

Limited numbers of marsh associated birds, such as song sparrows (*Melospiza melodia*) and red-winged blackbirds (*Agelaius phoeniceus*), may nest in the small stands of bulrush along Fallon/Croak Road. However, the majority of the marsh vegetation is too short and sparse to host nesting birds, although birds nesting elsewhere in the Project area may forage in this habitat. Common species of waterfowl, such as mallards (*Anas platyrhynchos*), Canada geese (*Branta canadensis*), and American coots (*Fulica americana*), were observed in the perennial marsh habitat during reconnaissance surveys. Amphibian species similar to those described above under *Perennial Stream,* and common garter snakes may also occur here.

The California vole (*Microtus californicus*) is a common small mammal species found in marshes in the Project vicinity and will breed in adjacent terrestrial habitats and forage in freshwater marshes. Other common foragers in this habitat are the great blue heron (*Ardea herodias*), great egret (*Ardea alba*), and snowy egret (*Egretta thula*). Terrestrial wintering and migrating songbirds, including golden-crowned sparrows (*Zonotrichia atricapilla*), white-

crowned sparrows (*Zonotrichia leucophrys*), and Lincoln's sparrows (*Melospiza lincolnii*), forage in the Study Area in cattails and other tall vegetation, as well as in adjacent upland habitats. In addition, urban-adapted wildlife species such as native raccoons and non-native roof rats (*Rattus rattus*) will make use of aquatic habitat in the site as a source of water and for foraging.

4.2.4 Seasonal Wetland

Vegetation. Large wetland patches scattered in parcel A comprise the seasonal wetland complex in the western part of the BSA (Photo 4). The seasonal wetlands occur in low lying areas and the largest patch is directly connected to the perennial marsh habitat that runs parallel to Fallon Road.

Historically, narrowleaf cattails (*Typha angustifolia*) dominated the central portion of the seasonal wetland in parcel A. However, these cattails had entirely died back at the time of reconnaissance level surveys in 2017, possibly from the disruption of the hydrological source to this feature (Photo 3). Historical aerials show that the cattail stand had only recently developed in the past approximately 8 years, and seems to have represented a temporary condition (Google 2018). Further changes in the site's hydrology were noted during the 2018 wetland delineation, and signs of marsh rewetting and some cattail regeneration were observed in April 2018; however, by May 2018 these areas were drying again and the area exhibited seasonal hydrology.

In general, this habitat supported seasonal ponding that ranged from very shallow to several feet deep at the southern end in March and April, and was associated with Clear Lake clay soils in the southwestern portion of the BSA. Typical seasonal wetland habitat within this large complex is depicted in Photo 4.

Seasonal wetland vegetation in the parcel A was dominated by native forbs and grasses. Plants such as popcorn flower (*Plagiobothrys sp.*), bird's eye speedwell (*Veronica persicaria*), alkali pepperweed, annual semaphore grass, alkali barley, bristled downingia (*Downingia bicornuta* var. *bicornuta*), woolly marbles (*Psilocarphus brevissimus* var. *brevissimus*), and meadow barley (*Hordeum brachyantherum* subsp. *brachyantherum*) were observed during spring surveys.

Non-native grasses such as seaside barley (*Hordeum marinum* ssp. *gussoneanum*), and Italian ryegrass (*Festuca perennis*) were common in the more limited seasonal wetlands scattered along ephemeral drainages across the BSA.

The seasonal wetlands and mesic grasslands surrounding seasonal wetlands in the BSA support a large population of Congdon's tarplant (Figure 3). A previous survey conducted by Sycamore & Associates (2002a) identified several thousand individuals in seasonal wetlands (and California annual grassland) in parcel A. A focused survey on June 29, 2018 revealed the persistence of the Congdon's tarplant population within 11 separate locations; four within the seasonal wetlands and seven along the southwestern end of Croak Road. Approximately 77,000 individuals are estimated to occur across these locations.

Wildlife. Seasonal wetlands can provide habitat for a unique array of special-status and common wildlife species that rely specifically on the particular features they provide. However, because the seasonal wetlands in the BSA are regularly disturbed by grazing cattle that compress soils and inhibit use by wetland-associated invertebrate and amphibian species that might take refuge in the moist soils, the habitat provided by these features is functionally similar to the adjacent grasslands and perennial marsh from the perspective of wildlife use.

Photo 4. Seasonal wetland in Parcel A.

4.2.5 Mixed Riparian Woodland and Riparian Grassland

Vegetation. Mixed riparian woodlands in the BSA are composed of stands of mature trees rooted in the banks of perennial streams (Photo 5). Tree species include red willow and valley oak. Valley oaks in and near the BSA that occur along Cottonwood Creek are very large (up to 4.8 ft dbh). Additionally, about 3.09 acres of riparian grassland occur within the top of the bank of Cottonwood Creek and the unnamed perennial stream to the west of Croak Road. The understory of mixed riparian woodlands intergrades with that of the surrounding habitats, and the areas of riparian grassland lacking tree cover support similar species to the surrounding California annual grassland, with species such as soft chess (*Bromus hordeaceus*) and Italian ryegrass.

Photo 5. Mixed riparian woodland habitat along Croak Road and parcel A.

Wildlife. Riparian habitat is typically of high value to wildlife, with water and streamside vegetation supporting a diverse and abundant fauna. However, the extremely limited extent of riparian woodland within the BSA greatly limits its value for wildlife. Riparian woodlands mapped to the BSA consist of isolated trees intergrading

into the surrounding habitats. Thus, the species occurring within the surrounding perennial marsh (described above) and California annual grassland (described below) are expected to utilize this habitat as well. The trees themselves provide potential foraging and nesting habitat for a variety of common birds, including the oak titmouse (*Baeolophus inornatus*), chestnut backed chickadee (*Poecile rufescens*), and Anna's hummingbird (*Calypte anna*). These trees may also provide hunting perches and nesting substrate for native raptors, such as the great horned owl (*Bubo virginianus*) and red-tailed hawk (*Buteo jamaicensis*). Trees with cavities or loose bark may provide roosting habitat for bat species, including the pallid bat (*Antrozous pallidus*) and California myotis (*Myotis californicus*), year-round. The riparian grassland provides similar habitat values and functions as the surrounding California annual grassland, though along the outer banks of Cottonwood Creek contained a higher density of California ground squirrel burrows (*Otospermophilus beecheyi*).

4.2.6 California Annual Grassland

Vegetation. The majority (121.31 ac) of the BSA consists of California annual grassland habitat (Photo 6). Much of this grassland is currently grazed by cattle and is dominated by a suite of non-native grasses, such as seaside barley (*Hordeum marinum* ssp. *gussoneanum*), meadow barley (*H. murinum*), soft chess, wild oat (*Avena* sp.), and Italian ryegrass. Common weedy (and non-native) forbs include various species of filaree and geranium (*Erodium* spp. *and Geranium* spp., respectively), bristly ox tongue (*Helminthotheca echioides*), and wild radish (*Raphanus sativus*). Large monocultures of bull thistle and black mustard (*Brassica nigra*) were also scattered across the BSA within the California annual grasslands.

Photo 6. California grassland habitat in the BSA.

Several invasive species occur in the BSA, including but not limited to black mustard, wild oat, and Italian ryegrass. While the majority of the grasslands in the BSA are composed of non-native, ruderal vegetation, grasslands interspersed between patches of seasonal wetlands in the Tseng parcel exhibited higher species diversity and frequency of native wildflowers, such as common gumplant (*Grindelia camporum*), Itherial's spear (*Triteleia laxa*), annual lupine (*Lupinus bicolor*), blue eyed grass (*Sisyrinchium bellum*), blow wives (*Achyrachaena mollis*), shining peppergrass (*Lepidium nitidum*), and small flowered fiddleneck (*Amsinkia* menziesii).

Wildlife. Small mammals such as California ground squirrels and Botta's pocket gophers (*Thomomys bottae*) are common residents of annual grasslands, and burrows of these species were observed in the BSA. Deer mice (*Peromyscus maniculatus*) and California voles are likely common throughout this habitat. Black-tailed deer

(*Odocoileus hemionus columbianus*) are common browsers in this habitat, and coyotes (*Canis latrans*) hunt prey in the grassland portions of the BSA.

Bird species that nest in nearby marsh, woodland, and urban habitats forage within grassland areas during the nesting season; these include the western bluebird (*Sialia mexicana*), violet-green swallow, mourning dove (*Zenaida macroura*), house finch (*Carpodacus mexicanus*), lesser goldfinch (*Carduelis psaltria*), and California scrub-jay (*Aphelocoma californica*). Raptors such as the red-tailed hawk and white-tailed kite (*Elanus leucurus*) may forage for small mammals within grassland habitats.

Several reptile species regularly occur in annual grassland habitat, including the western fence lizard (*Sceloporus occidentalis*), gopher snake (*Pituophis catenifer*), northern Pacific rattlesnake (*Crotalus oreganus*), and California kingsnake (*Lampropeltis californiae*). Burrows of Botta's pocket gophers provide refuges for these reptile species, as well as for common amphibians such as the western toad (*Anaxyrus boreas*) and Sierran chorus frog.

4.2.7 Developed/Landscaped Habitat.

Vegetation. About 5.71 acres of developed/landscaped habitat is present in the BSA as hardscaped areas along Fallon Road and Croak Road in parcels A, B, and C. Additional hardscaped areas such as parking, storage, and sheds and landscaped areas occur around buildings, fences, parking areas, and a landscaping company in parcels D, F, and G of the BSA.

Small patches of non-native of horticultural plant species such as filaree are scattered around the buildings in the developed/landscaped parts of the BSA. Several patches of ornamental trees, primarily eucalyptus, occur near fence lines and buildings in the BSA.

Wildlife. Wildlife that can occur in developed/landscaped portions of the site includes species that are typically accustomed to urban environments and high levels of disturbance from human activities. These include native bird species such as house finches, non-native European starlings (*Sturnus vulgaris*) and rock pigeons (*Columba livia*). Additional bird species, such as Anna's hummingbird, American robins (*Turdus migratorius*), American crows (*Corvus brachyrhynchos*), and lesser goldfinches, may utilize trees or other vegetation within landscaped areas for nesting. Mammals such as the house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*) and raccoon can also occur in developed portions of the site. Abandoned buildings, sheds and other structures may also provide habitat for migrating Mexican free-tailed bats or resident pallid bats. Reptiles such as western fence lizards and gopher snakes may bask on the paved surfaces in order to raise their body temperature.

Section 5. Special-Status Species and Sensitive Habitats

CEQA requires assessment of the effects of a project on species that are protected by state, federal, or local governments as "threatened, rare, or endangered"; such species are typically described as "special-status species". For the purpose of the environmental review of the project, special-status species have been defined as described below. Impacts on these species are regulated by some of the federal, state, and local laws and ordinances described in Section 3.0 above.

For purposes of this analysis, "special-status" plants are considered plant species that are:

- Listed under FESA as threatened, endangered, proposed threatened, proposed endangered, or a candidate species.
- Listed under CESA as threatened, endangered, rare, or a candidate species.
- Listed by the CNPS as CRPR 1A, 1B, 2, 3, or 4.

For purposes of this analysis, "special-status" animals are considered animal species that are:

- Listed under FESA as threatened, endangered, proposed threatened, proposed endangered, or a candidate species.
- Listed under CESA as threatened, endangered, or a candidate threatened or endangered species.
- Designated by the CDFW as a California species of special concern.
- Listed in the California Fish and Game Code as fully protected species (fully protected birds are provided in Section 3511, mammals in Section 4700, reptiles and amphibians in Section 5050, and fish in Section 5515).

Information concerning threatened, endangered, and other special-status species that potentially occur in the BSA was collected from several sources and reviewed by H. T. Harvey & Associates biologists as described in Section 2.1 above. Figure 4 depicts CNDDB records of special-status plant species in the general vicinity of the BSA and Figure 5 depicts CNDDB records of special-status animal species. These generalized maps show areas where special-status species are known to occur or have occurred historically.

5.1 Special-Status Plant Species

An inventory of CNPS (2019) and CNDDB (2019) (Figure 4) databases revealed a total of 81 extant or historical records of special-status plant species that occur within the Project region (defined by the nine-quadrangle and the Alameda County search areas). These 81 plant taxa were further analyzed for their presence in the BSA

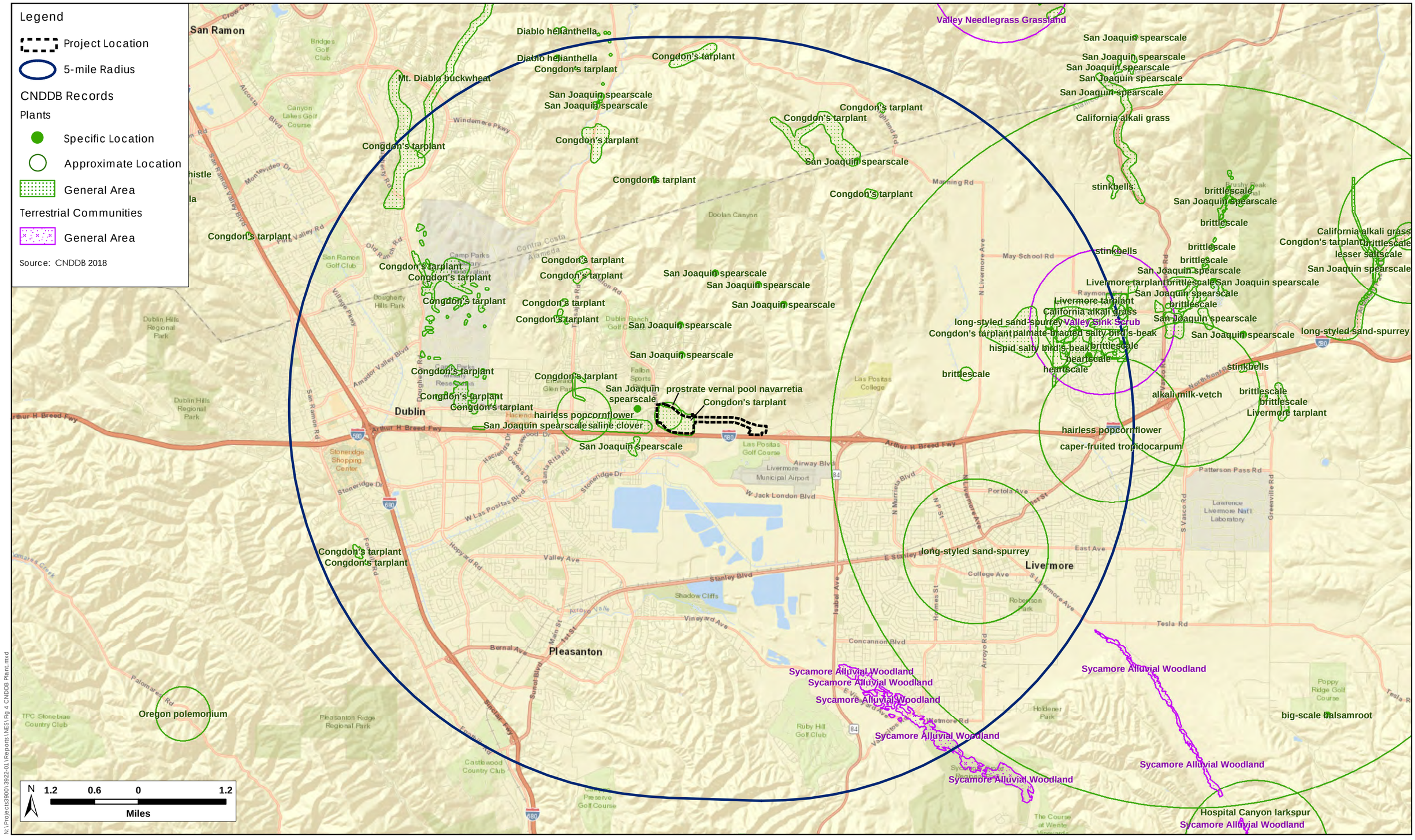
using the following criteria: (1) absence of suitable habitat types; (2) lack of specific microhabitat or edaphic requirements (e.g. serpentine soils); (3) the elevational range of the species being outside of the range of the that in the BSA; and/or (4) the species is presumed to be extirpated from the Project vicinity (which is the 5-mi radius around the BSA). Based on this analysis and the habitat types observed in the BSA during the 2017 and 2018 reconnaissance survey, 22 special-status plant species were preliminarily determined to have some potential to occur in the BSA.

The 22 special-status plant species could not be eliminated from consideration for their occurrence in the BSA for several reasons, including (1) CNDDB records of extant populations that occur in proximity to or even overlap with the limits of the BSA, (2) the majority of these species prefer alkaline soils, which occur in the southwestern portion of the BSA; and (3) many are known to occur in disturbed grassland and wetland habitats, which occur in the BSA. Additional information on these 22 species including their status, preferred habitat and potential to occur in the BSA is provided in Table 1.

The following three species in particular were further evaluated and determined to be present in the BSA because prior surveys in the vicinity revealed their presence in the southwestern portion of the BSA: Congdon's tarplant (CRPR 1B.1), San Joaquin spearscale (CRPR 1B.2) (Sycamore & Associates 2002a), and prostrate vernal pool navarretia (*Navarretia prostrata*) (CRPR 1B.1) (Figure 4, CNDDB 2019). San Joaquin spearscale was observed by Sycamore Associates, LLC (2002a), whereas the prostrate vernal pool navarretia was observed multiple times in 2001, 2008, and 2010 as reported by the CNDDB (2018). However, neither San Joaquin spearscale nor prostrate vernal pool navarretia were observed during focused surveys in either 2017 or 2018, at a time when these species were within the identifiable blooming period and confirmed to be germinated at known reference sites. Despite the fact that the surveys in 2017 and focused rare plant surveys in 2018 identified neither of these two species, possibly as a result of the hydrology that was significantly altered in approximately 2010 (which created the large cattail marsh), it is likely seed bank still exists for these species on the site. Suitable habitat for both San Joaquin spearscale and prostrate vernal pool navarretia would be located in the alkaline-affected seasonal wetland areas exhibiting vernal pool-like ponding to the south of the project footprint. Congdon's tarplant was confirmed on the site and the extent of the population was mapped during the June 2018 surveys (Figure 3).

Congdon's tarplant, San Joaquin Spearscle and prostrate vernal pool navarretia are discussed in more detail below:

Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*). Federal Listing Status: None; State Listing Status: None; CNPS List: 1B.1. Congdon's tarplant is an annual herb in the composite family (Asteraceae) that is endemic to California and ranked as CRPR 1B.1 by the CNPS. Thus, adverse effects on this species may be considered significant under CEQA. It has a variable blooming period extending from May through November. Congdon's tarplant occurs in valley and foothill grassland habitat, floodplains, and swales, particularly those with moderately alkaline substrates, which underlie the shallow valleys in the Livermore and



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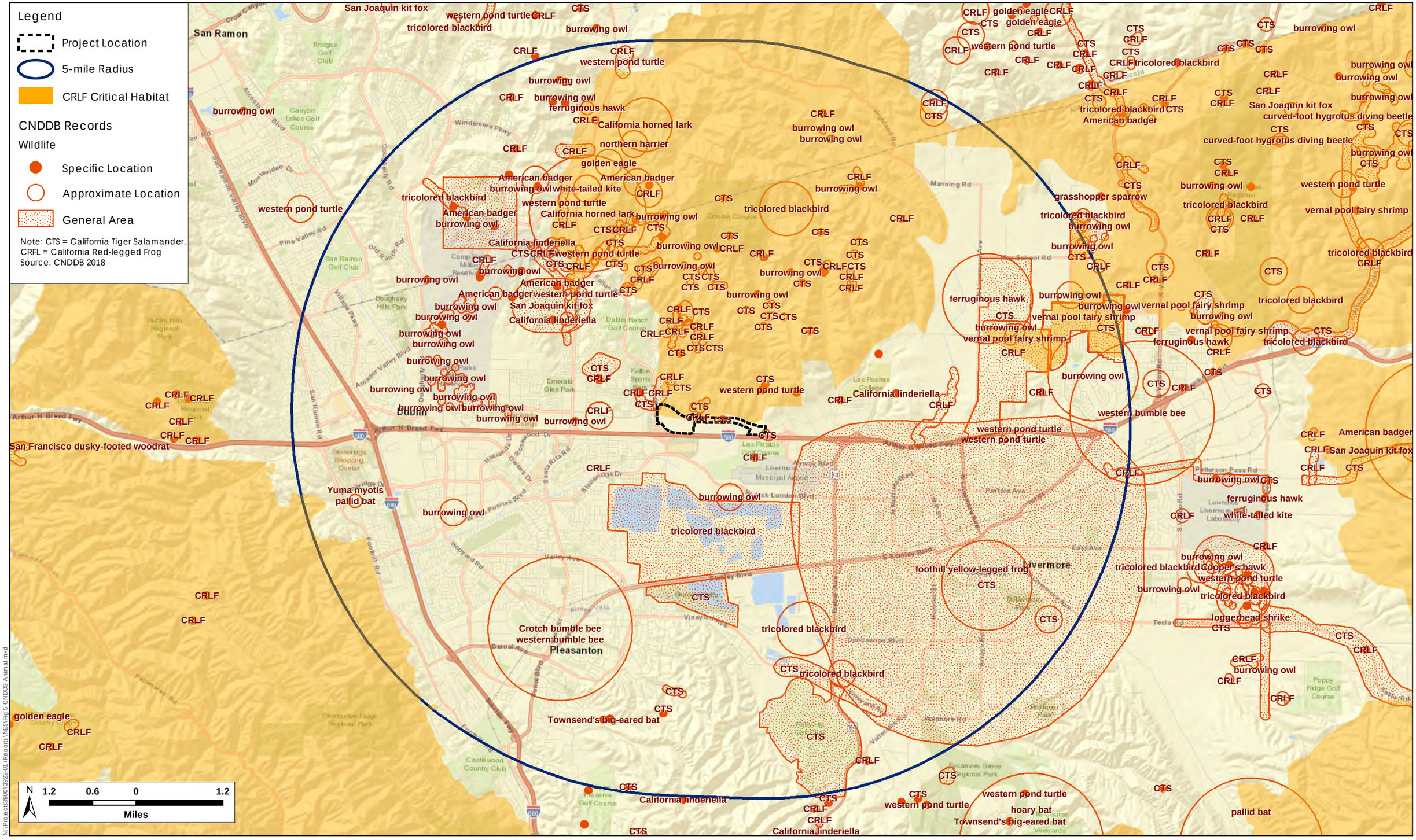
H. T. HARVEY & ASSOCIATES
Ecological Consultants

Figure 4. CNDDB Plant Records
Dublin Boulevard-North Canyons Parkway Extension Project
Biological Resources Report (3922-01)
February 2019



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Ecological Consultants

Figure 5. CNDDB Animal Records
Dublin Boulevard-North Canyons Parkway Extension Project
Biological Resources Report (3922-01)
February 2019

Tassajara areas where the BSA is located. The species can occur in disturbed areas with non-native grasses such as wild oats, ripgut brome, Italian ryegrass, and seaside barley (CNDDB 2019, CNPS 2019, Baldwin et al. 2012). It tends to occur on soils primarily belonging to the Clear Lake, Pescadero, Rincon, and Cropley series. Within this broad habitat type, Congdon's tarplant is most successful along the boundaries of seasonal wetlands or in other areas where competing vegetation is sparse (i.e. heavily grazed areas or recently disturbed areas). This is a focal species of the EACCS (ICF International 2010).

The statewide population includes at least 78 extant occurrences (CNPS 2019), and of these, approximately one occurs within the southwestern portion of the BSA. Nineteen occurrences occur or did at one time occur within the Project vicinity (i.e., the area within a 5-mi radius) (Figure 4). The CNDDB has recorded up to 114,000 individuals of Congdon's tarplant in the southwestern portion of the BSA between Fallon Road and Croak Road (CNDDB 2019). This species was also detected in seasonal wetlands in the southern portion of parcel A in 2002 (Sycamore and Associates 2002a). At that time, the population was estimated to contain 6,000 individuals, and another census in 2005 by H.T. Harvey & Associates detected approximately 40,000 individualsa.

Focused rare plant surveys completed on June 29, 2018 confirmed the presence of Congdon's tarplant on the BSA, and the occurrence was mapped as polygon and point features for the purposes of impact assessment (Figure 3). Approximately 77,000 plants distributed over approximately 8.2 ac were observed in the seasonal wetlands along the southern edge of the BSA near the intersection of Fallon and Croak Road and extending in lower densities to the north. Smaller numbers occurred in scattered areas to the west of the main population (Figure 3).

San Joaquin spearscale (*Extriplex joaquinana*). Federal Listing Status: None; State Listing Status: None; CNPS List: 1B.2. San Joaquin spearscale is endemic to California and is ranked as CRPR 1B.2 by the CNPS. Thus, adverse effects on this species may be considered significant under CEQA. It is an herbaceous annual plant in the goosefoot family (Chenopodiaceae), and has a highly variable blooming period from May through September. The statewide population is composed of at least 111 extant occurrences; and 11 occurrences are or were at one time located within the vicinity of the BSA (Figure 4, CNDDB 2019). The species grows in seasonal, moderately to strongly alkaline wetlands and vernal pools, and alkali sinks in chenopod scrub, meadows, playas, and valley and foothill grassland. San Joaquin spearscale apparently produces a long-lived seed bank, which germinates in response to soil disturbances, and the species can persist in weedy grasslands dominated by exotic species. This is a focal species of the EACCS (ICF International 2010).

The CNDDB has recorded a "small colony" of San Joaquin spearscale within a roughly bounded polygon that occurs immediately adjacent to the BSA, but the CNDDB does not show an on-site population (Figure 4, CNDDB 2019). This species was detected in seasonal wetlands in the southern portion of parcel A in 2002 (Sycamore and Associates 2002a). San Joaquin spearscale was not detected during the March 2017 reconnaissance survey or April - June 2018 focused rare plant surveys.

As hydrology has shifted on the site over the past 8-10 years, conditions may have been less suitable for this species and germination may have been suppressed, but as San Joaquin spearscale was observed in the BSA in 2002 (Sycamore and Associates 2002a) and is known to have a long-lived seed bank, it is assumed that this species may still be present within the BSA as seed bank. Because San Joaquin spearscale is adapted to alkaline wetlands, it is very likely the seed bank would not extend into the Project footprint, as alkalinity lessens to the north in parcel A, outside the Clear Lake clay soils. The maximum extent of the anticipated seed bank distribution of this species, based on habitat suitability, would be the northernmost extent of the Congdon's tarplant that was mapped on the site (Figure 3). It is unlikely that a seed bank for this species exists in the Project footprint, but if it does, the extent of Congdon's tarplant would serve as a reasonable proxy for the potential extent of this species' seed bank.

Prostrate vernal pool navarretia (*Navarettia prostrata*). Federal Listing Status: None; State Listing Status: None; CNPS List: 1B.1. Prostrate vernal pool navarretia is an annual herb in the phlox family (Polemoniaceae) that blooms from April to July. The species has a CRPR of 1B.1, and as such, adverse effects on this species may be considered significant under CEQA. This plant grows in alkaline vernal pools and flats in coastal scrub, meadows and seeps, and valley and foothill grassland communities, at elevations between 49 and 2,297 ft (CNPS 2019). Prostrate vernal pool navarretia is known to occur in areas of moderate to high alkalinity and typically shallow ponding. There are at least 51 extant occurrences statewide (CNPS 2019), although only one record – the record located on the BSA (Figure 4) - occurs in the 7.5-minute *Livermore* USGS quadrangle that the BSA is located in. The CNDDB record (CNDDB 2019, Occurrence #61) for the prostrate vernal pool navarretia occurrence recorded from the BSA indicates that the species was found in seasonal wetlands near the Fallon/Croak Road junction, in a "vernal mud depression".

Prostrate vernal pool navarretia was not observed during the March 2017 reconnaissance survey or April - June 2018 focused rare plant surveys. As hydrology has shifted on the site over the past 8-10 years, conditions may have been less suitable for both San Joaquin spearscale and prostrate vernal pool navarretia and germination may have been suppressed, but as the navarretia was last observed in the BSA in 2010 (CNDDB 2019) and San Joaquin spearscale was observed in the BSA in 2002 (Sycamore and Associates 2002a) and is known to have a long-lived seed bank, it is assumed both species may still be present within the BSA as seed banks. Because both of these species are adapted to alkaline wetlands, it is very likely the seed banks do not extend into the Project footprint, as alkalinity lessens to the north in parcel A, outside the Clear Lake clay soils. The maximum extent of the anticipated seed bank distribution of either species, based on habitat suitability, would be the northernmost extent of the Congdon's tarplant that was mapped on the site (Figure 3). It is unlikely that a seed bank for this species exists in the Project footprint, but if it does, the extent of Congdon's tarplant would serve as a reasonable proxy for the potential extent of this species' seed bank.

5.2 Special-Status Animal Species

The list of special-status fish and wildlife species that occur in the site region, developed from the resources described in Chapter 2, were considered for their potential to occur within the site (Table 1). CNDDB (2018)

records of special-status animals within the site vicinity are shown on Figure 5. A number of special-status animal species are known to occur in eastern Alameda County, but are considered absent from the site because of the lack of suitable habitat or because the site is outside of the known range of the species. These species are included in Table 1 to indicate the rationale for considering them absent from the site. A few other special-status wildlife species that occur in the site region may occur on the site only as uncommon to rare visitors, migrants, or transients, but are not expected to reside or breed here, to occur in large numbers, or otherwise to make substantial use of the site. Wildlife species that may winter or breed on the site include the California tiger salamander, California red-legged frog, western pond turtle white-tailed kite, burrowing owl, loggerhead shrike, grasshopper sparrow, tricolored blackbird, pallid bat, Townsend's big eared bat, San Joaquin kit fox and American badger. Expanded descriptions are provided in Appendix D for these potentially occurring species.

5.3 Sensitive Natural Communities, Habitats, and Vegetation Alliances

Natural communities have been considered part of the Natural Heritage Conservation triad, along with plants and animals of conservation significance, since the state inception of the Natural Heritage Program in 1979. The CDFW determines the level of rarity and imperilment of vegetation types, and tracks sensitive communities in its Rarefind database (CNDDB 2017). Global rankings (G) of natural communities reflect the overall condition (rarity and endangerment) of a habitat throughout its range, whereas state (S) rankings reflect the condition of a habitat within California. Natural communities are defined using NatureServe's standard heritage program methodology as follows (CDFG 2007):

G1/S1: Less than 6 viable occurrences or less than 2,000 ac.

G2/S2: Between 6 and 20 occurrences or 2,000 to 10,000 ac.

G3/S3: Between 21 and 100 occurrences or 10,000 to 50,000 ac.

G4/S4: The community is apparently secure, but factors and threats exist to cause some concern.

G5/S4: The community is demonstrably secure to ineradicable due to being common throughout the world (for global rank) or the state of California (for state rank).

State rankings are further described by the following threat code extensions:

S1.1: Very threatened

S1.2: Threatened

S1.3: No current threats known

Table 1. Special-status Plant and Animal Species, Their Status, and Potential Occurrence in the BSA

Name	*Status	Habitat	Potential for Occurrence in the BSA
Federal or State Endangered, Rare, or Threatened Species			
Conservancy Fairy Shrimp (*Branchinecta conservatio*)	FE	Ephemeral freshwater and playa pools in the Central Valley and the San Francisco Bay Area.	**Absent.** Extensive wet-season and dry-season protocol-level branchiopod surveys conducted in and near the BSA were negative for listed species (H.T. Harvey & Associates 1997a-b, 1998, 2000, Condor Country Consulting 2002, 2003, Helm Biological Consulting 2004). Furthermore, the BSA is outside of the species' range. Determined to be absent.
Longhorn fairy shrimp (*Branchinecta longiantenna*)	FE	Ephemeral freshwater and vernal pools in the Central Valley and the San Francisco Bay Area.	**Absent.** Extensive wet-season and dry-season protocol-level surveys have been conducted on the BSA where suitable habitat was considered to occur (parcels A, D, E, and F). Dry season samples were collected and analyzed following the USFWS protocol on these same parcels and were negative for listed species (Helm Biological Consulting 2004). No suitable habitat was identified on parcel G, H or I, or on the nearby Mandeville and Croak parcels (Condor Country Consulting 2002, 2003). Extensive protocol-level surveys were also conducted in adjacent and nearby sites at Dublin Ranch and at the Pao Yeh Lin parcels between 1995 and 2000 (H.T. Harvey & Associates 1997a-b, 1998, 2000). All of these surveys failed to detect special-status fairy shrimp. Further, the EACCS does not map any portions of the BSA (or adjacent areas) as suitable habitat for these species (ICF International 2010). Determined to be absent.

Name	*Status	Habitat	Potential for Occurrence in the BSA
Vernal pool fairy shrimp (*Branchinecta lynchi*)	FT	Ephemeral freshwater and vernal pools in the Central Valley and the San Francisco Bay Area.	**Absent.** Extensive wet-season and dry-season protocol-level surveys have been conducted on the BSA where suitable habitat was considered to occur (parcels A, D, E, and F). Dry season samples were collected and analyzed following the USFWS protocol on these same parcels and were negative for listed species (Helm Biological Consulting 2004). No suitable habitat was identified on the G, H, or I parcels, or on the nearby Mandeville and Croak parcels (Condor Country Consulting 2002, 2003). Extensive protocol-level surveys were also conducted in adjacent and nearby sites at Dublin Ranch and at the Pao Yeh Lin parcels between 1995 and 2000 (H.T. Harvey & Associates 1997a-b, 1998, 2000). All of these surveys failed to detect special-status fairy shrimp. Further, the EACCS does not map any portions of the BSA (or adjacent areas) as suitable habitat for these species (ICF International 2010). Determined to be absent.
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	FT	Elderberry shrubs (*Sambucus* sp.) associated with riparian forests that occur along rivers and streams	**Absent.** No elderberry shrubs are present in the BSA, and the BSA is outside the range of this beetle. Determined to be absent.
San Bruno elfin butterfly (*Callophrys mossii bayensis*)	FE	Grassland and chaparral containing stonecrop (*Sedum spathulifolium*), the larval host plant	**Absent.** The BSA is outside the current range of the species and the host plant does not occur on the site. Determined to be absent.
Callippe silverspot (*Speyeria callippe callippe*)	FE	Grassland habitat containing Johnny jump-up (*Viola pedunculata*), the larval host plant.	**Absent.** The EACCS maps the BSA as potential habitat for the Callippe Silverspot butterfly. However, the butterfly's occurrence is dependent on the presence of its larval host plant, Johnny jump-up. Extensive botanical surveys have been conducted within the BSA. Repeated surveys were conducted from March through May 1999-2001, which encompasses the bloom period of Johnny jump-up. All of these surveys failed to detect the Callippe silverspot host plant (Sycamore and Associates 2002a, WRA 2004). In addition, surveys of the entirety of the BSA by H.T. Harvey & Associates botanist in 2017 and 2018 also failed to detect Johnny jump-up. Therefore, Johnny jump-up, and thus the Callippe silverspot butterfly, are determined to be absent from the BSA.

Name	*Status	Habitat	Potential for Occurrence in the BSA
Central California Coast steelhead (*Oncorhynchus mykiss*)	FT	Cool streams with suitable spawning habitat and conditions allowing migration between spawning and marine habitats	**Absent.** Cottonwood Creek lacks sufficient instream vegetation and depth to support steelhead. Similarly, the unnamed perennial tributaries along Croak Road and Fallon/Croak Road lack sufficient depth to support steelhead. In addition, neither creek was connected to the ocean, either historically or currently, nor steelhead are not known from this watershed. Thus, suitable aquatic habitat is absent from the site. Determined to be absent.
Delta smelt (*Hypomesus transpacificus*)	FT, SE	Shallow, tidal water in the Sacramento/San Joaquin River Delta	**Absent.** Cottonwood Creek and ephemeral drainages on site do not provide suitable tidal habitat, and the BSA is outside the species' range. Determined to be absent.
California tiger salamander (*Ambystoma californiense*)	FT, ST	Vernal or temporary pools in annual grasslands or open woodlands.	**Present.** Based on prior surveys of the BSA, and on CNDDB records, this species is known to occur within the immediate vicinity of the BSA. A site assessment and focused surveys for breeding tiger salamanders, conducted from 2001 through 2003, detected several adult tiger salamanders immediately north of to the BSA (Sycamore Associates 2001a, 2003). Numerous additional records of tiger salamanders occur within ponds, intermittent streams and their tributaries in the vicinity of the BSA, including breeding records in ponds in close proximity to the site (H. T. Harvey & Associates 2001, Sycamore 2001b, CNDDB 2019). While suitable breeding ponds are absent from the BSA, perennial and ephemeral stream, perennial marsh, and seasonal wetland habitats on-site may provide suitable dispersal and foraging habitat for the species, while California annual grasslands in the BSA support California ground squirrel and pocket gopher colonies whose burrows can provide suitable refugia for California tiger salamander. The species is therefore determined to be present.

Name	*Status	Habitat	Potential for Occurrence in the BSA
California red-legged frog (*Rana draytonii*)	FT, CSSC	Streams, freshwater pools, and ponds with emergent or overhanging vegetation.	**Present.** A site assessment and a focused survey for breeding California red-legged frogs, conducted in 2001 on parcels A, D, E, F, and G failed to detect any California red-legged frogs, although the quarry pond to the north of the BSA on parcel D was considered to provide suitable breeding habitat (Sycamore Associates 2001b-c). Additional surveys conducted in 2003 detected an adult California red-legged frog at the head of an unnamed drainage within the immediate vicinity of the BSA (H. T. Harvey & Associates 2006). Suitable breeding habitat for red-legged frogs is absent from the BSA. However, perennial and ephemeral stream, perennial marsh, seasonal wetland, and California annual grassland habitats on site provide suitable foraging, dispersal and refugial habitat for red-legged frogs. Thus, the species is determined to be present. The northern portion of the BSA has been designated as critical habitat by the USFWS.BSA
Alameda whipsnake (*Masticophis lateralis euryxanthus*)	FT, ST	Primarily associated with scrub and chaparral. Also may occur in any inner Coast Range plant community	**Absent.** No suitable scrub or chaparral habitat occurs within the BSA, which is also outside the species' range. Determined to be absent.
California least tern (*Sterna antillarum browni*)	FE, SE	Nests along the coast on bare or sparsely vegetated, flat substrates. In S.F. Bay, nests in salt pannes and on an old airport runway. Forages for fish in open waters.	**Absent.** No suitable open water foraging habitat is present in the BSA. Furthermore, no suitable nesting or roosting habitat is present in the site vicinity. Determined to be absent.
Bank swallow (*Riparia riparia*)	ST	Colonial nester on vertical banks or cliffs with fine-textured soils near water	**Absent.** No suitable vertical banks or cliffs are present in the BSA. In addition, the low flow reach of Cottonwood Creek within the BSA is too shallow and narrow to support a nesting colony of bank swallows. Determined to be absent.

Name	*Status	Habitat	Potential for Occurrence in the BSA
Tricolored blackbird (*Agelaius tricolor*)	ST	Nests in extensive emergent vegetation and fields.	**Habitat Present.** Foraging habitat for this species occurs in the perennial marsh, seasonal wetlands, and California annual grassland habitats on parcel A and B. Dense stands of emergent vegetation and mustard (*Brassica* sp.) occurring in parcel B between Fallon/Croak Road and the I-580 off ramp provide marginally suitable habitat for a nesting colony of tricolored blackbirds. Furthermore, the species has been recorded in the BSA and was known to breed in the vicinity (Cornell Laboratory of Ornithology 2018). Thus, there is some potential, albeit low, for a breeding colony of tricolored blackbirds to become established in perennial marsh habitat in parcel B.
San Joaquin kit fox (*Vulpes macrotis mutica*)	FE, ST	Extensive open grasslands or grasslands with scattered shrubby vegetation.	**Habitat Present.** EACCS habitat modeling places the BSA within the extreme northwestern edge of the current range of the species. Extensive surveys of the BSA in the 1990s and early 2000s failed to detect any kit fox or evidence of their presence and all available data indicate that the current range of the San Joaquin kit fox does not extend as far south/west as the Dublin Boulevard area (H. T. Harvey & Associates 1997c-f, Sycamore Associates 2002c, Sycamore Associates and Townsend 2002a, b, CNDDB 2019). Only a single kit fox has been recorded in the area, approximately 5 mi northeast of the BSA along Morgan Territory Road (H. T. Harvey & Associates 1997c, d). Because California annual grasslands in the BSA offer ostensibly suitable foraging and denning habitat for kit foxes, and because an individual has been detected to the northeast, we cannot rule out the possibility that individual kit foxes may occur on-site. If the species were to be present, it would likely occur only as a rare and irregular dispersant. Given the existing high levels of human disturbance and lack of recent records anywhere in the vicinity, in spite of the presence of ostensibly suitable habitat, this species is likely absent from the site.

Name	*Status	Habitat	Potential for Occurrence in the BSA
California Native Plant Society (CNPS) Rare Species			
Heartscale (*Atriplex cordulata* var. *cordulata*)	CNPS Rank 1B.2	Chenopod scrub, meadows and seeps with saline or alkaline soils; valley and foothill grassland in sandy soils; 0 – 560 ft.	**Habitat present/Species Absent.** There is marginally suitable habitat along the southern edge of the BSA near the intersection of Fallon and Croak Roads. Known primarily from the Livermore Wetlands Preserve in eastern Alameda County. This species was not detected during the 2018 focused plant surveys. Therefore, this species is determined to be absent from the BSA.
Crownscale	CNPS Rank 4.2	Chenopod scrub, valley and foothill grassland, vernal pools in clay alkaline soils; 0 – 1,935 ft.	**Habitat present/Species Absent.** There is marginally suitable habitat along the southern edge of the BSA near the intersection of Fallon and Croak Roads. Known primarily from the Livermore Wetlands Preserve in eastern Alameda County. This species was not detected during the 2018 focused plant surveys. Therefore, this species is determined to be absent from the BSA.
Brittlescale	CNPS Rank 1B.2	Chenopod scrub, valley and foothill grassland, vernal pools in clay alkaline soils; 0 – 1,050 ft.	**Habitat present/Species Absent.** There is marginally suitable habitat along the southern edge of the BSA near the intersection of Fallon and Croak Roads. Known primarily from the Livermore Wetlands Preserve in eastern Alameda County. This species was not detected during the 2018 focused plant surveys. Therefore, this species is determined to be absent in the BSA.
Lesser saltscale (*Atriplex minuscula*)	CNPS Rank 1B.1	Chenopod scrub, playas, valley and foothill grassland in clay alkaline soils; 45 – 655 ft.	**Habitat present/Species Absent.** There is marginally suitable habitat along the southern edge of the BSA near the intersection of Fallon and Croak Roads. Known primarily from the Livermore Wetlands Preserve in eastern Alameda County. This species was not detected during the 2018 focused plant surveys. Therefore, this species is determined to be absent from the BSA**.**

Name	*Status	Habitat	Potential for Occurrence in the BSA
Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*)	CNPS Rank 1B.1	Valley and foothill grassland in depressions, swales floodplains with alkaline soils; usually disturbed areas; 0 – 755 ft.	**Habitat present/Species Present.** The species was observed during the 2018 focused plant surveys of the BSA. The statewide population includes 91 occurrences, and of these, approximately one occurs within the southwestern portion of the BSA and 19 occur within the immediate vicinity. The CNDDB has recorded up to 114,000 individuals of Congdon's tarplant in the southwestern portion of the BSA between Fallon Road and Croak Road, and 77,000 individuals were estimated in 2018. Determined to be present
Hispid bird's beak (*Chloropyron molle* ssp. *hispidum*)	CNPS Rank 1B.1	Saline marshes, playas, and flats within valley and foothill grassland; 0 – 510 ft.	**Habitat present/Species Absent.** There is marginally suitable habitat along the southern edge of the BSA near the intersection of Fallon and Croak Roads. Known primarily from the Livermore Wetlands Preserve in eastern Alameda County. This species was not detected during the 2018 focused plant surveys. Therefore, this species is determined to be absent from the BSA.
San Joaquin spearscale (*Extriplex joaquinana*)	CNPS Rank 1B.2	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland in alkaline soils; 0 – 2,740 ft.	**Habitat present/Seedbank Potentially Present.** Suitable habitat and suitable alkaline soils occur on site. Although not observed during the March 2017 or 2018 surveys, it was observed in the BSA in 2002. It produces a long-lived seed bank, which germinates in response to soil disturbances and can exist in weedy grasslands dominated by exotic species. The statewide population is composed of approximately 111 extant occurrences; and of these, 11 are or were within the immediate vicinity of the BSA. The CNDDB has recorded several occurrences near the BSA, some of which have likely been extirpated by recent development. Assumed to be potentially present as seedbank within the alkaline-affected seasonal wetlands in the southern portion of parcel A.
Diablo helianthella (*Helianthella castanea)*	CNPS Rank 1B.2	Broadleafed upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill grassland generally in rocky alluvial soils; 195 – 4,265 ft	**Habitat present/Species Absent.** There is marginally suitable habitat within the BSA. Known only from the Berkeley Hills in Alameda County. This species was not detected during the 2018 focused plant surveys. Therefore, this species is considered absent from the BSA

Name	*Status	Habitat	Potential for Occurrence in the BSA
Hogwallow starfish *Hesperevax caulescens*	CNPS Rank 4.2	Drying shrink-swell clay of shallow vernal pools and flats/depressions in Valley and foothill grassland; sometimes in alkaline soil; 0 – 1,655 ft.	**Habitat present/Species Absent.** Suitable habitat occurs in the seasonal wetlands in the BSA. Known mainly from the Diablo Range in Alameda County. This species was not detected during the 2018 focused plant surveys. Therefore, this species is determined to be absent from the BSA.
Ferris's goldfields *Lasthenia ferrisiae*	CNPS Rank 4.2	Wet saline flats and vernal pools with clay soils; 65 – 2,295 ft.	**Habitat present/Species Absent.** There is suitable habitat along the southern edge of the BSA near the intersection of Fallon and Croak Roads. This species was not detected during the 2018 focused plant surveys. Therefore, this species is determined to be absent from the BSA.
Little mousetail *Myosurus minimus* ssp. *apus*	CNPS Rank 3.1	Wet fields, vernal pools (alkaline soils), streambanks in valley and foothill grassland; 65 – 2,100 ft.	**Habitat present/Species Absent.** There is suitable habitat along the southern edge of the BSA in parcel A near the intersection of Fallon and Croak Roads. Known primarily from the Livermore Wetlands Preserve and the Diablo range in eastern Alameda County. This species was not detected during the 2018 focused plant surveys. Therefore, this species is determined to be absent from the BSA.
Cotula navarretia *Navarretia cotulifolia*	CNPS Rank 4.2	Occurs in wetlands with heavy soils within chaparral, cismontane woodland, valley and foothill grassland; 10 – 6,005 ft.	**Habitat present/Species Absent.** There is suitable habitat along the southern edge of the BSA in parcel A near the intersection of Fallon and Croak Roads. Known primarily from the Livermore Wetlands Preserve and the Diablo range in eastern Alameda County. This species was not detected during the 2018 focused plant surveys, and has never been recorded in prior plant surveys of the site. Therefore, this species is determined to be absent from the BSA.
Adobe navarretia *Navarretia nigelliformis* ssp. *nigelliformis*	CNPS Rank 4.2	Valley and foothill grassland in clay depressions, vernal pools; 325 – 3,280 ft.	**Habitat present/Species Absent.** There is suitable habitat within the BSA in parcel A. The only recent occurrence in Alameda County is from the Diablo range. This species was not detected during the 2018 focused plant surveys, and has never been recorded in prior plant surveys of the site. Therefore, this species is determined to be absent from the BSA.

Name	*Status	Habitat	Potential for Occurrence in the BSA
Prostrate vernal pool navarretia *Navarretia prostrata*	CNPS Rank 1B.1	Coastal scrub, meadows and seeps, valley and foothill grassland, vernal pools; 5 – 3,970 ft.	**Habitat present/Seedbank Potentially Present.** The CNDDB has recorded a small population of prostrate vernal pool navarretia within a roughly bounded polygon that occurs within the western portion of the BSA. This polygon is non-specific, but appears to be centered on the central or southern portions of the seasonal wetland complex in parcel A, which also represents the area of suitable habitat for the species in the BSA. It was observed multiple times in 2001, 2008, and 2010 as reported by the CNDDB, but was not detected in 2017 or 2018, possibly due to changing hydrologic conditions after 2010. The statewide population is composed of approximately 51 extant occurrences. Although not observed during the March 2017 and May 2018 surveys, it was observed on the site in several recent years and therefore it is assumed to be potentially present in the central and southern portions of the seasonal wetland complex in parcel A as seedbank.
Lobb's aquatic buttercup *Ranunculus lobbii*	CNPS Rank 4.2	Vernal pools and ponds in cismontane woodland, North Coast coniferous forest, valley and foothill grassland; 45 – 1,540 ft.	**Habitat present/Species Absent.** There is suitable habitat within the wetlands in parcel A of the BSA. Primarily known from the Berkeley Hills in Alameda County. This species was not detected during the March 2017 reconnaissance surveys or 2018 focused plant surveys. Therefore, this species is determined to be absent from the BSA.
Caper-fruited tropidocarpum *Tropidocarpum capparideum*	CNPS Rank 1B.1	Valley and foothill grassland in alkaline soils; 0 – 1495 ft.	**Habitat present/Species Absent.** Suitable habitat occurs in the BSA in the alkaline-affected areas in the southern portion of parcel A. Known mainly from the Diablo Range in Alameda County. This species was not detected during the 2018 focused plant surveys. Therefore, this species is determined to be absent from the BSA.
California Species of Special Concern			
Foothill yellow-legged frog (*Rana boylii*)	CSSC	Partially shaded shallow streams and riffles with a rocky substrate. Occurs in a variety of habitats in coast ranges	**Absent.** No suitable habitat occurs in the BSA, as creeks in this area are shallow, steep banked, and lack the riffles and cobble-sized stones preferred by the species. Thus, the species is not expected to occur in the BSA.

Name	*Status	Habitat	Potential for Occurrence in the BSA
Western spadefoot (*Scaphiopus hammondii*)	CSSC	Grasslands and occasionally valley-foothill hardwood woodlands; vernal pools or similar ephemeral pools required for breeding	**Absent.** The species is not known to occur as far west as Livermore, and no records of the species occur in the vicinity. Determined to be absent.
California horned lizard (*Phrynosoma coronatum frontale*)	CSSC	Open habitats with sandy, loosely textured soils, such as chaparral, coastal scrub, annual grassland, and clearings in riparian woodlands with the presence of native harvester ants (*Pogonomyrmex barbatus*).	**Absent.** No suitable sandy habitat is present in the BSA. Determined to be absent.
Western pond turtle (*Actinemys marmorata*)	CSSC	Occurs in and around a wide variety of perennial or nearly perennial aquatic habitats including canals, stock ponds, lakes, streams, and rivers. Nests in uplands, typically in close proximity to aquatic habitat.	**Habitat present.** Aquatic habitat for the western pond turtle occurs within the reaches of Cottonwood Creek, in the unnamed tributary along Fallon/Croak Road, and in ponded water at culverts along Croak Road. Although western pond turtles have been observed within Cottonwood Creek north of the BSA (CNDDB 2019), the reaches of the creek within the BSA provides only marginally suitable foraging habitat for the species. Within the BSA, Cottonwood Creek is shallow, steep banked, and lacks suitable basking sites and food resources; thus western pond turtles are not expected to occur regularly in the reaches within the BSA. Similarly, the shallow waters of the unnamed tributaries along Fallon/Croak Road provide only marginally suitable foraging habitat for the species. Nevertheless, the pond turtles may utilize perennial and ephemeral stream habitats in the BSA for dispersal or to move between suitable aquatic foraging and upland breeding habitats. Annual grasslands throughout the BSA, but in particular near Cottonwood Creek and the other perennial streams, provide suitable nesting habitat for the species. Thus western pond turtles may occur within the BSA, primarily as transients in aquatic and marsh habitat, but potentially as breeders in upland habitat.

Name	*Status	Habitat	Potential for Occurrence in the BSA
Burrowing owl (*Athene cunicularia*)	CSSC	Nests and roosts in open grasslands and ruderal habitats with suitable burrows, usually those made by California ground squirrels (*Spermophilus beecheyi*).	**Habitat present.** Burrowing owls and evidence of their presence (i.e., whitewash and/or pellets) were within the immediate vicinity of the BSA during focused surveys conducted in 2002 (Sycamore Associates 2002d). Burrowing owls have also been observed in grasslands within 2.0 mi of the BSA, primarily located on properties to the north (Sycamore Associates 2002e, CNDDB 2019). Burrows of California ground squirrels and active ground squirrel colonies were observed during the 2002 habitat assessment of the sites (Sycamore 2002d, e), and were also observed during the 2017 and 2018 surveys. Because suitable breeding and foraging habitat for burrowing owls is present throughout the BSA, particularly in the upland grasslands, burrowing owls may utilize California annual grasslands and portions of abandoned developed/landscaped habitats within the BSA.
Loggerhead shrike (*Lanius ludovicianus*)	CSSC (nesting)	Nests in tall shrubs and dense trees; forages in grasslands, marshes, and ruderal habitats.	**Present.** Suitable foraging habitat for loggerhead shrikes is available throughout the grassland habitat on site, and a loggerhead shrike was observed in the BSA during surveys in 2017 and 2018. Suitable nesting habitat is available within the BSA in isolated shrubs or trees, and up to two pairs of this species may nest in the BSA.
Yellow warbler (*Setophaga petechial*)	CSSC (nesting)	Nests in riparian woodlands, especially dominated by cottonwood (*Populus* spp.), willow (*Salix* spp.), and alder (*Alnus* spp.).	**Habitat Present.** No suitable riparian habitat occurs within the BSA. As migrants, yellow warblers may occur as occasional foragers on the BSA, but are not expected to nest on or adjacent to the BSA.
Yellow-breasted chat (*Icteria virens*)	CSSC (nesting)	Nests in dense stands of willow and other riparian habitat.	**Absent.** No suitable riparian or willow habitat occurs within the BSA. Determined to be absent.
Grasshopper sparrow (*Ammodramus savannarum*)	CSSC (nesting)	Breeds and forages in meadows, fallow fields, and pastures.	**Habitat Present.** Suitable nesting and foraging habitat is present throughout grasslands in the BSA.

Name	*Status	Habitat	Potential for Occurrence in the BSA
Townsend's big-eared bat (*Corynorhinus townsendii*)	CSSC	Roosts in caves and mine tunnels, and occasionally in deep crevices in trees such as redwoods or in abandoned buildings, in a variety of habitats.	**Habitat Present.** No suitably large tree cavities were observed in the BSA. Abandoned buildings within parcel D may provide habitat for individual roosting or breeding Townsend's big eared bats. Therefore, they may occur in the BSA as occasional foragers/dispersants.
Pallid bat (*Antrozous pallidus*)	CSSC	Forages over many habitats; roosts in caves, rock outcrops, buildings, and hollow trees.	**Habitat Present.** Suitable roosting and breeding habitat for individuals or a moderate number of pallid bats may be present in larger trees (if cavities are present) or abandoned buildings in the BSA. Abandoned buildings within parcel D could provide habitat for a medium sized roosting or maternity colony, although no evidence of large numbers of bats was observed during reconnaissance surveys in 2017.
Western red bat (*Lasiurus blossevillii*)	CSSC	Riparian woodlands; riparian obligate that roosts in the foliage of large trees.	**Absent.** The species does not breed in the region and suitable riparian roosting habitat is not available in the BSA.
American badger (*Taxidea taxus*)	CSSC	Burrows in grasslands and occasionally in infrequently disked agricultural areas.	**Habitat Present.** Badgers are not known to occur within the BSA and none were observed during reconnaissance level surveys in 2017. However, badgers have been recorded in the surrounding vicinity (CNDDB 2019; Figure 5). Suitable denning and foraging habitat for badgers is present in the grassland habitats, although badgers are unlikely to den on-site due to the surrounding high levels of human disturbance. Should badgers occur in the BSA, they would most likely represent dispersing or foraging individuals. Nevertheless, there is some potential for badgers to den in the BSA, albeit low.
California Fully Protected Species			
Golden eagle (*Aquila chrysaetos*)	SP	Breeds on cliffs or in large trees (rarely on electrical towers), forages in open areas.	**Habitat Present.** No golden eagle nests are known from the BSA or vicinity and suitably large trees or structures that could support an eagle nest are largely absent from the BSA and surrounding area. In addition, the EACCS models the BSA as potential foraging habitat for the species, but does not model any potential nesting habitat in the vicinity. Thus, golden eagles may occur as occasional foragers on the BSA, but are not expected to nest on or adjacent to the BSA.

Name	*Status	Habitat	Potential for Occurrence in the BSA
White-tailed kite (*Elanus leucurus*)	SP	Nests in trees and forages in extensive grasslands or marshes.	**Present.** White-tailed kites are known to occur in the BSA and were observed during reconnaissance level surveys in 2017. Grassland habitat provides suitable foraging habitat for kites, and isolated trees on site may provide suitable nesting habitat for up to one pair of nesting white-tailed kites.

Special-Status Species Code Designations

FE = Federally listed Endangered

FT = Federally listed Threatened

FC = Federal Candidate for listing

SE = State listed Endangered

ST = State listed Threatened

SC = State Candidate for listing

CSSC = California Species of Special Concern

SP = State Fully Protected Species

In addition to tracking sensitive natural communities, the CDFW also ranks vegetation alliances, defined by repeating patterns of plants across a landscape that reflect climate, soil, water, disturbance, and other environmental factors (Sawyer et al. 2009). If an alliance is marked G1-G3, all the vegetation associations within it will also be of high priority (CDFG 2007). The CDFW provides the Vegetation Classification and Mapping Program's (VegCAMP) currently accepted list of vegetation alliances and associations (CDFW 2019).

Impacts on CDFW sensitive natural communities, vegetation alliances/associations, or any such community identified in local or regional plans, policies, and regulations, must be considered and evaluated under CEQA (Title 14, Division 6, Chapter 3, Appendix G of the California Code of Regulations). Furthermore, aquatic, wetland and riparian habitats are also protected under applicable federal, state, or local regulations, and are generally subject to regulation, protection, or consideration by the USACE, RWQCB, CDFW, and/or the USFWS.

Sensitive Natural Communities. A query of sensitive habitats in Rarefind (CNDDB 2019) identified two sensitive habitats as occurring within a 5-mile radius surrounding the BSA: valley sink scrub (Rank G1/S1.1), and sycamore alluvial woodland (Rank G1/S1.1). Valley needlegrass grassland (Rank G3/S3.1) occurs just outside the 5-mile radius buffer of the study (Figure 4). No valley sink scrub, sycamore alluvial woodland, or valley needlegrass grassland was identified within the BSA during the field surveys.

Sensitive Vegetation Alliances. No vegetation listed by CDFW as a sensitive vegetation alliance occurs in the BSA (CDFW 2019).

Sensitive Habitats (Waters of the U.S./State). The perennial stream, ephemeral stream, perennial marsh, seasonal wetland, mixed riparian woodland, and riparian woodland in the study area may be considered waters of the U.S./state and/or CDFW protected riparian habitats. Any impacts on verified waters of the U.S./state within the study area would require a Section 404 permit from the USACE and Section 401 Water Quality Certification from the San Francisco RWQCB.

5.4 Non-Native and Invasive Species

Several invasive plant species were observed in the BSA, occurring in the California annual grassland and developed/landscaped habitats. Weed species rated as having a moderate high ecological impact or invasive potential by the Cal-IPC (2019) are of particular concern and include fennel, poison hemlock, bull thistle, and black mustard. Soil disturbance (an impact expected from this Project) is often followed by an invasion of the disturbed area by these species.

Section 6. Impacts and Mitigation Measures

The State CEQA Guidelines provide direction for evaluating the impacts of projects on biological resources and determining which impacts will be significant. CEQA defines a "significant effect on the environment" as "a substantial adverse change in the physical conditions which exist in the area affected by the proposed project." Under State CEQA Guidelines Section 15065, a project's impacts on biological resources are deemed significant if the project would:

A. "substantially reduce the habitat of a fish or wildlife species"

B. "cause a fish or wildlife population to drop below self-sustaining levels"

C. "threaten to eliminate a plant or animal community"

D. "reduce the number or restrict the range of a rare or endangered plant or animal"

In addition to the Section 15065 criteria that trigger mandatory findings of significance, Appendix G of State CEQA Guidelines provides a checklist of other potential impacts to consider when analyzing the significance of project effects. The impacts listed in Appendix G may or may not be significant, depending on the level of the impact. For biological resources, these impacts include whether the project would:

E. "have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service"

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

G. "have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act"

H. "interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites"

I. "conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance"

J. "conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan"

6.1 Impacts on Special-Status Species: Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS (Less than Significant with Mitigation)

6.1.1 Impacts on Special-Status Plants (Less than Significant with Mitigation)

Focused rare plant surveys completed on June 29, 2018 confirmed the presence of Congdon's tarplant on the BSA, and the occurrence was mapped as polygon and point features for the purposes of impact assessment (Figure 3). Approximately 77,000 plants distributed over approximately 8.2 ac were observed in the seasonal wetlands along the southern edge of the BSA near the intersection of Fallon and Croak Road and extending in lower densities to the north. Smaller numbers occurred in scattered areas to the west of the main population (Figure 3).

Neither San Joaquin spearscale nor prostrate vernal pool navarretia were observed during the March 2017 reconnaissance survey or April - June 2018 focused rare plant surveys. The CNDDB record (CNDDB 2019, Occurrence #61) for the prostrate vernal pool navarretia occurrence recorded from the BSA indicates that the species was found in seasonal wetlands near the Fallon/Croak Road junction, in a "vernal mud depression". The San Joaquin spearscale detected by Sycamore and Associates (2002a) was mapped outside the Project footprint in the southern area of parcel A.

As hydrology has shifted on the site over the past 8-10 years, conditions may have been less suitable for these two species and germination may have been suppressed, but as the navarretia was last observed in the BSA in 2010 (CNDDB 2019) and San Joaquin spearscale was observed in the BSA in 2002 (Sycamore and Associates 2002a) and is known to have a long-lived seed bank, it is assumed both species may still be present within the BSA as seed banks. Because both of these species are adapted to alkaline wetlands, it is very likely the seed banks do not extend into the Project footprint, as alkalinity lessens to the north in parcel A, outside the Clear Lake clay soils. The maximum extent of the anticipated seed bank distribution of either species, based on habitat suitability, would be the northernmost extent of the Congdon's tarplant that was mapped on the site (Figure 3). It is unlikely that seed banks for either species exist in the Project footprint, but if either does, the impact analysis for Congdon's tarplant will serve as a reasonable proxy for potential impacts to either species' seed banks, if such impacts occur.

The project will have up to 0.45 ac of direct and indirect temporary impacts to Congdon's tarplant and its seed bank (and seed banks of San Joaquin spearscale or prostrate vernal pool navarretia, if these occur in the Project footprint). This could directly affect up to approximately 400 Congdon's tarplant individuals and indirectly affect up to 2,000 plants within 50 feet of the direct impact area, though it should be noted that annual plant populations fluctuate over time in response to climate and other factors, and the 77,000 plants estimated to

occur on the site in 2018 was on the higher end of recorded population numbers for this occurrence. Impacts may be as minor as construction access needed to remove the utility line and poles, which would then be located elsewhere, outside of the Congdon's tarplant population.. No permanent impacts are anticipated to occur to this species or to the seed banks of San Joaquin spearscale or prostrate vernal pool navarretia from the Project.

Impacts to these species will or may occur for one or more of the following reasons:

- Direct temporary impacts could include access related impacts such as trampling or crushing of individuals where no ground disturbance related to utility line access occurs.
- Indirect impacts could include alteration of hydrology, or application of dust to foliage of avoided plants from nearby work activities, or a decrease in water quality within wetland areas supporting these species downslope of the Project footprint.

However, all appropriate AMMs listed in the EACCS (Appendix E) for these species and habitats capable of supporting these species will be enacted, which will avoid and minimize most direct and indirect impacts to these special-status species. Implementation of the following mitigation measures will further reduce impacts on Congdon's tarplant and the other special-status plants that have seed banks that may overlap the project footprint to a less-than-significant level.

Mitigation Measure 1. Implement Avoidance Buffers and Minimize Indirect Impacts to Avoided Plants. To the extent feasible, the Project will avoid all occupied habitat for Congdon's tarplant (which is also potential seed bank area for San Joaquin spearscale or prostrate vernal pool navarretia) plus a 50-ft buffer. This avoidance has been depicted on Figure 3, except in the utility relocation area. The Project will implement General Construction Permit conditions for dust control, such as watering, and control of stormwater and dust-control water on the site during construction. Following construction, water quality will be protected in downslope habitats through implementation of stormwater treatment features such as bioswales or other C.3-approved measures allowed by the MRP.

The mapped Congdon's tarplant (which also serves as a conservative proxy for the maximum potential impacts to seedbanks of for San Joaquin spearscale or prostrate vernal pool navarretia) will be clearly shown on all plans. Avoided plants and a buffer of at least 50 ft will be clearly protected from the active work areas through installation of environmental sensitive area fencing to prevent inadvertent access. The work area for the utility line will be similarly bounded by environmental sensitive area fencing. The placement of the fencing shall be overseen by a qualified plant ecologist.

Mitigation Measure 2. Utility Line Re-location. The utility line shall be relocated to the proposed ROW north of, and outside the Congdon's tarplant population, which will avoid and minimize impacts to the Congdon's tarplant, its seedbank and potentially co-occurring seedbanks for San Joaquin spearscale or prostrate vernal pool navarretia. . Work to remove the current line will proceed using the least impactful equipment necessary to minimize crushing, soil compaction, and erosion.

Mitigation Measure 3. Compensatory Mitigation. Following impacts, to track recovery of the temporarily impacted population, the actual area of impacts will be mapped and then will be monitored for at least 3 years by a qualified plant ecologist. Prior to impacts, a reference area to the south, outside the project footprint and of a similar size and similar density of tarplant to the area to be impacted, will be identified and used as a reference area. Objectives during the monitoring will include removing any weed populations that may have become introduced due to disturbance, and to encourage grazing that benefits the tarplant. By year 3, if the Congdon's tarplant density within the impacted area is not at least 50% of the reference area, or if there is more than 5% cover of Cal-IPC high or moderate ecological impact invasive plants within the recovery area (not including common non-native grasses that dominate the surrounding habitats), the portion of the population impacted by the Project will be considered permanently impacted and the Project will then be required to mitigate for the impacts as per the EACCS, which would require preservation in perpetuity and management per EACCS guidelines of a similar-sized area and number of plants at a 5:1 ratio.

6.1.2 Impacts on the California Red-Legged Frog and California Tiger Salamander (Less than Significant with Mitigation)

The USFWS listed the California red-legged frog as threatened in 1996, due to continued habitat degradation throughout the species' range and population declines (USFWS 1996). It is listed by the CDFW as a California species of special concern. Critical habitat was most recently designated in 2010 (USFWS 2010) and approximately 33.95 acres of the BSA are located within the designated critical habitat for the California red-legged frog (Figure 5). The California tiger salamander was listed as threatened under the FESA throughout its range by the USFWS on August 4, 2004 (USFWS 2004) and was listed as threatened under the CESA by the CDFW on August 19, 2010. Critical habitat for the California tiger salamander was designated in August 2005 (USFWS 2005b). The BSA is not located within designated critical habitat for this species.

The EACCS maps areas within the BSA as potential upland and movement habitat for the California red-legged frog and potential upland habitat for the California tiger salamander. Based on prior surveys of the BSA, and on CNDDB records, these species are known to occur within the immediate vicinity of the BSA. A site assessment and a focused survey for breeding California red-legged frogs, conducted in 2001 on parcels A, D, E, F, and G (Figure 2) failed to detect any red-legged frogs, although the quarry pond north of the Study Area was considered to provide suitable breeding habitat (Sycamore Associates 2001b, 2001c). Additional surveys conducted in 2003 detected an adult California red-legged frog at the head of an unnamed drainage immediately north of the BSA (H. T. Harvey & Associates 2006). Cottonwood Creek also provides potentially suitable foraging and dispersal habitat for the red-legged frog within the BSA.

A site assessment and focused surveys for breeding California tiger salamanders, conducted from 2001 through 2003, detected several adult tiger salamanders within the immediate vicinity of the BSA (Sycamore Associates 2001a, 2003). In addition, larval tiger salamanders were detected within the quarry pond, located approximately 0.15 mi north of the BSA in 2003, but not in 2001. Thus California tiger salamanders may breed in close proximity to the Project, at least in some years.

Numerous additional records of California red-legged frogs and California tiger salamanders occur within ponds, intermittent streams, and their tributaries in the Project vicinity, including breeding records in ponds located in close proximity to the BSA (H. T. Harvey & Associates 2001, Sycamore 2001b, CNDDB 2019). Many of these ponds have been altered or removed by development of the surrounding properties, reducing or eliminating their suitability for breeding red-legged frogs and tiger salamanders. Nevertheless, some of these areas, including a retention basin located 0.16 mi north of the BSA along Fallon Road, may still provide suitable breeding habitat for red-legged frogs and tiger salamanders.

The California annual grasslands in the BSA support California ground squirrels and Valley pocket gophers; the burrows of both of these animals can provide suitable refugia for red-legged frogs and tiger salamanders (Jennings and Hayes 1994). Ground squirrel and gopher burrows were observed on the hillslopes in the northern portion of the BSA, and in disturbed areas within and near the BSA during reconnaissance level surveys. Mammal burrows were scarce in the lower elevation flats of the Study Area, likely due to the wet conditions in these low-lying areas. Perennial and ephemeral stream, perennial marsh, and seasonal wetland habitats in the BSA may provide suitable dispersal and foraging habitat for both species, but the marsh and wetland habitats in the BSA do not pond deep enough to provide suitable breeding habitat for either species, and the on-site creeks do not provide pools suitable for use by breeding California red-legged frogs (California tiger salamanders are not expected to breed in any of the creeks).

Construction activities associated with the Project could result in the direct loss and indirect disturbance of California red-legged frogs and California tiger salamanders and their habitats. The Project could impact individual red-legged frogs and tiger salamanders as a result of:

- direct mortality during construction as a result of trampling by construction personnel or equipment;
- increased mortality due to roadkill caused by the construction and vehicular use in and around the vicinity of the Project;
- direct mortality from the collapse of underground burrows, resulting from soil compaction; and
- direct mortality or loss of suitable habitat resulting from the loss of dispersal habitat and refugia.

No known or potential California red-legged frogs or California tiger salamander breeding habitat would be directly or indirectly impacted by the Project's construction activities, as no breeding habitat is present in or downslope from the BSA, even in the areas designated as critical habitat for the frog. Nevertheless, in the event that either species were to attempt breeding in pools in the BSA, construction could also potentially impact these species through mortality of eggs or larvae if dewatering of pools was not avoided.

The Project could result in direct and indirect impacts to as much as 193.29 ac of non-breeding habitat, including perennial stream, perennial marsh, seasonal wetland, ephemeral stream, riparian grassland, mixed riparian woodland, and California annual grassland habitat that may serve as foraging, dispersal or upland refugial habitat for both species.

Permanent Direct Impacts. Approximately 22.70 ac of potential California tiger salamander foraging, dispersal, and upland refugial habitat would be permanently lost due to the construction of pavement and other hardscape in areas that currently provide natural habitat that may be used by California tiger salamanders. Approximately 22.70 ac of potential California red-legged frog foraging, dispersal and upland refugial habitat would be permanently lost due to the construction of pavement and other hardscape in areas that currently provide natural habitat that may be used by the California red-legged frog. Of this permanent impact acreage, approximately 11.44 ac is considered California red-legged frog critical habitat.

Permanent Indirect Impacts. Approximately 133.47 ac of potential California red-legged frog and California tiger salamander foraging, dispersal, and upland refugial habitat south of the new road, in areas that would not be directly impacted by construction related activities for the Project, may be indirectly but permanently impacted as a result of being disconnected from breeding sites north of the new road. Although the habitat in these areas would continue to be ostensibly suitable for use by California red-legged frogs and California tiger salamanders following road construction (at least unless and until this habitat is developed in the future), individual frogs and salamanders associated with breeding habitat north of the road would no longer be able to use the habitat between the new road and I-580, therefore representing an effective loss of habitat. In the unincorporated Alameda County portion of the Project, no future development is currently envisioned for the lands between the new road and I-580, and the use of a free-span bridge over Cottonwood Creek would allow California red-legged frogs and California tiger salamanders to continue to move back and forth under the new road between aquatic habitat to the north and the Alameda County portion of the Study Area (Parcel I, Figure 2).

Temporary Direct Impacts. Approximately 37.12 ac of potential California red-legged frog and California tiger salamander habitat will be impacted by being used for construction access and staging while the Project is being constructed or by grading (cut/fill) activities as part of the Project. Areas used for construction access and staging during construction would be subject to grading but would not be paved or otherwise permanently altered. These areas are expected to provide habitat of similar quality to existing conditions shortly (i.e., in less than one year) after the completion of construction. Of this temporary impact acreage, approximately 22.52 ac is considered California red-legged frog critical habitat.

Due to the rarity of these species, project-related impacts on individual California red-legged frog and/or California tiger salamander or their habitat would be considered significant (Criteria D and E) under CEQA.

The Project will employ the general and species-specific AMMs detailed in the EACCS and the General Minimization Measures listed in the Programmatic Biological Opinion (PBO) for the EACCS to protect special-status amphibians. These AMMs are listed in Appendix E. Types of AMMs include general measures that apply to all work, activity-specific measures designed to address anticipated effects of certain work activities or particular types of resources, and standard best management practices (BMPs). The following measures are the AMMs prescribed by the EACCS that pertain to the California red-legged frog and California tiger salamander, and that will be incorporated into the Project. The description of each measure is verbatim from the EACCS,

except for some measures where we have added italicized text in square brackets to indicate more specifically how the project will implement those measures.

Implementation of Mitigation Measures 4 and 5 will reduce project impacts on the California red-legged frog and California tiger salamander due to habitat loss and impacts on individuals to a less-than-significant level. Implementation of Mitigation Measure 17 (see Impact 6.3.2 below) will reduce project impacts on these species' habitats resulting from invasive weeds.

Mitigation Measure 4. Implement EACCS Measure AMPH-2.

- A qualified biologist will conduct pre-construction surveys prior to activities. If individuals are found, work will not begin until they are moved out of the construction zone to a USFWS/CDFW approved relocation site.
- A USFWS/CDFW-approved biologist should be present for initial ground disturbing activities.
- If the work site is within the typical dispersal distance (contact USFWS/CDFW for latest research on this distance for species of interest) of potential breeding habitat, barrier fencing will be constructed around the worksite to prevent amphibians from entering the work area. Barrier fencing will be removed within 72 hours of completion of work. [*The Project area is known to be within dispersal distance of potential breeding habitat for California red-legged frog and California tiger salamander, and therefore barrier fencing consisting of silt fence and orange construction zone fencing will be installed on the northern and southern boundaries of the Project area where construction activities border grassland habitat. The barrier fencing will be at least 3 ft high and the lower 6 inches of the fence will be buried in the ground to prevent animals from crawling under. The remaining 2.5 ft will be left above ground to serve as a barrier for animals moving on the ground surface.*]
- No monofilament plastic will be used for erosion control.
- Construction personnel will inspect open trenches in the morning and evening for trapped amphibians.
- A qualified biologist possessing a valid FESA Section 10(a)(1)(A) permit or USFWS-approved under an active biological opinion, will be contracted to trap and to move amphibians to nearby suitable habitat if amphibians are found inside a fenced area. [*No trapping, such as the use of upland traplines for California red-legged frogs or California tiger salamanders, is proposed for this Project. However, a biologist approved by the USFWS under the Project's Biological Opinion and by the CDFW under the Project's ITP will survey for and relocate any individuals found within the impact area. The applicant will prepare a relocation plan for the Project to be reviewed and approved by the USFWS and CDFW prior to the onset of construction.*]
- Work will be avoided within suitable habitat from 15 October (or the first measurable fall rain of 1 inch or greater) to 1 May.

Mitigation Measure 5. Compensatory Mitigation for California Red-legged Frog and California Tiger Salamander Habitat. Compensatory mitigation for the permanent direct or indirect loss of California red-legged frog and California tiger salamander habitat would be required in accordance with the

measures outlined in Tables 3-7 and 3-8 of the EACCS (ICF International 2010). The ratio of mitigation to impact varies with the location of the proposed mitigation, and would be 2.5:1 at minimum, but may be as high as 4:1 (on an acreage basis). Mitigation will take the form of purchase of mitigation credits from a mitigation bank or project specific mitigation, or other mitigation plan as approved by the USFWS and CDFW in the Project's permits (see below for specific requirements on mitigation for wetland, stream, and riparian habitats).

6.1.3 Impacts on the Tricolored Blackbird (Less than Significant with Mitigation)

The tricolored blackbird was given threatened status under the California Endangered Species Act on April 19, 2018. The species' populations have declined significantly in recent years due to habitat loss, shooting to protect crops, pesticide use, and annual losses of nests and nesting habitat thorough agricultural harvests (Center for Biological Diversity 2015).The EACCS maps portions of the BSA as foraging habitat for the tricolored blackbird. Suitable foraging habitat for the tricolored blackbird occurs in the perennial marsh, seasonal wetlands, and California annual grassland habitats on parcel A. Breeding tricolored blackbird colonies require dense stands of emergent vegetation. Until recently, the perennial marsh habitat on the Tseng parcel supported dense stands of cattails (*Typha* sp.) in most years. Recent diversion of flows away from this marsh have reduced the amount of emergent vegetation; however, such vegetation is expected to return if flows are reestablished.

Earlier surveys reported a tricolored blackbird breeding colony in the quarry pond located on parcel D in 1999 (WRA 2004). However, emergent vegetation within the pond has been greatly reduced by grazing since the time of this observation (WRA 2004), and no tricolored blackbirds or appropriate nesting habitat were observed at the quarry pond during reconnaissance level surveys in March 2017.

Tricolored blackbirds have been observed recently (from 2011 to 2014) on parcel A (Cornell Laboratory of Ornithology 2018). The majority of these observations were of isolated individuals in the non-breeding season. However, up to 50 tricolored blackbirds have been observed in the seasonal wetlands just south of the Project footprint during the breeding season (Cornell Laboratory of Ornithology 2018). Because tricolored blackbirds have been recorded breeding in the Project vicinity in the past, and have been observed in the BSA in recent years, there is some potential that a tricolored blackbird breeding colony could occur in the perennial marsh on-site if flows sufficient to maintain perennial marsh are reestablished and dense stands of cattails regenerate.

The tricolored blackbird is not expected to nest in the BSA under current conditions. However, if nesting habitat were to improve prior to Project initiation, there is some potential for the loss of suitable nesting habitat, loss of active nests, and/or disturbance of active nests (possibly causing the abandonment of eggs or young) as a result of construction activity. In addition, the Project will result in the permanent loss of approximately 22.70 ac of potential tricolored blackbird foraging habitat due to the construction of pavement and other hardscape and temporary impacts to approximately 54.25 ac of potential tricolored blackbird foraging habitat that will be used for construction access and staging while the Project is being constructed or by grading (cut/fill) activities as part of the Project.

Due to the rarity of this species, project-related impacts on tricolored blackbird and/or their habitat would be significant (Criteria D and E) under CEQA. Because the hydrology on site appears to have undergone several changes in recent years, there is some potential for dense stands of cattails to regenerate on the Project footprint. Thus, the following mitigation measures will be implemented to avoid impacts to a nesting colony of tricolored blackbirds. Implementation of Mitigation Measures 6 and 7 will reduce project impacts on the Tricolored Blackbird due to habitat loss and impacts on individuals to a less-than-significant level.

Mitigation Measure 6. Preconstruction Surveys for Tricolored Blackbird. If work is initiated within the nesting season (i.e., February 1 to August 31), then a preconstruction survey for an active nesting colony of tricolored blackbirds shall be conducted within all perennial marsh and seasonal wetland habitats on and within 250 ft of the Study Area).

Mitigation Measure 7. Implement EACCS Measure BIRD-3. If an active nest colony is identified within 250 ft of a proposed work area, work within 250 ft of the colony will be conducted outside of the nesting season (March 15 to September 1).

6.1.4 Impacts on the Western Pond Turtle (Less than Significant with Mitigation)

The western pond turtle (a California species of special concern) are known to occur within Cottonwood Creek north of the BSA (CNDDB 2019). Within the BSA, suitable habitat occurs within the reaches of Cottonwood Creek, the unnamed tributary along Croak Road, and within upland areas near these features. However, the low flow channel in the reach of Cottonwood Creek in the BSA are typically shallow and deeply cut, and lack suitable basking sites and food resources for western pond turtles. Similarly, the unnamed tributary is typically no more than a few inches deep, largely precluding its use by pond turtles, except for movement between habitats. The quarry pond located north of the BSA provides more suitable habitat for pond turtles, although no pond turtles have been reported at that pond despite extensive aquatic surveys of the pond for California red-legged frogs and California tiger salamanders (Sycamore Associates 2001a-c, 2003). These surveys reported aquatic wildlife observed within the quarry pond during sampling, and no observations of western pond turtles were described.

Nevertheless, potentially suitable habitat for the species is present within the BSA. Thus western pond turtles may occur within the BSA, primarily in aquatic habitats but possibly nesting in upland areas. Based on the absence of prior records from the immediate BSA, the occurrence of this species is expected to be infrequent.

There is a low probability that individual western pond turtles would be directly impacted by this Project. If a turtle or nest were to be present in the site when construction occurs, there is some potential for the turtle or eggs to be crushed by personnel or equipment during Project work. Implementation of the measures indicated below would minimize impacts to individuals of this species.

Mitigation measures implemented as described above in order to protect the California red-legged frog and California tiger salamander; compliance with the MRP and Construction General Permit, as well as standard

CDFW permit conditions; and implementation of the General Minimization Measures listed in the PBO for the EACCS (Appendix E) will avoid potential deleterious impacts on western pond turtles within and downstream of the site. Implementation of Mitigation Measures 4 and 5 described above for California red-legged frog and California tiger salamander would reduce impacts on western pond turtle individuals and/or their habitat to a less-than-significant level.

6.1.5 Impacts on the San Joaquin Kit Fox (Less than Significant with Mitigation)

The San Joaquin kit fox is the largest subspecies of the kit fox, the smallest canid species in North America. The San Joaquin kit fox was listed as endangered by the USFWS in 1967 and by the State of California in 1971. San Joaquin kit foxes are not known to occur on or in the vicinity of the BSA. Focused surveys for San Joaquin kit fox were conducted on parcels A, D, and E in 2002 (Figure 2). Monitoring of suitably sized burrows with remote cameras and tracking media failed to detect any evidence of kit fox use of these areas (Sycamore Associates 2002c, Sycamore Associates and Townsend 2002a, b). Extensive surveys of the east Dublin and north Livermore areas were conducted in the 1990s. These surveys detected only a single kit fox, at a location approximately 5 mi northeast of the BSA along Morgan Territory Road (H. T. Harvey & Associates 1997c, d). With the exception of the Morgan Territory Road detection, none of the surveys conducted by H. T. Harvey & Associates in eastern Dublin and northern Livermore have detected kit foxes, and all available data indicate that the current range of the San Joaquin kit fox does not extend as far south/west as the Dublin Boulevard area (H. T. Harvey & Associates 1997d-f, CNDDB 2019). We therefore consider the likelihood of kit foxes occurring in the BSA to be extremely low.

Nevertheless, the San Joaquin kit fox is predicted to occur in the Project BSA and in surrounding areas by the EACCS habitat model for the species (ICF International 2010). According to this habitat modeling, the BSA is located on the extreme northwestern edge of the current range of the kit fox. Grasslands in the BSA and undeveloped lands to the north offer moderately suitable habitat for kit foxes, but populations of coyotes, a natural predator of kit foxes, are high in the area. The BSA offers suitable foraging habitat for dispersing individuals, as it is contiguous with large areas of annual grasslands that fall within the range of the species. However, the lack of recent records in the general vicinity and the high levels of human disturbance associated with dense urban development in the surrounding properties suggest that the probability of San Joaquin kit fox utilizing the BSA is extremely low.

Because California annual grasslands in the BSA offer ostensibly suitable foraging and denning habitat for kit foxes, and because an individual has been detected to the northeast, we cannot rule out the possibility that individual kit foxes may occur on-site. If the species were to be present, it would likely occur only as a rare and irregular dispersant, and it is not expected to den on-site due to existing high levels of human disturbance.

If a kit fox were to be present in the site when construction occurs, there is some potential for a kit fox to be struck by a vehicle or equipment during Project work. Due to the rarity of this species, project-related impacts on individual kit fox would be considered significant (Criteria D and E) under CEQA. Implementation of the

Mitigation Measures 8 and 9 would minimize impacts to individuals of this species, in the unlikely event that one occurs on site.

Mitigation Measure 8. Preconstruction Surveys for San Joaquin Kit Fox. In order to avoid the take of individual San Joaquin kit fox, should one occur on the Study Area, the following measures will be implemented. A preconstruction survey of the Study Area for San Joaquin kit fox and their dens by a qualified biologist prior to the start of construction activities. In the unlikely event that the species is detected during the preconstruction survey, avoidance of impacts to occupied kit fox dens will be implemented per the *Standardized Recommendations For Protection Of The San Joaquin Kit Fox Prior To Or During Ground Disturbance* (USFWS 1999) and EACCS Measure MAMM-1. In addition, implementation of the General Minimization Measures listed in the PBO for the EACCS (Appendix E) will further avoid impacts.

Mitigation Measure 9. Implement Avoidance Measure EACCS Measure MAMM-1. If potential dens are present, their disturbance and destruction will be avoided.

If potential dens are located within the proposed work area and cannot be avoided during construction, a qualified biologist will determine if the dens are occupied or were recently occupied using methodology coordinated with the USFWS and CDFW. If unoccupied, the qualified biologist will collapse these dens by hand in accordance with USFWS procedures (USFWS 1999).

Exclusion zones will be implemented following USFWS procedures (USFWS 1999) or the latest USFWS procedures available at the time. The radius of these zones will follow current standards or the following standards listed in the PBO for the EACCS:

- Potential Den— A total of 4-5 flagged stakes will be placed 50 feet from the den entrance to identify the den location;
- Known Den— Orange construction barrier fencing will be installed between the construction work area and the known den site at a minimum distance of 100 feet from the den. The fencing will be maintained until all construction-related disturbances have been terminated. At that time, all fencing will be removed to avoid attracting subsequent attention to the den;
- Natal or Pupping Den— The Service will be contacted immediately if a natal or pupping den is discovered at or within 200 feet from the boundary of the construction area.

Pipes will be capped and trenches will contain exit ramps to avoid direct mortality while construction areas are active.

6.1.6 Impacts on the Burrowing Owl and American Badger (Less than Significant with Mitigation)

Burrowing owls and American badgers are California species of special concern. Burrowing owls are also protected by the MBTA and the California Fish and Game Code, which prohibit take of individuals (including active nests).

The EACCS models areas within the Study Area as potential habitat for the burrowing owl and American badger. Burrowing owls and evidence of their presence (i.e., whitewash and/or pellets) were detected in the Study Area during focused surveys conducted in 2002 (Sycamore Associates 2002d). Burrowing owls have also been observed in grasslands within 2.0 mi of the Study Area, primarily located on properties to the north (Sycamore 2002e, CNDDB 2019), although no more recent observations of burrowing owls have been recorded. Burrows of California ground squirrels and active ground squirrel colonies were observed during the 2002 habitat assessment of the sites (Sycamore 2002d,e), and were also observed in our 2017 reconnaissance level surveys. These burrows were located primarily in the hills and disturbed areas near abandoned farm buildings. Very few burrows were present in the flat lowlands that constitute the majority of the BSA. Parts of those areas are saturated with water in the winter months, precluding ground squirrel presence. Nevertheless, these areas provide potential foraging habitat for burrowing owls. Because suitable breeding and foraging habitat for burrowing owls is present throughout the BSA, particularly in the upland grasslands, burrowing owls may utilize California annual grasslands and portions of abandoned developed/landscaped habitats within the BSA.

No American badgers or potential badger dens were observed in the BSA during the reconnaissance-level survey. Badgers are not known to occur on-site, but have been recorded in the surrounding vicinity (CNDDB 2019; Figure 5). Suitable denning and foraging habitat for badgers is present in grassland habitats, although badgers are unlikely to den on-site due to the surrounding high levels of human disturbance. Should badgers occur in the BSA, they would most likely represent dispersing or foraging individuals. Nevertheless, there is some potential (albeit low) for badgers to den in the BSA.

The number of burrowing owls and American badgers that could potentially occur in the Project footprint is low due to the lack of burrows observed on the majority of the BSA. However, individuals could potentially be present in burrows within and nearby the Project footprint when Project activities occur. Construction activities associated with the Project could result in the direct loss and indirect disturbance of burrowing owls and American badgers and their habitats. The Project could impact individual burrowing owls and American badgers as a result of:

- direct mortality during construction as a result of collision with by construction vehicles or equipment;
- increased mortality due to roadkill caused by the construction and vehicular use in and around the vicinity of the Project;

- direct mortality from the collapse of underground burrows, resulting from soil compaction;
- direct mortality or loss of suitable habitat resulting from the loss of breeding, foraging, or dispersal habitat; and
- loss of eggs (in the case of burrowing owls) or young (in the case of either species) as a result of abandonment of occupied nests/dens due to construction-related disturbance.

The Project could result in permanent or temporary impacts to as much as 76.95 ac of habitat, including all undeveloped habitat types that will be impacted, that may serve as foraging, dispersal, or refugial habitat, and possibly nesting/denning habitat, for burrowing owls or American badgers. Two categories of habitat impacts were identified:

Permanent impacts. Approximately 22.70 ac of potential burrowing owl and American badger habitat would be permanently lost due to the construction of pavement and other hardscape in areas that currently provide natural habitat that may be used by burrowing owls or American badgers.

Temporary impacts. Approximately 54.25 ac of potential burrowing owl and American badger foraging habitat would be used for construction access and staging while the Project is being constructed or will be impacted by grading (cut/fill) activities as part of the Project. Areas used for construction access and staging during construction would be subject to grading but would not be paved or otherwise permanently altered. These areas are expected to provide habitat of similar quality to existing conditions shortly (i.e., in less than one year) after the completion of construction.

No recent breeding records for either burrowing owls or American badgers were found in CNDDB (2018) records, and it is highly unlikely for badgers to den on site. However, there is some potential for portions of the Study Area to serve as breeding habitat for these species, and these areas may be permanently or temporarily impacted as described above.

In summary, if not avoided and minimized, the Project could have substantial effects on burrowing owl and/or American badger. Due to the rarity of these species, project-related impacts on individual burrowing owl and/or American badger and/or their habitat would be considered significant (Criteria D and E) under CEQA.

Implementation of the General Minimization Measures listed in the PBO for the EACCS (Appendix E) will minimize impacts to this species and its habitat. Further, implementation of Mitigation Measures 10-12 will reduce project impacts on the burrowing owl and American badger due to habitat loss and impacts on individuals to a less-than-significant level.

Mitigation Measure 10. Preconstruction Surveys for Burrowing Owls and American Badgers. Conduct preconstruction surveys for nesting burrowing owls and denning American badgers. As feasible, all suitable habitat within 0.5 mi of the Project footprint shall be surveyed for nesting burrowing owls and for American badgers. The survey should be conducted during the owl's nesting season, defined by the

EACCS as March 15 to September 1. The survey shall be conducted by a qualified biologist prior to the start of construction. This survey shall consist of two or more site visits, with the biologist examining all potential burrows within 0.5 mi, as access permits, for signs of nesting burrowing owls (i.e., owls, pellets, feathers, and/or whitewash) and for American badger dens.

Should burrowing owls or American badgers be discovered on or near the BSA, avoidance of disturbance to the burrow or den will be conducted per EACCS Measure BIRD-2 below, or EACCS Measure MAMM-1 (above under *San Joaquin Kit Fox*), as appropriate.

Mitigation Measure 11. Implement EACCS Measure BIRD-2.

- If an active burrowing owl nest is identified near a proposed work area, work will be conducted outside of the nesting season (March 15 to September 1).
- If an active nest is identified near a proposed work area and work cannot be conducted outside of the nesting season, a no-activity zone will be established by a qualified biologist. The no activity zone will be large enough to avoid nest abandonment and will at minimum be 250-ft radius from the nest.
- If burrowing owls are present at the site during the non-breeding period, a qualified biologist will establish a no-activity zone of at least 150 ft.
- If an effective no-activity zone cannot be established in either case, an experienced burrowing owl biologist will develop a site-specific plan (i.e., a plan that considers the type and extent of the proposed activity, the duration and timing of the activity, and the sensitivity and habituation of the owls, and the dissimilarity of the proposed activity with background activities) to minimize the potential to affect the reproductive success of the owls.

Mitigation Measure 12. Compensatory Mitigation for Burrowing Owl.

The EACCS identifies burrowing owl nesting habitat as suitable habitat within 0.5 mi of a documented nest occurrence during the previous 3 years, and it recommends compensatory mitigation in the event of any impacts to such habitat. In the event that burrowing owls are found to be nesting on or within 0.5 mi of the Project footprint during preconstruction surveys, or if owls need to be evicted from burrows (which can only occur when they are not actively nesting) to implement the Project, compensatory mitigation will be necessary to mitigate for impacts on occupied burrowing owl habitat. If the California red-legged frog/California tiger salamander habitat mitigation provides suitable habitat for burrowing owls as well, then no additional mitigation for impacts to burrowing owls would be necessary. Otherwise, additional habitat mitigation would be necessary, in the form of purchase of mitigation credits from a mitigation bank or Project specific mitigation in an area that supports such habitat. The EACCS prescribes mitigation ratios of 3:1 to 3.5:1 (mitigation:impact), depending on the location of the mitigation site.

6.1.7 Impacts on Common and Special-Status Bats (Less than Significant with Mitigation)

Several species of bats are known or expected to occur in the region of the Project. Special-status bats include the pallid bat and Townsend's big-eared bat, both of which are considered California species of special concern. In addition to special-status bats, several non-special-status species, such as the Mexican free-tailed bat, hoary bat (*Lasiurus cinereus*) and California myotis occur in the vicinity of the BSA as well. Suitable roosting habitat for several species of common bats (e.g., the Yuma myotis and Mexican free-tailed bat) and for the pallid bat occurs in the buildings in the BSA. Townsend's big eared bat infrequently roosts and forms maternity colonies in abandoned buildings; this species is sensitive to human disturbance, and so is unlikely to occur within the buildings on-site, which are either occupied by humans or located adjacent to high levels of human disturbance (i.e., highway I-580). No CNDDB records exist for any bats in the Project vicinity; however, this does not preclude occurrence of these highly mobile species in the BSA. We were unable to survey the buildings in the BSA for bats because they were occupied at the time of our site visit, or because bulls were present around the unoccupied buildings. Thus, we cannot rule out the possibility that bats may be roosting on-site, or may roost within the BSA in the future.

The Project would result in the removal of a small amount of potential roosting sites for bats (e.g., small stands of mixed riparian woodland habitat or small abandoned buildings such as sheds). Construction activities near potential roosting habitat could flush a small number of roosting bats during daylight hours, which could increase the potential for predation by predatory birds. However, the Project is expected to result in impacts to few such bats, if any. If common species of bats are displaced (e.g., due to demolition), sufficient alternative night-roosting habitat is present that displacement during construction would not result in substantial loss of individuals from local and regional populations.

Project-related disturbance in close proximity to a maternity roost could potentially cause females to abandon their young. Loss of a small to moderate sized maternity roost of common bats (no large roost would be present in any of the trees or structures that may be removed) would not result in a substantial impact on these species as a whole. However, the loss of even a small maternity roost of pallid bats or Townsend's big eared bats could result in population-level impacts to these species given their regional rarity.

Due to the rarity of these species, project-related impacts on individual special-status bats and/or their habitat would be considered significant (Criteria D and E) under CEQA. Implementation of Mitigation Measures 13-16 will reduce project impacts on special-status bats due to habitat loss and impacts on individuals to a less-than-significant level. In addition, implementation of the General Minimization Measures listed in the PBO for the EACCS (Appendix E) will further avoid impacts and are required for all EACCS-compliant projects.

Mitigation Measure 13. Pre-construction Surveys for Bats. A pre-construction/pre-demolition survey for roosting bats will be conducted within 15 days prior to the commencement of any construction activities within 400 ft of trees or buildings providing potential roosting habitat. Such a survey will focus on detecting

bats that may be day-roosting in trees within or immediately adjacent to (i.e., within 100 ft of) the impact areas. The survey will be conducted by a qualified bat biologist. If suitable roost sites are found and a visual survey is not adequate to determine presence or absence of bats (which would be particularly likely in the case of potential roost trees), acoustical equipment will be used to determine occupancy. If no evidence of bat roosts is found, any buildings or trees that contain potential roosting sites and that are proposed for removal will be removed within 15 days following completion of the survey.

Mitigation Measure 14. Avoidance Buffers. If a day roost is found during the maternity season (1 April until the young are flying, typically by 31 August) within 400 ft of the impact areas, a qualified bat biologist (in consultation with the CDFW) will determine the width of a buffer that will be established around the roost. No construction-related activity shall occur within the buffer during the maternity season. Typical buffers recommended between intense construction activity and pallid bat roosts are: 90 ft for motor vehicles and foot traffic, 120 ft for heavy equipment, 150 ft for trenching, 250 ft for idling equipment or generators, 250 ft for shielded lighting, and 400 ft for unshielded lighting (H. T. Harvey & Associates 2016, Johnston et al. 2017). No tree or structure containing a maternity roost will be removed or otherwise physically disturbed during the maternity season.

Mitigation Measure 15. Roost Removal. Outside the maternity season, a day roost may be removed after individual bats are safely evicted under the direction of a qualified bat biologist. Eviction will occur between 1 September and 31 March, but will not occur during long periods of inclement or cold weather (as determined by the bat biologist) when prey are not available or bats are in torpor. If feasible, one-way doors will be used to evict bats. If use of a one-way door is not feasible, or the exact location of the roost entrance is not known, the roosts that need to be removed shall first be disturbed by the bat biologist. Such disturbance will occur at dusk to allow bats to escape during the darker hours. These buildings or trees shall then be removed the following day. All of these activities will be performed under the supervision of the bat biologist.

Mitigation Measure 16. Compensatory Mitigation for Special-status Bats. Compensatory mitigation for impacts on active bat roosts would not be warranted unless a maternity roost of pallid bats or Townsend's big-eared bats will be lost. In this instance, the provision of one or more alternate roost structures would be appropriate to reduce impacts on special-status bat species.

If a pallid bat or Townsend's big-eared bat day roost is located within a tree or building to be removed, an alternative bat roost structure will be provided by the City and its partners. The design and placement of this structure will be determined by a bat biologist, in consultation with the CDFW, based on the location of the original roost and the habitat conditions in the vicinity. The roost structure will be built to specifications as determined by a bat biologist and CDFW, or it may be purchased from an appropriate vendor. The structure will be placed as close to the impacted roost site as feasible. This bat structure will be erected at least one month (and preferably a year or more) prior to removal of the original roost structure. A bat biologist will monitor this structure during the breeding season for up to two years

following completion of the Project, or until it is found to be occupied by bats (whichever occurs first), to provide information for future projects regarding the effectiveness of such structures in minimizing impacts to bats.

6.1.8 Impacts on Special-Status Nesting Birds (Less than Significant with Mitigation)

The white-tailed kite (a state fully protected species), and the loggerhead shrike and grasshopper sparrow (both CSSCs), may nest in the extensive grasslands present on the BSA. These species are assessed together because potential impacts of the Project on these species would be similar. Habitat for the white-tailed kite and loggerhead shrike consists of extensive grasslands interspersed with trees or shrubs, in which these species will nest. Habitat for the grasshopper sparrow consists of extensive grasslands. The grasslands within the BSA provide suitable breeding habitat for white-tailed kites, loggerhead shrikes, and grasshopper sparrows. Mixed riparian woodland habitat also provides suitable nesting habitat for the white-tailed kite and loggerhead shrike. Individual white-tailed kites and loggerhead shrikes were observed during reconnaissance level surveys in March 2017, indicating that these species may nest in the area. No grasshopper sparrows were observed on the BSA during reconnaissance surveys. Because of the relatively large territory requirements of white-tailed kites and loggerhead shrikes, and the rarity of grasshopper sparrows in the region, we would not expect more than two nesting pairs of any of these species to occur within the BSA.

With implementation of the conservation measures described in the Migratory Birds Section (Section 6.5) below, the Project will avoid the potential to cause the death or injury of any migratory bird species, including white-tailed kites, loggerhead shrikes, grasshopper sparrows, or their active nests, eggs, or young.

Suitable habitat is present for the white-tailed kite, loggerhead shrike, and grasshopper sparrow in many areas surrounding the BSA, particularly in the hills north of the BSA, and the Project itself represents a very small fraction of the total breeding habitat available to these species. Furthermore, no more than one or two nests of any of these species are likely to be impacted. Therefore, the Project is not expected to substantially reduce these species' populations or habitats and any Project impacts will be minimal.

However, these bird species, along with other native bird species in the vicinity of the BSA, are protected by both the MBTA and the California Fish and Game Code, which prohibit the take of any individual bird, egg, or nest. This Project will implement measures to avoid and minimize effects (described in Section 6.5 below) to active nests of such protected birds. If any white-tailed kites, loggerhead shrikes, or grasshopper sparrows nest in or near the BSA, these measures will result in the avoidance of effects to these species. In addition, implementation of the General Minimization Measures listed in the PBO for the EACCS (Appendix E) will further avoid impacts.

Implementation of Mitigation Measures 20-24 described below in Section 6.5 will reduce project impacts on special-status nesting birds to a less-than-significant level.

6.1.9 Impacts on Non-breeding Special-status birds (Less than Significant with Mitigation)

The golden eagle (a state fully protected species), and the yellow warbler (a CSSC) are expected to occur only as occasional foraging birds during the nonbreeding season and are not expected to nest in the BSA. These species are assessed together because potential impacts of the Project on these species would be similar.

No nests of the yellow warbler are known from the BSA or surrounding vicinity, and no nests of the golden eagle are known from the BSA but individuals and nests are known from approximately 4.0 mi north, northeast of the BSA (CNDDB 2019; Figure 5). No individuals or nests of these species were observed on the BSA during reconnaissance level surveys, which also determined that the upland within the BSA does not provide suitable breeding habitat for these species.

Because these species are not expected to nest in the BSA, no impacts to nesting pairs of these species will occur. Impacts on the non-developed habitats in the BSA would result in the loss of some foraging habitat and/or prey production areas as well as a temporary impact on foraging individuals through the alteration of foraging patterns (e.g., avoidance of work areas because of increased noise and activity levels during Project activities). However, because the Project would not result in substantial changes to the availability of foraging habitat in the area, the Project is not expected to have a substantial long-term impact on foraging habitat or prey availability. Therefore, this Project would not result in substantial adverse effects on any of these species.

During preconstruction surveys for nesting birds (described in Section 6.5 below), nests for these and all protected species will be searched on and nearby the BSA. Though not expected, should an eagle nest occur on or nearby the BSA, non-disturbance buffers of up to 0.25 mi, or 0.5-mi line-of-sight, may be required during the breeding season, while the nest is active. In addition, implementation of the General Minimization Measures listed in the PBO for the EACCS (Appendix E) will further avoid impacts.

Implementation of Mitigation Measures 20-24 described below in Section 6.5 will reduce project impacts on non-breeding special-status birds to a less-than-significant level.

6.2 Impacts on Sensitive Communities: Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service

The 141.4-ac BSA supports six sensitive and regulated biotic habitats: 1) perennial streams, 2) ephemeral streams, 3) perennial marsh, 4) seasonal wetlands, 5) mixed riparian woodland, and 6) riparian grassland (grassy

areas within floodplain benches and below top-of-bank). As described in Chapter 2, these areas may be considered waters of the U.S./state and may be claimed by the USACE, RWQCB, and/or the CDFW.

Impacts to wetlands, streams, and riparian habitat may be considered significant under CEQA, and thus may require the implementation of measures to avoid and minimize impacts to these sensitive and regulated habitats. Moreover, the USACE, RWQCB, and CDFW all may impose compensatory mitigation requirements for the permanent loss of these habitats in the BSA.

Permanent and temporary impacts to the above mentioned habitats are summarized in Table 2 and discussed in sections 6.2.1, 6.2.2., and 6.3 below. Project impacts on biotic habitats in the 81.3-ac Project footprint are also illustrated on Figure 3. Permanent indirect impacts discussed above in Section 6.1.2 only apply to habitat value for California red-legged frog and California tiger salamander and not to general habitat value for other species or the values of sensitive habitats. Of the 133.47 ac of permanent indirect impact acreage for California red-legged frogs and California tiger salamanders, approximately 17.13 ac of areas south of the proposed road would be considered to comprise only temporary direct impacts for other resources (Figure 3).

Table 2. Habitat and Impact Acreages within the Project Footprint for the Dublin Boulevard Extension Project

	Temporary Impact (ac)	Permanent Impact (ac)	Total (ac)
Sensitive Habitats			
Perennial stream	0.01	0.02	0.03
Ephemeral stream	0.02	0.08	0.10
Perennial marsh	<0.01	0	<0.01
Seasonal wetland	0.33	0.12	0.45
Mixed riparian woodland	0.05	0.11	0.16
Riparian grassland	2.15	0.70	2.85
Subtotal	**2.56**	**1.03**	**3.59**
Non-Sensitive Habitats			
California annual grassland	51.69	21.67	73.36
Landscaped/Developed	2.18	2.17	4.35
Subtotal	**53.87**	**23.84**	**77.71**
Grand Total	**56.43**	**24.87**	**81.30**

6.2.1 Impacts on Riparian Habitat or Other Sensitive Natural Communities (Less than Significant with Mitigation)

Riparian habitats are found along streams, rivers, creeks, and lakes. Riparian habitat can range from dense thickets of shrubs to closed canopy of large mature trees, to non-forested, grassy areas below the top-of-bank and above the OHWMs of streams. Riparian systems have been removed, degraded, and disturbed since the first settlers arrived in California, with losses estimated to be as high as 95% of historical levels. There are 0.33 ac of mixed riparian woodlands and 3.09 acres of riparian grasslands within the top of banks of perennial and ephemeral streams in the BSA (Figure 3).

The Project will comply with the MRP and General Construction permit to prevent increases in peak flow, erosion, or reduction in water quality for downslope waters, which will prevent stream downcutting, riparian bank erosion, or other downstream impacts. All impacts to riparian habitats have been designed to be the minimum necessary. Work areas in riparian areas will be restricted to areas immediately adjacent to permanent impact locations. Access within the outer banks of Cottonwood Creek will be minimized and will not utilize long access paths from top-of-bank to the floodplain below. No equipment will be staged or refueled in the Cottonwood Creek riparian floodplain. Riparian woodland trees along Cottonwood Creek were carefully avoided in the bridge design. Finally, all appropriate AMMs listed in the EACCS (Appendix E) that would apply to and protect these riparian habitats will be enacted.

However, project work will have direct permanent impacts to 0.70 ac of riparian grassland through culverting of streams, construction of the Cottonwood Creek bridge abutments and piers, and grading associated with bridge supports; and 2.15 ac of temporary impacts due to construction access and work within top of bank of the ephemeral and perennial streams. Culverting and installation of structures will cause the Project-related loss of small amounts of this habitat type, while grading will simply permanently alter topography within these areas. Access has the potential to remove vegetation, cause compaction or erosion of soils, and may also include temporary grading that is later restored to pre-Project contours.

Project work will result in 0.11 ac of direct permanent impacts to riparian woodland habitat due to construction of the roadway and removal of approximately 8 red willow trees, and 0.05 ac of temporary impacts related to potential trimming of a large valley oak tree in the Cottonwood Creek corridor to construct the bridge.

Implementation of the avoidance and minimization measures described above as well as Mitigation Measure 17 will reduce impacts due to permanent or temporary disturbance of riparian habitat to a less-than-significant level.

> **Mitigation Measure 17. Compensatory Mitigation for Loss of Riparian Habitat.** The Project shall mitigate permanent loss of riparian habitat types as per the EACCS. Mitigation will be provided via preservation, enhancement, and management as per EACCS guidelines. Because all riparian habitats in the Project footprint provide habitat for focal species, the mitigation ratio for the impacts will be at least 2.5:1 and because these wetland and stream habitats all provide dispersal and foraging habitat for California red-

legged frog and California tiger salamander, the final mitigation ratio must be as high as the determined EACCS requirements for focal species (ICF International 2010, see also Mitigation Measures 1 – 5 for California red-legged frogs and California tiger salamanders, above). Mitigation ratios will vary based on the location and quality of the mitigation lands, which have not been selected yet. Mitigation must be in-kind for mixed riparian woodland impacts but riparian grassland impacts may be mitigated with either grassy or wooded riparian habitat.

Temporary impacts to these habitats shall be restored in place at a 1:1 ratio through re-establishment of original contours along banks, decompaction of compacted soils where necessary, and seeding with a native seed mix developed by a qualified restoration ecologist and containing species such as alkali barley, meadow barley, purple needlegrass (*Stipa purpurea*), and/or other native grass and forb species that occur in the Project vicinity. Temporary impact areas will be monitored for 2 years and the criteria for success will be 75% vegetation cover or more compared to pre-project conditions and no more than 5% cover of Cal-IPC-rated moderate and high impact weed species (excluding Cal-IPC-rated annual grasses).

6.2.2 Impacts Caused by Non-Native and Invasive Species (Less than Significant with Mitigation)

Several non-native, invasive plant species occur in the ruderal California annual grassland and seasonal freshwater wetland habitats located throughout the study area. Invasive species can spread quickly and can be difficult to eradicate. Many non-native, invasive plant species produce seeds that germinate readily following disturbance. Further, disturbed areas are highly susceptible to colonization by non-native, invasive species that occur locally, or whose propagules are transported by personnel, vehicles, and other equipment. Activities such as trampling, equipment staging, and vegetation removal are all factors that would contribute to disturbance. Areas of disturbance could serve as the source for promoting the spread of non-native species, which could degrade the ecological values of wetland habitat and adversely affect native plants and wildlife that occur there. Invasive species can have an adverse effect on native species and habitats in several ways, including by altering nutrient cycles, fire frequency and/or intensity, and hydrologic cycles; by creating changes in sediment deposition and erosion; by dominating habitats and displacing native species; by hybridizing with native species; and by promoting non-native animal species (Bossard et al. 2000).The study area contains invasive species with the potential to invade the sensitive wetland habitats, such as fennel, poison hemlock, bull thistle, and black mustard. These species are located to sensitive wetland habitats, where project activities could cause them to spread further into the wetlands in and adjacent to the study area. Therefore, this impact is considered significant. Implementation of Mitigation Measure 18 will reduce potential weed-related impacts on sensitive habitats and the species they support to a less-than-significant level.

Mitigation Measure 18. Invasive Species Best Management Practices (BMPs). The following BMPs will be implemented to limit the spread of invasive species into sensitive habitats:

- Prior to access to the site, all construction equipment will be washed to prevent the introduction of new infestations. Prior to being used at another construction site, the equipment will be washed again, to prevent spread of invasives from the Project footprint to new locations. If equipment if washed on site, it will be done in such a manner that soil, weed seeds, and other materials are collected and not allowed to drain into avoided areas, or into sensitive and regulated habitats.
- Following proposed Project implementation, native seed from a local source (within the same watershed if practicable) will be planted on all disturbed ground or ground denuded of vegetation by proposed Project activities.

6.3 Impacts on Wetlands: Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (Less than Significant with Mitigation)

Perennial streams, ephemeral streams, perennial marsh, and seasonal wetlands that may be subject to the regulatory jurisdiction of the USACE and RWQCB are present in the study area. Wetlands are relatively scarce regionally, and even small wetland areas make disproportionate contributions to water quality, groundwater recharge, watershed function, and wildlife habitat in the region. Thus, any permanent loss or temporary disturbance of wetland habitat because of the project would be considered significant under CEQA (Criterion G).

There are 10.50 ac of wetlands occurring as seasonal wetlands and perennial marsh, and 0.46 ac of streams, all considered potential waters of the U.S. within the BSA. These comprise 0.07 ac of perennial marsh, which runs parallel to and on the east side of old Fallon Road, and a complex of seasonal wetlands covering 10.43 ac with the largest seasonal wetland patch directly connected to the perennial marsh. Other waters in the BSA include 0.07 ac in four perennial streams, which includes the low flow channel of Cottonwood Creek, and 0.13 ac within three ephemeral streams.

To reduce and avoid impacts to wetlands and jurisdictional waters, the following avoidance and minimization measures will be implemented:

- All impacts to wetlands and waters have been designed to be the minimum necessary. Work areas in wetlands and streams will be restricted to areas immediately adjacent to permanent impact locations.
- The Project has been carefully designed to not interrupt hydrology to wetlands and streams to the south of the proposed road through appropriately sized and placed culverts, and a clearspan bridge over Cottonwood Creek that avoids placement of bridge supports within the OHWMs of the creek.
- The culvert conveying the perennial stream along the east side of the western portion of Croak Road on the western boundary of parcel A has been carefully designed as a native channel bottom, wide box culvert to allow water to flow out into the field wetland complex, as it does today.

- Work within streams and wetlands would be restricted to the dry season from April 15 to October 15 [or as directed by regulatory permitting agency] to protect water quality.
- All appropriate Avoidance and Minimization Measures (AMMs) listed in the EACCS that would apply to and protect these aquatic habitats will be enacted (Appendix E).
- No bioswales or other stormwater infrastructure, or non-critical Project elements such as landscaping, will be placed in wetlands or streams.
- All temporary fills placed in the Cottonwood Creek low-flow channel for construction access will be clean fills (such as clean rock) of a size that can be fully removed from the low-flow channel and the channel then restored to its former topography.

Additionally, the Project applicant will implement BMPs as recommended or required by the State or RWQCB to protect water quality. These measures will include, but are not limited to the following:

- No debris, soil, silt, sand, bark, slash, sawdust, cement, concrete, washings, petroleum products or other organic or earthen material will be allowed to enter into or be placed where it may be washed by rainfall or runoff into waters of the U.S./State or aquatic habitat.
- No equipment will be operated in the live stream channel.
- Equipment staging and parking areas shall occur within established access areas in upland habitat above the top of bank.
- Machinery or vehicle refueling, washing, and maintenance shall occur at least 60 ft from the top-of-bank. Equipment shall be regularly maintained to prevent fluid leaks. Any leaks shall be captured in containers until the equipment is moved to a repair location. A spill prevention and response plan will be prepared prior to construction and will be implemented immediately for cleanup of fluid or hazardous materials spills.
- Standard erosion control and slope stabilization measures will be required for work performed in any area where erosion could lead to sedimentation of a waterbody.
- The Project will comply with the MRP and General Construction permit to prevent increases in peak flow, erosion, or reduction in water quality for downslope waters.

However, the Project will result in direct permanent effects to 0.10 ac and 749 ln ft of stream habitats through culverting of five streams that intersect the proposed road alignment, and placement of fill through grading and road construction. The Project will also result in direct temporary impacts to 0.03 ac of stream habitats due to construction access, movement of equipment and personnel, and a temporary crossing of Cottonwood Creek. The Cottonwood Creek crossing may be clearspan across the low flow channel, or it may be constructed with temporary fill such as rock placed within the OHWMs to create a temporarily culverted access road. Indirect

impacts could include interruption or alteration of hydrology to waters downstream of the Project improvements, or reduction in water quality of downstream waters, if not avoided.

The Project activities will also result in 0.12 ac of direct permanent impacts to seasonal wetlands (including 249 ln ft of in-channel seasonal wetlands) as a result of pavement or road construction and 0.33 ac of direct temporary impacts to perennial marsh (<0.01 ac) and seasonal wetlands (0.33 ac) in the BSA due to grading and construction access

Implementation of the avoidance and minimization measures, choice of design alternatives to avoid and minimize impacts both at crossing areas and downstream of these crossings, and Mitigation Measure 19 will reduce impacts due to permanent or temporary disturbance of wetlands and waters to a less-than-significant level.

Mitigation Measure 19. Compensatory Mitigation for Loss of Waters and Wetlands. The Project will mitigate permanent loss of waters and wetlands as per the EACCS. Mitigation will be provided via preservation, enhancement, and management as per EACCS guidelines, with ratios set on ln ft of permanent impacts to streams and on area of permanent impacts for wetlands. This may be purchased as bank credits or managed as a project-specific mitigation site. Because all wetland and stream habitats in the Project footprint provide habitat for focal species, the mitigation ratio for the impacts will be at least 2.5:1 and because these wetland and stream habitats all provide dispersal and foraging habitat for California red-legged frog and California tiger salamander, the final mitigation ratio must be as high as the determined EACCS requirements for focal species (ICF International 2010, see also California red-legged frogs and California tiger salamanders, below). The required mitigation ratio will vary based on the location and quality of the mitigation lands, which have not been selected yet. Additionally, compensatory mitigation for wetlands and waters must be provided in-kind (wetlands for wetlands and streams for streams).

Temporary impacts to these habitats will be restored in place at a 1:1 ratio through re-establishment of original contours in stream channels and wetlands, decompaction of compacted soils where necessary, and seeding with a native wetland seed mix developed by a qualified restoration ecologist containing species such as alkali barley and Mexican rush. Temporary impact areas will be monitored for 2 years and the criteria for success will be 75% vegetation cover or more compared to pre-Project conditions and no more than 5% cover of Cal-IPC-rated moderate and high impact weed species (excluding Cal-IPC-rated annual grasses.

6.4 Impacts on Wildlife Movement: Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with

established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites (Less than Significant with Mitigation)

For many species, the landscape is a mosaic of suitable and unsuitable habitat types. Environmental corridors are segments of land that provide a link between these different habitats while also providing cover. Development that fragments natural habitats (i.e., breaks them into smaller, disjunct pieces) can have a twofold impact on wildlife: first, as habitat patches become smaller they are unable to support as many individuals (patch size); and second, the area between habitat patches may be unsuitable for wildlife species to traverse (connectivity).

The road Project is within a cul-de-sac of upland grassland habitat between development to the west and east and I-580 to the south. This habitat is thus not considered a movement corridor for wildlife between more suitable habitats outside of the Study Area. However, the road Project will disconnect upland habitat south of the Project from that to the north, effectively resulting in the loss of the ability of California red-legged frogs and California tiger salamanders associated with aquatic habitat north of the new road to use habitat between the new road and I-580. Thus, the City of Dublin will provide compensatory mitigation for both direct (construction-footprint) and indirect (south of the new roadway) California red-legged frog and California tiger salamander habitat loss, using the EACCS mitigation scoresheet so that California red-legged frog and California tiger salamander mitigation will be provided appropriately. In the unincorporated Alameda County portion of the Project no future development is currently envisioned for the lands between the new road and I-580, and the use of a free-span bridge over Cottonwood Creek would allow California red-legged frogs and California tiger salamanders to continue to move back and forth under the new road, thus avoiding indirect habitat loss in the Alameda County portion of the Study Area.

Construction disturbance during the avian breeding season (February 1 through August 31, for most species) could result in the incidental loss of eggs or nestlings, either directly through the destruction or disturbance of active nests or indirectly by causing the abandonment of nests. Due to the absence of sensitive habitats from the project site, the habitats on the project site support only regionally common, urban-adapted breeding birds and support only a very small proportion of these species' regional populations. These birds are habituated to disturbance related to the surrounding residential area. Therefore, project impacts on nesting and foraging birds and special-status species that use the site, due to habitat impacts or disturbance of nesting birds, would not rise to the CEQA standard of having a substantial adverse effect, and these impacts would not constitute a significant impact on these species or their habitats under CEQA. However, all native bird species are protected from direct take by federal and state statutes (see Sections 3.1.5 and 3.2.4). Therefore, we recommend that the following measures be implemented to ensure that project activities comply with the MBTA and California Fish and Game Code:

Mitigation Measure 20. Avoidance of the Nesting Bird Season. If feasible, Project activities will be scheduled to avoid the avian nesting season. If such activities are scheduled to take place outside the nesting season, all impacts on nesting birds, including raptors, protected under the MBTA and California Fish and

Game Code, would be avoided. The nesting season for most birds in Alameda County typically extends from February 1 through August 31, although in most years, a majority of birds have finished nesting by August 1.

Mitigation Measure 21. Vegetation Removal during the Non-Nesting Season. If Project activities will not be initiated until after the start of the nesting season, potential nesting substrate (e.g., bushes, trees, grasses, and other vegetation) that is scheduled to be removed by the Project may be removed prior to the start of the nesting season (e.g., prior to 1 February) to reduce the potential for initiation of nests. If it is not feasible to schedule vegetation removal during the nonbreeding season, or where vegetation cannot be removed (e.g., in areas immediately adjacent to the site), then pre-construction surveys for nesting birds will be conducted as described below. It is not recommended to remove sensitive and/or regulated wetland vegetation prior to construction, because of the potential water quality impacts such activities could enact.

Mitigation Measure 22. Pre-construction/Pre-disturbance Surveys for Nesting Birds. If it is not possible to schedule Project activities between September 1 and February 1, then pre-construction surveys for nesting birds will be conducted by a qualified biologist to ensure that no nests will be disturbed during Project implementation. These surveys will be conducted no more than one week prior to the initiation of Project activities. During this survey, a qualified biologist will inspect all potential nesting habitats (e.g., trees, shrubs, grasslands, and structures) within 300 ft of impact areas for raptor nests and within 100 ft of impact areas for nests of non-raptors. Surveys for burrowing owls and nesting golden eagles will extend out to 0.5 mile from the Project site (to the extent that such areas are accessible).

Mitigation Measure 23. Buffers around Active Nests. If an active nest (i.e., a nest with eggs or young, or any completed raptor nest attended by adults) is found sufficiently close to work areas to be disturbed by these activities, the biologist, in consultation with CDFW, will determine the extent of a disturbance-free buffer zone to be established around the nest to ensure that no nests of species protected by the MBTA and California Fish and Game Code will be disturbed during Project implementation. Typical buffers are 0.25 mile (or 0.5 mile line-of-sight) for golden eagles, 250 ft for burrowing owls, 300 ft for other raptors, and 50-100 ft for non-raptors. Because the majority of the site is already subject to disturbance by vehicles and pedestrians, activities that will be prohibited from occurring within the buffer zone around a nest will be determined on a case-by-case basis. In general, activities prohibited within such a buffer while a nest is active will be limited to new construction-related activities (i.e., activities that were not ongoing when the nest was constructed) involving significantly greater noise, human presence, or vibrations than were present prior to nest initiation.

Mitigation Measure 24. Nest Deterrence. If necessary to avoid impacts to active nests (i.e., nests containing eggs or young), nest starts may be removed on a regular basis (e.g., every second or third day), starting in late January or early February to prevent active nests from becoming established.

6.5 Impacts due to Conflicts with Local Policies: Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance (Less than Significant)

6.5.1 East Alameda County Conservation Strategy (Less than Significant)

The EACCS (ICF International 2010) is designed to serve as a coordinated approach to conservation in the eastern portion of Alameda County, in which the County and the Cities of Dublin and Livermore are active participants.

The BSA for the proposed Project overlaps with the study area for the EACCS, and occurs within Conservation Zone 4 (see Table 3-1, ICF International 2010). This conservation zone covers the northern-central portion of the Livermore Valley and includes land cover types that are of high conservation priority and require compensatory mitigation should any permanent impacts have the potential to occur as a result of proposed projects. Sensitive land cover types within Conservation Zone 4 include alkali meadows and scalds (Figure 3-1, ICF International 2010), California annual grasslands (Figure 3-2, ICF International 2010), mixed riparian forest and woodland (Figure 3-3, ICF International 2010), alkali wetlands (Figure 3-5, ICF International 2010), and seasonal wetlands (Figure 3-5, ICF International 2010). Focal plant and wildlife species of the EACCS are addressed below.

All non-developed portions of the BSA are considered to provide habitat for one or more EACCS focal species. Most often mitigation for impacts on land cover types that are considered high conservation priority by the EACCS is determined at the focal species level, but direct impacts on California annual grasslands as a result of the proposed Project must be avoided and minimized through the implementation of measures listed in Tables 3-2 and 3-3 of the EACCS (ICF International 2010). Moreover, compensatory mitigation will be required for the permanent loss of California annual grasslands.

All Mitigation Measures proposed earlier in this analysis are derived directly from or consistent with the General Minimization Measures listed in the Programmatic Biological Opinion (PBO) for the EACCS to protect special-status species (Appendix E of the EACCS). Therefore, any potential impacts related to conflict with the EACCS would be less than significant.

6.5.2 Alameda County and City of Dublin Tree Ordinance (Less than Significant)

The County of Alameda protects trees within the County right-of-way that are at least 10 ft tall and 2-inches diameter at breast height (dbh) on the mainstem. Removal of such trees requires an encroachment permit from the County. Typically such a permit requires, if feasible, replacement of the ordinance tree (Alameda County General Code Chapter 12.11, inclusive). The City of Dublin defines heritage trees as any oak, bay, cypress, maple, redwood, buckeye and sycamore tree having a trunk or main stem of twenty-four inches or more in diameter measured at four feet six inches above natural grade. Additionally, any tree preserved as part of an

approved development plan, zoning permit, use permit, site development review, or subdivision map is protected as a heritage tree as is any tree planted as a replacement for an unlawfully removed tree. Heritage trees may not be removed unless a tree removal permit is granted or the removal is approved as part of other approved development permits. If a development site contains heritage trees that are to be preserved under approved development plan, these trees must be protected during site development. A tree protection plan must be approved prior to commencement of work unless the Community Development Director of the City of Dublin has specifically waived this requirement (City of Dublin Municipal Code, Chapter 5.60, inclusive). The removal or pruning of trees protected by the Alameda County and/or City of Dublin Tree Ordinance is considered potentially significant under CEQA (Criterion I).

An ordinance-sized valley oak (Quercus lobata) tree present in unincorporated County lands will be preserved by the project and therefore no encroachment permit will be necessary. A small number (approximately 8) of red willow (Salix laevigata) trees would be removed by the project from within the Dublin City limits. A eucalyptus (Eucalyptus sp.) tree may also be removed. These trees are not considered heritage tree species under the ordinance and also the red willows are all smaller than the 24-inch size requirement. Therefore, no tree removal permit will be needed and any potential impacts related to conflict with local policies or ordinances protecting heritage trees would be less than significant.

6.6 Impact due to Conflicts with an Adopted Habitat Conservation Plan: Conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan (No Impact)

The study area is not located within an area covered by an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. Therefore, the project would not conflict with any such documents. While the EACCS is a regionwide plan for conservation of sensitive species and their habitats, it is not a formal Habitat Conservation Plan and does not provide take coverage. Nevertheless, the Project will comply with the measures and requirements of the EACCS.

6.7 Cumulative Impacts

Cumulative impacts arise due to the linking of impacts from past, current, and reasonably foreseeable future projects in the region. Future development activities in the City of Dublin and around the BSA, will result in impacts on the same habitat types and species that will be affected by the project. Project development, in combination with other projects in the area and other activities that impact the species that are affected by this project, could contribute to cumulative effects on special-status species. Other projects in the area past and planned residential and commercial development projects that could adversely affect these species and restoration projects that will benefit these species.

The cumulative impact on biological resources resulting from the project in combination with other projects in the project area and larger region would be dependent on the relative magnitude of adverse effects of these projects on biological resources compared to the relative benefit of impact avoidance and minimization efforts prescribed by planning documents, CEQA mitigation measures, and permit requirements for each project; compensatory mitigation and proactive conservation measures associated with each project. In the absence of such avoidance, minimization, compensatory mitigation, and conservation measures, cumulatively significant impacts on biological resources would occur.

However, the EACCS contains conservation measures that would benefit biological resources, as well as measures to avoid, minimize, and mitigate impacts on these resources. Projects in the region that impact resources similar to those impacted by the Project will be subject to CEQA requirements, and many will necessitate regulatory permits as well. It is expected that such projects will mitigate their impacts on sensitive habitats and special-status species through the incorporation of mitigation measures and compliance with permit conditions. Future projects that will seek regulatory permits are expected to be required by those agencies to also mitigate impacts per the requirements of the EACCS, ensuring these projects provide adequate mitigation in a regional framework intended to prevent deleterious cumulative impacts to species and their habitats. Thus, provided that this Project successfully incorporates the mitigation measures described in the EACCS, the Project will not have a cumulatively considerable contribution to cumulative effects on biological resources.

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Section 7. References

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Appendix A. Preliminary Delineation of Waters of the U.S./Wetland Technical Study

Preliminary Delineation of Wetlands and Other Waters

Dublin Boulevard-North Canyons Parkway Extension Project

Cities of Dublin and Livermore, Alameda County, California

Regional Transportation Plan Number: 17-01-0048

Federal Project Number "RTPL 5432 (019)"

Caltrans District 4

Fund Management System Identification Number: 6046.00

August 2018

H. T. HARVEY & ASSOCIATES

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Preliminary Delineation of Wetlands and Other Waters

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Summary

On April 13 and 17, 2018, H. T. Harvey & Associates' biologists performed a delineation of wetlands and other waters on the Dublin Boulevard North Canyon Extension project area in Alameda County, California. 141.40 acres were surveyed for jurisdictional waters (wetlands and other waters) that may be subject to regulation under Section 404 of the Clean Water Act administered by the U.S. Army Corps of Engineers (USACE). The survey also delineated the extent of waters of the state that may be subject to regulation under the Section 401 of the CWA and the Porter Cologne Water Quality Control Act administered by the Regional Water Quality Control Board (RWQCB) and riparian habitat that may be subject to regulation under Section 1600 of the Fish and Game Code administered by the California Department of Fish and Wildlife (CDFW).

The on-site determination assumed normal circumstances, and the results are based on the conditions present at the time of the surveys. H. T. Harvey & Associates' biologists conducted the surveys during the end of the wet season. This report is part of a request to USACE to verify maps of the extent and distribution of waters of the United States on the site. The on-site determination assumed normal circumstances, and the results are based on the conditions present at the time of the surveys. The Biological Study Area (BSA) is located in the San Francisco Bay East (Hydrologic Unit Code 18050004) watershed.

Approximately 10.96 acres of potentially jurisdictional waters of the U.S. were identified in the biological study area, comprising 10.5 acres of Section 404 wetlands and 0.46 acres of Section 404 other waters situated below the ordinary high water mark of Cottonwood Creek, six additional unnamed perennial streams, streams and within associated culverts. Additionally, approximately 4.02 acres constituting riparian bed and banks were identified as riparian waters of the state. These potentially jurisdictional waters are summarized in the table below.

Summary of Potentially Jurisdictional Waters in the Project Area

Potentially Jurisdictional Waters	Acres[1]
Total Section 404/401 Wetlands	**10.5**
Perennial Marsh	0.07
Seasonal Wetlands	10.43
Total Section 404/401 Other Waters of the U.S	**0.46**
Ephemeral stream	0.13
Perennial stream	0.33
Total of potentially jurisdictional waters of the U.S.	**10.96**
Riparian Waters of the State	**4.02**
Ephemeral stream (stream bed)	0.13
Perennial stream (stream bed)	0.33
In-stream seasonal wetland (stream bed)	0.14
Riparian vegetation within top of bank (stream banks above OHWM)	3.42
Total of Potentially Jurisdictional Waters	**14.38**

[1] Acreage totals are rounded.

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Acronym List

Caltrans	California Department of Transportation
CDFW	California Department of Fish and Wildlife
CFR	Code of Federal Regulations
CWA	Clean Water Act
FAC	Facultative
FACU	Facultative Upland Species
FACW	Facultative Wetland Species
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
OBL	Obligate Wetland Species
OHWM	Ordinary High Water Mark
PM	Post Mile
PRISM	Parameter-elevation Regressions on Independent Slope Model
RWQCB	Regional Water Quality Control Board
UPL	Upland Species
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service

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Chapter 1 – Introduction

1.1. Project Background

Traffic congestion on I-580 is an ongoing issue throughout the region. The eastern extension of Dublin Boulevard from its current terminus at Fallon Road to the Doolan Road/North Canyons Parkway intersection has been planned since 1984 to provide capacity relief to I-580 and to provide access to potentially developed areas in Dublin, as described in Dublin's General Plan Environmental Impact Report (City of Dublin 1984) as well as in various other regional and local land use planning documents such as Plan Bay Area (2035 update to 2040) (MTC and ABAF 2017), Eastern Dublin Specific Plan (EDSP) (City of Dublin 2016), Livermore's General Plan Circulation Element (City of Livermore 2014), and Fallon Village Supplemental Environmental Impact Report (SEIR) (2005).

The City of Dublin (Dublin), in cooperation with the California Department of Transportation (Caltrans), City of Livermore (Livermore), Alameda County (County), and Federal Highway Administration (FHWA), proposes to extend Dublin Boulevard approximately 1.5 miles eastward through eastern Dublin and an unincorporated portion of the County, terminating at the boundary between the County and Livermore city limits (the project).

The purpose of the project is to improve east-west local roadway connectivity between Dublin and Livermore, and improve mobility, multimodal access, safety and efficiency for all roadway users. The purpose is also to indirectly relieve vehicular congestion in the region by providing a completed freeway reliever route along the north side of I-580 between I-680 and Route 84.

The project will pass through undeveloped lands and will affect areas where jurisdictional waters or other waters of the state may occur. Therefore, a wetland delineation survey was performed for the project.

1.2. Project Description

The project is located within Dublin, the County, and Livermore, north of I-580 between the existing terminus of Dublin Boulevard to the west and terminus of North Canyons Parkway to the east. The roadway extension would start from the current terminus of Dublin Boulevard at the Dublin Boulevard/Fallon Road intersection in Dublin and would end at the Doolan Road/North Canyons Parkway intersection along the boundary of the County and Livermore. This roadway extension would provide four to six travel lanes and bicycle and pedestrian facilities (i.e., sidewalks and bike lanes). Beginning at Fallon Road, the roadway extension would have six travel lanes (three in each direction). Continuing eastward, the roadway extension would narrow to four travel lanes (two in

each direction) before intersecting with Croak Road. From Croak road to Doolan Road, the roadway extension would remain in the four lane configuration.

The Biological Study Area or BSA is approximately 141.4 acres and is located in the *Livermore* U.S. Geological Survey (USGS) 7.5-minute quadrangle in Alameda County.

The project location and BSA are depicted in **Figures 1 and 2** respectively.

1.3. General Study Area Conditions

In April, May, and June of 2018, H. T. Harvey & Associates plant and wetland ecologists performed a delineation of potentially jurisdictional waters on the proposed Dublin Boulevard Extension Project (project) site in the Cities of Dublin and Livermore, and unincorporated Alameda County, California (**Figure 1**). The 141.4-acre BSA (Figure 2) was surveyed to identify wetlands and other waters of the U.S. that may be subject to regulation under the Clean Water Act, as administered by the U.S. Army Corps of Engineers (USACE). This report documents the findings of the preliminary delineation survey and forms part of a request to the USACE to verify the mapped extent and distribution of potentially jurisdictional waters of the U.S.

The BSA is situated on the toe of rolling hills to the north, with relatively flat terrain to the south of the proposed road alignment (**Figure 1**). It is located immediately to the north of I-580 between the existing terminus of Dublin Boulevard to the west and terminus of North Canyons Parkway to the east. At the time of the delineation, the project site included a developed residential area, a landscaping business, Croak Road, and undeveloped grasslands used primarily for cattle grazing. Surrounding land uses are primarily developed, including residential and commercial developments to the west, northwest, and east, and I-580 to the south (**Figure 2**). The BSA is located in the *Livermore* U.S. Geological Survey (USGS) 7.5-minute quadrangle (**Figure 3**).

The topography of the BSA ranges from relatively flat in the southern portion near I-580, to gently rolling hills to the north. The topography slopes slightly northward, and Cottonwood Creek drains from north to west in the eastern half of the BSA.

Chapter 2 – Chapter 2 – Study Methods

2.1. Personnel and Survey Dates

A technical delineation of wetlands and other waters on the project site was performed on April 13 (9 a.m. to 4 p.m.) and April 17 (9 a.m. to 4 p.m.), 2018, in accordance with the Corps Manual (Environmental Laboratory 1987), the Regional Supplement (USACE 2008), and *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM)*

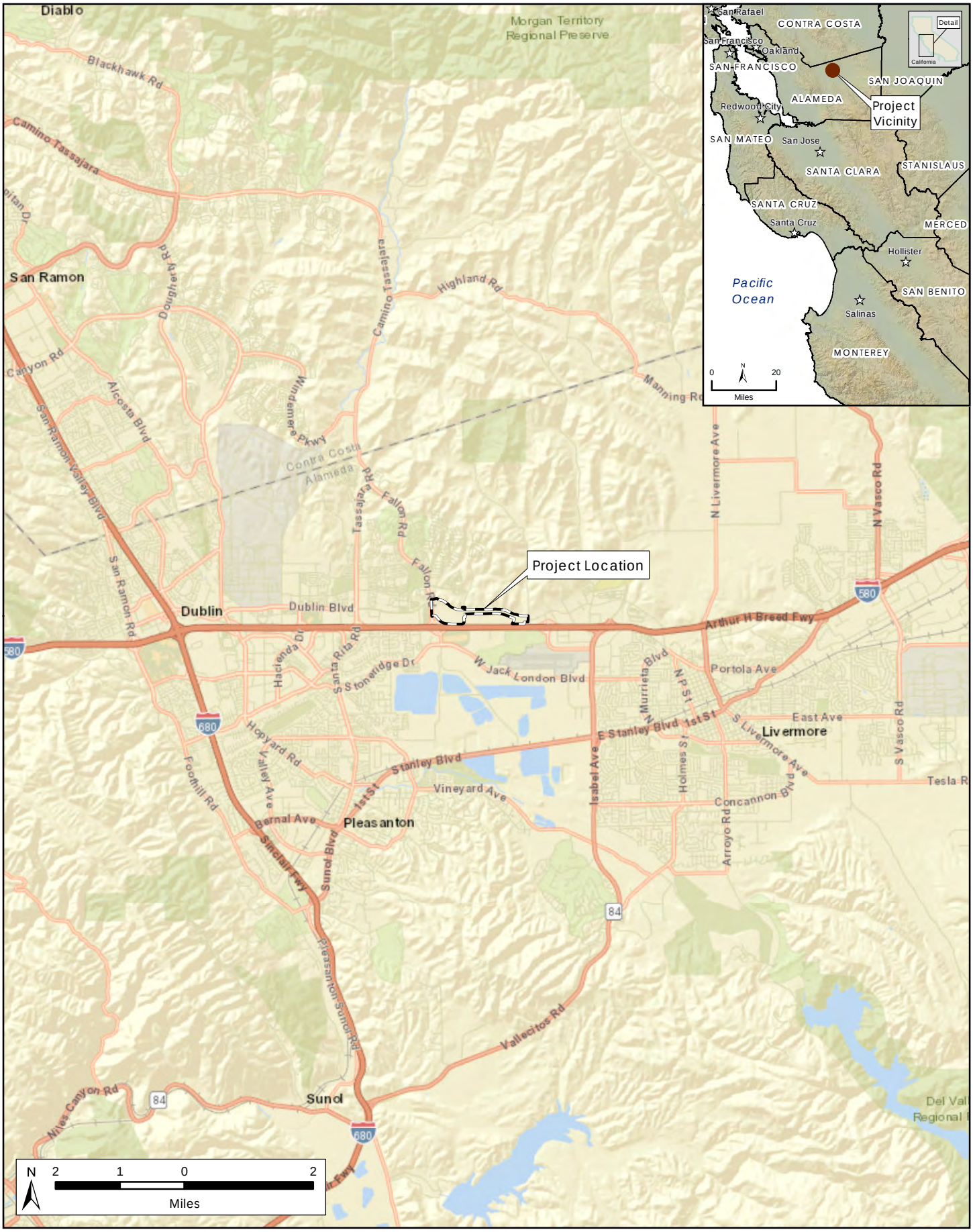

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Figure 1. Vicinity Map
Dublin Boulevard-North Canyons Parkway Extension Project - Wetland Delineation Report (3922-01)
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Figure 2, Study Area over Aerial Photo and Photo Points
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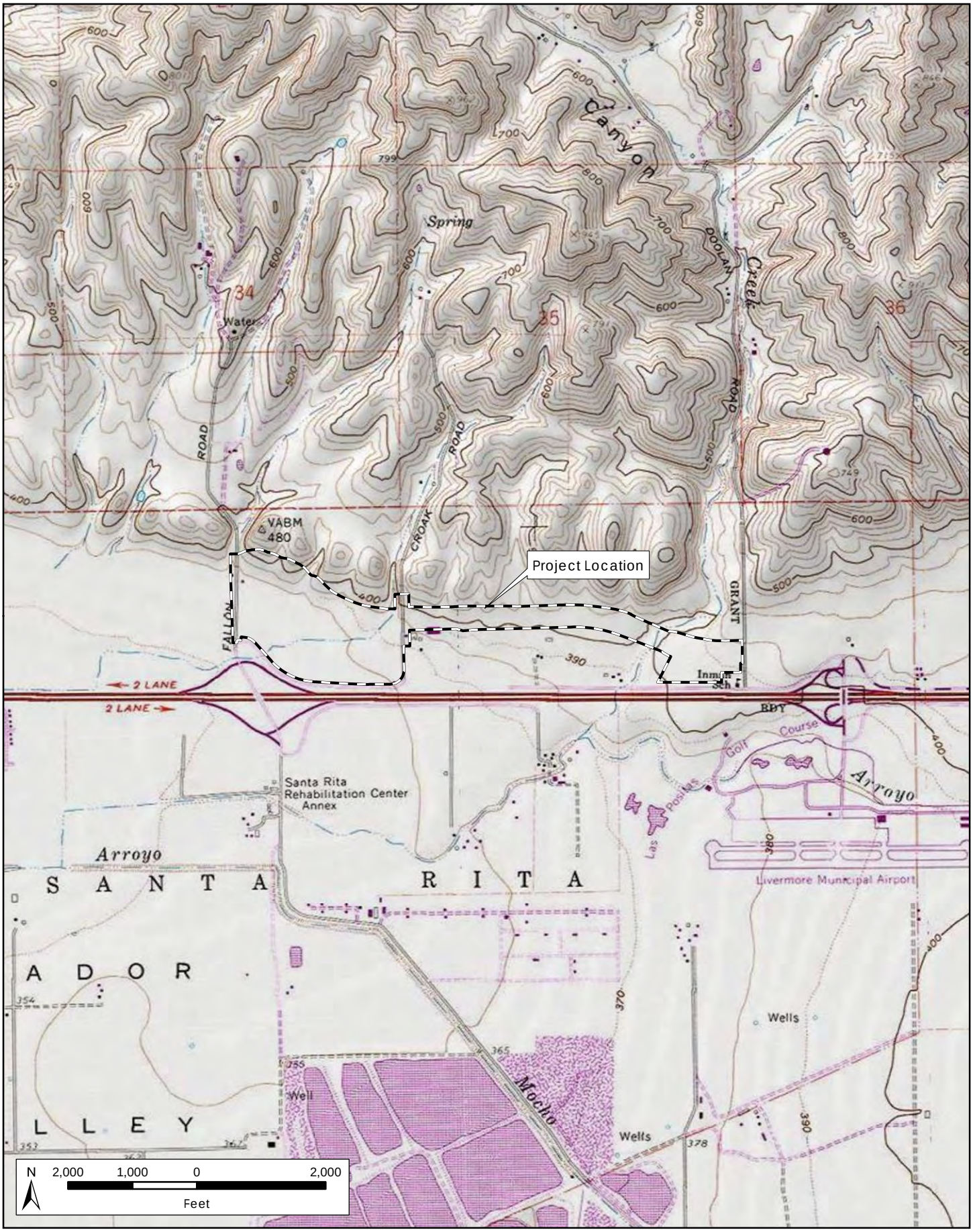

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Figure 3. USGS Topographic Map
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in the Arid West Region of the Western United States: A Delineation Manual (USACE 2008b). The purpose of the survey was to identify the extent and distribution of wetlands and other waters that may be subject to regulation by the USACE, RWQCB, and CDFW. Weather conditions on April 13 and 17, 2018, were cool to warm, dry, and clear. Unsafe or inaccessible portions of the project site were assessed remotely for potentially jurisdictional features. Additional survey dates that contributed to the conclusions in this delineation include reconnaissance site visits on March 14 and 16, 2017, and hydrology monitoring site visits on May 8, 10, and June 29, 2018.

The entire Project site was covered on foot to find all potential features and to map these features using a submeter Global Positioning System (GPS). The wetland delineation was conducted during the end of the wet season. The following sections present descriptions of the methods used to identify Section 404 jurisdictional waters (wetlands and other waters).

Chapter 3 – Identification of Jurisdictional Waters

In general, surveys examining the vegetation, soils, and hydrology of an area use the routine determination method “On-Site Inspection Necessary” (Section D) outlined in the Corps Manual (Environmental Laboratory 1987) and use the updated data forms, vegetation sampling methods, and hydric soil and hydrology indicators developed for the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Regional Supplement) (USACE 2008). This three-parameter approach to identifying wetlands is based on the presence of hydrophytic vegetation, hydric soils, and wetland hydrology. Alternatively, on some sites, a two-parameter approach to identifying wetlands is used in situations where the vegetation, soils, or hydrology indicator is absent because of human activities or natural events (described in Chapter 5, “Difficult Wetland Situations in the Arid West” of the Regional Supplement).

At the project site, the vegetation, soils, and hydrology were examined following the guidelines outlined in the routine determination method discussion in the Corps Manual. In addition, the Regional Supplement was followed to document site conditions relative to hydrophytic vegetation, hydric soils, and wetland hydrology. The methods in the Corps Manual were followed except where superseded by instruction issued in the more recent and location-specific Regional Supplement. This delineation report was also compiled in accordance with guidance provided in *Information Requested for Verification of Corps Jurisdiction* (USACE 2007a), *Updated Map and Drawing Standards for the South Pacific Regulatory Division Regulatory Program* (USACE 2016a), and *Minimum Standards for Acceptance of Aquatic Resources Delineation Reports* (USACE 2016b). These documents identify information that must be submitted as part of a request for a jurisdictional determination, including a vicinity map (Figure 1), BSA (Figure 2), topographic map (Figure 3), soils map (Figure 4), National Wetland Inventory map

(Figure 5), habitats map (Figure 6), and Waters of the U.S. identification map (Figures 7a and 7b), a list of plant species observed (**Appendix A**), a copy of applicable sections of the current soil survey report (**Appendix B**), data forms for wetlands sample points (**Appendix C**), written rationale for sample point choice (**Chapter 5**), color photographs (**Appendix D**), the aquatic resources table (**Appendix E**), and a signed statement from the property owners allowing access (**Appendix F**).

Before the site surveys were conducted, topographic maps and aerial photographs of the project site were obtained from several sources and reviewed. These sources included USGS, the U.S. Fish and Wildlife Service's (USFWS's) National Wetland Inventory, Nationwide Environmental Title Research (NETR) (2018), and Google Earth (Google 2018). The project site was examined for topographic features, drainages, alterations to site hydrology or vegetation, and areas of significant recent disturbance. A determination was then made as to whether normal environmental conditions were present at the time of the field surveys. Paired sample point data were used to document which portions of the project site where wetlands and where the wetlands-uplands boundary occurred.

Overall, the approach used to identify wetlands included digging soil pits to sample soil from various depths, observing vegetation growing in proximity to the soil sample areas, and determining current surface and subsurface hydrologic features present near the sample areas. Features meeting these criteria were then mapped in the field using a Trimble GeoXT™ Global Positioning System (GPS) unit capable of submeter accuracy and augmenting the GPS data through aerial imagery interpretation.

A brief overview of the USACE methodology specifically applicable to the identification of jurisdictional wetlands and other waters on the site is provided in the following sections.

3.1. Identification of Section 404 Jurisdictional Wetlands (Special Aquatic Sites)

Where wetland field characteristics were present, the surveyor examined vegetation, soils, and hydrology using the routine determination method outlined in the Corps Manual (Environmental Laboratory 1987) and using the updated data forms, vegetation sampling methods, and hydric soil and hydrology indicators developed for the Regional Supplement (USACE 2008). This three-parameter approach to identifying wetlands is based on the presence of hydrophytic vegetation, hydric soils, and wetland hydrology.

Vegetation. Plants observed at each of the sample points were identified to species, when possible, using *The Jepson Manual: Vascular Plans of California*, second edition (Jepson Manual) (Baldwin et al. 2012, Jepson Flora Project 2017). The wetland indicator status of each species was obtained from the *National Wetland Plant List*: *2016 Wetland Ratings* (Lichvar et al. 2016). The recent revision of plant names in the Jepson Manual

has led to several differences in nomenclature between the latest Jepson Manual and the 2016 National Wetland Plant List. In these cases, the indicator status of recognized synonyms were also determined. A list of species for each sample point was then compiled, and a visual estimate of the percent cover of plant species was made following guidance provided in the Regional Supplement. Which of the sample points supported wetland vegetation was then determined using the applicable indicator (i.e., 1-Dominance Test, 2-Prevalence Test, or 3-Morphological Adaptations) as described in the Regional Supplement.

Wetland indicator species are designated according to their frequency of occurrence in wetlands. For instance, a species with a presumed frequency of occurrence of 67–99% in wetlands is designated a facultative wetland (FACW) indicator species. The wetland indicator groups, indicator symbol, and the frequency of occurrence of species within them in wetlands are presented in **Table 1**.

Table 1. Wetland Indicator Status Categories for Vascular Plants

Indicator Category	Symbol	Frequency of Occurrence
Obligate	OBL	Greater than 99%
Facultative wetland	FACW	67–99%
Facultative	FAC	34–66%
Facultative upland	FACU	1–33%
Upland	UPL	Less than 1%

Source: Environmental Laboratory 1987.

Obligate (OBL) and facultative wetland indicator species are hydrophytes that occur “in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present” (Environmental Laboratory 1987). Facultative indicator species may be considered wetland indicator species when found growing in hydric soils that experience periodic saturation. Plant species not on the regional list of wetland indicator species are considered upland species. A complete list of the vascular plants observed on the project site, as well as their current indicator status, is presented in **Appendix A**.

Soils. Where possible, the top 20 inches of the soil profile were examined for hydric soil indicators. Diagnostic features include numerous indicators defined and described by the National Technical Committee for Hydric Soils. These indicators include the presence of organic soils (Histosols, A1), histic epipedons (A2), depleted matrix (F3), redox depressions (F8), redox dark surface (F6), and mottling indicated by the presence of gleyed or bright spots of colors (in the former case, blue grays; in the latter case, orange

red or red brown) in the soil horizons observed, among other features. Mottling of soils usually indicates poor aeration and lack of good drainage.

Munsell soil notations (Munsell 2009) were recorded for the soil matrix for each soil sample. The Munsell color system is based on three color dimensions: hue, value, and chroma. A brief description of each component of the system is presented below in the order in which they are used in describing soil color, (i.e., hue/value/chroma)*:*

- **Hue**. The Munsell Soil Color Chart is divided into five principal hues: yellow (Y), green (G), purple (P), blue (B), and red (I). It also includes intermediate hues, such as yellow-red (YR) and green-yellow (GY). Examples of commonly encountered hue numbers are 2.5YR, 10YR, and 5Y.

- **Value**. *Value* refers to lightness ranging from white to gray to black. Common numerical values for value in the Munsell Soil Color Chart range from 2 for saturated soils to 8 for faded or light colors. Hydric soils often show low-value colors when soils have accumulated organic material sufficient to indicate development under wetland conditions but can show high-value colors when iron depletion has occurred, removing color value from the soil matrix. Value numbers are commonly reported as 8/, 2.5/ and 6/.

- **Chroma**. *Chroma* refers to the purity of the color from “true” or “pure” colors to “pastel” or “washed out” colors. Chromas commonly range from 1 to 8 but can range higher for gley pages in the chart. Soil matrix chroma values that are 1 or less, or 2 or less when mottling is present, are typical of soils that have developed under anaerobic conditions. Chroma numbers are listed as /1, /5 and /8 as examples.

The Soil Survey: Supplement to the Soil Survey of Alameda Area, California (USDA 1966) and Natural Resources Conservation Service (NRCS) Web Soil Survey (NRCS 2018) were consulted to determine which soil types have been mapped on the project site (**Table 2, Figure 4**). Detailed descriptions of these soil mapping units are provided in **Appendix B**.

Hydrology. Each of the sample sites was examined for positive field indicators (primary and secondary) of wetland hydrology following the guidance provided in the Regional Supplement. Such indicators might include visual observation of inundation (A1) and/or soil saturation (A3), surface soil cracks (B6), inundation visible on aerial imagery (B7), waterborne sediment deposits (B2), water-stained leaves (B9), and drainage patterns in wetlands (B10).

3.2. Identification of Section 404 Jurisdictional Other Waters

In concert with USACE's efforts to revise the wetland delineation manuals and make them more specific to different geographic regions of the United States, as described above, efforts have been initiated by USACE to develop an OHWM delineation manual. In particular, five relatively recent publications have attempted to further refine the definition of OHWM and the delineation of the OHWM in the Arid West (including California):

- Review of Ordinary High Water Mark Indicators for Delineating Arid Streams in the Southwestern United States (USACE 2004)
- Distribution of Ordinary High Water Mark (OHWM) Indicators and Their Reliability in Identifying the Limits of "Waters of the United States" in Arid Southwestern Channels (USACE 2006)
- Review and Synopsis of Natural and Human Controls on Fluvial Channel Processes in the Arid West (USACE 2007b)
- A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States: A Delineation Manual (USACE 2008b)
- Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States (USACE 2010)

Historically, in nontidal waters, USACE jurisdiction extends to the OHWM, as defined in 33 CFR 328.3 (see "Regulatory Requirements"). This guidance is based on the identification of the OHWM by examining physical evidence of surface flow in the stream channel; there is no hydrologic definition of the OHWM.

In addition, Regulatory Guidance Letter 05-05 (dated December 7, 2005) deals specifically with the topic of OHWM identification (USACE 2005). That publication lists the following physical characteristics that should be considered when making an OHWM determination: (1) natural line impressed on the bank; (2) shelving; (3) changes in the character of the soil; (4) destruction of terrestrial vegetation; (5) wracking; (6) vegetation matted down, bent, or absent; (7) sediment sorting; (8) leaf litter disturbed or washed away; (9) scour; (10) deposition; (11) multiple observed flow events; (12) bed and banks; (13) water staining; and (14) and change in plant community.

Just as with the Corps Manual, development of the definition of the OHWM and description of the field indicators to be used were based primarily on environmental conditions present in more temperate climates of the United States. In these areas, rain

distribution and amounts are more consistent from one year to the next, and the channel geomorphology has responded by developing field characteristics that reflect a system in relative equilibrium. Such “ordinary” precipitation events occurring in these temperate climates are more likely to cause the development of “ordinary” features commonly used by USACE to identify the OHWM as defined under 33 CFR 328.3.

The difficulty with this approach is that the environmental conditions present in the Arid West are different from those encountered in temperate climates. In particular, the Mediterranean climate present throughout central California is characterized by a high degree of seasonal and inter-annual variability in precipitation. Occurrences of drought conditions followed by extreme discharges are more common in the Arid. Thus, much of what is observed in the field in terms of geomorphic features, such as channel down-cutting, erosion, and channel formation, is not in response to “ordinary” precipitation events but to relatively high-intensity and infrequent rainfall events.

For purposes of the current study, the identification of the OHWM in the field was based on observation of a suite of natural geomorphic field indicators that have formed during channel-forming events. These features included staining of rocks and culverts, erosion of soil to bedrock, and channel bed morphology, among other factors.

The presence of one or more of the natural geomorphic field indicators listed above, taking into consideration such factors as size of the watershed, channel slope, landscape setting, elevation, gradient, land use practices, and soil type, was taken as direct evidence of an OHWM, and such channels were identified as “other waters.”

3.3. Identification of Waters of the State

All areas mapped as Section 404 jurisdiction were also confirmed to constitute Section 401 jurisdiction under the CWA, and would be claimed by the RWQCB under the CWA and the state Porter Cologne Water Quality Control Act as waters of the State.

3.4. Identification of CDFW Riparian Jurisdiction

Several streams and associated riparian vegetation in the BSA that qualified as CDFW jurisdiction were mapped using aerial imagery in ArcGIS and were also verified for top of bank location in the field.

Chapter 4 – Results: Environmental Setting

The BSA, as shown in **Figure 2**, is 141.4 acres and is located immediately to the north of I-580 between the existing terminus of Dublin Boulevard to the west and terminus of North Canyons Parkway to the east. The BSA was extended south to the full extent of parcel A (Figure 2) to observe a large wetland complex and rare plant habitat.

The land uses in the immediate vicinity of the BSA include residential, industrial, open space, and commercial uses in Dublin; resource management and large parcel agricultural uses in the County; and business and commercial uses in Livermore. In Dublin, residential, industrial, and commercial land uses have not yet been developed in the Project area, although these are planned to occur, and existing land uses are largely agricultural or rural-residential. Parcel F contains a landscaping business/commercial development (**Figure 2**).

The BSA consists of primarily undeveloped grazing ranchland and open space, with intermittent residences and outbuildings. Improvements to the agricultural lands generally consist of private paved and unpaved roads used to access private property, fences, barns, corrals, wells, water tanks, single-family homes and various outbuildings.

4.1. Existing Physical Conditions

Elevations in the BSA range from approximately 380 ft. to approximately 410 ft. above sea level (**Figure 3**) (Google 2018). The topography of the BSA ranges from relatively flat in the southern portion near I-580, to gently rolling hills to the north. The topography slopes slightly northward, and Cottonwood Creek drains from north to west in the eastern half of the BSA. The BSA is located in the San Francisco Bay East (Hydrologic Unit Code 18050004) watershed.

Normal climate conditions from 1981 through 2010 were estimated for the BSA using the Parameter-elevation Regressions on Independent Slope Model (PRISM, Lat: 37.7049, Lon: -121.8381, Elevation: 505ft), a high-spatial-resolution climate model developed in conjunction with the NRCS and Oregon State University. The mean annual low and high temperatures are 48°F and 72.2°F, respectively, and the mean annual precipitation is approximately 16.11 inches (PRISM Climate Group 2018).

The BSA is underlain by five soil types (**Figure 4**): 1) CdB-Clear Lake clay, drained, 3 to 7 percent slopes; 2) DvC-Diablo clay, very deep, 3 to 15 percent slopes; 3) LaC-Linne clay loam, 3 to 15 percent slopes; 4) LaD-Linne clay loam, 15 to 30 percent slopes; and 5) RdA-Rincon clay loam, 0 to 3 percent slopes. **Table 2** provides a summary of all the soil units mapped in the BSA, along with their associated textures, drainage classification, and hydric soil status. The Clear Lake clay, drained, 3 to 7 percent slopes soil type is listed as a hydric soil (NRCS 2018).

Table 2. Type, Texture, Drainage Classification, and Hydric Soil Status for Soil Types in the BSA

Soil Symbol	Soil Name	Drainage Classification	Hydric Soil Status
CdB bb3l	Clear Lake clay, drained, 3 to 7 percent slopes	Moderately well drained	Yes
DvC hb3b	Diablo clay, very deep, 3 to 15 percent slopes	Well drained	No
LaC	Linne clay loam, 3 to 15 percent slopes	Well drained	No
LaD 2w63l	Linne clay loam, 15 to 30 percent slopes	Well drained	No
RdA hb4j	Rincon clay loam, 0 to 3 percent slopes	Well drained	No

N:\Projects3900\3922-01\Reports\Wetland Delineation\Fig 4 Soils Map.mxd

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Figure 4. NRCS Soils Map

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4.2. Existing Biological Conditions

The NWI identifies five features in the project area (**Figure 5**) (NWI 2018).

1) Cottonwood Creek crosses the BSA in a north-south direction in the east. It is mapped by NWI as freshwater emergent wetland—palustrine, emergent, persistent, temporary flooded.

2) The second NWI feature is an unnamed ephemeral stream which originates to the north, and runs in north-south direction in the center of the BSA to terminate in parcel A. It is identified by NWI as freshwater emergent wetland—palustrine, emergent, persistent, temporary flooded.

3) The third NWI feature is also an unnamed perennial stream tributary to the west of the eastern portion of Croak Road. It originates in the north and runs diagonally into parcel A. It is identified as freshwater emergent wetland—palustrine, emergent, persistent, temporary flooded in the northern reach, and as it turns westward it is identified as riverine—intermittent, streambed, seasonally flooded.

4) The fourth NWI occurs in the northwestern corner of the BSA occurs to the east of the western portion of Croak Road and is identified by NWI as freshwater forested/shrub wetland—palustrine, scrub-shrub, seasonally flooded. This feature flows into a perennial stream that discharges onto the BSA.

5) The fifth NWI feature is an unnamed perennial stream which flows parallel to western Croak Road along the western border of the BSA and is identified by NWI as riverine, intermittent, streambed, seasonally flooded.

We identified eight biotic habitats within the BSA (**Figure 6**): perennial stream (0.33 ac), ephemeral stream (0.13 ac), perennial marsh (0.07 ac), seasonal wetland (10.43 ac), mixed riparian woodland (0.33 ac), riparian grassland (3.09 ac), California annual grassland (121.31 ac), and developed/landscaped habitat (5.71 ac). These are described below. Appendix A provides a list of all plant species identified in the BSA.

Perennial Streams

Four perennial streams comprise the perennial stream habitat in the BSA (0.33 acres) (**Figure 6**). These are the existing floodplain of Cottonwood Creek in the east and three additional unnamed streams in the western half of the BSA.

Cottonwood Creek is a perennial stream with a connection to groundwater and flows overland through the eastern portion of the BSA. It originates 4 miles north of the BSA in the Diablo Mountains near Collier Canyon Road, and flows southward to exit the BSA

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Figure 5. National Wetlands Inventory Map
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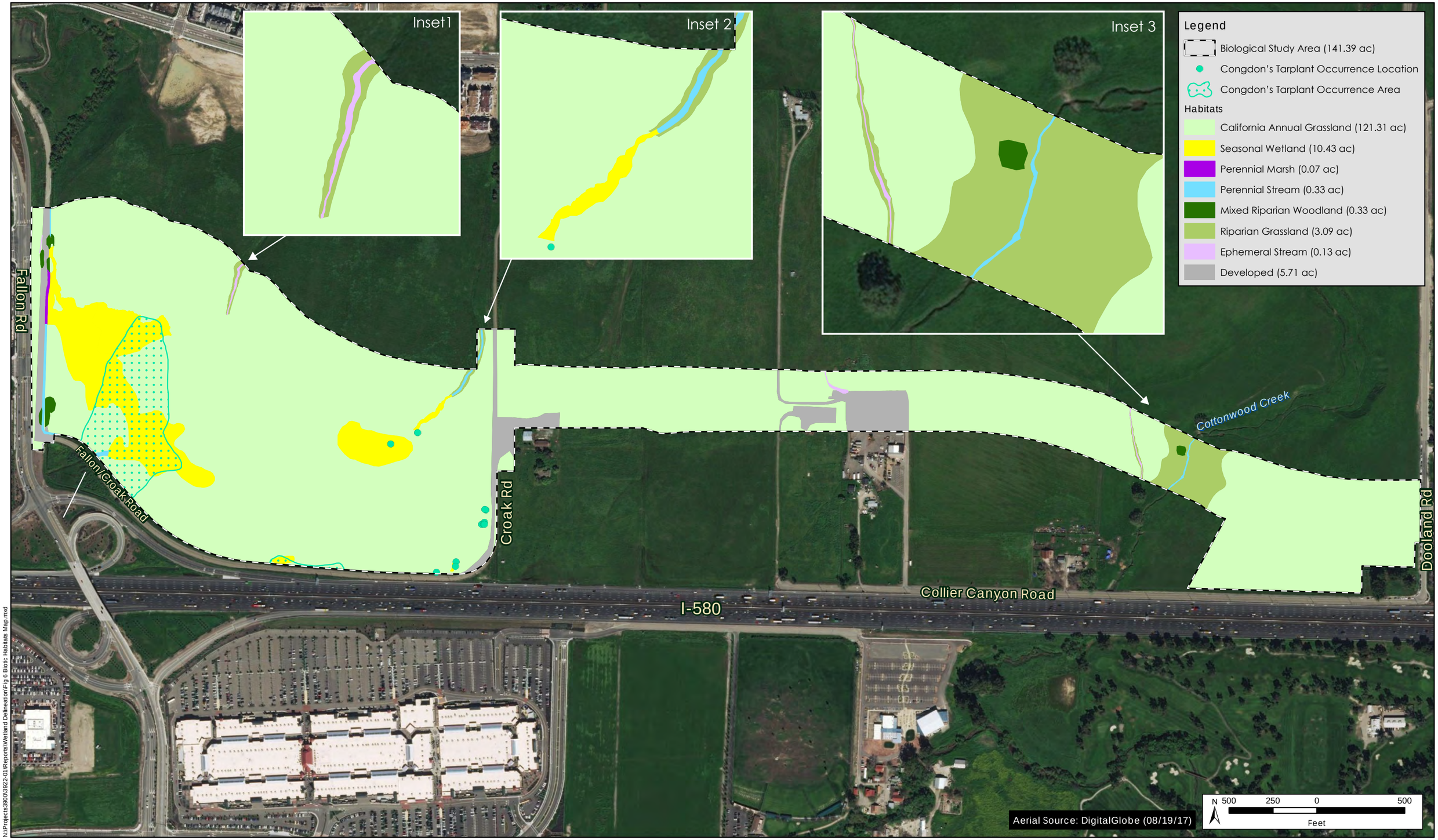

N:\Projects\3900\3922-01\Reports\Wetland Delineation\Fig 6 Biotic Habitats Map.mxd

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Figure 6. Biotic Habitats Map
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through a double box culvert beneath I-580, and then empties to Arroyo Las Positas after just 0.15 mi. Arroyo Las Positas flows into Arroyo Mocho, and historically, this watercourse went underground shortly thereafter, exhibiting no overland connection to the San Francisco Bay. During the present day, Arroyo Mocho flows through an aboveground engineered channel, draining into Alameda Creek and ultimately reaching the Bay, a traditionally navigable water. The main stem of Cottonwood Creek is split into two low flow channels just upstream of the BSA, and these channels converge in the central portion of the BSA. Although historical aerial photos indicate that this section of Cottonwood Creek generally conveys water year-round, it is possible that in periods of drought, sections of the stream may dry up or retreat underground. The inner stream banks are sharply incised and generally lined with exposed soil, providing little stabilization. As a result, numerous erosional features, such as headcuts and gullies, were apparent during surveys.

A second, smaller perennial stream is located along the western portion of Croak Road along the western boundary of parcel A (**Figure 6**). A portion of this stream has been culverted and capped with concrete for roughly 350 ln ft. Substantial flows of water emanated from a culvert outlet in both 2017 and 2018 where the stream daylights, and a portion of the stream's water spills into the northern portion of the wetland complex to the south of the road alignment. Shortly thereafter, the aboveground, wetted streambed supports perennial marsh vegetation (described below) and continues to flow southward, parallel to western Croak Road (**Figure 6**).

To the west of the eastern portion of Croak Road, another small perennial stream emerges from the hills and flows into a seasonal wetland swale as the topography becomes less steep.

In the southwest corner of the BSA, an additional reach of perennial stream drains into the southern portion of the large wetland complex. This stream flows from parcel B to be conveyed under Fallon/Croak Road into parcel A. The stream then crosses to the west under Fallon Road and runs outside the BSA parallel to I-580 before discharging to a culvert under the highway and entering a flood control channel. This channel then drains to Arroyo Las Positas to the south.

The above discussed perennial streams generally convey water year round. Vegetation within perennial stream habitat is either consistent with that of the adjacent perennial marsh described below or absent due to ponding and flows.

Ephemeral Streams

Three ephemeral streams covering 0.13 acres occur in the BSA (**Figure 6**). These streams convey water during and immediately following rain events, and dry out during the summer months. No flowing water was present in any of these ephemeral streams during the surveys conducted in April and May 2018. A rocked area occurs in one

ephemeral stream in parcel F, Otherwise, the majority of the ephemeral stream banks were vegetated with plants found in the surrounding California annual grasslands described below.

Perennial Marsh

The perennial marsh habitat (0.07 acres) in the BSA supports strongly hydrophytic, emergent plants, and the marsh within the BSA is within the OHWMs of the perennial stream along Fallon/Croak Road. This feature contained surface water and was codominated by Mexican rush (*Juncus mexicanus,* FACW) and iris-leaved rush (*Juncus xiphioides,* OBL), although some patches of hardstemmed bulrush (*Schoenoplectus acutus*, OBL) were also observed. Surface water was evident during all survey dates. Along the fenceline, dominant vegetation included alkali bulrush (*Bolboschoenus maritimus* [*Schoenoplectus maritimus*], OBL), water parsnip (*Berula erecta*, OBL), creeping buttercup (*Ranunculus repens*, FAC), water speedwell (*Veronica anagallis-aquatica*, OBL), and hardstemmed bulrush.

Seasonal Wetland

Large wetland patches scattered in parcel A comprise the seasonal wetland complex (10.43 acres) in the western part of the BSA (**Figure 6**). The seasonal wetlands occur in low lying areas and the largest patch is directly connected to the perennial marsh habitat that runs parallel to Fallon Road.

Historically, narrowleaf cattails (*Typha angustifolia*, OBL) dominated the central portion of the seasonal wetland in parcel A. During a reconnaissance survey done in March 2017, these cattails were observed to have died back, possibly from the disruption of the hydrological source to this feature. Historic aerials show that the cattail stand had only recently developed in the past approximately 8 years, and seems to have represented a temporary condition (Google 2018). Further changes in the site's hydrology were noted during the 2018 wetland delineation, and signs of marsh rewetting and some cattail regeneration were observed in April 2018. However, in surveys in May and June, 2018, the area was observed to be dry again and the new cattail shoots had died, indicating the existing hydrology in this area is seasonal.

Seasonal wetland vegetation in the parcel A was dominated by native forbs and grasses. Plants such as popcorn flower (*Plagiobothrys sp*.), alkali pepperweed (*Lepidium dictyotum*, FAC), annual semaphore grass (*Pleuropogon californicus* var. *californicus*, OBL), alkali barley (*Hordeum depressum*, FACW), flatface downingia (*Downingia pulchella,* OBL), woolly marbles (*Psilocarphus brevissimus* var. *brevissimus*, FACW), and meadow barley (*Hordeum brachyantherum* subsp*. brachyantherum,* FACW) were observed during spring surveys, mixed with some upland vegetation such as bird's eye speedwell (*Veronica persica,* UPL). The California Native Plant Society-ranked plant

species Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*, FACW) also occurred in this habitat type and in the uplands surrounding the wetland complex.

Non-native grasses such as seaside barley (*Hordeum marinum* ssp. *gussoneanum*, FAC), and Italian ryegrass (*Festuca perennis* [*Lolium perenne*], FAC) were common in the more limited seasonal wetlands scattered along ephemeral drainages across the BSA.

Mixed Riparian Woodland and Riparian Grassland

Mixed riparian woodlands (0.33 acres) in the BSA are composed of stands of mature trees rooted in the banks of perennial streams. Tree species include red willow (*Salix laevigata*, FACW) and valley oak (*Quercus lobata*, FACU). Valley oaks in and near the BSA that occur along Cottonwood Creek are very large (up to 4.8 feet [ft] diameter at breast height [dbh]). Additionally, about 3.09 acres of riparian grassland occur within the top of the bank of Cottonwood Creek and the unnamed perennial stream to the west of Croak Road. The understory of mixed riparian woodlands intergrades with that of the surrounding habitats, and the areas of riparian grassland lacking tree cover support similar species to the surrounding California annual grassland, with species such as soft chess (*Bromus hordeaceus,* FACU) and Italian ryegrass.

California Annual Grassland

The majority (121.31 ac) of the BSA consists of California annual grassland habitat. Much of this grassland is currently grazed by cattle and is dominated by a suite of non-native grasses, such as seaside barley, meadow barley (*Hordeum murinum*, FACU), soft chess, wild oat (*Avena* sp., UPL), and Italian ryegrass. Common weedy (and non-native) forbs include various species of filaree and geranium (*Erodium* spp., FACU *and Geranium* spp., FACU, respectively), bristly ox tongue (*Helminthotheca echioides*, FAC), and wild radish (*Raphanus sativus*, UPL). Large monocultures of bull thistle and black mustard (*Brassica nigra,* UPL) were also scattered across the BSA within the California annual grasslands.

While the majority of the grasslands in the BSA are composed of non-native, ruderal vegetation, grasslands interspersed between patches of seasonal wetlands in parcel A exhibited higher species diversity and frequency of native wildflowers, many adapted to more mesic soils, including but not limited to common gumplant (*Grindelia camporum,* FACW), Itherial's spear (*Triteleia laxa*, UPL), annual lupine (*Lupinus bicolor*, UPL), blue eyed grass (*Sisyrinchium bellum*, FACW), blow wives (*Achyrachaena mollis*, FAC), shining peppergrass (*Lepidium nitidum*, FAC), and small flowered fiddleneck (*Amsinkia* menziesii, UPL).

Developed/Landscaped

About 5.71 acres of developed/landscaped habitat is present in the BSA as hardscaped areas along Fallon Road and Croak Road in parcels A, B, and C (**Figure 6**). Additional hardscaped areas such as parking, storage, and sheds and landscaped areas occur around buildings, fences, parking areas, and a landscaping company in parcels D, F, and G of the BSA.

Small patches of non-native of horticultural plant species such as filaree are scattered around the buildings in the developed/landscaped parts of the BSA. Several patches of ornamental trees, primarily eucalyptus (*Eucalyptus* sp., UPL) occur near fence lines and buildings in the BSA.

Chapter 5 – Chapter 5 – Results: Biological Resources

5.1. Survey Results and Discussion

Nine formal sample points (SP) were taken throughout the BSA during the 2018 wetland delineation surveys (Figures 7a and 7b, Appendix C). Nine wetland data forms and one OHWM data form were prepared during the April 2018 survey and are included in Appendix C. Approximately 10.96 acres of potentially jurisdictional waters of the U.S. (wetlands and other waters) were identified in the BSA. Potentially jurisdictional waters of the U.S. in the BSA are illustrated in Figures 7a and 7b and summarized below in Table 3.

Table 3. Summary of Potentially Jurisdictional Waters in the Project Area

Potentially Jurisdictional Waters	Acres[1]
Total Section 404 Wetlands	**10.5**
Perennial Marsh	0.07
Seasonal Wetlands	10.43
Total Section 404 Other Waters of the U.S	**0.46**
Ephemeral stream	0.13
Perennial stream	0.33
Total of potentially jurisdictional waters of the U.S.	**10.96**
Riparian Waters of the State	**4.02**
Ephemeral stream (stream bed)	0.13
Perennial stream (stream bed)	0.33
In-stream seasonal wetland	0.14
Riparian vegetation within top of bank (stream banks above OHWM)	3.42
Total of Potentially Jurisdictional Waters	**14.38**

[1] Acreage totals are rounded.

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H. T. HARVEY & ASSOCIATES
Ecological Consultants

Figure 7a. ID of Waters Map
Dublin Boulevard-North Canyons Parkway Extension Project -
Wetland Delineation Report (3922-01)
August 2018

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N:\Projects3900\3922-01\Reports\Wetland Delineation\Fig 7b ID of Waters Map.mxd

H. T. HARVEY & ASSOCIATES
Ecological Consultants

Figure 7b. ID of Waters Map
Dublin Boulevard-North Canyons Parkway Extension Project - Wetland Delineation Report (3922-01)
August 2018

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Information pertinent to the identification of jurisdictional wetlands and other waters assembled during this investigation is presented in six appendices to this report:

- **Appendix A**, “Plants Observed in the BSA”
- **Appendix B**, “Soil Survey of Alameda County”
- **Appendix C**, “USACE Arid West Wetland Determination Data Forms”
- **Appendix D**, “Photographs of the BSA”
- **Appendix E**, “Aquatic Resources Table”
- **Appendix F**, “Signed Statement from the Property Owner Allowing Access”

5.2. Assumptions, Observations, and Rationale

Conditions observed during the delineation site visits and are reported here along with pertinent background information and precipitation records.

5.2.1. Assumptions and Observations

This preliminary delineation assumes that normal circumstances prevailed at the time of the April 2018 survey, and results are based upon the conditions present. The survey was performed using the “Routine Method of Determination” using three parameters, as outlined in the Corps Manual and the Arid West Regional Supplement.

The survey took place toward the end of the 2017–2018 wet season. Relative to the 30-year climate normals, the BSA experienced drier-than-normal conditions during the beginning of the 2017–2018 wet season, prior to the survey. Additionally, the site experienced wetter-than-normal conditions during the 2016–2017 wet season. These conditions were taken into account when assessing the waters present on the site.

At the time of the April 2018 survey, the project area had received 13.23 inches of precipitation, which is approximately 82% of the 30-year average annual precipitation (1981–2010) (16.11 inches) (PRISM Climate Group 2018). The area received a total of 25.93 inches (183% of average) in the 2016–2017 rain year prior to March 2017 reconnaissance surveys (PRISM Climate Group 2018).

The boundaries of wetlands were clear owing to the presence of strongly hydrophytic vegetation and active hydrology indicators. The OHWM for streams was clear and delineated based on presence of break in slope, change in sediment characteristics, and

change in vegetation characteristics, along with other supporting features such as drift, bank undercutting, and root exposure.

The following observations were made at the project site during the surveys:

- No water was observed flowing in ephemeral streams ES1 and ES2 at the time of the 2018 surveys. The stream bed and banks were vegetated except for a rocked area in ES2 in parcel F. The OHWM for these stream was observed and mapped in the field on evidence that included bank incision, topography, soil development, and distinct transition of vegetation composition and structure.

- At the time of the 2018 delineation survey, no flowing water was present in ephemeral stream ES3. The banks were vegetated and the OHWM for ES3 was mapped in the field based on topography and where an incision was observed. The upstream portion was incised while the downstream portion formed a swale.

- The upstream portion of perennial stream PS1 was cemented and culverted and capped with concrete for about 350 ln ft, extending to the north of the BSA (D1 in **Figure 7a**). Flowing water was observed in downstream portion of perennial stream PS1 which flows along the western portion of Croak Road and along the western boundary of parcel A.

- PS2 was flowing during all surveys in 2017 and 2018. This stream flows from parcel B (**Figure 2**) to be conveyed under Fallon/Croak Road into parcel A. The stream then crosses to the west under Fallon Road and runs outside the BSA parallel to I-580 before discharging to a culvert under the highway and entering a flood control channel. This channel then drains to Arroyo Las Positas to the south.

- No flowing water was observed in the perennial stream PS3 in June 2018, but the streambed was lined with wet exposed soil. The stream has been flowing in 2017 and April 2018 and may be intermittent, but due to the lower than average precipitation in 2018, was mapped as perennial. PS3 was observed and mapped based on topography, incised bank, a distinct change in vegetation.

- Cottonwood Creek is a perennial stream that flows overland through the eastern portion of the BSA. It originates 4 miles north of the BSA in the Diablo Mountains near Collier Canyon Road, and flows southward to exit the BSA through a double box culvert beneath I-580, and then empties to Arroyo Las Positas after just 0.15 mile. Arroyo Las Positas flows into Arroyo Mocho, and historically, this watercourse went underground shortly thereafter, exhibiting no overland connection to the San Francisco Bay. During the present day, Arroyo Mocho flows through an aboveground engineered channel, draining into Alameda Creek and ultimately reaching San Francisco Bay, a traditionally navigable water.

- At the time of the 2018 delineation surveys overland flows were observed in Cottonwood Creek, identified as a perennial stream PS4, with connection to ground water.

- The OHWMs of Cottonwood Creek were observed and mapped in the field based on topography and the stream banks being sharply incised and lined with exposed soil subject to erosion.

- Several inches of standing water with numerous cow punches were observed in the perennial marsh PM1.

- More saturated soils than ponding were observed in the seasonal wetland complex. Regeneration of narrowleaf cattails was observed in the center of the largest seasonal wetland patch SW1 in April 2018, but this area had dried considerably by May and June of 2018.

Riparian waters of the state were mapped at either the top of bank or extent of riparian vegetation and are shown on **Figure 6** as mixed riparian woodland or riparian grassland. Grassy-banked streams lacking riparian canopy were mapped at top of bank, while functional riparian canopy was mapped lower gradient streams. The current practice of the RWQCB is to claim all areas up to the top of bank, plus any associated riparian canopy that could contribute deadfall and leaf litter, as waters of the state. Riparian waters of the state also include all potential waters of the U.S. mapped on the BSA.

5.2.2. Rationale for Sample Point Choice

Wetland data form sample points (**Appendix C**) were placed in areas that captured the diversity of wetland types or lack of wetland indicators in various features on the project site and where an upland or wetland habitat determination was aided by sample point data collection. Not every individual feature was sampled if it was well characterized by other sample points, or if access was limited at the time of the survey. The Wetland Determination Data Form – Arid West Region, Version 2.0 (USACE 2008a) was used for data collection. In total, nine sample points (SPs) and one OHWM transect were taken at the project site:

- SP 1 was selected to document the lack of wetland characteristics at culvert outlet in the northwestern corner of the BSA.

- SP2 was selected to document the upland-wetland boundary for SW1, where parameters are mesic but not wetland. It is the upland point for the SP2/SP3/SP6 triad, or the drier eastern and northern side of SW1.

- SP3 was selected to document the northern wetland boundary for SW1. It represents the seasonal wetland with more saturation than ponding in April 2018.
- SP4 was selected to document the upland-wetland boundary for the more mesic western side of SW1, where parameters are mesic but not wetland. It is the upland point for SP4/SP5 pair.
- SP5 was selected to document wetland boundary for PM1. It represents the wetland point for SP4/SP5 pair and is example of seasonal wetland with several inches of ponding in April.
- SP6 was selected to document eastern wetland extent for SW1, part of SP2/SP3/SP6 triad. This is an example of a portion of this seasonal wetland with more saturation than ponding in April.
- SP7 was selected to document floodplain swale wetland SW4, and is the wetland point for SP7/SP8 pair.
- SP8 was selected to document upland-wetland boundary, where parameters are mesic but not wetland. It is the upland point for the SP7/SP8 pair.
- SP9 (Figure 7b) was selected to document an area of standing water observed in April 2018 which did not qualify as a regularly flooded wetland.
- OHWM1 was chosen to characterize Cottonwood Creek.

5.2.3. Photodocumentation

Table 4 lists the labels of the photographs taken to document conditions at the project site, along with the coordinates of the photo points and a description that indicates the rationale for photodocumentation at that point. All photodocumentation is available in **Appendix D**.

Table 4. Coordinates and Descriptions of Photographs

Label*	Latitude, Longitude	Description
Photo 1	37.422445 -121.510057	Concreter lined portion of perennial stream PS1.
Photo 2	37.422072, -121.505909	Culvert outlet which empties into the perennial marsh habitat in the northwestern corner of the project area.
Photo 3	37.422072 -121.505909	Perennial marsh (PM1) habitat with pooled water.

Label*	**Latitude, Longitude**	**Description**
Photo 4	37.421469 -121.505578	Regrowth of *Typha* sp. seen in the seasonal wetland SW1.
Photos 5A and B	37.422144 -121.505984	A-wetland sample point SP5 representing perennial marsh (PM1) habitat with several inches of ponding, and B-paired upland sample point SP4 showing conditions that are mesic but not wetland.
Photos 6A and B	37.421949 -121.510006	A-wetland sample point SP3 for seasonal wetland (SW1) with more saturation than ponding and extensive cow punches. B-paired upland sample point (SP2) where conditions are mesic but not wetland.
Photos 7A and B	37.421734 -121.503493	A-wetland sample point, SP7, in the floodplain swale wetland, SW4 formed by the perennial stream PS3. B-paired upland boundary sample point, SP8, for SW3.
Photo 8	37.411685 -121.503400	Perennial stream, PS3 showing both OHWM and top of bank as defined by distinct change in vegetative cover and composition.
Photo 9	37.422027. -121.504652	Ephemeral stream, ES1 in the northwestern part of the project area as defined by change in slope and topography and no flowing water.
Photo 10	37.421214 -121.494466	(A)-the upstream incised portion of ephemeral stream ES3. (B)-downstream portion of ES3 where it fans out to form a swale.
Photo 11	37.421226 -121.494151	Cottonwood Creek perennial stream (PS4) habitat showing OHWM as defined by sharp incised banks.
Photo 12	37.421226 -121.494151	Riparian woodland habitat on the upper banks of Cottonwood Creek.
Photo 13	37.421475 -121.494842	Typical California annual grassland habitat which dominated majority of the project area.
Photo 14	37.420749 -121.493239	Location of sampling point 9 where water had pooled but no wetland parameter were found.

* Labels list the Photo_#-direction (N = north; W = west; E = east; NE = northeast; NW = northwest; SW = southwest; SE = southeast; ESE = east-southeast; SSW = south-southwest; NA = not applicable, for photos taken facing down for soil pictures, etc.)

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Chapter 6 – Wetlands and Other Waters Coordination Summary

6.1. Areas Meeting the Regulatory Definition of Section 404 Jurisdictional Waters

6.1.1. Identification of Section 404 Potentially Jurisdictional Wetlands (Special Aquatic Sites)

Section 404 potentially jurisdictional wetlands were identified in the project area.

Four of the nine sample point locations had sufficient three-parameter characteristics to meet the definition of a jurisdictional wetland. Perennial marsh wetland was represented by PM1 (Figure 7a) and seasonal wetlands were represented by SW1, SW2, SW3, and SW4 (Figures 7a). These wetlands and sample points are described below.

Perennial Marsh. The perennial marsh wetland, PM1, toward the western boundary of the project area is considered potentially USACE jurisdictional. This feature occupies approximately 0.07 acres. A summary of wetland data form results is presented in Table 5. The data are also presented on the completed delineation forms in Appendix C.

The perennial marsh habitat was identified based on the dominance of hydrophytic species such as alkali bulrush and iris-leaved rush, inundated soils with redox concentrations; and the primary hydrology indicators, surface water (A1) and saturation (A3). At every site visit in 2017 and 2018, this habitat was inundated with flowing water.

Seasonal Wetland. Four seasonal wetlands (SW1 to SW4) scattered in low lying portions in the western half of the project area are considered potentially USACE jurisdictional. These features occupy a total of approximately 10.43 acres. A summary of wetland data form results is presented in Table 5. The data are also presented on the complete forms in **Appendix C**.

The triad of sampling points SP2, SP3, and SP6 were used to demarcate the seasonal wetland SW1 in the northwestern part of the project area which is approximately 8.589 acres. SP2 and SP6 were selected to represent the northern and eastern boundaries of this seasonal wetland while SP2 represented the upland boundary where conditions were mesic but not wetland. Seasonal wetland, SW1, was identified based on the saturation visible in the aerial imageries from October 2011 and April 2012; GPS recording of the boundary in the field; observation of a break in hydrophytic vegetation communities; a substantial amount of cattle hoof punches approximately 2 – 6 inches deep; and deep clayey soils with redox concentrations conforming to redox dark surface (F6).

Seasonal wetlands SW2, SW3, SW4, and the southern portion of SW1 were demarcated based on saturation observed on the aerial imagery and the presence of wetland vegetation such as popcornflower (OBL), woolly marbles (FACW*),* annual semaphore grass (OBL), and flatface downingia (OBL).

SW3 represents the floodplain of the perennial stream (PS3) and is approximately 1.730 acres in size. The sampling point, SP 7 represents the northern boundary of this wetland and is paired with SP8 where parameters are mesic but not wetland. In addition to the saturation observed in the aerial imagery, SW3 was identified in the field based on the dominance of Italian ryegrass (FAC) and moist soil with redox concentrations (F6).

SW2 and SW4 along the southern boundary of the project area represent approximately 0.102 and 0.010 acres respectively.

Table 5. Summary of Wetland Data Forms Pertaining to BSA

Name	Sampling Rationale	Hydrophytic Vegetation?	Hydric Soil?	Wetland Hydrology?	Overall Wetland Assessment
SP1	Selected to document lack of wetland characteristics at culvert outlet	No	No	No	Not a 3-parameter wetland
SP2	Upland point of seasonal wetland to document wetland boundary with mesic but not wetland conditions	No	No	No	Not a 3-parameter wetland
SP3	Example of seasonal wetland with more saturation than ponding	Yes	Yes	Yes	A 3-parameter wetland
SP4	Upland point of perennial marsh with mesic but not wetland conditions.	No	No	No	Not a 3-parameter wetland
SP5	Example of marsh wetland with several inches of ponding	Yes	Yes	Yes	A 3-parameter wetland
SP6	Example of seasonal wetland with more saturation than ponding	Yes	Yes	Yes	A 3-parameter wetland
SP7	Example of seasonal wetland SW4 in the swale floodplain	Yes	Yes	Yes	A 3-parameter wetland

Name	Sampling Rationale	Hydrophytic Vegetation?	Hydric Soil?	Wetland Hydrology?	Overall Wetland Assessment
SP8	Upland point for seasonal wetland SW4	No	No	No	Not a 3-parameter wetland
SP9	Area of standing water that did not qualify as regulatory wetland.	Yes	Yes	Yes	A 3-parameter wetland

6.1.2. Identification of Section 404 Potentially Jurisdictional Other Waters of the U.S.

Section 404 potentially jurisdictional other waters were identified in the BSA.

Section 404 potential other waters include four perennial streams; Cottonwood Creek or PS4 and three unnamed streams, PS1, PS2, and PS3. Potential other waters also include a concrete lined ditch associated with the perennial stream and two culverts associated with the ephemeral streams. These features are discussed separately below.

Perennial Stream. The BSA comprises of four perennial streams occupying a total of approximately 0.33 acre and 1,671 ln. ft., and are situated at or below the OHWMs of Cottonwood Creek (0.039 acre, 352 linear feet); PS3 (0.076 acres, 380 ln, ft.); PS2 (0.034 acres, 72 ln. ft.); and PS1 (0.163 acres, 704 ln. ft.).

Cottonwood Creek (PS4) is a perennial stream with a connection to the ground water and flows overland through the eastern portion of the BSA. Substrate was exposed soil and the banks were vegetated with grass. One OHWM point was taken at the perennial stream PS4 (**Appendix C**). This point was defined by a break in slope, change in vegetation characteristics, and change in sediment characteristics. This perennial stream was mapped as occurring in areas below the OHWM that are devoid of emergent vegetation.

The unnamed perennial stream PS3 is present at the northern border of the project area just west of the eastern part of Croak Road and is approximately 0.076 acre (380 linear feet). Flowing water was not observed in the stream at the time of the April 2018 survey but, the stream bed comprised of exposed moist soil. One OHWM point was taken at this perennial stream. This point was defined by a break in slope and change in vegetation characteristics. This perennial stream was mapped as occurring in areas below the OHWM that are devoid of emergent vegetation.

The unnamed perennial stream PS1 runs along the western boundary of parcel A parallel to Croak Road and covers approximately 0.163 acre (704 linear feet) in the project area. Flowing water was observed in the stream at the time of the survey in April 2018. No OHWM transects were taken but, the OHWM was defined by break in slope,

change in vegetation characteristics, and change in sediment characteristics. This perennial stream was mapped as occurring in areas below the OHWM that are devoid of emergent vegetation.

The unnamed perennial stream PS2 occurs in the southwestern corner of the project area and covers approximately 0.034 acre (72 linear feet). This stream drains the perennial marsh wetland (discussed below) and flowing water was observed in the stream at the time of the survey in April 2018. No OHWM transects were taken but, the OHWM was defined by break in slope, change in vegetation characteristics, and change in sediment characteristics. Similar to PS1, this perennial stream was also mapped as occurring in areas below the OHWM that are devoid of emergent vegetation.

Ephemeral Stream. Three ephemeral streams and one culverted ephemeral stream (see below) occur within the BSA. The three non-culverted ephemeral streams are ES1 (0.052 acre, 314 ln ft, **Figure 7a**) and ES2 and ES3 (0.047 and 198 ln ft., 0.020 and 427 ln ft., respectively, **Figure 7b**). These all flow from north to south. Both ES1 and ES2 become swale-like or disappear before I-580, which ES3 flows into Cottonwood Creek (PS4) to the south of the BSA.

Ditch. One cemented ditch approximately 0.018 acre (D1, 163 linear feet) within the project area is associated with potentially jurisdictional waters. At the time of the survey in April 2018, standing water was seen in this ditch. Because this feature exhibits indicator of hydrology without a hydric vegetation community, it would be considered other waters of the USACE.

Culverts. Two culverts connect potentially jurisdictional waters. Both these features exhibit indicators of hydrology without a hydric vegetation community and thus would be considered other waters by USACE. These culverts occupy 0.008 acre and are approximately 109 linear feet.

6.2. Areas Meeting the Regulatory Definition of Historic or current Section 10 Waters

No Section 10 potentially jurisdictional waters were identified in the project area.

6.3. Riparian Areas Meeting the Regulatory Definition of Waters of the State

Areas meeting the regulatory definition of waters of the state include the perennial and ephemeral streams which meet the definition of the waters of the U.S (discussed above) as well as the associated riparian vegetation up to the top of the bank. The USACE does not consider the areas between OHWMs and top of bank to be jurisdictional, so these are referred to as riparian waters of the State (**Figure 6**). Approximately 3.42 acre of riparian vegetation was identified within the top of bank of the mapped jurisdictional streams of approximately 0.46 acre (Table 3) in the BSA. Thus the full area meeting the regulatory definition of riparian waters of the state in the BSA, including streambeds claimed by the USACE as potential waters of the U.S. is approximately 4.02 acres. All out of stream wetlands that are potential waters of the U.S. are also expected to be claimed by the RWQCB as waters of the state.

6.4. Areas Not Meeting the Regulatory Definition of Waters of the United States/State

The remainder of the project area (totaling approximately 127.02 acres) meets none of the regulatory definitions of jurisdictional waters. The majority of these areas, classified as uplands (**Figure 7a** and **7b**), support California annual grassland and Developed/Landscaped areas. The majority of the project area, approximately 121.31 acres was mapped as California annual grassland and is dominated by a suite of non-native grasses, such as seaside barley (FAC), meadow barley (FACU), and wild oat (UPL).

Developed/Landscaped areas in the project area cover approximately 5.71 acres and include rural residential structures, office space and storage space, and barns and other areas used for storing farming and landscaping equipment.

Although a portion of a NWI wetland feature described as riverine, intermittent, streambed, seasonally flooded, appears to connect PS2 and PS3 (**Figure 5**), no feature on the ground surface was observed to correspond to regulatory definitions under the Clean Water Act. This riverine feature previously mapped by the NWI may provide some hydrology to the seasonal wetlands. However, at the time of the survey in April 2018, no incision, drainage patterns, or discernable wetland swale was evident.

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Appendix A – Plants Observed on the Project Site

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Family	**Scientific Name**	**Common name**	**Indicator Status**
Anacardiaceae	*Toxicodendron diversilobum*	Poison oak	FACU
Apiaceae	*Berula erecta*	Cut leaved water parsnip	OBL
	Conium maculatum	Poison hemlock	FACW
	Foeniculum vulgare	Fennel	UPL
	Sanicula bipinnatifida	Purple sanicle	UPL
Asclepiadaceae	*Asclepias fascicularis*	Mexican whorled milkweed	FAC
Asteraceae	*Achyrachaena mollis*	Blow wives	FAC
	Anthemis cotula	Dog fennel	FACU
	Baccharis pilularis	Coyote brush	UPL
	Carduus pycnocephalus	Italian thistle	UPL
	Centaurea solstitialis	Yellow star thistle	UPL
	Centromadia parryi ssp. *congdonii*	Congdon's tar plant	FACW
	Cirsium vulgare	Bull thistle	FACU
	Grindelia camporum	Common gumplant	FACW
	Helminthotheca echioides	Bristly oxtongue	FAC
	Hypochaeris glabra	Smooth cat's ear	UPL
	Logfia gallica	Narrowleaf cottonrose	UPL
	Matricaria discoidea	Pineapple weed	FACU
	Picris echioides	Bristly ox tongue	UPL
	Psilocarphus brevissmus var. *brevissimua*	Short woollyheads	FACW
	Silybum marinum	Blessed milkthistle	UPL
	Sonchus arvensis ssp. *arvensis*	Field sowthistle	FACU
	Xanthium spinossum	Spiny cockleburr	FACU
Boraginaceae	*Amsinckia menziesii*	Menzies' fiddleneck	UPL
	Plagiobothrys (leptocladus)	Alkali popcorn flower	OBL
	Plagiobothrys sp.	Popcorn flower	FAC-OBL
Brassicaceae	*Brassica nigra*	Black mustard	UPL
	Capsella bursa-pastoris	Shepherd's purse	FACU
	Cardamine oligosperma	Bitter cress	FAC
	Hirschfeldia incana	Mediterranean hoary mustard	UPL
	Lepidium dictyotum	Alkali pepperweed	FAC
	Lepidium nitidum	Shining peppergrass	FAC
	Raphanus sativus	Wild raddish	UPL

Family	**Scientific Name**	**Common name**	**Indicator Status**
Campanulaceae	*Downigia bicornuta* var. *bicornuta*	Doublehorn calicoflower	OBL
Caryophyllaceae	*Stellaria (media)*[1]	Chickweed	FACU
Convolvulaceae	*Convolvulus arvensis*	Field bindweed	UPL
Cyperaceae	*Bolboschoenus maritimus*	Alkali bulrush	UPL
	Carex sp.	sedge	FAC-OBL
	Cyperus eragrostis	Tall cyperus	UPL
	Eleocharis macrostachya	Common spikerush	UPL
	Schoenoplectus acutus	Hardstem bulrush	OBL
Fabaceae	*Lupinus bicolor*	Annual lupine	UPL
	Medicago polymorpha	Bur medic	FACU
	Melilotus indicus	Annual yellow sweetclover	FACU
	Quercus agrifolia	Coast live oak	UPL
	Quercus lobata	Valley oak	FACU
	Triticum aestivum	Common wheat	UPL
	Trifolium hirtum	Rose clover	UPL
	Trifolium sp.	Clover	?
	Vicia sativa	Spring vetch	FACU
	Vicia villosa ssp. *villosa*	Winter vetch	UPL
Geraniaceae	*Erodium botrys*	Big heron bill	FACU
	Erodium cicutarium	red stemmed filaree	UPL
	Erodium moschatum	Musky stork's bill	UPL
	Geranium dissectum	Cutleaf geranium	UPL
	Geranium molle	Crane's bill geranium	UPL
Iridaceae	*Sisyrinchium bellum*	Western blue eyed grass	FACW
Juncaceae	*Juncus bufonius*	Toad rush	FACW
	Juncus mexicanus	Mexican rush	FACW
	Juncus xiphioides	Iris leaved rush	OBL
Malvaceae	*Malva nicaeensis*	Bull mallow	UPL
	Malvella leprosa	Alkali mallow	FACU
Myrsinaceae	*Lysimachia arvensis*	Scarlet pimpernel	FAC
Myrtaceae	*Eucalyptus* sp.	Eucalyptus	UPL
Oleaceae	*Olea europa*	Common olive	UPL
Onagraceae	*Epilobium ciliatum*	Fringed willowherb	FACW
Orobanchaceae	*Bellardia trixago*	Mediterranean lineseed	UPL

Family	**Scientific Name**	**Common name**	**Indicator Status**
	Castilleja exserta ssp. *exserta*	Exserted indian paintbrush	UPL
Pappavaraceae	*Eschscholzia californica*	California poppy	UPL
Plantaginaceae	*Plantago lanceolata*	Narrowleaf plantain	FAC
	Veronica persica	Bird's eye speedwell,	UPL
Poaceae	*Avena barbata*	Slender oat	UPL
	Avena fatua	Wild oat	UPL
	Avena sp.	Oat	UPL
	Bromus diandrus	Ripgut brome	UPL
	Bromus hordeaceus	Soft brome	FACU
	Festuca perennis	Italian rye grass	UPL
	Hordeum brachyatherum ssp. *brachyantherum*	Meadow barley	FACW
	Hordeum depressum	Alkali barley	FACW
	Hordeum marinum ssp. *gussoneanum*	Mediterranean barley	FAC
	Hordeum murinum	Meadow barley	FACU
	Poa annua	Annual Blue Grass	FAC
	Pleuropogon californicus var. *californicus*	annual semaphoregrass	OBL
Polygonaceae	*Polygonum* sp.	Polygonum	FACU-OBL
	Rumex conglomeratus	Clustered dock	FACW
	Rumex crispus	Curly dock	FAC
Portulacaceae	*Claytonia* sp.	Miner’s lettuce	FACU-FAC
Ranunculaceae	*Ranunculus repens*	Creeping buttercup	FAC
	Ranunculus sceleratus var. *sceleratus*	Cursed buttercup	OBL
Salicaceae	*Salix laevigata*	Polished willow	FACW
Scrophulariaceae	*Triphysaria eriantha* ssp. *eriantha*	Butter 'n' eggs	UPL
	Veronica americana	Water speedwell	OBL
	Veronica anagallis-aquatica	Water speedwell	OBL
Themidaceae	*Triteleia laxa*	Ithuriel's spear	UPL
Typhaceae	*Typha (angustifolia)*[1]	Cattail	OBL

[1] The use of parentheses around a specific epithet denotes uncertainty about the species identification attributable to the time of year when surveys were conducted. The species given, such as Erigeron (canadensis), denotes the species that was likely encountered and the best judgment of the plant ecologist, while reflecting the fact that this specific identification could not be confirmed by plant morphology. This approach is used in contrast to using “sp.” (e.g., Eucalyptus sp.), which indicates a greater level of uncertainty regarding which species is present or even a possibility that multiple unidentified species in that genus are present.

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Appendix B – Supplement to the Soil Survey of Alameda County Area, California

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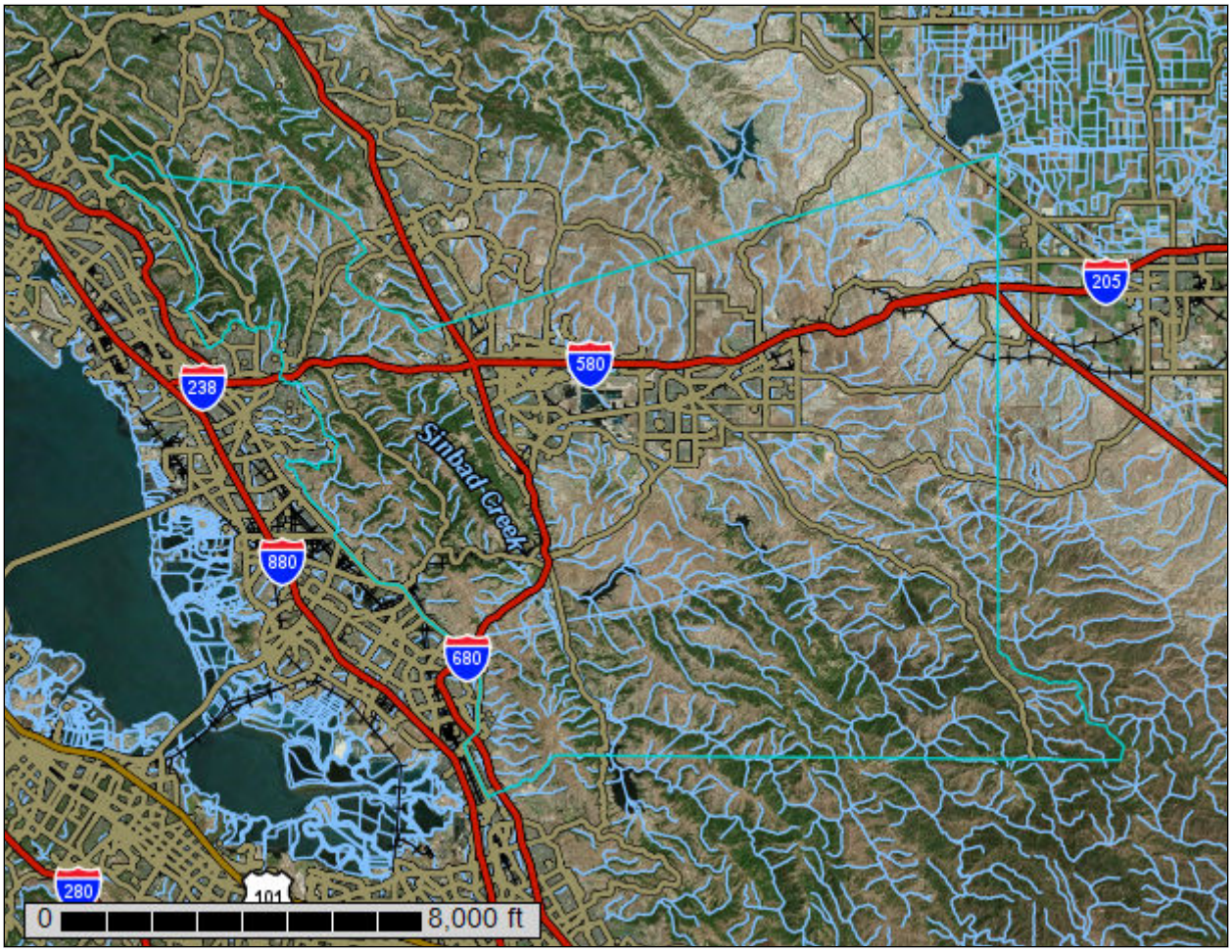
United States Department of Agriculture

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Alameda Area, California



May 23, 2018

CdB—Clear Lake clay, drained, 3 to 7 percent slopes

Map Unit Setting

National map unit symbol: hb31
Elevation: 100 to 900 feet
Mean annual precipitation: 14 to 15 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 240 to 260 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Clear lake and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Clear Lake

Setting

Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock

Typical profile

H1 - 0 to 36 inches: clay
H2 - 36 to 65 inches: clay

Properties and qualities

Slope: 3 to 7 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to moderately saline (0.0 to 8.0 mmhos/cm)
Available water storage in profile: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Hydric soil rating: Yes

Minor Components

Unnamed

Percent of map unit: 5 percent
Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Capay

Percent of map unit: 5 percent
Hydric soil rating: No

San ysidro

Percent of map unit: 5 percent
Hydric soil rating: No

CeBcc—Conejo clay loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: vx7g
Elevation: 10 to 1,000 feet
Mean annual precipitation: 14 to 25 inches
Mean annual air temperature: 59 degrees F
Frost-free period: 260 to 300 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Conejo and similar soils: 85 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Conejo

Setting

Landform: Fans, valleys
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock

Typical profile

H1 - 0 to 27 inches: clay loam
H2 - 27 to 60 inches: clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches

Hydric soil rating: No

Minor Components

Clear lake

Percent of map unit: 5 percent
Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Pescadero

Percent of map unit: 5 percent
Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Landslips

Percent of map unit: 5 percent
Hydric soil rating: No

DvC—Diablo clay, very deep, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: hb3b
Elevation: 300 to 1,700 feet
Mean annual precipitation: 10 to 15 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 240 to 280 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Diablo and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Diablo

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Alluvium derived from shale and siltstone

Typical profile

H1 - 0 to 15 inches: clay
H2 - 15 to 42 inches: silty clay
H3 - 42 to 60 inches: silty clay

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to moderately saline (0.0 to 8.0 mmhos/cm)
Available water storage in profile: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Altamont

Percent of map unit: 5 percent
Hydric soil rating: No

Linne

Percent of map unit: 5 percent
Hydric soil rating: No

Clear lake

Percent of map unit: 3 percent
Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Pescadero

Percent of map unit: 2 percent
Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Natural drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Rock outcrop

Percent of map unit: 15 percent
Hydric soil rating: No

Los osos

Percent of map unit: 5 percent
Hydric soil rating: No

Los gatos

Percent of map unit: 5 percent
Hydric soil rating: No

Vallecitos

Percent of map unit: 5 percent
Hydric soil rating: No

LaC—Linne clay loam, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: hb3l
Elevation: 700 to 1,700 feet
Mean annual precipitation: 10 to 15 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 240 to 260 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Linne and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Linne

Setting

Landform: Hills
Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 36 inches: clay loam
H2 - 36 to 40 inches: weathered bedrock

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Altamont

Percent of map unit: 5 percent
Hydric soil rating: No

Diablo

Percent of map unit: 5 percent
Hydric soil rating: No

Clear lake

Percent of map unit: 3 percent
Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Pescadero

Percent of map unit: 2 percent
Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

LaD—Linne clay loam, 15 to 30 percent slopes, MLRA 15

Map Unit Setting

National map unit symbol: 2w63l
Elevation: 20 to 2,010 feet
Mean annual precipitation: 12 to 22 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 260 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Linne and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Linne

Setting

Landform: Mountain slopes, hillslopes
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Residuum weathered from calcareous shale

Typical profile

Ap - 0 to 9 inches: clay loam
A1 - 9 to 14 inches: clay loam
A2 - 14 to 29 inches: clay loam
AC - 29 to 32 inches: sandy clay loam
Ck - 32 to 36 inches: fine sandy loam
Cr - 36 to 51 inches: bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 35 to 50 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Diablo

Percent of map unit: 5 percent
Landform: Mountain slopes, hillslopes
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Ecological site: CLAYEY (R015XD001CA)
Hydric soil rating: No

Altamont

Percent of map unit: 4 percent
Landform: Hillslopes
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Clear lake

Percent of map unit: 3 percent
Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Pescadero

Percent of map unit: 2 percent
Landform: Depressions, drainageways
Down-slope shape: Concave, convex
Across-slope shape: Concave
Hydric soil rating: Yes

Haploxerolls, landslides

Percent of map unit: 1 percent
Landform: Landslides, slumps
Hydric soil rating: No

LaE2—Linne clay loam, 30 to 45 percent slopes, eroded

Map Unit Setting

National map unit symbol: hb3n
Elevation: 700 to 1,700 feet
Mean annual precipitation: 10 to 15 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 240 to 260 days
Farmland classification: Not prime farmland

Map Unit Composition

Linne and similar soils: 85 percent

Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Linne

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 36 inches: clay loam
H2 - 36 to 40 inches: weathered bedrock

Properties and qualities

Slope: 30 to 45 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: CLAYEY HILLS (R014XD092CA)
Hydric soil rating: No

Minor Components

Altamont

Percent of map unit: 5 percent
Hydric soil rating: No

Diablo

Percent of map unit: 5 percent
Hydric soil rating: No

Clear lake

Percent of map unit: 3 percent
Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Pescadero

Percent of map unit: 2 percent
Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

LbDcc—Linne clay loam, 5 to 15 percent slopes

Map Unit Setting

National map unit symbol: vx7s
Elevation: 150 to 1,000 feet
Mean annual precipitation: 12 to 15 inches
Mean annual air temperature: 59 degrees F
Frost-free period: 260 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Linne and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Linne

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from calcareous shale and/or residuum weathered from calcareous sandstone

Typical profile

H1 - 0 to 29 inches: clay loam
H2 - 29 to 33 inches: weathered bedrock

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent

Pd—Pescadero clay

Map Unit Setting

National map unit symbol: hb48
Elevation: 100 to 1,700 feet
Mean annual precipitation: 10 to 15 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 240 to 260 days
Farmland classification: Not prime farmland

Map Unit Composition

Pescadero and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pescadero

Setting

Landform: Rims
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sandstone and shale

Typical profile

H1 - 0 to 2 inches: clay
H2 - 2 to 20 inches: clay
H3 - 20 to 72 inches: clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 36 to 72 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 90.0
Available water storage in profile: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D

Hydric soil rating: Yes

Minor Components

Clear lake

Percent of map unit: 5 percent
Landform: Basin floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Diablo

Percent of map unit: 5 percent
Hydric soil rating: No

Solano

Percent of map unit: 5 percent
Landform: Rims
Hydric soil rating: No

PgA—Pleasanton gravelly loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hb49
Elevation: 220 to 800 feet
Mean annual precipitation: 14 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 260 to 280 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Pleasanton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pleasanton

Setting

Landform: Fluvial terraces, alluvial fans
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sandstone and shale

Typical profile

H1 - 0 to 21 inches: gravelly loam
H2 - 21 to 64 inches: gravelly clay loam
H3 - 64 to 72 inches: gravelly silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

San ysidro

Percent of map unit: 10 percent
Hydric soil rating: No

Pleasanton

Percent of map unit: 5 percent
Hydric soil rating: No

RdA—Rincon clay loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: hb4j
Elevation: 10 to 600 feet
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 57 degrees F
Frost-free period: 260 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Rincon and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rincon

Setting

Landform: Fans, valley floors

Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sandstone and shale

Typical profile

H1 - 0 to 16 inches: clay loam
H2 - 16 to 52 inches: sandy clay
H3 - 52 to 60 inches: stratified sandy loam to clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Clear lake

Percent of map unit: 5 percent
Hydric soil rating: No

San ysidro

Percent of map unit: 5 percent
Hydric soil rating: No

Pleasanton

Percent of map unit: 5 percent
Hydric soil rating: No

RdB—Rincon clay loam, 3 to 7 percent slopes

Map Unit Setting

National map unit symbol: hb4k
Elevation: 10 to 600 feet
Mean annual precipitation: 12 to 16 inches

Mean annual air temperature: 57 degrees F
Frost-free period: 260 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Rincon and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rincon

Setting

Landform: Valley floors, fans
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sandstone and shale

Typical profile

H1 - 0 to 16 inches: clay loam
H2 - 16 to 52 inches: sandy clay
H3 - 52 to 60 inches: stratified sandy loam to clay loam

Properties and qualities

Slope: 3 to 7 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

San ysidro

Percent of map unit: 5 percent
Hydric soil rating: No

Pleasanton

Percent of map unit: 5 percent
Hydric soil rating: No

Clear lake

Percent of map unit: 5 percent
Hydric soil rating: No

YmA—Yolo loam, calcareous substratum, 0 to 6 percent slopes, MLRA 14

Map Unit Setting

National map unit symbol: 2w89t
Elevation: 70 to 480 feet
Mean annual precipitation: 15 to 24 inches
Mean annual air temperature: 59 to 61 degrees F
Frost-free period: 260 to 360 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Yolo, calcareous substratum, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Yolo, Calcareous Substratum

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock

Typical profile

A - 0 to 8 inches: loam
A - 8 to 16 inches: loam
C1 - 16 to 24 inches: very fine sandy loam
C2 - 24 to 46 inches: fine sandy loam
C3 - 46 to 60 inches: loam

Properties and qualities

Slope: 0 to 6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum in profile: 2 percent
Salinity, maximum in profile: Nonsaline (0.3 to 0.5 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Unnamed
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Livermore
Percent of map unit: 5 percent
Hydric soil rating: No

Sycamore
Percent of map unit: 5 percent
Hydric soil rating: No

YmB—Yolo loam, 0 to 8 percent slopes, MLRA 15

Map Unit Setting
National map unit symbol: 2w89h
Elevation: 70 to 2,530 feet
Mean annual precipitation: 16 to 29 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 260 to 360 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition
Yolo and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Yolo

Setting
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium derived from metamorphic and sedimentary rock

Typical profile
Ap - 0 to 8 inches: loam
A - 8 to 16 inches: loam
C1 - 16 to 24 inches: very fine sandy loam
C2 - 24 to 46 inches: fine sandy loam
C3 - 46 to 60 inches: loam

Properties and qualities
Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium

Appendix C – USACE Arid West Wetland Determination Data Forms

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WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Dublin Boulevard/ North Canyons City/County: Dublin/ Alameda Sampling Date: April 13, 2018
Applicant/Owner: State: California Sampling Point: SP1
Investigator(s): Elan Alford Section/Township/Range:
Landform (hillslope, terrace, etc.): excavated swale Local Relief (concave, convex, none): Concave Slope (%): 0-1
Subregion (LRR): California Lat: Long: Datum:
Soil Map Unit Name: NWI classification
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation ___ Soil ___ or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation ___ Soil ___ or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ___ No X
Hydric Soil Present? Yes ___ No X
Wetland Hydrology Present? Yes ___ No X

Is the Sampled Area within a Wetland? Yes ___ No X

Remarks:
Sedimented culvert outlet. Little live vegetation is present in excavated swale.

VEGETATION

Tree Stratum (Plot size: *30 ft*)	Absolute Cover %	Dominant Species?	Indicator Status
1. *None*	0		
2.			
3.			
4.			
Total Cover:	0		
Sapling/Shrub Stratum (Plot size: *15 ft*)			
1. *None*	0		
2.			
3.			
4.			
5.			
Total Cover:	0		
Herb Stratum (Plot size: *5 ft x 5 ft*)			
1. *Geranium molle*	<1	X	UPL
2. *Brassica sp.*	<1	X	NI
3. *Unk. grass*	<1		NI
4. *Unk grass*	<1		NI
5.			
6.			
7.			
8.			
Total Cover:	2		
Woody Vine Stratum (Plot size: *15 ft*)			
1. *None*	0		
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 10 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0/2 = 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL Species	x 5 =	
Column totals	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ Dominance Text is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ___ **No** **X**

Remarks:
Cover is dominated by dead thatch

SOIL

Sampling Point: SP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10 YR 3/2	100					loamy sand	with sand
6-15	10 YR 2/2	95					clay loam	mixed soil, sand
	10 YR 4/3	5						
15-17	10 YR 2/2	83	10 YR 5/8	2	C	M	clay loam	
	10 YR 4/3	15						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (If present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

Sediment deposits from culvert outlet. Soil is moist. Mixed sands from deposition.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required: check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- X Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): NA

Water Table Present? Yes ___ No X Depth (inches): NA

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): NA

Wetland Hydrology Present? **Yes** ___ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Insufficient indicators.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Dublin Boulevard/ North Canyons City/County: Dublin/ Alameda Sampling Date: April 13, 2018
Applicant/Owner: State: California Sampling Point: SP2
Investigator(s): Elan Alford Section/Township/Range:
Landform (hillslope, terrace, etc.): flat Local Relief (concave, convex, none): None Slope (%): 0-1%
Subregion (LRR): California Lat: Long: Datum:
Soil Map Unit Name: NWI classification
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation ___ Soil ___ or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation ___ Soil ___ or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ___ No X
Hydric Soil Present? Yes ___ No X
Wetland Hydrology Present? Yes ___ No X

Is the Sampled Area within a Wetland? Yes ___ No X

Remarks:
Near apparent vegetation break where more grasses of higher stature are predominant at this location. This is approximately 10-ft north and on upland side the vegetation break.

VEGETATION

Tree Stratum (Plot size: *30 ft*)	Absolute Cover %	Dominant Species?	Indicator Status
1. *None*	0		
2.			
3.			
4.			
Total Cover:	0		
Sapling/Shrub Stratum (Plot size: *15 ft*)			
1. *None*	0		
2.			
3.			
4.			
5.			
Total Cover:	0		
Herb Stratum (Plot size: *5 ft x 5 ft*)			
1. *Hordeum murinum*	40	X	FACU
2. *Bromus hordeaceus*	27	X	FACU
3. *Brassica sp.*	5		
4. *Erodium cicutarium*	2		
5. *Helminthotheca eichioides*	1		FAC
6. *Veronica americana*	1		
7. *Navarettia sp.*	1		
8. *Geranium molle*	3		
Total Cover:	80		
Woody Vine Stratum (Plot size: *15 ft*)			
1. *None*	0		
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0/2 = 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL Species	x 5 =	
Column totals	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ Dominance Text is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ___ **No** **X**

Remarks:
Grass thatch cover is approximately 20%.

SOIL

Sampling Point: SP2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-9	10 YR 3/2	99	10 YR 4/8	1	C	M	sandy clay loam	brown roots, no stained pore linings, many roots
9-20	10 YR 2/1	100					clay loam	fewer roots

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (If present):

Type: None

Depth (inches): NA

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

Deep clay, no hydrogen sulfide.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required: check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): NA

Water Table Present? Yes ___ No X Depth (inches): NA

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): NA

Wetland Hydrology Present? **Yes** ___ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Notably less hoof punch than nearby sample area.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Dublin Boulevard/ North Canyons City/County: Dublin/ Alameda Sampling Date: April 13, 2018
Applicant/Owner: State: California Sampling Point: SP3
Investigator(s): Elan Alford Section/Township/Range:
Landform (hillslope, terrace, etc.): flat Local Relief (concave, convex, none): None Slope (%): 0-1
Subregion (LRR): California Lat: Long: Datum:
Soil Map Unit Name: NWI classification
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation ___ Soil ___ or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation ___ Soil ___ or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No
Hydric Soil Present? Yes X No
Wetland Hydrology Present? Yes X No

Is the Sampled Area within a Wetland? Yes X No

Remarks:
On wetter side of vegetation break with SP2. Approximately 10 ft from the break. Distinct cattle hoof punch is present, approximately 2"-6" deep.

VEGETATION

Tree Stratum (Plot size: *30 ft*)	Absolute Cover %	Dominant Species?	Indicator Status
1. *None*	0		
2.			
3.			
4.			
Total Cover:	0		
Sapling/Shrub Stratum (Plot size: *15 ft*)			
1. *None*	0		
2.			
3.			
4.			
5.			
Total Cover:			
Herb Stratum (Plot size: *5 ft x 5 ft*)			
1. *Lolium perenne*	60	X	FAC
2. *Picris eichioides*	20	X	FAC
3. *Geranium dissectum*	10		
4. *Brassica sp.*	3		
5. *Hordeum sp.*	1		
6. *Bromus hordeaceus*	1		
7.			
8.			
Total Cover:	95		
Woody Vine Stratum (Plot size: *15 ft*)			
1. *None*	0		
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 5 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 2/2 = 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL Species	x 5 =	
Column totals	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

X Dominance Text is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks:
Lots of microtopography from hoof punches. Some more upland species persist on top position of mounds from hoofprint. Lolium is the dominant vegetation.

SOIL

Sampling Point: SP3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10 YR 2/2	99	10 YR 5/6	1	C	PL	clay loam	roots
6-20	10 YR 2/1	57	10 YR 4/6	3	C	PL	clay loam	mixed soil
	10 YR 3/1	40					sandy clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (If present):

Type: None

Depth (inches): No

Hydric Soil Present? **Yes** X **No** ___

Remarks:

Deep clayey soil.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required: check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- X Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): NA

Water Table Present? Yes ___ No X Depth (inches): NA

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): NA

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Aerial imagery date from April 2012 shows saturation. Extensive cow punch present.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Dublin Boulevard-North Canyons City/County: Dublin/ Alameda Sampling Date: April 13, 2018
Applicant/Owner: State: California Sampling Point: SP4
Investigator(s): Elan Alford Section/Township/Range:
Landform (hillslope, terrace, etc.): flat Local Relief (concave, convex, none): None Slope (%): 0-1
Subregion (LRR): California Lat: Long: Datum:
Soil Map Unit Name: NWI classification
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation ___ Soil ___ or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation ___ Soil ___ or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ___ No X
Hydric Soil Present? Yes ___ No X
Wetland Hydrology Present? Yes ___ No X

Is the Sampled Area within a Wetland? Yes ___ No X

Remarks:
A small area that is elevated 6" to 1 ft above surrounding soil and supports distinct vegetation type than surrounding wetter area.

VEGETATION

Tree Stratum (Plot size: *30 ft*)	Absolute Cover %	Dominant Species?	Indicator Status
1. *None*	0		
2.			
3.			
4.			
Total Cover:	0		
Sapling/Shrub Stratum (Plot size: *15 ft*)			
1. *None*	0		
2.			
3.			
4.			
5.			
Total Cover:	0		
Herb Stratum (Plot size: *5ft x 5ft*)			
1. *Hordeum murinum*	40	X	FACU
2. *Erodium cicutarium*	30	X	UPL
3. *Geranium dissectum*	8		
4. *Picris eichioides*	10		
5. *Brassica sp*	2		
6.			
7.			
8.			
Total Cover:	90		
Woody Vine Stratum (Plot size: *15ft*)			
1. *None*	0		
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 10 % Cover of Biotic Crust

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0/2 = 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL Species	x 5 =	
Column totals	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ Dominance Text is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ___ **No** **X**

Remarks:
Distinctive vegetation change occurs on this mound and is dominated by Hordeum grasses and forbs.

SOIL

Sampling Point: SP4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/2	97	10YR 3/4	3	C	M	clay loam	roots present

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (If present):

Type: None

Depth (inches): No

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

Insufficient redox concentrations to make this soil F6.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required: check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): None
Water Table Present?	Yes ___	No X	Depth (inches): None
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): None

Wetland Hydrology Present? **Yes** ___ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

This is approximately 5-10 ft away from an area with ponded surface water. Ponded water is not present in this location.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Dublin Boulevard/ North Canyons City/County: Dublin/ Alameda Sampling Date: April 13, 2018
Applicant/Owner: State: California Sampling Point: SP5
Investigator(s): Elan Alford Section/Township/Range:
Landform (hillslope, terrace, etc.): flat Local Relief (concave, convex, none): Concave Slope (%): 0-1
Subregion (LRR): California Lat: Long: Datum:
Soil Map Unit Name: NWI classification
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation ___ Soil ___ or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation ___ Soil ___ or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No
Hydric Soil Present? Yes X No
Wetland Hydrology Present? Yes X No

Is the Sampled Area within a Wetland? Yes X No

Remarks:
This area is inundated with several inches of water.

VEGETATION

Tree Stratum (Plot size: *30ft*)	Absolute Cover %	Dominant Species?	Indicator Status
1. *None*	0		
2.			
3.			
4.			
Total Cover:	0		
Sapling/Shrub Stratum (Plot size: *15ft*)			
1. *None*	0		
2.			
3.			
4.			
5.			
Total Cover:	0		
Herb Stratum (Plot size: *5ft x 5ft*)			
1. *Lolium perenne*	30	X	FAC
2. *Rumex sp.*	10		
3. *Picris eichioides*	10		
4. *Geranium dissectum*	5		
5. *Bromus hordeaceus*	5		
6. *Cyperus eragrostis*	5		
7. *Medicago polymorpha*	5		
8.			
Total Cover:	70		
Woody Vine Stratum (Plot size: *15 ft*)			
1. *None*	0		
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 30 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 1/1 = 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL Species	x 5 =	
Column totals	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

X Dominance Text is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks:
Distinct break in which grass species is dominant compared to SP4.

SOIL

Sampling Point: SP5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 2/1	97	10YR 4/6	3	C	PL	clay loam	roots

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (If present):

Type: None

Depth (inches): No

Hydric Soil Present? **Yes** X **No** ___

Remarks:

Inundated soil. This soil smells of manure so I was unable to note hydrogen sulfide.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required: check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): 0
Water Table Present?	Yes ___	No X	Depth (inches): no
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Water is approximately 4 inches deep. The soil has 6-inch deep cattle punches.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Dublin Boulevard/ North Canyons City/County: Dublin/ Alameda Sampling Date: April 17, 2018
Applicant/Owner: State: California Sampling Point: SP6
Investigator(s): Elan Alford Section/Township/Range:
Landform (hillslope, terrace, etc.): flat Local Relief (concave, convex, none): None Slope (%): 0-1
Subregion (LRR): California Lat: Long: Datum:
Soil Map Unit Name: NWI classification
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation ___ Soil ___ or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation ___ Soil ___ or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No
Hydric Soil Present? Yes X No
Wetland Hydrology Present? Yes X No

Is the Sampled Area within a Wetland? Yes X No

Remarks:
This area is shown in historic aerials (Google Earth 10/2011) to be saturated or inundated. There is substantial amount of cow punch here and a distinctive grass signature compared to the surrounding adjacent areas considered to be upland. Paired pit with SP2 as upland and this site is used to verify continuing extent of conditions at SP3.

VEGETATION

Tree Stratum (Plot size: *30ft*)	Absolute Cover %	Dominant Species?	Indicator Status
1. *None*	0		
2.			
3.			
4.			
Total Cover:	0		

Sapling/Shrub Stratum (Plot size: *15ft*)			
1. *None*	0		
2.			
3.			
4.			
5.			
Total Cover:	0		

Herb Stratum (Plot size: *5ft x 5ft*)			
1. *Lolium perenne*	25	X	FAC
2. *Hordeum depressum*	25	X	FACW
3. *Geranium dissectum*	4		
4. *Bromus hordeaceus*	5		
5. *Convolvulus sp.*	5		
6. *Plagiobothrys (leptocladus)*	1		
7. *Medicago polymorpha*	5		
8.			
Total Cover:	70		

Woody Vine Stratum (Plot size: *15 ft*)			
1. *None*	0		
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 30 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 21/2= 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL Species	x 5 =	
Column totals	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

X Dominance Text is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks:
Bare or thatch on ground.

SOIL

Sampling Point: SP6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 2/1	94	10YR 5/8	1	C	M	clay loam	roots
			10YR 3/6	5	C	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (If present):

Type: None

Depth (inches): No

Hydric Soil Present? **Yes** X **No** ___

Remarks:

Clayey soil with redox concentrations.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required: check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- X Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- X Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): 0
Water Table Present?	Yes ___	No X	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

October 2011 aerial imagery evidence of saturation. There are many 2-inch deep cattle punches.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Dublin Boulevard/ North Canyons City/County: Dublin/ Alameda Sampling Date: April 17, 2018
Applicant/Owner: State: California Sampling Point: SP7
Investigator(s): Elan Alford Section/Township/Range:
Landform (hillslope, terrace, etc.): swale Local Relief (concave, convex, none): Concave Slope (%): 0-1
Subregion (LRR): California Lat: Long: Datum:
Soil Map Unit Name: NWI classification
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation ___ Soil ___ or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation ___ Soil ___ or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No
Hydric Soil Present? Yes X No
Wetland Hydrology Present? Yes X No

Is the Sampled Area within a Wetland? Yes X No

Remarks:
The area is in a swale location where an ephemeral stream empties into a broader floodplain. Lolium is a dominant grass.

VEGETATION

Tree Stratum (Plot size: *30ft*)	Absolute Cover %	Dominant Species?	Indicator Status
1. *None*	0		
2.			
3.			
4.			
Total Cover:	0		
Sapling/Shrub Stratum (Plot size: *15ft*)			
1. *None*	0		
2.			
3.			
4.			
5.			
Total Cover:	0		
Herb Stratum (Plot size: *5ft x 5ft*)			
1. *Lolium perenne*	50	X	FAC
2. *Hordeum murinum*	10		
3. *Bromus hordeaceus*	5		
4. *Hirschfeldia incana*	4		
5. *Erodium cicutarium*	5		
6. *Avena fatua*	1		
7.			
8.			
Total Cover:	75		
Woody Vine Stratum (Plot size: *15 ft*)			
1. *None*	0		
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 25 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 1/1 = 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL Species	x 5 =	
Column totals	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

X Dominance Text is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes X No**

Remarks:
Lolium grass is dominant and there is cow punch.

SOIL

Sampling Point: SP7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 2/1	100				PL	clay loam	many roots
7-12	10YR 2/1	97	10YR 5/8	3	C	M	clay loam	many roots

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (If present):

Type: None

Depth (inches): No

Hydric Soil Present? **Yes** X **No** ___

Remarks:

Soil is moist.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required: check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- X Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): 0
Water Table Present?	Yes ___	No X	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

The area is in a swale feature with a distinctive lolium vegetation and hoof punch.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Dublin Boulevard/ North Canyons City/County: Dublin/ Alameda Sampling Date: April 17, 2018
Applicant/Owner: State: California Sampling Point: SP8
Investigator(s): Elan Alford Section/Township/Range:
Landform (hillslope, terrace, etc.): flat Local Relief (concave, convex, none): None Slope (%): 0-1
Subregion (LRR): California Lat: Long: Datum:
Soil Map Unit Name: NWI classification
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation ___ Soil ___ or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation ___ Soil ___ or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ___ No X
Hydric Soil Present? Yes ___ No X
Wetland Hydrology Present? Yes ___ No X

Is the Sampled Area within a Wetland? Yes ___ No X

Remarks:
Avena dominated area located in upland setting outisde ephemeral stream/swale. Few 1-inch deep cow punch present.

VEGETATION

Tree Stratum (Plot size: *30ft*)	Absolute Cover %	Dominant Species?	Indicator Status
1. *None*	0		
2.			
3.			
4.			
Total Cover:	0		
Sapling/Shrub Stratum (Plot size: *15ft*)			
1. *None*	0		
2.			
3.			
4.			
5.			
Total Cover:	0		
Herb Stratum (Plot size: *5ft x 5ft*)			
1. *Avena fatua*	30	X	UPL
2. *Vicia sativa*	3		
3. *Lolium perenne*	1		
4. *Bromus hordeaceus*	25	X	FACU
5. *Erodium botrys*	1		
6.			
7.			
8.			
Total Cover:	60		
Woody Vine Stratum (Plot size: *15 ft*)			
1. *None*	0		
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 40 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0/2 = 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL Species	x 5 =	
Column totals	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ Dominance Text is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ___ **No** **X**

Remarks:
Grass thatch is present.

SOIL

Sampling Point: SP8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 2/1	100					clay loam	many roots

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (If present):

Type: None

Depth (inches): No

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

No indicators observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required: check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): 0
Water Table Present?	Yes ___	No X	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): 0

Wetland Hydrology Present? **Yes** ___ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Uplands, no indicators.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Dublin Boulevard/ North Canyons City/County: Dublin/ Alameda Sampling Date: April 17, 2018
Applicant/Owner: State: California Sampling Point: SP9
Investigator(s): Elan Alford Section/Township/Range:
Landform (hillslope, terrace, etc.): flat Local Relief (concave, convex, none): Concave Slope (%): 0-1
Subregion (LRR): California Lat: Long: Datum:
Soil Map Unit Name: NWI classification
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation ___ Soil ___ or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation ___ Soil ___ or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ___ No X
Hydric Soil Present? Yes ___ No X
Wetland Hydrology Present? Yes ___ No X

Is the Sampled Area within a Wetland? Yes ___ No X

Remarks:
The location holds standing water.

VEGETATION

Tree Stratum (Plot size: *30ft*)	Absolute Cover %	Dominant Species?	Indicator Status
1. *None*	0		
2.			
3.			
4.			
Total Cover:	0		
Sapling/Shrub Stratum (Plot size: *15ft*)			
1. *None*	0		
2.			
3.			
4.			
5.			
Total Cover:	0		
Herb Stratum (Plot size: *5ft x 5ft*)			
1. *Erodium botrys*	10	X	FACU
2. *Bromus hordeaceus*	5	X	FACU
3. *Poa annua*	5	X	FAC
4. *Polygonum sp.*	2		
5.			
6.			
7.			
8.			
Total Cover:	22		
Woody Vine Stratum (Plot size: *15 ft*)			
1. *None*	0		
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 78 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 1/3 = 33% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL Species	x 5 =	
Column totals	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ Dominance Text is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ___ **No** **X**

Remarks:
Bare soil present with cow punches.

SOIL

Sampling Point: SP9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-15	10YR 3/1	100					clay loam	few roots

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (If present):

Type: None

Depth (inches): No

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

Inundated spot but no hydric soil indicators.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required: check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- X Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (Riverine)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): 0
Water Table Present?	Yes ___	No X	Depth (inches): no
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Standing water present and surface cracks. However the review of historic aerials does not show that the area is frequently and extensively saturated.

Appendix D – Photographs of the Biological Study Area

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Photo 1. Concrete lined section of perennial stream PS1 that runs parallel to Croak Road and parcel A.

Photo2. Culvert outlet which empties into the perennial marsh habitat in the northwestern corner of the BSA.

Photo 3. Perennial marsh (PM1) habitat with pooled water and extensive cow punches.

Photo 4. Regrowth of *Typha* sp. in the seasonal wetland SW1.

Photo 5A. Wetland sample point, SP5, representing seasonal wetland habitat with several inches of ponding and
Photo 5B. Paired upland sample point, SP4, where conditions are mesic but not wetland.

Photo 6A. Wetland sample point (SP3) for seasonal wetland (SW1) with more saturation than ponding and several cow punches and Photo 6B. Paired upland sample point (SP2) where conditions are mesic but not wetland.

Photo 7A. Wetland sample point, SP7, in the floodplain swale wetland of SW4 formed by the perennial stream PS3 and
Photo 7B. Paired upland boundary sample point, SP8, for SW3.

Photo 8. Unnamed perennial stream (PS3) showing the ordinary high water mark and the top of bank as defined here by the distinct change in vegetative cover and composition.

Photo 9. Ephemeral stream (ES1) in the northwestern part of the project area as defined by change in slope and topography and no flowing water.

Photo 10A. The upstream portion of ephemeral stream ES3 with more incised banks and
Photo 10B. The downstream swale forming portion of PS3.

Photo 11. Cottonwood creek perennial stream (PS4) habitat showing cattle crossing, cow punches, and the ordinary high water mark as defined by the incised banks.

Photo 12. Riparian woodland habitat (in background) on the upper banks of Cottonwood.

Photo 13. Typical California annual grassland habitat dominated majority of the BSA.

Photo 14. Location of sampling point 9 in April 2018 showing water pooled at the southeastern corner of the BSA. However, this was determined to be ephemeral ponding and did not display any wetland characteristics such as hydrophytic vegetation. This area was dry in both March 2017 and May 2018.

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Appendix E – Aquatic Resources Table

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3922 Aquatic Resources Table

Waters Name	Waters Name Label	State	Cowardin Code	HGM Code	Measurement Type	Amount	Units	Measurement Type	Linean feet (ln. ft.)	Waters Type	Latitude	Longitude	Local Waterway
Delineate/NRPW	C1	California	R4	riverine	Area	0.007	Acre	100	ln. ft.	Waters of the U.S.	-121.850554	37.706661	
Delineate/NRPW	C2	California	R4	riverine	Area	0.001	Acre	9	ln. ft.	Waters of the U.S.	-121.850370	37.706781	
Delineate/RPW	D1	California	R3	riverine	Area	0.018	Acre	163	ln. ft.	Waters of the U.S.	-121.850377	37.707013	
Delineate/NRPW	ES1	California	R4	riverine	Area	0.052	Acre	314	ln. ft.	Waters of the U.S.	-121.846711	37.706052	
Delineate/NRPW	ES2	California	R4	riverine	Area	0.047	Acre	198	ln. ft.	Waters of the U.S.	-121.834853	37.704636	
Delineate/NRPW	ES3	California	R4	riverine	Area	0.020	Acre	427	ln. ft.	Waters of the U.S.	-121.828953	37.703747	
Delineate/RPW	PM1	California	R3	riverine	Area	0.066	Acre	310	ln. ft.	Wetland	-121.850412	37.705829	
Delineate/RPW	PS1	California	R3	riverine	Area	0.163	Acre	704	ln. ft.	Waters of the U.S.	-121.850376	37.704512	
Delineate/RPW	PS2	California	R3	riverine	Area	0.034	Acre	72	ln. ft.	Waters of the U.S.	-121.849294	37.703402	
Delineate/RPW	PS3	California	R3	riverine	Area	0.076	Acre	380	ln. ft.	Waters of the U.S.	-121.842097	37.704879	
Delineate/RPW	PS4	California	R3	riverine	Area	0.039	Acre	352	ln. ft.	Waters of the U.S.	-121.828039	37.703459	
Delineate/RPWWD	SW1	California	PAB	depress	Area	8.589	Acre	1786	ln. ft.	Wetland	-121.848856	37.704708	
Delineate/RPWWN	SW2	California	PAB	depress	Area	0.102	Acre	128	ln. ft.	Wetland	-121.845697	37.701781	
Delineate/RPWWN	SW3	California	PAB	depress	Area	1.730	Acre	735	ln. ft.	Wetland	-121.843712	37.703732	
Delineate/RPWWN	SW4	California	PAB	depress	Area	0.010	Acre	53	ln. ft.	Wetland	-121.842369	37.701701	

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Appendix F – Signed Statement from the Property Owner Allowing Access

I, **OBAID KHAN** of the City of Dublin, will allow Corps personnel to enter the Dublin Boulevard Extension BSA, between Croak Road in Dublin and North Canyons Parkway in Livermore, California to collect samples during normal business hours. The property is composed of several parcels, some of which are land-locked, and permission from the subject property owner(s) will be required in order to provide access. The City of Dublin will facilitate procuring this access allowing the Corps to enter the BSA.

Thank you,

OBAID KHAN

City of Dublin

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Appendix B. USFWS ESA Letter

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
Phone: (916) 414-6600 Fax: (916) 414-6713

In Reply Refer To: April 16, 2018
Consultation Code: 08ESMF00-2018-SLI-1844
Event Code: 08ESMF00-2018-E-05376
Project Name: Dublin Boulevard-North Canyons Parkway Extension Project

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, under the jurisdiction of the U.S. Fish and Wildlife Service (Service) that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Please follow the link below to see if your proposed project has the potential to affect other species or their habitats under the jurisdiction of the National Marine Fisheries Service:

http://www.nwr.noaa.gov/protected_species/species_list/species_lists.html

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
(916) 414-6600

Project Summary

Consultation Code: 08ESMF00-2018-SLI-1844

Event Code: 08ESMF00-2018-E-05376

Project Name: Dublin Boulevard-North Canyons Parkway Extension Project

Project Type: TRANSPORTATION

Project Description: Proposed development of the Dublin Boulevard-North Canyons Parkway Extension from Fallon Road in the City of Dublin to North Canyons Parkway in the City of Livermore.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/37.70478950300006N121.84020254105323W

Counties: Alameda, CA

Endangered Species Act Species

There is a total of 11 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
San Joaquin Kit Fox *Vulpes macrotis mutica* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2873	Endangered

Birds

NAME	STATUS
California Least Tern *Sterna antillarum browni* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8104	Endangered

Reptiles

NAME	STATUS
Alameda Whipsnake (=striped Racer) *Masticophis lateralis euryxanthus* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5524	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog *Rana draytonii* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2891	Threatened
California Tiger Salamander *Ambystoma californiense* Population: U.S.A. (Central CA DPS) There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2076	Threatened

Fishes

NAME	STATUS
Delta Smelt *Hypomesus transpacificus* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/321	Threatened

Insects

NAME	STATUS
San Bruno Elfin Butterfly *Callophrys mossii bayensis* There is **proposed** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/3394	Endangered
Valley Elderberry Longhorn Beetle *Desmocerus californicus dimorphus* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7850 Habitat assessment guidelines: https://ecos.fws.gov/ipac/guideline/assessment/population/436/office/11420.pdf	Threatened

Crustaceans

NAME	STATUS
Conservancy Fairy Shrimp *Branchinecta conservatio* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8246	Endangered
Vernal Pool Fairy Shrimp *Branchinecta lynchi* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/498	Threatened

Flowering Plants

NAME	STATUS
Palmate-bracted Bird's Beak *Cordylanthus palmatus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1616	Endangered

Critical habitats

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
California Red-legged Frog *Rana draytonii* https://ecos.fws.gov/ecp/species/2891#crithab	Final

Appendix C. Plants Observed

Family	Scientific Name	Common Name
Anacardiaceae	*Toxicodendron diversilobum*	Poison oak
Apiaceae	*Berula erecta*	Cut leaved water parsnip
	Conium maculatum	Poison hemlock
	Foeniculum vulgare	Fennel
	Sanicula bipinnatifida	Purple sanicle
Asclepiadaceae	*Asclepias fascicularis*	Mexican whorled milkweed
Asteraceae	*Achyrachaena mollis*	Blow wives
	Anthemis cotula	Dog fennel
	Baccharis pilularis	Coyote brush
	Carduus pycnocephalus	Italian thistle
	Centaurea solstitialis	Yellow star thistle
	Centromadia parryi ssp. *congdonii*	Congdon's tar plant
	Cirsium vulgare	Bull thistle
	Grindelia camporum	Common gumplant
	Helminthotheca echioides	Bristly oxtongue
	Hypochaeris glabra	Smooth cat's ear
	Logfia gallica	Narrowleaf cottonrose
	Matricaria discoidea	Pineapple weed
	Picris echioides	Bristly ox tongue
	Psilocarphus brevissmus var. *brevissimua*	Short woollyheads
	Silybum marinum	Blessed milkthistle
	Sonchus arvensis ssp. *arvensis*	Field sowthistle
	Xanthium spinossum	Spiny cockleburr
Boraginaceae	*Amsinckia menziesii*	Menzies' fiddleneck
	Plagiobothrys (leptocladus)	Alkali popcorn flower
	Plagiobothrys sp.	Popcorn flower
Brassicaceae	*Brassica nigra*	Black mustard
	Capsella bursa-pastoris	Shepherd's purse
	Cardamine oligosperma	Bitter cress
	Hirschfeldia incana	Mediterranean hoary mustard
	Lepidium dictyotum	Alkali pepperweed
	Lepidium nitidum	Shining peppergrass
	Raphanus sativus	Wild raddish
Campanulaceae	*Downigia bicornuta* var. *bicornuta*	Doublehorn calicoflower
Caryophyllaceae	*Stellaria (media)*[1]	Chickweed
Convolvulaceae	*Convolvulus arvensis*	Field bindweed
Cyperaceae	*Bolboschoenus maritimus*	Alkali bulrush
	Carex sp.	sedge

	Cyperus eragrostis	Tall cyperus
	Eleocharis macrostachya	Common spikerush
	Schoenoplectus acutus	Hardstem bulrush
Fabaceae	*Lupinus bicolor*	Annual lupine
	Medicago polymorpha	Bur medic
	Melilotus indicus	Annual yellow sweetclover
	Quercus agrifolia	Coast live oak
	Quercus lobata	Valley oak
	Triticum aestivum	Common wheat
	Trifolium hirtum	Rose clover
	Trifolium sp.	Clover
	Vicia sativa	Spring vetch
	Vicia villosa ssp. *villosa*	Winter vetch
Geraniaceae	*Erodium botrys*	Big heron bill
	Erodium cicutarium	red stemmed filaree
	Erodium moschatum	Musky stork's bill
	Geranium dissectum	Cutleaf geranium
	Geranium molle	Crane's bill geranium
Iridaceae	*Sisyrinchium bellum*	Western blue eyed grass
Juncaceae	*Juncus bufonius*	Toad rush
	Juncus mexicanus	Mexican rush
	Juncus xiphioides	Iris leaved rush
Malvaceae	*Malva nicaeensis*	Bull mallow
	Malvella leprosa	Alkali mallow
Myrsinaceae	*Lysimachia arvensis*	Scarlet pimpernel
Myrtaceae	*Eucalyptus* sp.	Eucalyptus
Oleaceae	*Olea europa*	Common olive
Onagraceae	*Epilobium ciliatum*	Fringed willowherb
Orobanchaceae	*Bellardia trixago*	Mediterranean lineseed
	Castilleja exserta ssp. *exserta*	Exserted indian paintbrush
Pappavaraceae	*Eschscholzia californica*	California poppy
Plantaginaceae	*Plantago lanceolata*	Narrowleaf plantain
	Veronica persica	Bird's eye speedwell,
Poaceae	*Avena barbata*	Slender oat
	Avena fatua	Wild oat
	Avena sp.	Oat
	Bromus diandrus	Ripgut brome
	Bromus hordeaceus	Soft brome
	Festuca perennis	Italian rye grass
	Hordeum brachyatherum ssp. *brachyantherum*	Meadow barley
	Hordeum depressum	Alkali barley
	Hordeum marinum ssp. *gussoneanum*	Mediterranean barley
	Hordeum murinum	Meadow barley

	Poa annua	Annual Blue Grass
	Pleuropogon californicus var. *californicus*	annual semaphoregrass
Polygonaceae	*Polygonum* sp.	Polygonum
	Rumex conglomeratus	Clustered dock
	Rumex crispus	Curly dock
Portulacaceae	*Claytonia* sp.	Miner's lettuce
Ranunculaceae	*Ranunculus repens*	Creeping buttercup
	Ranunculus sceleratus var. *sceleratus*	Cursed buttercup
Salicaceae	*Salix laevigata*	Polished willow
Scrophulariaceae	*Triphysaria eriantha* ssp. *eriantha*	Butter 'n' eggs
	Veronica americana	Water speedwell
	Veronica anagallis-aquatica	Water speedwell
Themidaceae	*Triteleia laxa*	Ithuriel's spear
Typhaceae	*Typha (angustifolia)*[1]	Cattail

Appendix D. Detailed Descriptions of Special-Status Animal Species Potentially Occurring in the BSA

Conservancy Fairy Shrimp (*Branchinecta conservatio*). Federal Listing Status: Endangered; State Listing Status: None; Longhorn Fairy Shrimp (*Branchinecta longiantenna*). Federal Listing Status: Endangered; State Listing Status: None; Vernal Pool Fairy Shrimp (*Branchinecta lynchi*). Federal Listing Status: Threatened; State Listing Status: None. The conservancy fairy shrimp and longhorn fairy shrimp, federally listed as endangered, and vernal pool fairy shrimp, federally listed as threatened, are members of the aquatic crustacean order Anostraca and are endemic to ephemeral fresh water habitats and vernal pools in California. Vernal pools form in Mediterranean climates where shallow depressions fill with rainwater during fall and winter and then dry via the evaporative process in spring. Percolation of the water is prevented by an impervious layer, which may be clay pan, hardpan, or a volcanic stratum.

The present distribution of the longhorn fairy shrimp is restricted to vernal pools in four locales in Contra Costa, Alameda, Merced, and San Luis Obispo counties (Sugnet & Associates 1993, USFWS 2007a). The present distribution of the vernal pool fairy shrimp in California is restricted to vernal pools within a geographic range extending from Shasta County south through the Central Valley into Tulare County, and along the central coast range from northern Solano County south into Ventura County (USFWS 2003). These two species of fairy shrimp may occur together in the same vernal pool. The Conservancy fairy shrimp is known from only eight populations in Butte, Tehama, Glenn, Yolo, Solano, Stanislaus, and Merced (USFWS 1994). Conservancy fairy shrimp typically does not occur in the same types of pools that support the other two species, more frequently occurring in larger, cold water pools that pond for longer hydroperiods.

The longhorn fairy shrimp ranges in size from 0.5 to 0.8 inches (USFWS 1994) and the Conservancy fairy shrimp is 0.5 to 1.0 inch (USFWS 1994), while the slightly larger vernal pool fairy shrimp ranges in size from 1.2 to 1.5 inches (USFWS 2007a). Both species mature rapidly to take advantage of the short lived nature of vernal pools (USWFS 2005a), but may persist in pools that persist longer.

In general, these shrimp eat algae, bacteria, protozoa, other smaller invertebrates, and bits of detritus (Pennak 1989, USFWS 1994). Populations survive through the dry summer months as dormant eggs in the pool sediment. Some of the eggs hatch when the pool fills with water in subsequent seasons, while the remaining eggs remain in the sediment. Eggs contained within the sediment at any given point can represent eggs deposited from several breeding seasons.

Amphibians, predatory water beetle larvae (family Notonectidae), caddis fly larvae (*Trichoptera* sp.), and waterfowl are the chief predators of fairy shrimp (Pennak 1989). These fairy shrimp are in danger of extinction principally as the result of flood control, highway and utility projects, urban development, conversion of native habitats to agriculture and by virtue of the small isolated nature of many of the remaining populations (USFWS 1994). In fact, any activity or disturbance that alters the hydrologic regime of an area containing vernal pools

may reduce the population size or reproductive success of these animals or eliminate them altogether. All three fairy shrimp species were listed as endangered on September 19, 1994 by the USFWS largely because of the significant threats associated with future habitat loss and fragmentation (USFWS 1994). The state of California has not designated these species with any special status (CDFG 2008).

The EACCS does not map the BSA as potential habitat for special-status fairy shrimp. Vernal pool fairy shrimp have been reported approximately 3.5 mi east of the BSA at the Springtown Preserve. Longhorn fairy shrimp have been reported approximately 4.9 mi northeast of the BSA at Byron Hot Springs. Marsh and wetland habitats within the BSA may contain water for sufficient periods of time to support longhorn and vernal pool fairy shrimp in some years, but likely not the type of long-term, cold temperature playa pool that typically provides habitat for the Conservancy fairy shrimp.

Callippe silverspot (*Speyeria callippe callippe*). Federal Listing Status: Endangered; State Listing Status: None. The Callippe silverspot was listed as endangered by the USFWS on December 5, 1997 (USFWS 1997). Critical habitat has not been designated for this species. The species' occurrence is dependent upon the availability of its larval host plant, Johnny jump-up. Historically, the callippe silverspot butterfly occupied much of the grasslands in the San Francisco Bay region. It is now restricted to a few locations in San Mateo County, Sonoma County, the hills between Vallejo and Cordelia, and the hills near Pleasanton (USFWS 2007b).

Adults have one flight period, which is typically from mid-May to July, but largely depends on environmental conditions (USFWS 2007b). Males seek hilltops and hillsides of native grasslands for mates. Females lay their eggs in the dead or dying larval food plant or in nearby woody debris.

The EACCS maps the Study Area as potential habitat for the Callippe silverspot butterfly. However, the butterfly's occurrence is dependent on the presence of its larval host plant, Johnny jump-up. Extensive botanical surveys have been conducted within the western parcels of the BSA (parcels A, D, E, and F). During these surveys, the entirety of all four parcels was traversed on foot, and all plant species encountered were identified and recorded. Repeated surveys were conducted from March through May 1999-2001, which encompasses the bloom period of Johnny jump-up. All of these surveys failed to detect the Callippe silverspot host plant (Sycamore and Associates 2002a, WRA 2004). In addition, no Johnny jump-up was detected in reconnaissance-level surveys of the entirety of the BSA by H. T. Harvey & Associates botanists in March of 2017 when the species was known to be flowering at other sites in the region, or in April 2018. Therefore, Johnny jump-up, and thus the Callippe silverspot butterfly, is considered absent from the BSA.

California Red-legged Frog (*Rana draytonii*). Federal Listing Status: Threatened; State Listing Status: Species of Special Concern; California Tiger Salamander (*Ambystoma californiense*). Federal Listing Status: Threatened; State Listing Status: Endangered. The USFWS listed the California red-legged frog as threatened in 1996, due to continued habitat degradation throughout the species' range and population declines (USFWS 1996). It is listed by the CDFW as a California species of special concern. Critical habitat was most recently designated in 2010 (USFWS 2010) and approximately 33.95 acres of the BSA are located within the

designated critical habitat for the California red-legged frog (Figure 5). The California red-legged frog is California's largest native frog. The species is generally restricted to riparian and lacustrine habitats in California and northern Baja California. Red-legged frogs prefer deep, calm pools (usually more than 2 ft deep) in creeks, rivers, or lakes below 5000 ft in elevation (Jennings and Hayes 1994). Breeding habitat requirements include freshwater emergent or dense riparian vegetation, such as willows adjacent to shorelines. Red-legged frogs can survive in seasonal bodies of water that are dry for short periods if a permanent water body or dense vegetation stands are nearby.

Adult red-legged frogs are normally active at night and breed in still water during the late winter or early spring after waters recede. Females attach eggs in a single cluster to vegetation just under the surface of the water. The eggs hatch in approximately one week and larvae feed on plant and animal material. It takes a minimum of approximately 4 months for the larvae to metamorphose into juvenile frogs. On rare occasions larvae over winter. Red-legged frogs can move considerable distances overland. Dispersal often occurs within creek drainages, but movements of more than a mile over upland habitats have been reported (Bulger et al. 2003). Red-legged frogs are often found in summer months in habitat that would not be suitable for breeding; these individuals presumably move seasonally between summer foraging habitat and winter breeding habitat.

The California tiger salamander was listed as threatened under the FESA throughout its range by the USFWS on August 4, 2004 (USFWS 2004) and was listed as threatened under the CESA by the CDFW on August 19, 2010. Critical habitat for the California tiger salamander was designated in August 2005 (USFWS 2005b). The BSA is not located within designated critical habitat for this species.

The California tiger salamander occurs in areas of the Central Valley and California Coast Ranges where temporary ponded environments (e.g., vernal pools or human-made ponds providing water for at least 3 months) are surrounded by uplands that support small mammal burrows. Breeding pools are usually ephemeral pools (e.g., vernal pools), but they must retain water long enough for metamorphosis to occur. Permanent ponds are also used for breeding, but larger ponds often contain predators that consume eggs and larvae, and prevent successful breeding.

During summer months, California tiger salamanders occur in subterranean refuge sites, usually in small mammal burrows, but also in crevices in the soil. After winter rains have moistened the ground, the salamanders emerge from their refugia and migrate to breeding pools. Females deposit eggs one, or occasionally up to four, at a time in the water and attach them to submerged vegetation or debris. Females may lay eggs twice in a single season (USFWS 2004). Lifetime reproductive success of females is fairly low; females in one study bred an average of 1.4 times in their lives, producing about 11 young each (Trenham et al. 2000). Adults may live more than 10 years, but do not reproduce until they are 4 to 5 years old (Trenham et al. 2000). Eggs take 10 to 14 days to hatch. Aquatic juveniles usually complete metamorphosis after 3 to 6 months. Generally, ephemeral breeding ponds dry up during summer months, but over-summering larvae have been observed (Shaffer et al. 1993). Following metamorphosis, juveniles spend a few days at the pond margin, and then migrate to refuge

sites. Overland migration may extend up to 1.2 mi, but most California tiger salamanders remain within 0.4 mi of their breeding ponds (USFWS 2004).

The EACCS maps areas within the BSA as potential upland and movement habitat for the California red-legged frog and potential upland habitat for the California tiger salamander. Based on prior surveys of the BSA, and on CNDDB records, these species are known to occur within the immediate vicinity of the BSA. A site assessment and a focused survey for breeding California red-legged frogs, conducted in 2001 on parcels A, D, E, F, and G, failed to detect any red-legged frogs, although the quarry pond north of the BSA was considered to provide suitable breeding habitat (Sycamore Associates 2001b, 2001c). Additional surveys conducted in 2003 detected an adult California red-legged frog at the head of an unnamed drainage immediately north of the BSA (H. T. Harvey & Associates 2006). Cottonwood Creek also provides potentially suitable foraging and dispersal habitat for the red-legged frog within the BSA.

A site assessment and focused surveys for breeding California tiger salamanders, conducted from 2001 through 2003, detected several adult tiger salamanders within the immediate vicinity of the BSA (Sycamore Associates 2001a, 2003). In addition, larval tiger salamanders were detected within the quarry pond, located approximately 0.15 mi north of the BSA in 2003, but not in 2001. Thus California tiger salamanders may breed in close proximity to the Project, at least in some years.

Tricolored Blackbird (*Agelaius tricolor*). Federal Listing Status: None; State Listing Status: Threatened. The tricolored blackbird was given Threatened status under the California Endangered Species Act on April 19, 2018. The species' populations have declined significantly in recent years due to habitat loss, shooting to protect crops, pesticide use, and annual losses of nests and nesting habitat thorough agricultural harvests (Center for Biological Diversity 2015).

Tricolored blackbirds are found primarily in the Central Valley and in central and southern coastal areas of California. The tricolored blackbird is highly colonial in its nesting habits and forms dense breeding colonies that, in some parts of the Central Valley, may consist of up to tens of thousands of pairs. Colonies occur in emergent vegetation, grain fields, fallow fields, extensive thickets of blackberry, and occasionally in early-successional riparian habitat. Nesting colonies are usually located near fresh water. Tricolored blackbirds form large, often multi-species flocks during the non-breeding period and range more widely than during the breeding season.

The EACCS maps portions of the BSA as foraging habitat for the tricolored blackbird. Suitable foraging habitat for the tricolored blackbird occurs in the perennial marsh, seasonal wetlands, and California annual grassland habitats on parcel A. Breeding tricolored blackbird colonies require dense stands of emergent vegetation. Until recently, the perennial marsh habitat on parcel A supported dense stands of cattails (*Typha* sp.) in most years. Recent diversion of flows away from this marsh have reduced the amount of emergent vegetation; however, such vegetation is expected to return if flows are reestablished.

Western Pond Turtle (*Emy marmorata*). Federal Listing Status: None; State Listing Status: Species of Special Concern The western pond turtle occurs in ponds, streams, and other aquatic habitats in the Pacific Slope drainages of California and northern Baja California, Mexico. Ponds or slack-water pools with suitable basking sites (e.g., logs) are an important habitat component for pond turtles. Its nesting season typically occurs from April through July, with the peak occurring in late May to early July. Females lay eggs in upland habitats, typically in clay or silty soils in unshaded (often south-facing) areas within a few hundred yards of aquatic habitat. Nesting sites typically consist of open habitat with full sun exposure and are typically located along stream or pond margins, but if no suitable habitat is available, adults have been documented making considerable overland journeys and nesting as far as 1300 ft (0.25 mi) from the water (Jennings and Hayes 1994, Bury and Germano 2008). Juveniles feed and grow in shallow aquatic habitats (often creeks) with emergent vegetation and ample invertebrate prey. Although degradation of aquatic habitats because of development, introduction of non-native predators, and water diversions all impact western pond turtles, the destruction of non-aquatic habitat (e.g., basking areas and nesting habitats) is equally detrimental to their long-term persistence.

Western pond turtles are known to occur within Cottonwood Creek north of the BSA (CNDDB 2019). Within the BSA, suitable habitat occurs within the reaches of Cottonwood Creek, the unnamed tributary along Croak Road, and within upland areas near these features. However, the low flow channel in the reach of Cottonwood Creek in the BSA are typically shallow and deeply cut, and lack suitable basking sites and food resources for western pond turtles. Similarly, the unnamed tributary is typically no more than a few inches deep, largely precluding its use by pond turtles, except for movement between habitats. The quarry pond located north of the BSA provides more suitable habitat for pond turtles, although no pond turtles have been reported at that pond despite extensive aquatic surveys of the pond for California red-legged frogs and California tiger salamanders (Sycamore Associates 2001a-c, 2003). These surveys reported aquatic wildlife observed within the quarry pond during sampling, and no observations of western pond turtles were described.

San Joaquin Kit Fox (*Vulpes macrotis mutica*). Federal Listing Status: Endangered; State Listing Status: Threatened. The San Joaquin kit fox is the largest subspecies of the kit fox, the smallest canid species in North America. The San Joaquin kit fox was listed as endangered by the USFWS in 1967 and by the State of California in 1971. Loss of habitat from urban, agricultural, and industrial development are the principal factors in the decline of the San Joaquin kit fox. Subpopulations of the San Joaquin kit fox appear to be increasingly isolated from one another due to development within its range (USFWS and CDFG 2003). Critical habitat has not been designated for this species.

The San Joaquin kit fox is primarily nocturnal and typically occurs in annual grassland or mixed shrub/grassland habitats throughout low, rolling hills and in the valleys. It requires underground dens for temperature regulation, shelter, reproduction, and predator avoidance. Kit foxes commonly modify and use dens constructed by other animals and human-made structures (USFWS 1998). Dens are usually located on loose-textured soils on slopes less than 40 degrees, but San Joaquin kit fox dens vary across the fox's geographic range in regard to the number

of openings, shape, and the slope of the ground on which they occur (USFWS 1998). Kit foxes change dens frequently, often using numerous dens each year.

Breeding occurs from December through February with pups usually born in February or March. One litter per year, with an average of four pups per litter, is typical (McGrew 1979). The pups remain with the parents until June or July at which time the juveniles usually disperse distances of 0.6 to 4.4 mi. A six year study at Elk Hills Naval Petroleum Reserves in California reported average dispersal distances of 5.0 ± 0.9 mi (Scrivner et al. 1987).

San Joaquin kit foxes are not known to occur on or in the vicinity of the BSA. Focused surveys for San Joaquin kit fox were conducted on parcels A, D, and E in 2002 (Figure 2). Monitoring of suitably sized burrows with remote cameras and tracking media failed to detect any evidence of kit fox use of these areas (Sycamore Associates 2002c, Sycamore Associates and Townsend 2002a, b). Extensive surveys of the east Dublin and north Livermore areas were conducted in the 1990s. These surveys detected only a single kit fox, at a location approximately 5 mi northeast of the BSA along Morgan Territory Road (H. T. Harvey & Associates 1997c, d). With the exception of the Morgan Territory Road detection, none of the surveys conducted by H. T. Harvey & Associates in eastern Dublin and northern Livermore have detected kit foxes, and all available data indicate that the current range of the San Joaquin kit fox does not extend as far south/west as the Dublin Boulevard area (H. T. Harvey & Associates 1997d-f, CNDDB 2019).

Burrowing Owl (*Athene cunicularia*). Federal Listing Status: None; State Listing Status: Species of Special Concern (burrows). American Badger. Federal Listing Status: None; State Listing Status: Species of Special Concern. Burrowing owls and American badgers are California species of special concern. Burrowing owls are also protected by the MBTA and the California Fish and Game Code, which prohibit take of individuals (including active nests). Due to the similarity of their habitat requirements, these species are assessed together because the potential impacts of the project would be similar.

The burrowing owl is a small, terrestrial owl of open country. It prefers annual and perennial grasslands, typically with sparse or nonexistent tree or shrub canopies. In California, burrowing owls are found in close association with California ground squirrels; owls use the abandoned burrows of ground squirrels for shelter and nesting. The nesting season as recognized by the CDFW runs from February 1 through August 31. After nesting is completed, adult owls may remain in their nesting burrows or in nearby burrows, or they may migrate (Gorman et al. 2003); young birds disperse across the landscape from 0.1 to 35 mi from their natal burrows (Rosier et al. 2006). Burrowing owl populations have declined substantially in the San Francisco Bay area in recent years, with declines estimated at 4-6% annually (DeSante et al. 2007).

The American badger is a stocky, burrowing mammal that occurs in grassland habitats throughout the western United States. Badgers can have large territories, up to 21,000 acres in size, with territory size varying by sex and by season. They are strong diggers and feed primarily on other burrowing mammals, such as ground squirrels. In central California, American badgers typically occur in annual grasslands, oak woodland savannas,

semi-arid shrub/scrublands, and any habitats with stable ground squirrel populations or other fossorial rodents (Zeiner et al. 1990a). They occur to a lesser extent in agricultural areas, where intensive cultivation inhibits den establishment and reduces prey abundance. Badgers are primarily nocturnal, although they are often active during the day. They breed during late summer, and females give birth to a litter of young the following spring.

The EACCS models areas within the BSA as potential habitat for the burrowing owl and American badger. Burrowing owls and evidence of their presence (i.e., whitewash and/or pellets) were detected in the BSA during focused surveys conducted in 2002 (Sycamore Associates 2002d). Burrowing owls have also been observed in grasslands within 2.0 mi of the BSA, primarily located on properties to the north (Sycamore 2002e, CNDDB 2019), although no more recent observations of burrowing owls have been recorded. Burrows of California ground squirrels and active ground squirrel colonies were observed during the 2002 habitat assessment of the sites (Sycamore 2002d,e), and were also observed in our 2017 reconnaissance level surveys. These burrows were located primarily in the hills and disturbed areas near abandoned farm buildings. Very few burrows were present in the flat lowlands that constitute the majority of the BSA. Parts of those areas are saturated with water in the winter months, precluding ground squirrel presence. Nevertheless, these areas provide potential foraging habitat for burrowing owls. Because suitable breeding and foraging habitat for burrowing owls is present throughout the BSA, particularly in the upland grasslands, burrowing owls may utilize California annual grasslands and portions of abandoned developed/landscaped habitats within the BSA.

No American badgers or potential badger dens were observed in the BSA during the reconnaissance-level survey. Badgers are not known to occur on-site, but have been recorded in the surrounding vicinity (CNDDB 2019; Figure 5). Suitable denning and foraging habitat for badgers is present in grassland habitats, although badgers are unlikely to den on-site due to the surrounding high levels of human disturbance. Should badgers occur in the BSA, they would most likely represent dispersing or foraging individuals. Nevertheless, there is some potential (albeit low) for badgers to den in the BSA.

Pallid Bat (*Antrozous pallidus*) Federal Listing Status: None; State Listing Status: Species of Special Concern . Townsend's Big-eared Bat (*Corynorhinus townsendii*). Federal Listing Status: None; State Listing Status: Species of Special Concern. The pallid bat is a light brown or sandy colored, long-eared, moderate-sized bat that occurs throughout California with the exception of the northwest corner of the state and the high Sierra Nevada (Zeiner et al. 1990b). Pallid bats are most commonly found in oak savannah and in open dry habitats with rocky areas, trees, buildings, or bridges for roosting. Coastal colonies commonly roost in deep crevices in rocky outcroppings, in buildings, under bridges, and in the crevices, hollows, and exfoliating bark of trees. Colonies can range from a few individuals to over a hundred (Barbour and Davis 1969), and usually this species occurs in groups larger than 20 individuals (Wilson and Ruff 1999). Males and females typically occupy the same late-fall and winter roosts found in canyon bottoms and riparian areas (Johnston et al. 2006). After mating with males during the late-fall and winter season, females leave to form a separate maternity colony, often on ridge tops or other warmer situations (Johnston et al. 2006). Although crevices are important for day roosts, night roosts often include open buildings, porches, garages, highway bridges, and mines. Pallid bats may travel up to several miles for water or foraging sites if roosting sites are limited. This bat

prefers foraging on terrestrial arthropods in open habitats and regional populations and individuals may show selective prey preferences (Johnston and Fenton 2001). Pallid bat roosts are very susceptible to human disturbance, and urban development has been cited as the most significant factor contributing to their regional decline (Miner and Stokes 2005).

The Townsend's big-eared bat is a colonial species, and females aggregate in the spring at maternity colonies to begin their breeding season, which may extend through the end of August. Females give birth to one young, and females and young show a high fidelity to both their group and their specific roost site (Pearson et al. 1952). Although the Townsend's big-eared bat is usually a cave dwelling species, many colonies are found in anthropogenic structures, such as the attics of buildings or old abandoned mines. Known roost sites in California include limestone caves, lava tubes, mine tunnels, buildings, and other structures (Williams 1986). This species also roosts in deep crevices of redwood trees. Radio tracking studies suggest that movement from a colonial roost during the maternity season is confined to the area within 9 mi of the roost (Pierson and Rainey 1998). This species is easily disturbed while roosting in buildings, and females are known to abandon their young when disturbed (Humphrey and Kunz 1976). Townsend's big-eared bats feed primarily on moths and other soft-bodied insects (Kunz and Martin 1982).

Suitable roosting habitat for several species of common bats (e.g., the Yuma myotis and Mexican free-tailed bat) and for the pallid bat occurs in the buildings in the BSA. Townsend's big eared bat infrequently roosts and forms maternity colonies in abandoned buildings; this species is sensitive to human disturbance, and so is unlikely to occur within the buildings on-site, which are either occupied by humans or located adjacent to high levels of human disturbance (i.e., highway I-580). No CNDDB records exist for any bats in the Project vicinity; however, this does not preclude occurrence of these highly mobile species in the BSA. We were unable to survey the buildings in the BSA for bats because they were occupied at the time of our site visit, or because bulls were present around the unoccupied buildings. Thus, we cannot rule out the possibility that bats may be roosting on-site, or may roost within the BSA in the future.

White-tailed Kite (*Elanus leucurus*). Federal Listing Status: None; State Listing Status: Fully Protected. Loggerhead Shrike (*Lanius ludovicianus*). Federal Listing Status: None; State Listing Status: Species of Special Concern (Nesting). Grasshopper Sparrow (*Ammodramus savnnarum*). Federal Listing Status: None; State Listing Status: Species of Special Concern (Nesting). White-tailed kites are year-round residents, establishing breeding territories in grasslands, agricultural fields, cismontane woodlands, and other open habitats that encompass open areas with healthy prey populations, and snags, shrubs, trees, or other nesting substrates (Polite et al. 1990, Dunk 1995, Erichsen et al. 1996). Nonbreeding birds typically remain in the same area over the winter, although some movements do occur (Polite et al. 1990). The presence of white-tailed kites is closely tied to the presence of prey species, particularly voles, and prey base may be the most important factor in determining habitat quality for white-tailed kites (Dunk and Cooper 1994, Skonieczny and Dunk 1997).

Loggerhead shrikes establish breeding territories in open habitats with relatively short vegetation that allows for visibility of prey; they can be found in grasslands, scrub habitats, riparian areas, other open woodlands, ruderal habitats, and developed areas including golf courses and agricultural fields (Yosef 1996). Ideal breeding habitat for loggerhead shrikes is open, with short grassy vegetation punctuated by many perches, shrubs, or trees for nesting, and sharp branches or barbed wire fences for impaling prey (Yosef 1996). Shrikes nest earlier than most other passerines, especially in the west where populations are sedentary (Yosef 1996). The breeding season may begin as early as late February, and lasts through July (Yosef 1996). Nests are typically established in shrubs and low trees including sagebrush (*Artemisia* spp.), willow (*Salix* spp.), and mesquite (*Prosopis* spp.), through brush piles may also be used when shrubs are not available (Yosef 1996, Humple 2008).

In California, the distribution of breeding grasshopper sparrows includes the Coast Ranges, the northern Central Valley, and areas west of the southeastern deserts (Lyon 2000, Unitt 2008). The grasshopper sparrow breeds in open, short grasslands with scattered clumps of shrubby vegetation, constructing domed ground nests with grasses in patches of dense vegetation (Vickery 1996, Sutter and Ritchison 2005, Unitt 2008). Prime breeding habitat features very large, unfragmented areas of grassland with patches of bare ground, and clumps of shrubby vegetation surrounded by denser grass cover for singing perches and nest sites (Vickery 1996, Lyon 2000, Sutter and Ritchison 2005). Grasshopper sparrows breed from mid-March to August in California, after which they migrate to wintering grounds that are presumed to be in Mexico and Central America (Vickery 1996, Unitt 2008).

The grasslands within the BSA provide suitable breeding habitat for white-tailed kites, loggerhead shrikes, and grasshopper sparrows. Mixed riparian woodland habitat also provides suitable nesting habitat for the white-tailed kite and loggerhead shrike. Individual white-tailed kites and loggerhead shrikes were observed during reconnaissance level surveys in March 2017, indicating that these species may nest in the area. No grasshopper sparrows were observed on the BSA during reconnaissance surveys. Because of the relatively large territory requirements of white-tailed kites and loggerhead shrikes, and the rarity of grasshopper sparrows in the region, we would not expect more than two nesting pairs of any of these species to occur within the BSA.

Northern Harrier (*Circus cyaneus*). Federal Listing Status: None; State Listing Status: Species of Special Concern (Nesting). The northern harrier nests in marshes and grasslands with tall vegetation and sufficient moisture to inhibit accessibility of nest sites to predators. This species forages primarily on small mammals and birds in a variety of open grassland, ruderal, and agricultural habitats. The species is fairly widespread as a forager in grasslands, extensive wetlands, and agricultural areas in the project region during migration and winter. During the breeding season, the northern harrier occurs primarily along the coast, where it nests in extensive marshes and grasslands, and in tidal marsh along South San Francisco Bay (SAS 2001, Cornell Lab of Ornithology 2017). Suitable nesting and foraging habitat for the northern harrier is present in the extensive non-tidal salt marsh located partially within the eastern portion of the BSA. This species is unlikely to nest in the BSA itself, due to proximity to upland habitat (along the existing rail line) accessible to mammalian predators. However, it may nest in the interior of the marsh and it is expected to forage in the eastern portion of the BSA.

Appendix E. Applicable EACCS Avoidance and Minimization Measures

EACCS Measure GEN-01. Employees and contractors performing construction activities will receive environmental sensitivity training. Training will include review of environmental laws and AMMs that must be followed by all personnel to reduce or avoid effects on covered species during construction activities.

EACCS Measure GEN-02. Environmental tailboard trainings will take place on an as-needed basis in the field. The environmental tailboard trainings will include a brief review of the biology of the covered species and guidelines that must be followed by all personnel to reduce or avoid negative effects on these species during construction activities. Directors, Managers, Superintendents, and the crew foremen and forewomen will be responsible for ensuring that crewmembers comply with the guidelines.

EACCS Measure GEN-03. Contracts with contractors, construction management firms, and subcontractors will obligate all contractors to comply with these AMMs.

EACCS Measure GEN-04. The following will not be allowed at or near work sites for covered activities: trash dumping, firearms, open fires (such as barbecues) not required by the activity, hunting, and pets (except for safety in remote locations).

EACCS Measure GEN-05. Vehicles and equipment will be parked on pavement, existing roads, and previously disturbed areas to the extent practicable.

EACCS Measure GEN-06. Off-road vehicle travel will be minimized.

EACCS Measure GEN-07. Vehicles will not exceed a speed limit of 15 mi per hour on unpaved roads within natural land-cover types, or during off-road travel.

EACCS Measure GEN-08. Vehicles or equipment will not be refueled within 100 ft of a wetland, stream, or other waterway unless a bermed and lined refueling area is constructed.

EACCS Measure GEN-09. Vehicles shall be washed only at approved areas. No washing of vehicles shall occur at job sites.

EACCS Measure GEN-10. To discourage the introduction and establishment of invasive plant species, seed mixtures/straw used within natural vegetation will be either rice straw or weed-free straw.

EACCS Measure GEN-11. Pipes, culverts, and similar materials greater than 4 inches in diameter will be stored so as to prevent covered wildlife species from using these as temporary refuges, and these materials will be inspected each morning for the presence of animals prior to being moved.

EACCS Measure GEN-12. Erosion control measures will be implemented to reduce sedimentation in wetland habitat occupied by covered animal and plant species when activities are the source of potential erosion problems. Plastic monofilament netting (erosion control matting) or similar material containing netting shall not be used at the Project. Acceptable substitutes include coconut coir matting or tackified hydroseeding compounds.

EACCS Measure GEN-13. Stockpiling of material will occur such that direct effects on covered species are avoided. Stockpiling of material in riparian areas will occur outside of the top of bank, and preferably outside of the outer riparian dripline and will not exceed 30 days.

EACCS Measure GEN-14. Grading will be restricted to the minimum area necessary.

EACCS Measure GEN-15. Prior to ground disturbing activities in sensitive habitats, Project construction boundaries and access areas will be flagged and temporarily fenced during construction to reduce the potential for vehicles and equipment to stray into adjacent habitats.

EACCS Measure GEN-16. Significant earth-moving activities will not be conducted in riparian areas within 24 hours of predicted storms or after major storms (defined as 1 inch of rain or more).

EACCS Measure GEN-17. Trenches will be backfilled as soon as possible. Open trenches will be searched each day prior to construction to ensure no covered species are trapped. Earthen escape ramps will be installed at intervals prescribed by a qualified biologist.

In addition to the general and specific measures in the EACCS that apply to the Project site, the PBO for the EACCS stipulates additional specific avoidance and minimization measures (the text of which is paraphrased below) for projects covered under the PBO. The Project will employ the following PBO general measures, as well as the PBO's species-specific measures mentioned for individual species in the text of this NES.

PBO General Minimization Measure 1. At least 15 days prior to any ground disturbing activities, the applicant will submit to the USFWS for review and approval the qualifications of the proposed biological monitor(s). A qualified biological monitor means any person who has completed at least four years of university training in wildlife biology or a related science and/or has demonstrated field experience in the identification and life history of the listed species.

PBO General Minimization Measure 2. A USFWS-approved biological monitor will remain on-site during all construction activities in or adjacent to habitat for listed species. The USFWS-approved biological monitor(s)

will be given the authority to stop any work that may result in the take of listed species. If the USFWS-approved biological monitor(s) exercises this authority, the USFWS will be notified by telephone and electronic mail within one working day. The USFWS-approved biological monitor will be the contact for any employee or contractor who might inadvertently kill or injure a listed species or anyone who finds a dead, injured, or entrapped individual. The USFWS-approved biological monitor will possess a working wireless/mobile phone whose number will be provided to the USFWS.

PBO General Minimization Measure 3. Prior to construction, a construction employee education program will be conducted in reference to potential listed species on site. At minimum, the program will consist of a brief presentation by persons knowledgeable in endangered species biology and legislative protection (USFWS-approved biologist) to explain concerns to contractors, their employees, and agency personnel involved in the project. The program will include: a description of the species and their habitat needs; any reports of occurrences in the Project area; an explanation of the status of each listed species and their protection under the Act; and a list of measures being taken to reduce effects on the species during construction and implementation. Fact sheets conveying this information and an educational brochure containing color photographs of all listed species in the work area(s) will be prepared for distribution to the above-mentioned people and anyone else who may enter the project area. A list of employees who attend the training sessions will be maintained by the applicant to be made available for review by the USFWS upon request. Contractor training will be incorporated into construction contracts and will be a component of weekly project meetings.

PBO General Minimization Measure 4. Pre-construction surveys for listed species will be performed immediately prior to groundbreaking activities. Surveys will be conducted by USFWS-approved biologists. If at any point, construction activities cease for more than five consecutive days, additional pre-construction surveys will be conducted prior to the resumption of these actions.

PBO General Minimization Measure 5. To prevent the accidental entrapment of listed species during construction, all excavated holes or trenches deeper than 6 inches will be covered at the end of each work day with plywood or similar materials. Foundation trenches or larger excavations that cannot easily be covered will be ramped at the end of the work day to allow trapped animals an escape method. Prior to the filling of such holes, these areas will be thoroughly inspected for listed species by USFWS-approved biologists. In the event of a trapped animal is observed, construction will cease until the individual has been relocated to an appropriate location.

PBO General Minimization Measure 6. Translocation will be approved on a project specific basis. The applicant will prepare a listed species translocation plan for the Project to be reviewed and approved by the USFWS prior to Project implementation. The plan will include trapping and translocation methods, translocation site, and post translocation monitoring.

PBO General Minimization Measure 7. Only USFWS-approved biologists will conduct surveys and move listed species.

PBO General Minimization Measure 8. All trash and debris within the work area will be placed in containers with secure lids before the end of each workday in order to reduce the likelihood of predators being attracted to the site by discarded food wrappers and other rubbish that may be left on-site. Containers will be emptied as necessary to prevent trash overflow onto the site and all rubbish will be disposed of at an appropriate off-site location.

PBO General Minimization Measure 9. All vegetation which obscures the observation of wildlife movement within the affected areas containing or immediately adjacent to aquatic habitats will be completely removed by hand just prior to the initiation of grading to remove cover that might be used by listed species. The USFWS-approved biologist will survey these areas immediately prior to vegetation removal to find, capture, and relocate any observed listed species, as approved by the USFWS.

PBO General Minimization Measure 10. All construction activities must cease one half hour before sunset and should not begin prior to one half hour after sunrise. There will be no nighttime construction.

PBO General Minimization Measure 11. Grading and construction will be limited to the dry season, typically May-October.

PBO General Minimization Measure 12. BMPs will be used to minimize erosion and effects on water quality and effects on aquatic habitat. If necessary, a Stormwater Pollution Prevention Plan (SWPPP) will be prepared.

PBO General Minimization Measure 13. The applicant will ensure a readily available copy of this PBO is maintained by the construction foreman/manager on the Project site whenever earthmoving and/or construction is taking place. The name and telephone number of the construction foreman/manager will be provided to the USFWS prior to groundbreaking.

PBO General Minimization Measure 14. The construction area shall be delineated with high visibility temporary fencing at least 4 ft in height, flagging, or other barrier to prevent encroachment of construction personnel and equipment outside of the construction area. Such fencing shall be inspected and maintained daily until completion of the Project. The fencing will be removed only when all construction equipment is removed from the site.

PBO General Minimization Measure 15. Silt fencing or wildlife exclusion fencing will be used to prevent listed species from entering the project area. Exclusion fencing will be at least 3 ft high and the lower 6 inches of the fence will be buried in the ground to prevent animals from crawling under. The remaining 2.5 ft will be left above ground to serve as a barrier for animals moving on the ground surface. The fence will be pulled taut at each support to prevent folds or snags. Fencing shall be installed and maintained in good condition during all construction activities. Such fencing shall be inspected and maintained daily until completion of the Project. The fencing will be removed only when all construction equipment is removed from the site.

PBO General Minimization Measure 16. A USFWS-approved biologist shall ensure that the spread or introduction of invasive exotic plant species shall be avoided to the maximum extent possible. When practicable, invasive exotic plants in the Project areas shall be removed.

PBO General Minimization Measure 17. Project sites shall be revegetated with an appropriate assemblage of native riparian wetland and upland vegetation suitable for the area. A species list and restoration and monitoring plan shall be included with the Project proposal for review and approval by the USFWS and the USACE. Such a plan must include, but not be limited to, location of the restoration, species to be used, restoration techniques, time of year the work will be done, identifiable success criteria for completion, and remedial actions if the success criteria are not achieved.

PBO General Minimization Measure 18. If a work site is to be temporarily dewatered by pumping, intakes shall be completely screened with wire mesh not larger than 5 millimeters. Water shall be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any barriers to flow shall be removed in a manner that would allow flow to resume with the least disturbance to the substrate.

PBO General Minimization Measure 19. A USFWS-approved biologist shall permanently remove, from within the project area, any individuals of exotic species, such as bullfrogs [*Lithobates catesbeianus*], crayfish [*Pacifastacus leniusculus* and *Procambarus clarkii*], and centrarchid fishes, to the maximum extent possible. The applicant shall have the responsibility to ensure that their activities are in compliance with the California Fish and Game Code.

Appendix F. NMFS ESA Letter

From: NMFSWCRCA Specieslist - NOAA Service Account
[mailto:nmfswcrca.specieslist+canned.response@noaa.gov]
Sent: Friday, August 24, 2018 9:38 AM
To: Steve Rottenborn <srottenborn@harveyecology.com>
Subject: Re: Caltrans - Dublin Blvd-North Canyons Parkway Extension Project

Receipt of this message confirms that NMFS has received your email to nmfswcrca.specieslist@noaa.gov. If you are a federal agency (or representative) and have followed the steps outlined on the California Species List Tools web page (http://www.westcoast.fisheries.noaa.gov/maps_data/california_species_list_tools.html), you have generated an official Endangered Species Act species list.

Messages sent to this email address are not responded to directly. For project specific questions, please contact your local NMFS office.

Northern California/Klamath (Arcata) 707-822-7201

North-Central Coast (Santa Rosa) 707-387-0737

Southern California (Long Beach) 562-980-4000

California Central Valley (Sacramento) 916-930-3600

Quad Name **Livermore**
Quad Number **37121-F7**

ESA Anadromous Fish

SONCC Coho ESU (T) -
CCC Coho ESU (E) -
CC Chinook Salmon ESU (T) -
CVSR Chinook Salmon ESU (T) -
SRWR Chinook Salmon ESU (E) -
NC Steelhead DPS (T) -
CCC Steelhead DPS (T) -
SCCC Steelhead DPS (T) -
SC Steelhead DPS (E) -
CCV Steelhead DPS (T) -
Eulachon (T) -
sDPS Green Sturgeon (T) -

ESA Anadromous Fish Critical Habitat

SONCC Coho Critical Habitat -
CCC Coho Critical Habitat -
CC Chinook Salmon Critical Habitat -
CVSR Chinook Salmon Critical Habitat -
SRWR Chinook Salmon Critical Habitat -
NC Steelhead Critical Habitat -
CCC Steelhead Critical Habitat -
SCCC Steelhead Critical Habitat -
SC Steelhead Critical Habitat -
CCV Steelhead Critical Habitat -
Eulachon Critical Habitat -
sDPS Green Sturgeon Critical Habitat -

ESA Marine Invertebrates

Range Black Abalone (E) -
Range White Abalone (E) -

ESA Marine Invertebrates Critical Habitat

Black Abalone Critical Habitat -

ESA Sea Turtles

East Pacific Green Sea Turtle (T) -
Olive Ridley Sea Turtle (T/E) -
Leatherback Sea Turtle (E) -
North Pacific Loggerhead Sea Turtle (E) -

ESA Whales

Blue Whale (E) -
Fin Whale (E) -
Humpback Whale (E) -
Southern Resident Killer Whale (E) -
North Pacific Right Whale (E) -
Sei Whale (E) -
Sperm Whale (E) -

ESA Pinnipeds

Guadalupe Fur Seal (T) -
Steller Sea Lion Critical Habitat -

Essential Fish Habitat

Coho EFH - **X**
Chinook Salmon EFH - **X**
Groundfish EFH -
Coastal Pelagics EFH -
Highly Migratory Species EFH -

MMPA Species (See list at left)

ESA and MMPA Cetaceans/Pinnipeds

See list at left and consult the NMFS Long Beach office
562-980-4000

MMPA Cetaceans -
MMPA Pinnipeds -

Appendix F: Geotechnical Feasibility Study

GEOTECHNICAL FEASIBILITY STUDY

Dublin Boulevard Extension
Fallon Road to Doolan Road
Federal Project No. RTPL 5432 (019)
City of Dublin and Alameda County, California

PREPARED FOR:

BKF ENGINEERS
4670 WILLOW ROAD, SUITE 250
PLEASANTON, CALIFORNIA 94588

BkF
ENGINEERS / SURVEYORS / PLANNERS

PREPARED BY:

GEOCON CONSULTANTS, INC.
6671 BRISA STREET
LIVERMORE, CALIFORNIA 94550

GEOCON

GEOCON PROJECT NO. E9027-04-01

JULY 2018

GEOCON
CONSULTANTS, INC.
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. E9027-04-01
July 31, 2018

BKF Engineers
4670 Willow Road, Suite 250
Pleasanton, California 94588

Attention: Mr. Gordon Sweet

Subject: DUBLIN BOULEVARD EXTENSION
FALLON ROAD TO DOOLAN ROAD
CITY OF DUBLIN AND ALAMEDA COUNTY, CALIFORNIA
FEDERAL PROJECT NO. RTPL 5432 (019)
GEOTECHNICAL FEASIBILITY SUMMARY

Dear Mr. Sweet:

In accordance with your request, we herein submit our Geotechnical Feasibility Summary for the proposed extension of Dublin Boulevard in the City of Dublin and Alameda County, California. The accompanying report presents the findings and conclusions from our study. No field exploration or laboratory testing was performed for this preliminary study; future design-level studies should include both. Should project details change from those presented herein, we should review this report for applicability and possible revision.

If you have any questions regarding this report, or if we may be of further service, please contact the undersigned at your convenience.

Sincerely,

GEOCON CONSULTANTS, INC.

REGISTERED PROFESSIONAL ENGINEER
SHANE A. RODACKER
No. 2915
GEOTECHNICAL
STATE OF CALIFORNIA

Shane Rodacker, PE, GE
Senior Engineer

(1/e-mail) Addressee
(1/e-mail) BKF Engineers
Attention: Mr. Blake Silkwood

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GEOTECHNICAL FEASIBILITY SUMMARY

1. INTRODUCTION

This report presents the results of a geotechnical feasibility summary for the proposed extension of Dublin Boulevard in the City of Dublin and Alameda County, California. The purpose of this study was to evaluate the background geologic setting along the proposed extension and identify geotechnical constraints that may impact the project.

2. SCOPE OF SERVICES

The scope of this study included:

- Reviewing published geologic maps, aerial photographs, project plans, in-house documents, and other literature pertaining to the site to aid in evaluating geologic conditions and hazards that may be present.
- Performing a field reconnaissance to observe the existing conditions at the site.

Subsurface exploration, laboratory testing and engineering analyses were not performed.

3. SITE AND PROJECT DESCRIPTION

The planned project will extend Dublin Boulevard from its existing terminus at Fallon Road approximately 1 ½ miles eastward to Doolan Road (see Vicinity Map, Figure 1). Based on the information provided by BKF Engineers (BKF), the alignment of the proposed extension generally trends just below the hills that ascend from the Livermore Valley north of I-580. The alignment traverses pasture land between Fallon Road and Croak Road. Between Croak Road and Doolan Road, the roadway will cross pasture land, a former farmstead and a staging yard for a landscaping business.

The alignment crosses several seasonal drainages, and Cottonwood Creek approximately ¼ mile west of Doolan Road. At the intersection with the proposed alignment, most of the seasonal drainages are incised only a few feet below adjacent grade. Cottonwood Creek is more significant with the creek bed approximately 8 feet below adjacent grade and near-vertical channel walls in some areas. Topographic information from BKF and aerial imagery indicate that grading associated with prior development of the farmstead and landscaping business, and possibly a gravel pit north of the project alignment, have obscured the natural course of some of the seasonal drainages that flow from the hills southward to the Livermore Valley.

The project plans indicate the Dublin Boulevard extension will consist of three travel lanes and shoulder bike lanes in each direction, a separate shared pedestrian-bike path on the north side of the roadway and a separate sidewalk on the south side of the roadway between Fallon Road and Croak Road. The roadway will narrow to two travel lanes in each direction east of Croak Road. The project will include a major bridge to convey traffic over Cottonwood Creek. The bridge is conceptually planned as a three- to four-span, 270-foot long structure with abutments on each end and bent supports. Stormwater treatment facilities and underground utilities are proposed along the entire alignment.

Detailed grading plans have not yet been prepared but we understand that grading will generally consist of cuts along the northern margin of the roadway and fills along the southern edge. General embankment heights

will be approximately eight feet or less with isolated areas up to 15 feet. Cuts of eight feet or less are anticipated throughout most of the alignment. Cuts up to 12 feet may be needed in isolated areas such as the northern side of the roadway, just east of Fallon Road.

4. CLIMATE

Monthly climate data near the project site are presented in Table 4. These data were obtained from information published on line by Western Regional Climate Center (www.wrcc.dri.edu). The monthly data were recorded from 1903 to 2016 and the station used for recording was located at Latitude 37.41°; Longitude -121.46°; Elevation 480 feet (Livermore, California #044997).

TABLE 4
MONTHLY CLIMATE SUMMARY

Climate Data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Avg. Total Precip. (inches)	2.97	2.47	2.15	1.00	0.44	0.11	0.02	0.04	0.22	0.67	1.54	2.56	14.18
Avg. High (°F)	56.8	61.2	65.2	70.5	76.4	83.1	89.0	88.2	86.0	77.7	66.3	57.5	73.2
Avg. Low (°F)	36.7	39.4	41.3	43.6	47.6	51.7	54.2	54.0	52.5	47.7	41.1	37.0	45.6

Based on the information obtained, the average precipitation for a calendar year is 14.18 inches. The majority of this precipitation (over 90 percent) falls between October and April. The warmest months are July and August with average highs and lows of approximately 89°F and 54°F, respectively. The coolest months are December and January with average highs and lows of approximately 57°F and 37°F, respectively.

5. GEOLOGIC CONSIDERATIONS

5.1 Site Geology

Geologic references map the hills along the northern margin of the proposed extension as Pliocene to Pleistocene age Livermore Gravels. Alluvial materials below (south of) the hills are variable with Late Pleistocene to Holocene age alluvial fan deposits and undifferentiated alluvial deposits mapped along the roadway alignment. Artificial fills were noted at the former farmstead on the eastern side of Croak Road during our site reconnaissance. A Geology Map is presented as Figure 2 (attached).

Caltrans performed four soil borings for the I-580 / Cottonwood Creek crossing in July of 1965. The borings extended to depths of approximately 80 feet or less and generally encountered very loose to medium dense silty sands, and stiff to very stiff sandy silts with hard consistency noted below a depth of approximately 60 feet. The log of test boring (LOTB) sheet and relevant site plans are presented in Appendix A. Soil borings performed in January of 1997 for improvements to the I-580 / Airport Boulevard interchange generally encountered stiff to hard lean clays.

5.2 Faulting

Geologists and seismologists recognize the San Francisco Bay Area as one of the most seismically-active regions in the United States. The significant earthquakes that occur in the Bay Area are typically associated with crustal movements along well-defined active fault zones that generally trend in a northwesterly direction.

The site is not located within an Alquist-Priolo Earthquake Fault Zone as established by the State Geologist around known active faults. Review of the Caltrans fault database and field reconnaissance did not reveal evidence of active faulting through or near the site. It should be noted that some geologic references place the inferred location of the Mt. Diablo Thrust Fault in close proximity to the project, and crossing the roadway alignment just west of the proposed bridge over Cottonwood Creek. The Caltrans fault database dates the fault as Late Quaternary age and places the fault approximately 1 ¾ miles north of the site. While Caltrans provides design guidance for bridges that cross faults, we are not aware of any special mitigation or design measures for Caltrans' roadways that cross active faults – including those with a known risk of surface rupture e.g. Hayward Fault, Calaveras Fault, etc.

Table 5 presents approximate distances to active faults in the site vicinity based on mapping by CGS as presented in an online fault database maintained by Caltrans. For the purposes of Table 5, we used the location of the planned Cottonwood Creek Bridge - site coordinates are N 37.7033°, W 121.8280°.

TABLE 5
REGIONAL FAULT SUMMARY

Fault Name	Approximate Distance to Site (miles)	Maximum Earthquake Magnitude, M_w	Fault Age
Mt. Diablo Thrust	1 ¾	6.6	Late Quaternary
Pleasanton	3 ¾	6.6	Holocene
Las Positas	5 ½	6.4	Holocene
Calaveras (North)	5 ½	6.9	Holocene
Greenville (North)	6 ¼	6.9	Holocene
Clayton	11	6.9	Holocene
Hayward (South)	12 ¼	7.3	Holocene
Greenville (South)	12 ½	6.9	Holocene
Great Valley 6	15 ¼	6.8	Holocene
Concord	16 ¼	6.6	Holocene
Hayward (South Extension)	16 ½	6.7	Holocene
Great Valley 7	16 ¾	6.7	Holocene
Calaveras (Central)	16 ¾	6.9	Holocene
Hayward (North)	17 ¼	7.3	Holocene
Silver Creek	17 ¼	6.9	Holocene
Los Medanos – Roe Island	19 ¼	6.8	Holocene
Contra Costa Shear Zone	20 ¾	6.5	Holocene
Great Valley 5	21 ½	6.6	Holocene

Faults tabulated above and many others in the Bay Area are sources of potential ground motion. However, earthquakes that might occur on other faults within the northern California area are also potential generators of significant ground motion and could cause ground shaking at the site.

5.3 Tsunamis and Seiches

Tsunamis are large sea waves caused by submarine earthquakes, landslides, or volcanic eruptions. A seiche is defined as a free or standing wave oscillation of the water surface in an enclosed basin. The potential of tsunamis and/or seiches to occur at the site is considered nil due to the large distance to the Pacific Ocean and enclosed bodies of water.

5.4 Groundwater

Information from the CGS seismic hazard zone report for the project area indicates historic high groundwater levels are on the order of 20 to 25 feet below grade along the project alignment. The same CGS source indicates historic high groundwater levels closer to 10 feet below grade in the area northwest of the existing I-580 / Fallon Road interchange. An approximately 80-foot-deep boring performed by Caltrans in 1965 for the I-580 / Cottonwood Creek crossing encountered groundwater at a depth of approximately 32 feet. See Caltrans Boring No. B-2 on the LOTB sheet in Appendix A. A deep soil boring performed in January 1997 at the I-580 / Airport Boulevard interchange encountered groundwater at a depth of approximately 39 feet.

Shallower groundwater levels may be present throughout the proposed roadway alignment, particularly at the Cottonwood Creek crossing.

6. GEOTECHNICAL CONSIDERATIONS

6.1 Preliminary Foundation Recommendations

Based on the anticipated soil and geologic conditions at the location of the planned creek crossing, cast-in-drilled-hole (CIDH) concrete piles or driven steel pipe piles are potential foundation types for the Cottonwood Creek Bridge. Other foundation types may also be feasible. Casing for CIDH piles may be required if loose sands or other soils and/or groundwater conditions susceptible to caving are present.

Various geologic references map Late Pleistocene to Holocene age alluvial deposits at the Cottonwood Creek Bridge crossing, with the hills north of the crossing mapped as Livermore Gravels. Soil borings for the I-580 / Cottonwood Creek Bridge extended to maximum depths of 80 feet with no significant occurrences of gravel noted. However, Livermore Gravels could be encountered at depth in foundation excavations for the bridge. If present, the gravels could influence foundation type selection for the bridge or foundation construction techniques.

6.2 Liquefaction Potential

Liquefaction is a phenomenon in which loose, saturated, and relatively cohesionless soil deposits located beneath the groundwater table lose strength during strong ground motions. Primary factors controlling liquefaction include intensity and duration of ground accelerations, characteristics of the subsurface soil, in-situ stress conditions, and depth to groundwater. USGS mapping indicates a low susceptibility to liquefaction throughout the majority of the project site. However, the Cottonwood Creek drainage is mapped with a very high susceptibility to liquefaction (see Figure 2) and an area of moderate susceptibility is mapped to the east

of the bridge. Liquefaction potential at the Cottonwood Creek crossing could necessitate foundation elements deeper than those required for structural loading purposes.

The banks of Cottonwood Creek present free-face geometry that may be susceptible to lateral spreading if liquefiable soils exist at depths that correspond to elevations within the creek banks or near the creek bottom. Lateral spreading potential may require mitigation measures such as remedial earthwork to remove susceptible soils and replace with engineered fill, ground improvement, or a containment mechanism such as a slurry cut-off wall. Other mitigation measures may be considered The potential for liquefaction and lateral spreading should be evaluated during project design, based on site-specific subsurface explorations.

6.3 Seismically-Induced Settlement

Seismically-induced settlement is possible at the proposed bridge location, commensurate with the very high liquefaction potential along Cottonwood Creek. Settlements due to liquefaction may require consideration in foundation design for Cottonwood Creek Bridge, which is not unusual for bridges and other infrastructure throughout the Bay Area.

6.4 Embankments

We do not anticipate the need for a surcharge program or settlement monitoring for the project embankments, given the thickness of proposed embankments and anticipated soils conditions. The compressibility of soils below project embankments should be evaluated in future design-level geotechnical studies.

6.5 Slopes

The project proposes significant cuts on the northern side of the Dublin Boulevard Extension just east of Fallon Road. We understand that cut slopes for the project will be inclined at 3:1. Fill slopes of 2:1 or flatter are anticipated throughout the project. Based on the referenced geologic mapping and our experience in the area, we do not anticipate that significant mitigation measures will be required. We anticipate that slopes at the proposed inclinations and heights should possess adequate factor of safety against deep-seated instability. We do not anticipate that interim benches will be required in the slopes for stability purposes but may be considered for slope maintenance. The stability of proposed cut and fill slopes should be evaluated during future studies for the project.

Fill slopes constructed of predominantly clayey materials can be prone to surficial slumping, especially when not properly vegetated after grading operations. If clayey soils are used for fill slopes, some future maintenance to repair surficial slumps, skin failures, etc. may be required. The suitability of existing soils for re-use in fill slopes should be addressed in future design-level studies for the project. Selective grading provisions may be implemented to mitigate the potential for clayey materials in fill slopes.

6.6 Expansive Soils

Expansive soils are common in the Livermore Valley and are likely present along the project alignment. Depending on the extent of expansive soils and level of expansion potential, mitigation measures such as lime-treatment, selective grading or select import fill materials may be necessary.

6.7 Corrosive Soils

Soil corrosivity is not a visually discernable characteristic and soil sampling and testing to evaluate soil corrosion parameters have not been performed. Sampling and testing should be performed in future design level studies. If corrosive soils exist onsite, the use of select pipe materials and concrete mixes should effectively mitigate the effects thereof.

6.8 Cut-Fill Transitions

Portions of the new roadway will be constructed in side-hill terrain with cuts planned on the northern side of the roadway and fills on the opposite (southern) side, thereby creating a cut-fill transition in the roadway. In our experience, such cut-fill transitions can cause distress within roadways due to the difference in support characteristics. Project-specific grading provisions may be required to mitigate the potential for adverse effects of cut-fill transitions within the roadway. Such provisions can include undercuts with the cut portions of the roadway. In general, undercuts should be backfilled with soil possessing an R-value of 15 or higher. Portions of the native site soils should be suitable to re-use as backfill in the undercut areas but some selective grading may be necessary. The suitability of existing soils for re-use as fill material should be a focal point of future geotechnical studies.

6.9 Retaining Walls

We understand that project retaining walls may be considered to minimize right-of-way impacts and reduce the overall project footprint. Based on the information reviewed for this feasibility study and our experience in the area, we do not anticipate geotechnical conditions that would preclude the use of standard Caltrans retaining walls with shallow continuous footings for foundation support. Depending on the geometry at each wall location and potential logistical constraints, CIDH pile foundations may be selected and should be feasible from a geotechnical standpoint.

6.10 Culverts

The proposed roadway extension will cross several minor drainages and preliminary project design indicates that pipe or box culverts may be used to convey flows beneath the roadway. Soils conditions in the drainages may be loose or soft and over-excavations may be required to provide suitable subgrade support for culverts and associated wing walls.

6.11 Pavements

Based on information from BKF Engineers, we understand a design Traffic Index (TI) of 10.5 is anticipated for the new roadway. Specific subgrade soil conditions will be evaluated during future design level studies. The table below presents recommended flexible pavement sections for various subgrade R-values, reflective of the anticipated low R-value soils that are common in the area; and the potential for selective grading or lime treatment as mitigation measures to improve subgrade soil support. We developed the following pavement structural sections in general accordance with Caltrans design methodology using a 20-year design life.

TABLE 6
FLEXIBLE PAVEMENT SECTION RECOMMENDATIONS

Alignment	Subgrade R-value = 5			Subgrade R-value = 15 (Select Grading Scenario)			Subgrade R-value = 40 (Lime Treated Subgrade Scenario)		
	HMA	AB	Total Section Thickness	HMA	AB	Total Section Thickness	HMA	AB	Total Section Thickness
Dublin Boulevard (TI =10.5)	6.5	24.5	31	6.5	21	27.5	6.5	12	18.5

Notes:

1. All thicknesses are in inches.
2. AB: Class 2 AB with a minimum R-Value of 78 and meeting the requirements of Section 26 of the latest Caltrans Standard Specifications.
3. HMA: Hot Mix Asphalt meeting the requirements of Section 39 of the latest Caltrans Standard Specification.
4. Lime-treated subgrade assumed to be at least 12 inches thick.

7. FUTURE GEOTECHNICAL AND GEOLOGICAL STUDIES

Design-level studies for the project should include a comprehensive evaluation of the geotechnical and geologic considerations discussed herein. Future studies should include subsurface exploration, laboratory testing and engineering analyses. Key considerations include, but may not be exclusive to:

- The potential for liquefaction and related seismically-induced settlements, particularly at the proposed Cottonwood Creek Bridge.
- The stability of proposed cut and fill slopes for the project.
- The suitability of existing soils for re-use as fill material.

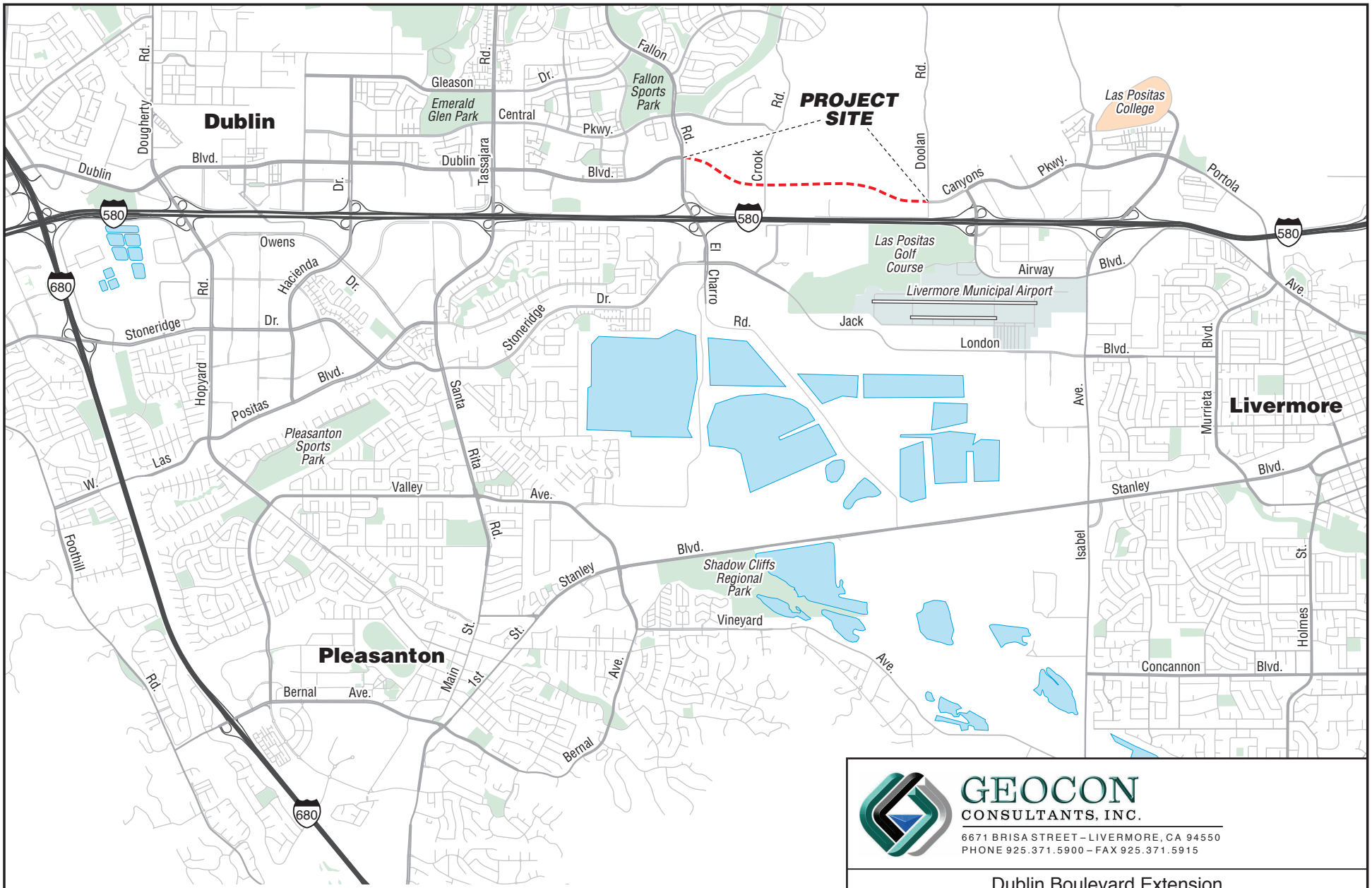
Future subsurface exploration should generally include soil borings at approximate 500-foot intervals along the roadway extension. In addition, borings should specifically be performed for cut slopes over 8 feet, at retaining wall locations, at bridge support locations, and at culvert crossing locations. Additional borings may be necessary for other project components. The field investigation program should consider project design details at the time.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon. should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by Geocon.

This report is issued with the understanding that it is the responsibility of the owner or his representative to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.



GEOCON
CONSULTANTS, INC.
6671 BRISA STREET – LIVERMORE, CA 94550
PHONE 925.371.5900 – FAX 925.371.5915

Dublin Boulevard Extension

Fallon Road to Doolan Road
City of Dublin and Alameda County, California

VICINITY MAP

E9027-04-01	July 2018	Figure 1

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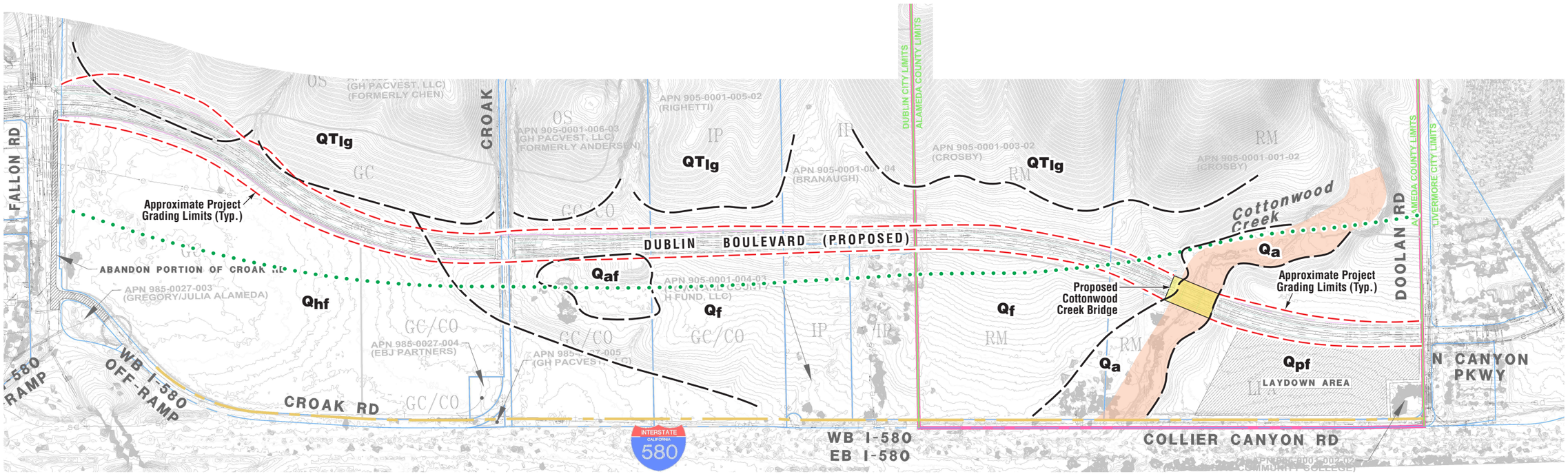

Note: Site geology derived from various geologic references and site-specific mapping. See List of References.

LEGEND:

- Approximate Geologic Contact
- Approximate Location of Buried Thrust Fault (Inferred)
- Very High Susceptibility to Liquefaction
- Q_{af} Artificial Fill
- Q_{hf} Holocene Age Alluvial Fan
- Q_a Undifferentiated Late Pleistocene to Holocene Age Alluvium
- Q_f Late Pleistocene to Holocene Alluvial Fan
- Q_{pf} Late Pleistocene Alluvial Fan
- QT_{lg} Livermore Gravels, Pliocene to Early Pleistocene Age

0 1200
Scale in Feet

GEOCON CONSULTANTS, INC.
6671 BRISA STREET – LIVERMORE, CA 94550
PHONE 925.371.5900 – FAX 925.371.5915

Dublin Boulevard Extension

Fallon Road to Doolan Road
City of Dublin and Alameda County, California

GEOLOGY MAP

E9027-04-01	July 2018	Figure 2

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APPENDIX A

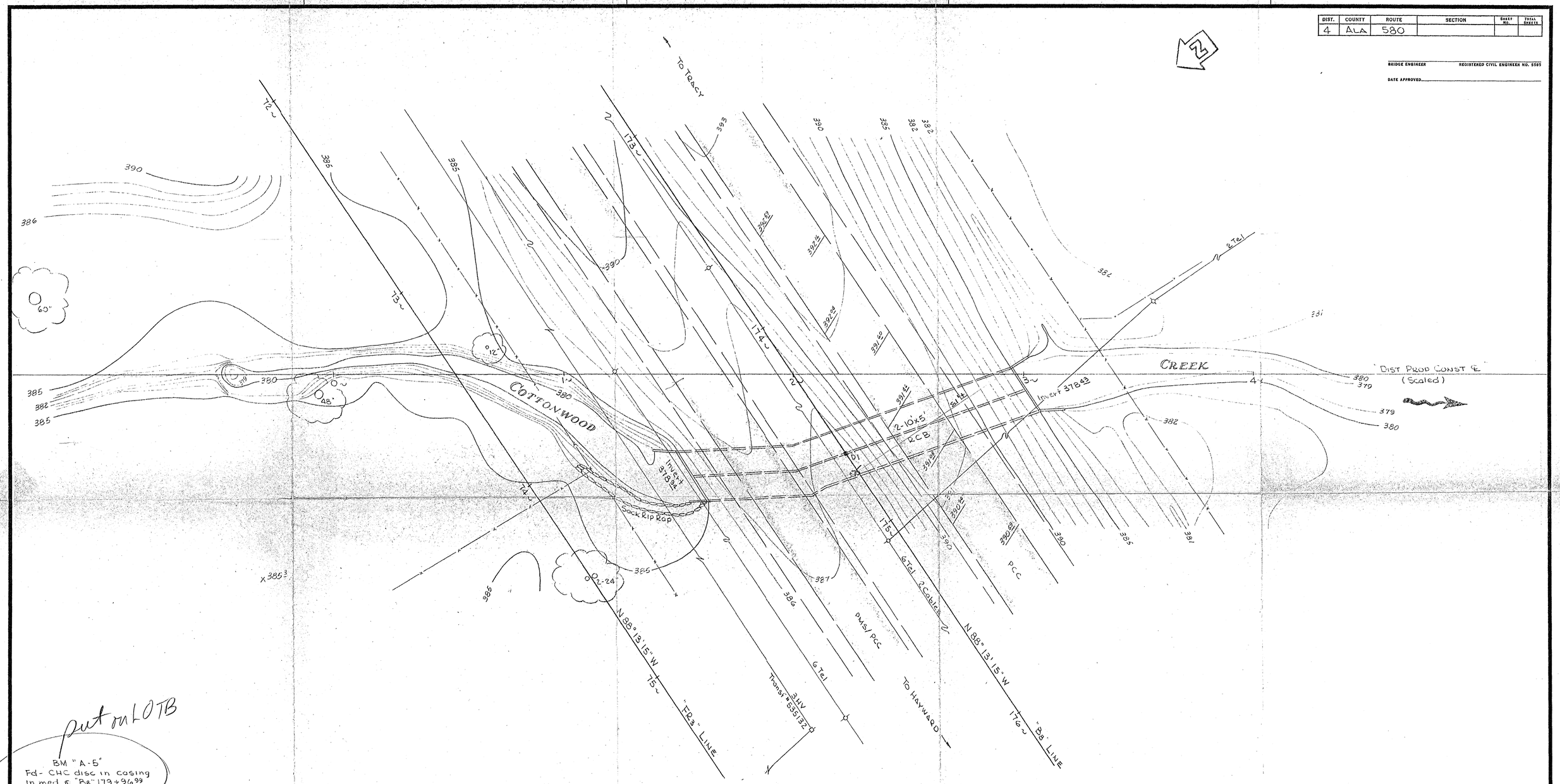
APPENDIX A

CALTRANS INFORMATION FROM I-580 CROSSING AT COTTONWOOD CREEK AND I-580 / AIRPORT BOULEVARD INTERCHANGE

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
4	ALA	580			

BRIDGE ENGINEER REGISTERED CIVIL ENGINEER NO. 5595

DATE APPROVED



PR-3313-1

put on LOTB

BM "A-5"
Fd- CHC disc in casing
In med ℄ "B8" 179+96.99
EL 362.65

BM "A"
Set-~~elevated~~ □" top Fdwl.
@ ∠ Pt WW 80.3 Lt "B8" ~~[illegible]~~ 174+74 ← Correct sta.
EL 385.19

~~used this one~~
elev. OK — location "wrong"
quote Baumgardner (P.B.)

SCALE	1" = 20'
LEVEL DATUM:	USC & GS MSL
FOR ALINEMENT TIES SEE	PR-3313-3
CONTOURS AS OF	5-19-65
SITE PLAN TO SUPPLEMENT DISTRICT DATA.	
SURVEY BY	DJB DATE 5-65
DRAWN BY	RPB DATE 7-65
TRACED BY	JS DATE 8-9-65

BRIDGE DEPARTMENT
DESIGN SECTION

Section Supervisor

DESIGN	By	
	Checked	
DETAILS	By	
	Checked	
QUANTITIES	By	
	Checked	

STATE OF CALIFORNIA
HIGHWAY TRANSPORTATION AGENCY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

COTTONWOOD CREEK

SITE PLAN 6

BRIDGE NO. 33-13 R/L | DRAWING NO. | SHEET | OF

WO 04204 136441

Disregard prints bearing earlier revision dates →

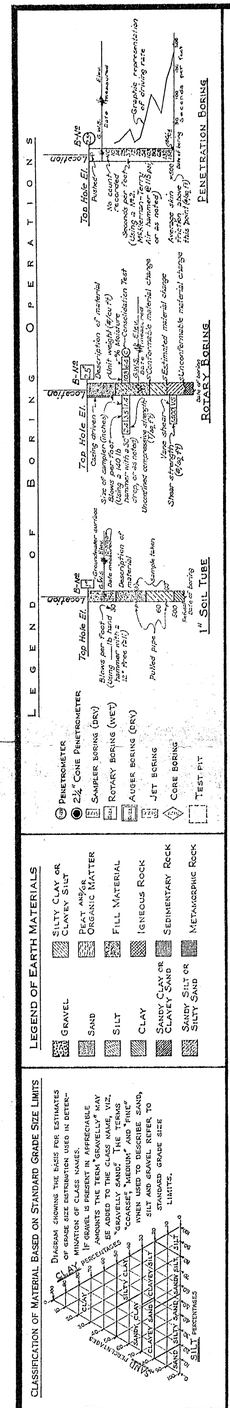
REVISION DATES (PRELIMINARY STAGE ONLY)

FED. ROAD DIV. No.	STATE	F. A. PROJECT No.	SHEET No.	TOTAL SHEETS
7	CALIF.			

DIST.	COUNTY	ROUTE	SECTION	SHEET No.	TOTAL SHEETS
04	ALA	58C			

BRIDGE ENGINEER CIVIL ENGINEER—LICENSE 5595

DATE APPROVED

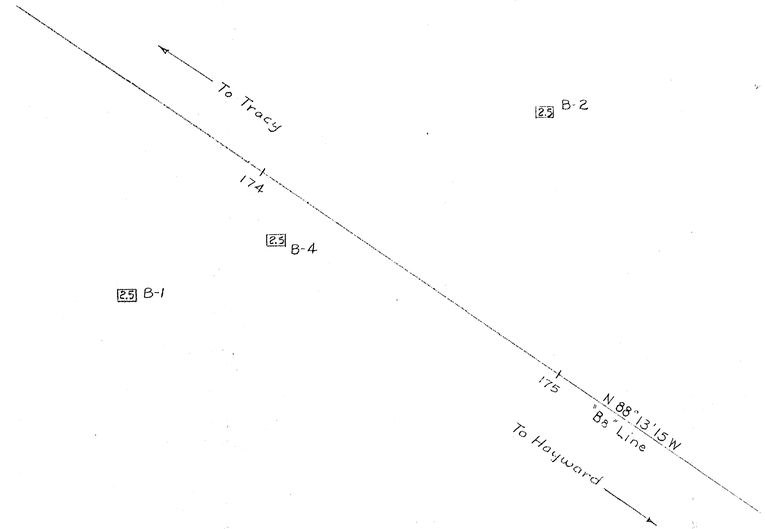


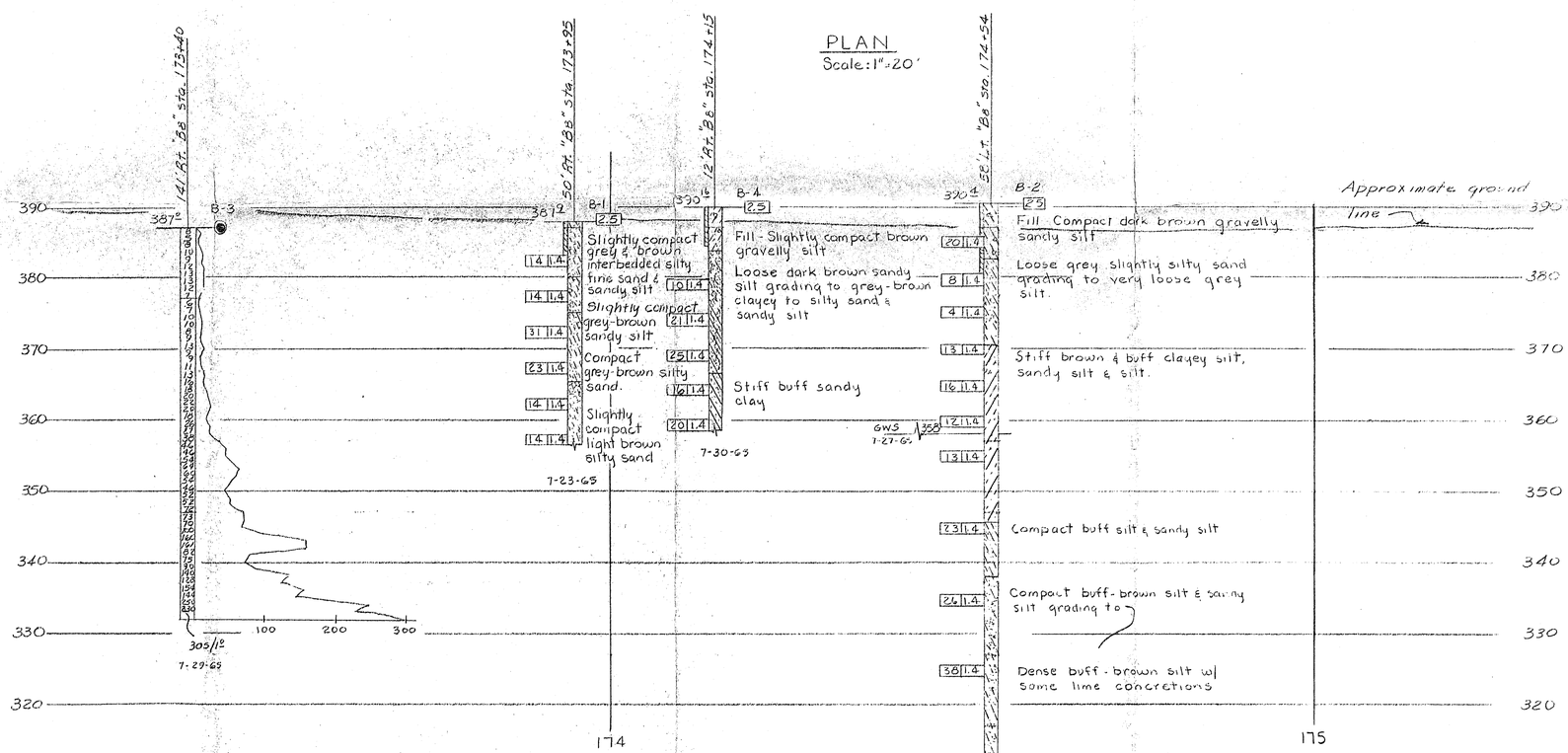
NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

FIELD STUDY	By: Nelson	7-65
DRAWN	By: E. C. Hughes	11/65
CHECKED	By:	

Approval Recommended by ..... Engineering Geologist

BRIDGE DEPARTMENT
ENGINEERING GEOLOGY SECTION





BM "A-5"
Fd. CHC disc in casing in med. @ "B8" 179+96.99
Elev. 362.63

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

COTTONWOOD CREEK

LOG OF TEST BORINGS

5

SCALE As Shown	BRIDGE 33-13 R/L	FILE	DRAWING

04204
136441

Disregard prints bearing earlier numbers → PREL. DRAWING No. PR-3313 R

DIST	COUNTY	ROUTE	POST KILOMETERS TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
4	Ala	580	24.1		

GEOTECHNICAL PROFESSIONAL

1/28/98
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER GARY PARIKH No. G.E. 666 Exp.12/31/01 GEOTECHNICAL STATE OF CALIFORNIA

PARIKH CONSULTANTS, INC.
481 VALLEY WAY
MILPITAS CA 95035

Bench Mark No. A-453
57 mm CADH brass disk in sidewalk at northeasterly corner of Airway Overcrossing ℄ Route 580
Sta. B8M 42+72.241 54.281 Lt. Elev. 131.902

Bench Mark No. AB-947
PK nail and Caltrans shiner in southeasterly shoulder of route 580
Sta. B8M 40+24.519 23.466 Rt. Elev. 121.653

"A" LINE ALIGNMENT DATA

		NORTHING	EASTING
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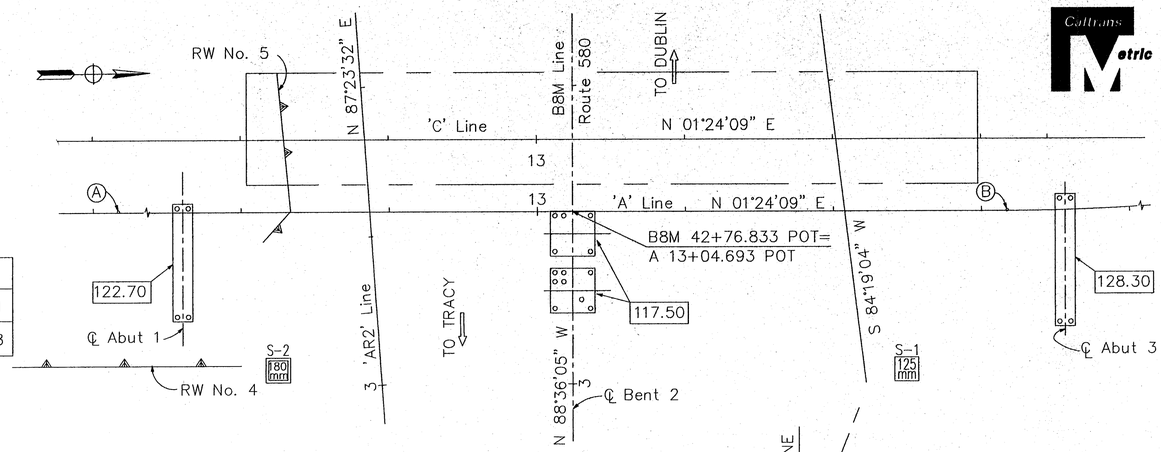
(B)	13+63.213 "A"LINE	634,162.3837	1,883,796.1588



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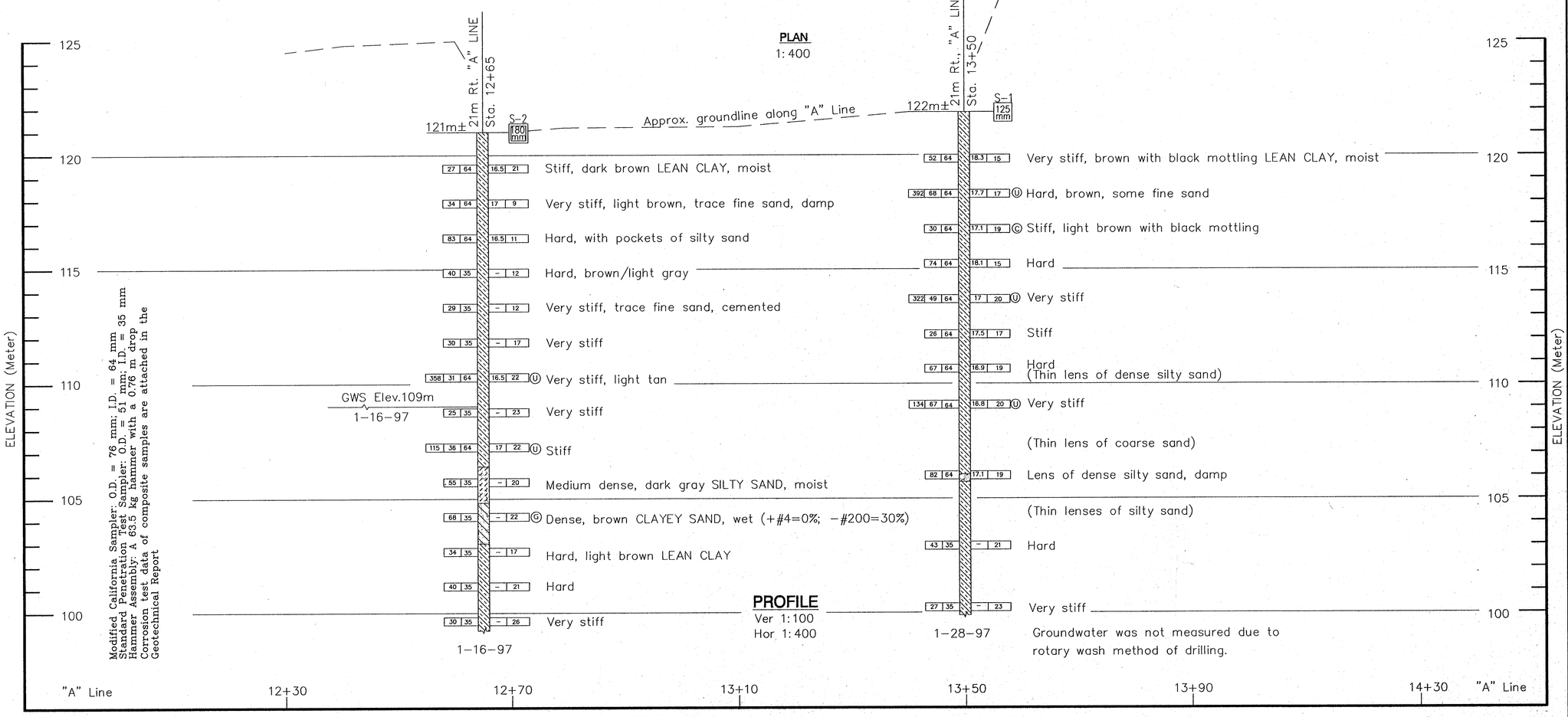

PROFILE
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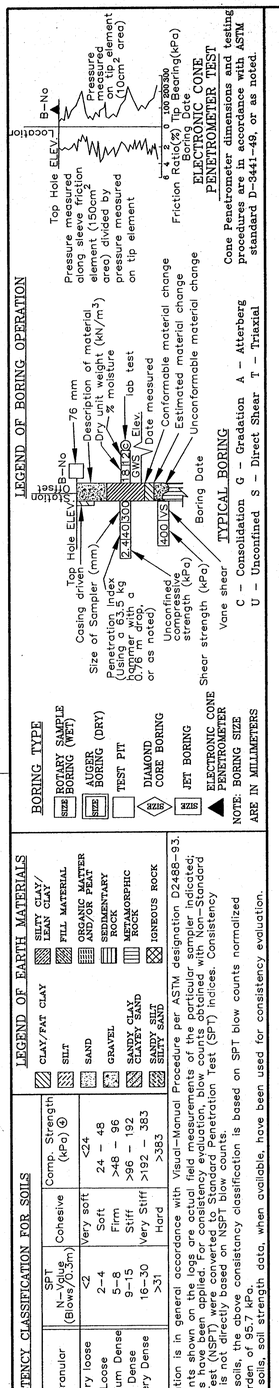
Hor 1:400



FIELD INVESTIGATOR	GREG BLOOM	DATE	OCTOBER, 1997
DRAWN BY	HONGYUAN SU		
CHECKED BY	Y. DAVID WANG		

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

Y. DAVID WANG
PROJECT ENGINEER

BRIDGE NO 33-408R
POST KM 24.1

AIRWAY BOULEVARD OVERCROSSING
LOG OF TEST BORINGS

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 20 40 60 80 100

CU 04256
EA 116061

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 9/22/97 2/9/98

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET 18 OF 19

Plate A-1

C:\96157\LOTB-10 Wed Feb 11 16:35:54 1998

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1. Barlock, V.E., *Geologic Map of the Livermore Gravels, Alameda, County, California,* USGS OFR 88-516, 1988.
2. California Department of Transportation, *Caltrans Fault Database V2 (KML File):* http://dap3.dot.ca.gov/ARS_Online/technical.php.
3. California Geological Survey (CGS), *Seismic Hazard Zone Report for the Livermore 7.5-Minute Quadrangle, Alameda County, California,* 2008.
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8. Unpublished reports, aerial photographs, and maps on file with Geocon Consultants.
9. Western Regional Climate Center: https://wrcc.dri.edu

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Appendix G: Phase I Environmental Site Assessment Report (ESA)

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PHASE I ENVIRONMENTAL SITE ASSESSMENT REPORT

DUBLIN BOULEVARD EXTENSION
ALAMEDA COUNTY, CALIFORNIA

PREPARED FOR:
BKF ENGINEERS
4670 WILLOW ROAD, SUITE 250
PLEASANTON, CA 94588

PREPARED BY:
GEOCON CONSULTANTS, INC.
6671 BRISA STREET
LIVERMORE, CA 94550

GEOCON

GEOCON PROJECT NO. E9027-02-02

JUNE 2018

GEOCON
CONSULTANTS, INC.
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. E9027-02-02
June 4, 2018

Mr. Gordon Sweet
BKF Engineers
4670 Willow Road
Pleasanton, California 94588

Subject: PHASE I ENVIRONMENTAL SITE ASSESSMENT
DUBLIN BOULEVARD EXTENSION
DUBLIN TO LIVERMORE, ALAMEDA COUNTY, CALIFORNIA

Dear Mr. Sweet:

In accordance with your request and our proposal LE-16-078 dated June 30, 2016, we have performed a Phase I Environmental Site Assessment (ESA) of portions of seven parcels located between Fallon Road in Dublin, and Doolan Road in Livermore, California along the proposed alignment of an extension and Dublin Boulevard in Dublin in Alameda County, California. We performed the Phase I ESA for BKF Engineers (the Client) as requested by the City of Dublin (the City) to assess the potential for existing hazardous substances and/or petroleum product impacts along the proposed alignment prior to right-of-way acquisition and construction of the extension by the City.

This report summarizes the findings of the Phase I ESA including the potential presence of recognized environmental conditions as defined by the American Society for Testing and Materials *Designation E 1527-13, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*.

We appreciate the opportunity to have performed this Phase I ESA for BKF Engineers. Please contact us if you have any questions concerning this report or if we may be of further service.

Sincerely,

GEOCON CONSULTANTS, INC.

Luann Beadle
Project Scientist

John Juhrend, PE, CEG
Senior Engineer

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PHASE I ENVIRONMENTAL SITE ASSESSMENT REPORT

1.0 INTRODUCTION

This report summarizes the methodology and presents the findings of a Phase I Environmental Site Assessment (ESA) of portions of seven parcels located between Fallon Road in Dublin and Doolan Road in Livermore in the proposed alignment of an extension to Dublin Boulevard (the Site), in Alameda County, California. We performed the Phase I ESA for BKF Engineers (the Client) to assess the potential for existing hazardous substances and/or petroleum product impacts within the proposed alignment prior to right-of-way (ROW) acquisition and construction of the roadway by the City of Dublin.

1.1 Purpose and Objectives

The purpose of the Phase I ESA was to identify evidence or indications of 'recognized environmental conditions' (REC) as defined by the American Society for Testing and Materials (ASTM) *Designation E 1527-13 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.* Section 1.1.1 of ASTM *Designation E 1527-13* defines an REC as "the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. De minimis conditions are not recognized environmental conditions." De minimis conditions are those that generally do not present a threat to human health or the environment and that generally would not be the subject of the enforcement action if brought to the attention of appropriate governmental agencies.

ASTM *Designation E1527-13* also defines 'Historical' and 'Controlled' RECs (HREC and CREC, respectively). An 'Historical REC' is defined as "a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to "the satisfaction of the applicable regulatory authority or meeting unrestricted use criteria established by a regulatory authority, without subjecting the property to any required controls (for example, property use restrictions, activity and use limitations, institutional controls, or engineering controls)." A 'Controlled REC' is defined as "a recognized environmental condition resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority (for example, as evidenced by the issuance of a no further action letter or equivalent, or meeting risk-based criteria established by regulatory authority), with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls (for example, property use restrictions, activity and use limitations, institutional controls, or engineering controls)." An HREC is not an REC if the property meets current standards for unrestricted residential use. A CREC remains an REC by definition when the property does not meet the unrestricted residential use requirement unconditionally.

We also conducted the Phase I ESA in general accordance with the requirements of 40 Code of Federal Regulations (CFR) Part 312 titled *Standards and Practices for All Appropriate Inquiries,* as required under Sections 101(35)(B)(ii) and (iii) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The purpose of conducting an all appropriate inquiries investigation into the previous ownership and uses of a property is to meet the provisions necessary for the landowner, contiguous property owner, and/or bona fide prospective purchaser to qualify for certain landowner liability protections under CERCLA.

The following principles are an integral part of ASTM *Designation E1527-13*:

> ***"Uncertainty Not Eliminated*** - No environmental site assessment can wholly eliminate uncertainty regarding the potential for recognized environmental conditions in connection with a property. Performance of this practice is intended to reduce, but not eliminate, uncertainty regarding the potential for recognized environmental conditions in connection with a property, and this practice recognizes reasonable limits of time and cost."
>
> ***"Not Exhaustive*** - All Appropriate Inquiries does not mean an exhaustive assessment of a property. There is a point at which the cost of information obtained or the time required to gather it outweighs the usefulness of the information and, in fact, may be a material detriment to the orderly completion of transactions. One of the purposes of this practice is to identify a balance between the competing goals of limiting the costs and time demands inherent in performing an environmental site assessment and the reduction of uncertainty about unknown conditions resulting from additional information."
>
> ***"Level of Inquiry is Variable*** – Not every property will warrant the same level of assessment. Consistent with good commercial and customary practice, the appropriate level of environmental site assessment will be guided by the type of property subject to assessment, the expertise and risk tolerance of the user, and the information developed in the course of the inquiry."

1.2 Scope of Services

Our Proposal No. LE-16-078 dated June 30, 2016, outlines and describes the scope of services we have performed for this Phase I ESA.

The main components of the Phase I ESA and their objectives, as specified by the referenced standards, include the following:

- **Physical Setting:** We reviewed physical setting references to obtain information concerning the topographic, geologic, and hydrogeologic characteristics of the Site and vicinity. Such information may be indicative of the direction and/or extent that a contaminant could migrate in the event of a spill or release.

- **Records Review:** We reviewed publicly available Federal, State, and local regulatory agency records to obtain information that could potentially help identify RECs at or potentially affecting the Site.
- **Site History:** We reviewed historical references to assess the history of previous uses of the Site and surrounding area to identify those that could have led to RECs on or near the Site. Historical sources reviewed included aerial photographs, topographic maps, city directories, and previous site assessment reports. In addition, we conducted interviews with persons who were expected to be reasonably knowledgeable about historical and/or current conditions at and uses of the Site.
- **Site Reconnaissance:** We performed a site reconnaissance to observe site conditions and activities for indications of evidence of RECs. The site reconnaissance was for the Site only. Offsite properties and features were viewed solely from the vantage of the Site and public thoroughfares.

1.3 Report Limitations

We prepared this Phase I ESA report exclusively for the Client on behalf of the City of Dublin. The information obtained is only relevant for the dates of the records reviewed or as of the date of the latest site visit. Therefore, the information contained herein is only valid as of the date of the report and will require an update to reflect recent records/site visits.

The Client should recognize that a Phase I ESA is not a comprehensive site characterization and should not be construed as such. The findings and conclusions presented in this report are predicated on the site reconnaissance, a review of the specified regulatory records, and a review of the historical usage of the Site, as presented in this report. The Client should also understand that wetlands, asbestos-containing building materials (ACM), lead-containing paint (LCP), lead in drinking water, radon, mercury related to mining activities, methane, and mold surveys were not included in the scope of services for this Phase I ESA. Assessment for potential naturally occurring hazards such as asbestos and arsenic also was not included.

Therefore, the report should only be deemed conclusive with respect to the information obtained. No guarantee or warranty of the results of the Phase I ESA is implied within the intent of this report or any subsequent reports, correspondence or consultation, either express or implied. We strived to conduct the services summarized herein in accordance with the local standard of care in the geographic region at the time the services were rendered.

1.4 Data Gaps

A data gap is defined by ASTM *Designation E 1527-13* as "a lack of or inability to obtain information required by this practice despite good faith efforts by the environmental professional to gather such information." Data gaps could include such things as insufficient historical information, the inability to interview persons with direct site knowledge (e.g., the owner(s), past owner(s), tenants, workers, etc.) or the lack of access to all parts of a site during the site reconnaissance. We visited the portions of the properties within the proposed alignment and performed site observations with the assistance of Mr. Jay Greenwood, Vice President of GH PacVest, LLC, owner representative for APNs 985-27-2 and 905-1-6-3, and Mr. Randy Branaugh, owner of APN 905-1-4-4. Three parcels, APNs 905-1-4-3 (owned by Town and County H Fund, LLC), 905-1-3-2, and 905-1-1-2 (both owned by Crosby), were accessed without the accompaniment of the owners but with permission. One parcel, APN 905-1-5-2 (owned by Righetti), was viewed from the vantage point of adjoining parcels as access was not granted by the current owner in time for this report. This is not considered a significant data gap. With the exception of Mr. Branaugh, we were not provided with contacts with direct knowledge of past operations of the properties. This is considered a data gap.

2.0 SITE DESCRIPTION

This section describes the location and physical characteristics of the proposed alignment area parcels including size, topography, geologic, soil, and hydrogeologic conditions.

2.1 Location and Legal Description

The area of the proposed alignment is located in the City of Dublin and in unincorporated Alameda County, California (Figure 1). The property is largely undeveloped land zoned for agricultural, commercial, and industrial use. Seven parcels located between Fallon Road in Dublin and Doolan Road in Livermore (totaling approximately 470 acres) consisting largely of undeveloped land are proposed for temporary and permanent partial ROW acquisition, including construction activities such as temporary construction easements and laydown areas, in order to construct an approximate 1.5 mile extension of existing Dublin Boulevard at Fallon Road in Dublin to Doolan Road in Livermore. The parcels are identified as Alameda County Assessor's Parcel Numbers (APN) as detailed below:

APN	Owner	Location	Existing Area (Acres)	Impact/Take
985-27-2	GH PacVest, LLC	City of Dublin	135.49	Partial
905-1-6-3	GH PacVest, LLC	City of Dublin	48.90	Partial
905-1-5-2	Righetti	City of Dublin	48.78	Partial
905-1-4-4	Branaugh	City of Dublin	39.80	Partial
905-1-4-3	Town and County H Fund, LLC	City of Dublin	8.81	Partial
905-1-3-2	Crosby	Alameda County	76.43	Partial
905-1-1-2	Crosby	Alameda County	109.92	Partial

Parcel maps depicting the properties included in the proposed project area are in Appendix A. Site Maps, illustrating the seven parcels with an overlay of the proposed extension, is included as Figures 2a and 2b.

The greater area beyond the parcels affected by the proposed ROW acquisition include the Interstate 580 (I-580) corridor to the south, vacant ranchland and residential development to the north, commercial development to the west, and vacant ranchland and commercial development to the east.

The area of the proposed alignment is depicted on the United States Geological Survey's (USGS) Livermore, California, 7.5-minute topographic map (USGS, 2012). According to the website http://www.earthpoint.us/TownshipsSearchByLatLon.aspx the project area has been in private hands since before California joined the United States and is therefore not part of the Township and Range system which was a survey of federal lands. The California Department of Pesticide Regulation defines the area as Section 3, Township 3 South, Range 1 East as an extrapolation of the federal system.

2.2 Site and Vicinity General Characteristics

The proposed corridor extension is largely undeveloped. Asphalt-paved driveways and parking areas associated with a landscaping business are located on APN 905-1-4-4 (1181 Collier Canyon Road). A gated concrete pad area used by a landscaping business for storage of equipment and supplies is located on APN 905-1-4-3. The proposed alignment is in area of primarily vacant or agricultural land with occasional associated ranch houses. The greater surrounding area is developed with a mix of residential and commercial development with the east-west oriented I-580 corridor bordering the parcel boundaries along Collier Canyon and Croak Roads.

2.2.1 Topography

The USGS Livermore topographic map (USGS, 2012) shows the topography of the proposed alignment as sloping slightly towards the south, at an elevation of approximately 400 feet above mean sea level.

2.2.2 Geologic Conditions

The proposed alignment is located in the Livermore Valley in eastern Alameda County along the margins of the cities of Dublin and Livermore and includes a portion of unincorporated Alameda County. The area is bounded by the foothills of the Diablo Range. According to the *Geologic Map of San Francisco – San Jose Quadrangle* (California Geological Survey [CGS] 1991, the proposed alignment is underlain by Quaternary alluvium with northern hillsides part of the Tassajara Formation.

2.2.3 Soil Conditions

We obtained information concerning soil conditions in proximity to the proposed alignment from the United States Department of Agriculture – Natural Resources Conservation Service Web Soil Survey Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm). Web Soil Survey information indicates that surficial onsite soil is predominately classified as Linne clay loam and Diablo clay which is generally well-drained with 3 to 15 percent slopes.

2.2.4 Hydrologic and Hydrogeologic Conditions

Specific information regarding groundwater flow direction within the proposed alignment is not available. Therefore, to assess local groundwater conditions for the vicinity we reviewed reports available on the California State Water Resources Control Board GeoTracker website (http://geotracker.waterboards.ca.gov) for groundwater information at the nearest facility with a groundwater monitoring array such as leaking underground storage tank (LUST) facilities or other agency-regulated cleanup properties. The nearest such facility with available data is the former Jordan Ranch at Central Parkway and Fallon Road in Dublin. According to the report *Second Quarter 2014 Groundwater Monitoring Report – Jordan Ranch Parcel H, Dublin, California,* by Engeo, Incorporated, July 2014 available on GeoTracker, depth to water in the closest monitoring well, MW-4 located approximately 1/3 mile north of the western end of the proposed alignment, ranged from 10.42 feet to 18.58 feet between December 2005 and June 2014. According to the report, groundwater flow beneath this facility is to the south with a gradient of approximately 0.30 feet per foot.

EDR searched federal, state, and local environmental databases for the proposed alignment area and properties/facilities within one mile. According to the Physical Setting Source Map from the EDR report, groundwater wells were not identified within the proposed alignment. Twenty-three water supply wells are located within a one mile radius of the proposed alignment, primarily to the south

beyond I-580, with flow direction identified as being to the southwest. Recent groundwater elevation data was not provided. A copy of the report: *The EDR Radius Map Report with GeoCheck*, dated January 31, 2018, is in Appendix C.

2.3 Current and Planned Uses of the Site

The proposed alignment is predominately vacant ranchland used for cattle grazing. Gated fencing, asphalt-paved driveways, parking areas, an open metal shed, and storage areas associated with APNs 905-1-4-3 and 905-1-4-4 are located in the center of the proposed alignment. The fenced parking areas are primarily utilized for landscaping supply storage, however, spaces on APN 905-1-4-4 are also utilized by a pool contractor and other small businesses for vehicle and heavy equipment storage.

The City of Dublin proposes to construct an extension of Dublin Boulevard from the intersection of Fallon Road and Dublin Boulevard in Dublin to Doolan Road in Livermore to support future mixed-use development as described in the *Eastern Dublin Specific Plan, City of Dublin, California,* dated January 7, 1994 and updated October 7, 2014 prepared by Wallace Roberts & Todd.

2.4 Descriptions of Structures, Roads, Other Improvements on the Site

The proposed extension to Dublin Boulevard crosses seven parcels proposed for partial ROW acquisition. Barbed wire fencing is present along the individual parcel boundaries. Overhead utilities aligned west-to-east transverse the properties and are partially contained within the proposed alignment boundaries. Features within the portion each of parcel that are included in the proposed alignment are as follows:

APN 985-27-2 – Remnants of a livestock loading area (Photo 1) and vacant land used for cattle grazing.

APN 905-1-6-3 – Vacant land used for cattle grazing. Demolition debris and miscellaneous trash apparently associated with a former rural residence were observed (Photos 2 and 3).

APN 905-1-5-2 – Vacant land used for grazing (Photo 4).

APN 905-1-4-3 – Vacant land and a fenced, paved area used for storage of equipment related to a landscaping business (Photo 5). Occasional de minimis debris was observed.

APN 905-1-4-4 –Fencing, drainage, an asphalt-paved roadway, a portion of a fenced equipment yard used primarily for commercial landscaping material and vehicle storage, and a metal shed currently used for heavy equipment storage (Photos 6 and 7).

APN 905-1-3-2 – Vacant land used for cattle grazing (Photo 8).

APN 905-1-1-2 – Vacant land used for grazing. North-south oriented Cottonwood Creek crosses the proposed alignment (Photo 9).

3.0 USER–PROVIDED INFORMATION

This section summarizes user (Client)-provided information regarding the parcels affected by the proposed ROW acquisition provided by client representative Mr. Gordon Sweet. Mr. Sweet forwarded User Questionnaires to the City of Dublin and to Alameda County to determine if they had knowledge of legal or administrative proceedings involving the affected parcels. The Alameda County User Questionnaire was completed by Ruben Izon, Associate Engineer, for APNs 905-1-3-2 and 905-1-1-2. A User Questionnaire for APNs 905-1-4-4, 905-1-5-2, 985-27-2, and 905-1-6-3 was completed by Alameda County Fire Deputy Fire Marshall Darrell Jones. Copies of the completed User Questionnaires are included in Appendix B. A User Questionnaire was not returned by the City of Dublin for APN 905-1-4-3.

3.1 Title, Appraisal and Sale Agreement Records

Client representative Gordon Sweet provided preliminary title reports for the seven parcels. No items were noted indicating an environmental concern.

3.2 Environmental Liens or Activity and Use Limitations

Mr. Izon indicated that he is not aware of any environmental liens for the parcels, however, the parcels fall under East County Area Plan Measure D regulations which limit development due to the parcels' proximity to Livermore Municipal Airport located south of I-580. According to Mr. Obaid Khan with the City of Dublin, the properties within the study area are subject to the Dublin General Plan (including land use designations, development capacity, and restrictions based on the Airport Land Use Compatibility Plan), Eastern Dublin Specific Plan, Planned Development Zoning Stage 1 Development Plan (Ordinance 32-05), and the Livermore Airport Land Use Compatibility Plan.

3.3 Specialized Knowledge

Mr. Izon and Mr. Jones have no specialized knowledge regarding past or current uses of the parcels that could potentially impair or could have impaired the environmental conditions of the proposed alignment. We asked Mr. Izon and Mr. Jones if they knew of previous environmental reports or documents that may exist and, if so, whether copies could be provided. Mr. Izon and Mr. Jones stated that they were unaware of environmental reports or documents related to the parcels that would be beneficial for the purposes of the Phase I ESA.

3.4 Commonly Known or Reasonably Ascertainable Information

Mr. Izon and Mr. Jones indicated that according to their knowledge, there haven't been any instances of environmental concern related to the parcels.

3.5 Valuation Reduction for Environmental Issues

Mr. Izon and Mr. Jones are not aware of any environmental conditions on the parcels which could lead to a potential valuation reduction for parcels.

3.6 Owner, Property Manager, and Occupant Information

The preliminary title reports for the seven parcels included within the proposed alignment were provided by Mr. Sweet and are detailed below:

APN 985-27-2 – Title dated December 12,2016. Title is vested in Robert Chen (86.5% interest), Caroline M. Chen (10% interest), and the remaining 3.5% interest divided by multiple parties.

APN 905-1-6-3 – Title dated December 12, 2916. Title is vested in FAB 5 Management, LLC, a Utah Domestic LLC.

APN 905-1-5-2 – Title dated December 12, 2016. Title is vested in Righetti Partners, LP, a California Limited Partnership. Easements for utilities including a strip of land 10 feet in width for transmission of electrical energy.

APN 905-1-4-3 – Title dated December 8, 2016. Title is vested in Town and County H Fund, LLC, Forfeited A Delaware limited liability company.

APN 905-1-4-4 – Title dated December 8, 2016. Title is vested in Robert D. Branaugh, Trustee of the Robert D. Branaugh's Survivor's Trust under the Branaugh 1991 Trust dated July 25, 1991, as to an undivided fifty percent (50%) interest and to Robert D. Branaugh, Trustee of the Shirley M. Branaugh Exemption Tryst under the Branaugh 1991 Trust dated July 25, 1991, as to an undivided fifty percent (50%) interest. An option to purchase said Land with certain terms, covenants, conditions and provisions is noted with Dublin Corporate Center, a California LLC as Optionee and Robert D. and Shirley M. Branaugh, Trustees of the Branaugh 1991 Trust as Optionor.

APN 905-1-3-2 – Title dated December 8, 2016. Title is vested in LIVBOR-Manning LLC, a California limited liability company.

APN 905-1-1-2 – Title dated December 8, 2016. Title is vested in LIVBOR-Manning LLC, a California limited liability company.

Multiple easements were listed for utilities including overhead electrical transmission lines, telecommunications equipment and State of California, County of Alameda, or City of Dublin for erosion, infrastructure or road-related activities for the parcels. An instrument entitled Notice of Establishment of Dublin Ranch East Side Drain Benefit District by the City of Dublin is listed for APNs 905-1-5-2, 905-1-4-3, and 905-1-4-4 with charges required upon issuance of a building permit in the amount of $200,865.92 plus other costs for parcels 905-1-4-3, and 905-1-4-4. Property tax liens were noted for APN 905-1-6-3. Environmental liens or other environmental issues were not observed in the title documents provided.

We provided Mr. Sweet with site owner questionnaires regarding the use, storage, or disposal of hazardous substances and/or petroleum products on the parcels. Mr. Sweet forwarded the owner questionnaires to the current property owners. According to Mr. Sweet, APNs 985-27-2, and 905-1-6-3 are currently owned by GH PacVest, LLC.

Mr. Jay Greenwood, Vice President of Real Estate Development with GH PacVest, completed the owner questionnaires for APNs 985-27-2 and 905-1-6-3. Mr. Greenwood stated that he was unaware of any environmental concerns for the properties.

Mr. Randy Branaugh completed the owner questionnaire for APN 905-1-4-4. Mr. Branaugh stated that auto repair work was performed on the property and that aboveground storage tanks (ASTs) had been located on the property at one point. Mr. Branaugh provided additional details regarding his responses during our April 11, 2018 site walk, discussed in Section 7.0.

Owner questionnaires were not returned for the remaining parcels. Copies of the completed site owner questionnaires are in Appendix B.

3.7 Reason for Performing Phase I ESA

The Client requested the Phase I ESA on behalf of the City of Dublin to obtain information regarding the potential for existing hazardous substances and/or petroleum product impacts in the area proposed for ROW acquisition prior to the City of Dublin acquiring the property for roadway construction.

3.8 Additional Information

Client representative Gordon Sweet supplied us with two previous Phase I Environmental Site Assessment reports prepared by Engeo Incorporated for the two parcels owned by GH PacVest, LLC (APNs 985-27-2 and 905-1-6-23) as part of previous due diligence activities. The reports are discussed in Section 4.3.5. The reports concluded that no RECs were found for either property.

4.0 RECORDS REVIEW

This section summarizes information we obtained from readily available agency records pertaining to the proposed alignment and properties and facilities in the vicinity.

4.1 Standard Environmental Record Sources

EDR searched federal, state, and local environmental databases for the proposed alignment area and properties/facilities within one mile. The following table lists the databases that were searched which list properties/facilities and the number of properties/facilities listed. Other databases searched that do not list any properties/facilities are not included in the table. A copy of the report: *The EDR Radius Map Report with GeoCheck*, dated January 31, 2018, is in Appendix C.

Database Name	Search Radius (Miles)	Number of Listings
FEDERAL DATABASES		
Resource Conservation and Recovery Act – Large Quantity Generator (RCRA-LQG)	0.25	1
Resource Conservation and Recovery Act – Conditionally Exempt Small Quantity Generator (RCRA-CESQG)	0.25	1
STATE, LOCAL, AND TRIBAL DATABASES		
(Department of Toxic Substances Control [DTSC] equivalent CERCLIS Database (EnviroStor)	1.0	6
State and Tribal Leaking Underground Storage Tank (LUST)	0.5	4
Spills, Leaks, Investigations, and Cleanups sites (SLIC)	0.5	2
Alameda County Contaminated Sites	0.5	5
ADDITIONAL ENVIRONMENTAL RECORDS		
Local Lists of Hazardous Waste/Contaminated Sites SCH (DTSC School Property Evaluation Program)	0.25	1
HIST CORTESE (Historical ("Cortese" Hazardous Waste & Substance Site List)	0.5	2
Proposition 65 Records (Notify 65)	1.0	1

4.1.1 Site

The seven parcels (including the proposed alignment area) are not listed in the EDR database search results.

4.1.2 Offsite Properties

No properties are listed within $^{1}/_{8}$ mile of the proposed alignment in the EDR databases. It is therefore unlikely that a neighboring property could have caused an REC at the area proposed for ROW acquisition.

4.2 Orphan Summary

The Orphan Summary identifies facilities that have incomplete address information and could not be specifically plotted. The Orphan Summary contained one listing for a Spills, Leaks, Investigations, and Cleanups (SLIC) facility located near the intersection of Dublin Boulevard and Hacienda Drive. This location is approximately 2 miles west of the proposed alignment and therefore unlikely to have caused an REC at the proposed alignment.

4.3 Other Environmental Record Sources

4.3.1 GeoTracker and EnviroStor

We reviewed information available on GeoTracker and the EnviroStor (http://www.envirostor.dtsc.ca.gov/public/) database for information regarding environmental assessment and cleanup at the properties proposed for partial ROW acquisition and/or properties/facilities within ¼ mile. No information for the seven parcels (including the proposed alignment area) was available on GeoTracker or EnviroStor.

No cases are listed on GeoTracker within ¼ mile of the proposed alignment area. One case, E-5 Alternative School Site, is listed on the EnviroStor website within ¼ mile. The property was undeveloped land identified as APN 985-98-2, approximately 1/5 mile north of the proposed alignment. No address was assigned. In 2015, the property was being considered by the City of Dublin for construction of a new school site and contained degraded asphalt. The case is listed as No Further Action status and unlikely to create an REC at the area proposed for ROW acquisition.

4.3.2 Alameda County Environmental Health Services Department

The Alameda County Environmental Health Services (ACEHS) serves as the host for the Certified Unified Program Agency (CUPA) for the area of the proposed alignment. We accessed the ACEHS online system (http://www.acgov.org/aceh/index.htm) for information regarding the location and status of any leaking underground storage tanks (USTs) or hazardous materials spills in the area. The online system did not contain records for addresses within the alignment boundaries.

We requested a file search for information regarding hazardous materials storage and use, ASTs and USTs, and releases at the addresses associated with parcels proposed for parcel ROW acquisition. The County responded that no records were found for the listed addresses.

4.3.3 City of Dublin Building Department

We reviewed available records from the City of Dublin through their electronic database at their office.

3457 Croak Road, Dublin (APN 985-1-6-3) - Permits for the construction of a covered riding arena, riding arena and public riding stable were approved in 1971, 1972 and 1973 with continued boarding for up to 50 horses in 1974. A temporary power pole associated with mobile homes for employee housing was issued in 1975. The mobile homes were later identified as "vacation-type" trailers and did not fall under building department regulations. Demolition of a Pole Barn on the side of a building was approved in 1993, but no particular building was specified. Surface Mining Permit SMP-10 approved by the Department of Mining and Reclamation was noted for an approximately 30-acre area to provide clean fill material. A compost-mixing business was noted as operating on the property and was issued a Conditional Land Use Permit for the storage of sand, soil, and mushroom compost. The compost business was operated by a single person and a truck used for transporting compost was kept on the property. Several documents related to litigation associated with the riding facility were included, as well as report concerning vehicle abatement. The structures appeared to be located adjacent to the southern project boundary, south of the area proposed for ROW acquisition.

1881 Collier Canyon Road (APN 905-1-4-4) - Multiple tenant improvements and files related to Arizona Stone which operated on the parcel south of the proposed alignment. Files pertaining to the portion of the parcel proposed for ROW acquisition were not observed.

4.3.4 DOGGR

We reviewed the State of California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR) online mapping system for information regarding the location and status of any oil or natural gas exploration or production at or in the vicinity of the proposed alignment. The DOGGR online mapping system shows no wells within a mile of the proposed alignment (DOGGR, 2018).

4.3.5 Previous Phase I Reports

APN 985-27-2 (Fallon Road)

We reviewed the report, *Phase I Environmental Site Assessment, Chen Property, Fallon Road – APN 985-27-2, Dublin, California* prepared by Engeo Incorporated, dated November 8, 2016. The report indicated that the property was undeveloped pastureland used for grazing at the time of the site inspection. Improvements consisted of barbed wire fences, wooden telephone poles and remnants of wooden corrals. Historic information cited noted that seven structures were formerly located in the northwestern portion of the property from 1939 to 1968, and a residential compound was located adjacent to the southeast property corner in 1958. No RECs were identified for the property.

APN 905-1-6-3 (3457 Croak Road)

We reviewed the report, *Phase I Environmental Site Assessment, Andersen Property, 3457 Croak Road, Dublin, California* prepared by Engeo Incorporated, dated November 8, 2016. The report indicated that the property was developed with a rural residential compound with pastureland used for grazing at the time of the site inspection. Improvements consisted of a residence, uninhabitable at the time of the site inspection, barns and a stable in an advanced state of disrepair, barbed wire fences, wooden utility poles, water troughs, cisterns, and sheds. Historic information cited noted that two structures were formerly located in the west-central portion of the property from at least 1940, and additional structures and riding areas were added nearby or replaced original structures between 1949 and 1982. The southern portion of property appeared to be used for dry farming from 1940 to 1968. No RECs were identified for the property.

4.3.6 Additional Reports

Additional Phase I or Phase II environmental investigation reports were not provided, however, we were provided the *Eastern Dublin Specific Plan* (Wallace Roberts & Todd) and the *Fallon Village Project Draft Supplemental Environmental Impact Report,* dated August 2005, prepared by Jerry Haag, Urban Planner, subsequent to the completion of the draft version of this Phase I environmental Site Assessment report.

The reports were prepared as part of a larger regional planning effort and included portions of the Site. We reviewed the reports for evidence of environmental conditions that would indicate the presence of an REC at the Site. According to and the *Fallon Village Project Draft Supplemental Environmental Impact Report,* a number of ESA's have been conducted in the project area. It was noted that the area had largely been used for agricultural use and had little potential for hazardous material contamination. Multiple properties in the area both within and without the Site boundary were identified as a group and noted uses included horse ranch, trucking facility, landscape materials/storage facilities, residence/office, and a former quarry. Specific locations for the listed activities were not identified. The former existence of above-ground diesel storage tanks on the Branaugh property (APN 905-1-4-4) was noted, and the presence of potential ACM/LCP materials in buildings (since removed) was mentioned for the Anderson property (APN 905-1-6-3). Evidence of spills, leaks or release of hazardous materials on the Site was not identified.

5.0 HISTORICAL USE

We evaluated the historical use of the proposed alignment and adjacent properties through review of Sanborn Fire Insurance Maps (Sanborn maps), historical aerial photographs, historical topographic maps, and city directories provided by EDR. This section summarizes the information obtained from these sources.

5.1 Sanborn Fire Insurance Maps

The area of the proposed alignment does not appear in a search of Sanborn maps (Appendix D).

5.2 Aerial Photographs

We reviewed historical aerial photographs for the years 1940, 1949, 1950, 1968, 1979, 1982, 1993, 1998, 2006, 2010, and 2014 (Appendix E) for indications of past land uses that had the potential to have impacted the area proposed for ROW acquisition through the use, storage or disposal of hazardous substances and/or petroleum. The following table summarizes our observations of the proposed alignment and adjacent properties on the aerial photographs.

Year	Observations	
	Site	**Adjacent Properties**
1940 (1" = 1,125')	What appeared to be unpaved trails or narrow roads, possibly associated with dry land farming, were present throughout the proposed alignment. The trails connected objects, possibly grass or hay piles. What appeared to be a ranch compound with six or seven structures was present along the western end of the proposed alignment along Fallon Road in the current approximate location of a decayed livestock loading area. A road crossed the west-central portion of the area proposed for the alignment at the approximate current location of Croak Road. Two minor, likely seasonal, north-south oriented creeks were visible crossing the central and western areas of the proposed alignment. A third, larger creek crossed the eastern (current Cottonwood Creek) areas of the proposed alignment.	The aerial image does not include the western end of the proposed alignment or the area beyond. A road in the current alignment of Doolan Road was present adjacent to the east, beyond which was rangeland. Croak Road extends north-south through the proposed alignment. The surrounding area contained numerous paths or narrow roads as described within the proposed alignment boundaries. A road in the current alignment of I-580 was visible further south of the proposed alignment.
1949 (1" = 1,125')	The western and central portion of the proposed alignment was open space, possibly rangeland, with faint patterns of previous trails visible at regular intervals. An area of what appeared to be a hay field was present in the eastern area of the proposed alignment. What appeared to be a ranching compound with fenced pasture areas and a riding arena were present on APN 905-1-6-3 (likely former residence 3457 Croak Road), however, the structures appeared to be south of the proposed alignment.	A road in the current alignment of Fallon Road was present at the western terminus of the proposed alignment. What appeared to be a fenced area, trees, and a possible structure was located adjacent to the southwestern end of the proposed alignment, however the details are difficult to discern due to the photographic scale. The surrounding areas appeared to be rangeland or field crops with faint lines remaining from the 1940 paths. Additional structures, apparent ranch houses, were present south of the proposed alignment and north of I-580.
1950 (1" = 1,125')	The proposed alignment appeared to be predominately rangeland with possible field crops.	The aerial image does not include the western end of the proposed alignment or the area beyond. Conditions in other directions were similar to the 1949 photograph, with the faint

Year	Observations	
	Site	**Adjacent Properties**
		pathways no longer visible.
1968 (1" = 1,125')	Conditions were similar to the 1950 photograph.	Conditions in other directions were similar to the 1950 photograph.
1979 (1" = 1,125')	Conditions were similar to the 1968 photograph, with an increase in what appeared to be hay, field, or row crops visible.	Conditions in other directions were similar to the 1968 photograph. An interchange was constructed along I-580 and Fallon Road, and I-580 appeared widened. Structures were located south of the central portion of the proposed alignment, possibly ranch homes and barns or sheds.
1982 (1" = 1,125')	The ranch along Fallon Road was no longer visible. Multiple structures were present on APN 905-1-4-3, within or just south of the approximate proposed project alignment. What appeared to be a canal crossed the proposed alignment at APN 905-1-6-3 and led a short distance northeast. Conditions in remaining areas were similar to those observed on the 1979.	Conditions were similar to those observed in the 1979 photograph. Additional structures, possibly a barn and shed or ranch home, were visible south of the proposed alignment near I-580.
1993 (1" = 1,125')	Conditions were similar to the 1982 photograph.	Conditions were similar to those observed in the 1982 photograph. The possible structure formerly located at the southwestern terminus of the project area was not visible. A disturbed area was visible north of the central area of the proposed alignment. The property adjacent to the southwest appeared vacant of structures and trees.
1998 (1" = 1,125')	Conditions were similar to those observed on the 1993 photograph. What appeared to be a driveway connecting the expanded ranch compound between Croak Road and Doolan Road to a pond was visible.	Conditions were similar to those observed on the 1993 photograph.
2006 (1" = 1,125')	Conditions were similar to those observed on the 1998 photograph.	Conditions in remaining areas appeared similar to those observed on the 1998 photograph. The area across Fallon Road at the western terminus of the proposed alignment appeared disturbed for construction.
2010 and 2014 (1" = 1,125')	Conditions were similar to those observed on the 2006 photograph. The structures that were present on APN 905-1-4-3 were not visible in the 2014 image. What appeared to be a paved area was present in the approximate location of the current alignment.	Conditions were similar to those observed on the 2006 photograph. A road in the current alignment of Dublin Boulevard was present across Fallon Road west of the proposed alignment in the 2010 photograph.

Paths or narrow roads, possibly related to dry land farming, were present within the area proposed for ROW acquisition since before 1940. The purpose of the pathways is not known. An apparent ranch compound was located along the western terminus of the proposed alignment near Fallon Road (APN 985-27-2) from before 1940 to before 1982. The building structures appeared to be located adjacent south of the proposed alignment. A decayed livestock loading corral likely formerly associated with the structures is currently located in the alignment area. Possible ranch structures were present on APN 905-1-4-3 from before 1982 to before 2014 in the approximate alignment of the proposed roadway extension. Septic and heating oil tanks may have been associated with the structures formerly located on APNs 985-27-2, and 905-1-4-3. The proposed alignment area has been used primarily for rangeland with partial field or row crops since at least 1949. It is possible pesticides were in use in field or row crop areas (APN 905-1-3-2). This is a potential REC for the proposed alignment.

5.3 Topographic Maps

We reviewed historical topographic maps for the years 1906, 1941, 1947, 1953, 1961, 1968, 1973, 1980, and 2012 (Appendix F). The following table summarizes our observations of the proposed alignment area and adjacent properties on the historical topographic maps.

Year	Observations	
	Site	**Adjacent Properties**
1906 (1: 62,500)	The proposed alignment is depicted as undeveloped. A creek crosses the proposed alignment in the approximate current location of Cottonwood Creek.	The surrounding area is depicted largely undeveloped with occasional rural dwellings. A single structure is depicted adjacent to the northwest terminus of the proposed alignment. An unimproved road is depicted in the approximate current alignment of Fallon Road adjacent west of the proposed alignment. A light duty road is depicted in the approximate location of current Doolan Road adjacent east of the proposed alignment. A paved roadway is depicted south of the proposed alignment in the current alignment of I-580. A structure labeled as a church is depicted at the intersection of Doolan Road and I-580 to the southeast of the proposed alignment.

Year	Observations	
	Site	**Adjacent Properties**
1941 (1: 62,500)	Similar to conditions depicted on the 1906 map with the exception of an unimproved road is depicted in the current alignment of Croak Road.	The dwelling depicted at the northwest terminus of the proposed alignment is no longer depicted. I-580 is depicted as a highway or road with a median strip and labeled Highway 50. An unimproved road and associated dwelling are depicted south of the proposed alignment. The structure previously depicted as a church at the intersection of Doolan Road and I-580 is labeled as a school.
1947 (1: 50,000)	Similar to conditions depicted on the 1941 map.	Fallon Road and Croak Road are depicted as light duty roads. Doolan Road is depicted as a primary highway.
1953 (1:24,000)	Similar to conditions depicted on the 1947 map.	Similar to conditions depicted on the 1947 map. Structures are depicted south of the proposed alignment on Croak Road and north of I-580. I-580 is depicted as a 2 lane divided highway.
1961 (1:24,000)	Similar to conditions depicted on the 1953 map.	Similar to conditions depicted on the 1953 map.
1968 (1:24,000)	Similar to conditions depicted on the 1961 map.	Similar to conditions depicted on the 1961 map. A single structure is depicted adjacent to the southwestern terminus of the proposed alignment.
1973 (1:24,000)	Similar to conditions depicted on the 1968 map.	Similar to conditions depicted on the 1968 map. A second structure is depicted at the southwestern terminus of the proposed alignment. A commercial building is depicted south of the central area of the proposed alignment.
1980 (1:24,000)	Similar to conditions depicted on the 1973 map.	Similar to conditions depicted on the 1973 map. The second structure at the property located adjacent to the southwestern terminus of the proposed alignment is no longer depicted. The commercial structure that was depicted south of the central portion of the proposed alignment is depicted as larger.
2012 (1:24,000)	No structures or land uses depicted on the proposed alignment.	No structures or land uses depicted on the adjacent properties.

The topographic maps do not depict features or land uses that directly suggest the presence of RECs on the proposed alignment. Structures were depicted north and south of the western proposed alignment terminus as early as 1906. Although the structures are no longer depicted, dwellings of this time period have been associated with septic systems and possibly underground tanks used for the storage of heating oil. The purpose of the commercial building south of the central portion of the proposed alignment corresponds to the former location of a covered riding arena described during a personal interview with Mr. Randy Branaugh, owner of APN 905-1-4-4 on April 11, 2018.

5.4 City Directories

EDR prepared an abstract of city directories including city, cross reference and telephone directory listings (Appendix G) with information provided for approximate 5-year intervals, if available, from 1975 to 2014.

5.4.1 Onsite Addresses

3457 Croak Road, Dublin

Pleasanton Trucking is listed from 2000 to 2014, and A M Backhoe is listed for 1992. The address corresponds to a former residence located on APN 905-1-6-3. The business name listings suggest the relationship to a trucking and equipment enterprise which may have included the storage and use of petroleum products or other hazardous materials. The listings do not appear in the EDR report, on GeoTracker, or on agency websites, and are not reported as being associated with a release. The listings therefore pose a low potential to have caused an REC at the proposed alignment.

5.4.2 Offsite Addresses

The adjacent properties listed in the EDR report consist of landscaping and residential listings and businesses operating in the shopping center along Fallon Road and the Doolan Road area. The business listing names do not, in and of themselves, suggest the use, storage, release, or disposal of hazardous substances or petroleum products.

5.4.3 Nearby /Additional Information

A former mine listing identified in the Engeo Incorporated, *Phase I Environmental Site Assessment, Chen Property, Fallon Road, APN 985-27-2, Dublin, California,* dated November 2016 report for APN 905-1-6-3 was identified as "Bezely Pit" reported by EDR on the MINES database search. Documentation in the City of Dublin Building Permit department indicated that a Surface Mining Permit (SMP-10) was issued to a Mr. Bezely for mining of clean fill material. The listing therefore poses a low potential to have caused an REC at the proposed alignment.

6.0 SITE RECONNAISSANCE

This section summarizes our observations of the proposed alignment and surrounding properties made during the site reconnaissance.

6.1 Methodology and Limiting Conditions

Luann Beadle, Project Scientist with Geocon, performed a site reconnaissance on March 26, 2018 and April 11, 2018. Ms. Beadle was accompanied by Mr. Greenwood from PacVest, LLC as an owner representative for APNs 985-27-2 and 905-1-6-3 on March 26, 2018 and Mr. Randy Branaugh, the

owner of APN 905-1-4-4 on April 11, 2018. The owners of APNs 905-1-1-2, 905-1-3-2, and 905-1-4-3 allowed Ms. Beadle to walk the properties unaccompanied. APN 905-1-5-2 was observed from the surrounding properties. Ms. Beadle performed the site reconnaissance by walking throughout the proposed alignment and along the proposed alignment perimeter to observe proposed alignment features and conditions. The offsite survey was performed by making observations of adjacent properties from the proposed alignment and public roads.

Weather on the days of the site reconnaissance was mild with temperatures in the 60s°F. Photographs of various features within the proposed alignment and offsite properties are attached. Site Maps are included as Figures 2a and 2b.

6.2 Site Setting

The proposed alignment is situated in an area of primarily agricultural land uses. A landscaping business is located south of the proposed alignment within APN 905-14-4 (1881 Collier Canyon Road, Photo 10).

6.3 Onsite Survey

As described in Section 2.4, the proposed alignment is largely undeveloped and used for grazing. Barbed wire fencing and metal access gates are located along the various parcel boundaries. Wooden overhead utility poles and livestock watering sources are located within the proposed alignment (Photo 11). The portion of the proposed alignment that passes through APN 905-14-4 (1881 Collier Canyon Road), is improved with drainage, lighting, gates, fencing, an asphalt-paved parking/storage area and driveway connecting the front entrance to the property on Collier Canyon Road (Photo 12). An open metal shed and shipping container are also included in this area. APN 905-1-4-4 contained a paved fenced and gated area used for storage of landscaping supplies (Photo 13). The portion of the alignment passing through APN 905-1-6-3 (3457 Croak Road) was observed to contain degraded driveways associated with a former residence, wood waste, possibly demolition debris, pieces of rusted metal equipment, and miscellaneous de minimis refuse (Photos 2 and 3). Two soil berms/stockpiles covered with vegetation were present and appeared to be arranged in a position behind the former building locations. The remnants of a livestock loading corral was observed on APN 985-27-2 at the western proposed alignment boundary adjacent to Fallon Road (Photo 1). Cottonwood Creek traverses the eastern portion of the proposed alignment in a roughly north-south direction (Photo 9).

No evidence of RECs or a release of hazardous substances was observed on proposed alignment.

6.4 Offsite Survey

Adjacent properties consist of the following:

- North – Croak Road and undeveloped pastureland (Photo 14);

- East – Doolan Road is adjacent to the east, beyond which is North Canyon Parkway, a sanitary supply company, and a casino (Photos 15 and 16);
- South – Croak Road, undeveloped pasture land with the exception of APN 905-1-4-4 (1881 Collier Canyon Road, Allied Landscape Services and others) and APN 905-1-4-3 (landscaping supply storage) (Photos 17 and 10);
- West – Fallon Road beyond which is a shopping center featuring restaurants and commercial businesses along Dublin Boulevard (Photo 18).

Two heavily rusted and apparently empty (holes were visible) storage tanks (or possibly one storage tank and a 55 gallon drum) were observed lying in a debris area near the apparent location of the former residences south of the proposed alignment on APN 985-27-2. Two tanks were noted as being present during Engeo Incorporated in their 2016 report for the property at this location. It is unknown whether the tanks were ASTs or USTs. The tanks pose a low potential to be an environmental concern for the proposed alignment.

No evidence of RECs or a release of hazardous substances was observed in the areas surrounding the proposed alignment.

7.0 INTERVIEWS

We interviewed Mr. Jay Greenwood, Vice President of GH PacVest, LLC, for information regarding past and present use of the proposed alignment and the potential for impacts related to the use, storage, or disposal of hazardous substances or petroleum on the parcels APN 985-27-2 and 905-1-6-3. Mr. Greenwood also completed a site owner questionnaire regarding the use, storage, or disposal of hazardous substances or petroleum on the GH PacVest, LLC-owned parcels. We interviewed Mr. Randy Branaugh, owner of APN 905-1-4-4, for information regarding past and present use of APN 905-1-4-4 and the potential for impacts related to the use, storage, or disposal of hazardous substances or petroleum on the potion of the parcel within the proposed alignment. Owner questionnaires were not returned for APNs 905-1-5-2, 905-1-4-3, 905-1-3-2, and 905-1-1-2. Copies of the completed site owner questionnaires are in Appendix B.

Mr. Greenwood stated that rural residential structures had been removed from APN 905-1-4-3 (3457 Croak Road) and that no environmental issues, ASTs, or USTs were encountered to his knowledge, nor was he aware of any environmental issues related to the remaining area of the portion of the parcels proposed for ROW acquisition or the parcels as a whole.

We interviewed Mr. Randy Branaugh, owner of APN 905-1-4-4 (1181 Collier Canyon Road) during our April 11, 2018. Mr. Branaugh explained that auto repair work noted in his questionnaire response was associated with maintenance of vehicles parked onsite by the current tenants at locations likely not within the proposed alignment and amounted to typical oil changes or other incidental maintenance associated with vehicles. The repair work was not done on a commercial basis and is considered a de

minimis condition. Two ASTs were located in the current paved and gated area (eastern portion of the property) and were in the approximate location of the proposed alignment. The tanks were located on a paved area with containment berms and each stored approximately 5,000 gallons of diesel fuel associated with a former paving business that leased the property. The tanks were removed sometime between 1985 and 1990 without incident. According to Mr. Branaugh, there were no spills or leaks that he was aware of, and the soil below the tanks was tested for contamination subsequent to the tanks being removed. Evidence of contamination was not found. We contacted Alameda County Department of Environmental Health, the Alameda County Fire Department, and the City of Dublin Fire Prevention Bureau for information regarding the former diesel tanks. The agencies reported that they did not have records related to the property address. No information for the tanks appears on the GeoTracker database or in the EDR report. The former presence of the diesel ASTs is a potential environmental concern for the proposed alignment.

Mr. Branaugh also stated that the general surrounding area had been used in the past for horse riding stables with covered arenas, barns, and riding areas.

8.0 CONCLUSIONS AND RECOMMENDATIONS

We have performed a Phase I ESA, in general conformance with the scope and limitations of ASTM *Designation E 1527-13* of the portions of the properties proposed for ROW acquisition from Fallon Road in Dublin, to Doolan Road in Livermore, California along the proposed alignment of an extension to Dublin Boulevard in Dublin and in Alameda County, California. Exceptions to, or deletions from, this practice are described in Section 1.4 of this report.

The Phase I ESA did not reveal any RECs associated with the proposed alignment. The following are environmental concerns in connection with the proposed alignment and adjacent properties:

- The former existence of rural residential structures or commercial riding facilities in or near the proposed alignment path could have been associated with water/dry wells, septic systems and fuel or heating oil tanks. If undocumented USTs, onsite septic systems, water wells and/or dry wells are encountered during construction activities, they should be abandoned and/or removed in accordance with ACEHS requirements.
- Former diesel ASTs were reportedly located on APN 905-1-4-4 which poses a potential environmental concern for the proposed alignment. If petroleum-impacted soil is encountered during any construction activities, the area should be isolated and mitigated in accordance with ACEHS requirements.
- The Phase I ESA has revealed previous agricultural land use at the proposed alignment (possibly dry farming and row crops). The potential presence of residual pesticides associated with agricultural activities is a potential environmental concern.

As part of the ROW acquisition process, a limited soil investigation is recommended within the proposed alignment area to identify potential impacts from past petroleum hydrocarbon and agricultural use.

9.0 REFERENCES

American Society for Testing and Materials, *Designation E 1527-13 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*, 2013.

California Geological Survey (CGS), *Geologic Map of the San Francisco – San Jose Quadrangle,* 1991.

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Engeo Incorporated, *Phase I Environmental Site Assessment, Chen Property, Fallon Road, APN 985-27-2*, Dublin, California, dated November 2016.

Engeo Incorporated, *Phase I Environmental Site Assessment, Anderson Property, 3457 Croak Road,* Dublin, California, dated November 2016.

Engeo Incorporated, *Second Quarter 2014 Groundwater Monitoring Report – Jordan Ranch Parcel H, Dublin, California,* dated July 2014.

Haag, Jerry, Urban Planner, *Fallon Village Project Draft Supplemental Environmental Impact Report,* dated August 2005.

State of California Department of Conservation, Division of Oil, Gas & Geothermal Resources – DOGGR Home Page, http://www.conservation.ca.gov/dog/Pages/Index.aspx, accessed in March 2018.

State of California, Department of Toxic Substances Control, EnviroStor website (http://www.envirostor.dtsc.ca.gov/public/, February 2018.

United States Department of Agriculture, Natural Resources Conservation Service, http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx, March 2018.

United States Geological Survey, Livermore, California. 7.5-minute topographic map, 2012.

Wallace Roberts & Todd, *Eastern Dublin Specific Plan, City of Dublin, California,* dated January 7, 1994 and updated October 7, 2014.

10.0 QUALIFICATIONS

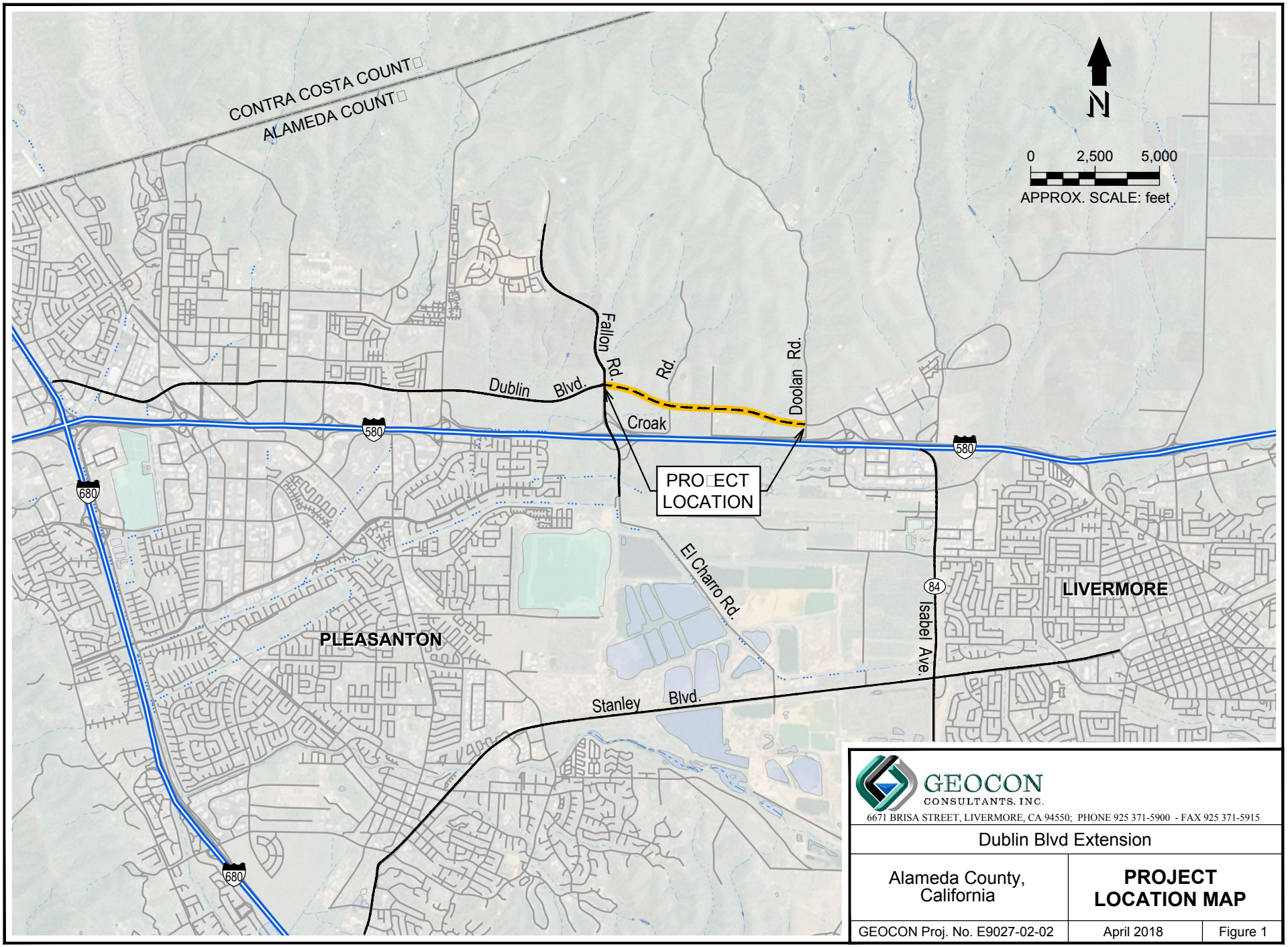
This Phase I ESA report was prepared by Luann Beadle and reviewed Mr. John Juhrend, PE, CEG, CEM.

Ms. Beadle has over 20 years of experience in environmental investigation and remediation projects including 12 years in the preparation of Phase I ESAs. Ms. Beadle has a BS degree in environmental and systematic biology, and has experience in the performance of Phase I and II ESAs of commercial, industrial, and agricultural properties, and transportation corridors.

Mr. Juhrend has over 30 years of experience in the environmental and geotechnical consulting industry in California and Nevada. Mr. Juhrend is a California Professional Engineer and Certified Engineering Geologist, with a BS degree in engineering geology and MS degree in civil engineering. His personal experience includes the performance of hundreds of environmental projects including Phase I and Phase II site assessments, remedial investigations and feasibility studies, corrective action programs and litigation support. His primary expertise includes environmental assessments of Brownfields properties, industrial, commercial and residential properties, and transportation corridors.

I declare that, to the best of my professional knowledge and belief, I meet the definition of environmental professional as defined in §312.10 of 40 CFR 312 and I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. I have developed and performed the all appropriate inquiries investigation in conformance with the standards and practices set forth in 40 CFR Part 312.

Luann Beadle
Project Scientist



GEOCON
CONSULTANTS, INC.
6671 BRISA STREET, LIVERMORE, CA 94550; PHONE 925 371-5900 - FAX 925 371-5915

Dublin Blvd Extension

Alameda County, California	**PROJECT LOCATION MAP**	
GEOCON Proj. No. E9027-02-02	April 2018	Figure 1

VicMap0318.DWG

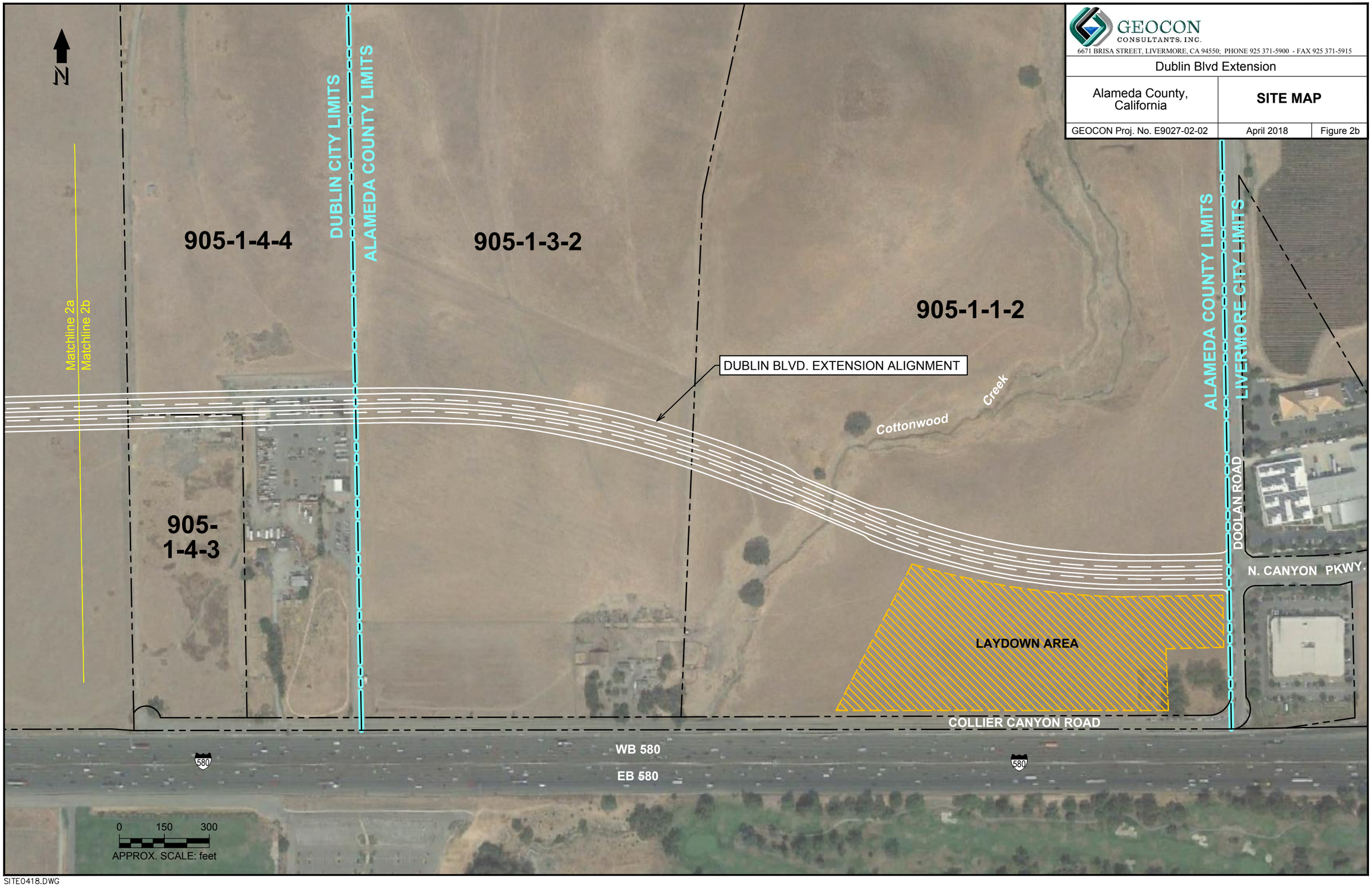
GEOCON CONSULTANTS, INC.
6671 BRISA STREET, LIVERMORE, CA 94550; PHONE 925 371-5900 - FAX 925 371-5915

Dublin Blvd Extension		
Alameda County, California	**SITE MAP**	
GEOCON Proj. No. E9027-02-02	April 2018	Figure 2a

SITE0418.DWG

GEOCON CONSULTANTS, INC.
6671 BRISA STREET, LIVERMORE, CA 94550; PHONE 925 371-5900 - FAX 925 371-5915

Dublin Blvd Extension		
Alameda County, California	**SITE MAP**	
GEOCON Proj. No. E9027-02-02	April 2018	Figure 2b



SITE0418.DWG

Photo 1 – View of Site Looking East, APN 985-27-2, Dublin, Alameda County, California

Photo 2 – APN 905-1-6-3, Debris Pile, former 3457 Croak Road Residence

Photo 3 – APN 905-1-6-3, Soil Berm and Driveway, former 3457 Croak Road Residence

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PHOTOGRAPHS 1, 2, & 3		
Dublin Boulevard Extension Dublin, Livermore, and Alameda County, California		
E9027-02-02		April 2018

Photo 4 –APN 905-1-5-2, West End Looking East

Photo 5 – APN 905-1-4-3, Gravel Driveway to Storage Area

Photo 6 – APN 905-1-4-4, Asphalt Driveway Adjacent North of Storage/Equipment Yard

Photo 7 –APN 905-1-4-4, Landscaping Business Equipment and Storage Yard

Photo 8 – APN 905-1-3-2, Viewed from West End Looking East

Photo 9 – APN 905-1-1-2, Viewed Looking West with Cottonwood Creek in Center

Photo 10 –APN 905-1-4-4, Landscaping Business Entrance

Photo 11 – APN 985-27-2, Viewed from East End Looking West

Photo 12 – APN 905-1-4-4, Landscaping Storage Yard Viewed from Berm Looking Southwest

Photo 13 –APN 905-1-4-3, Landscaping Business Equipment Storage

Photo 14 –Viewed North of Site from APN 905-1-4-4

Photo 15 – View from East of Site Looking East (North Canyons Parkway)

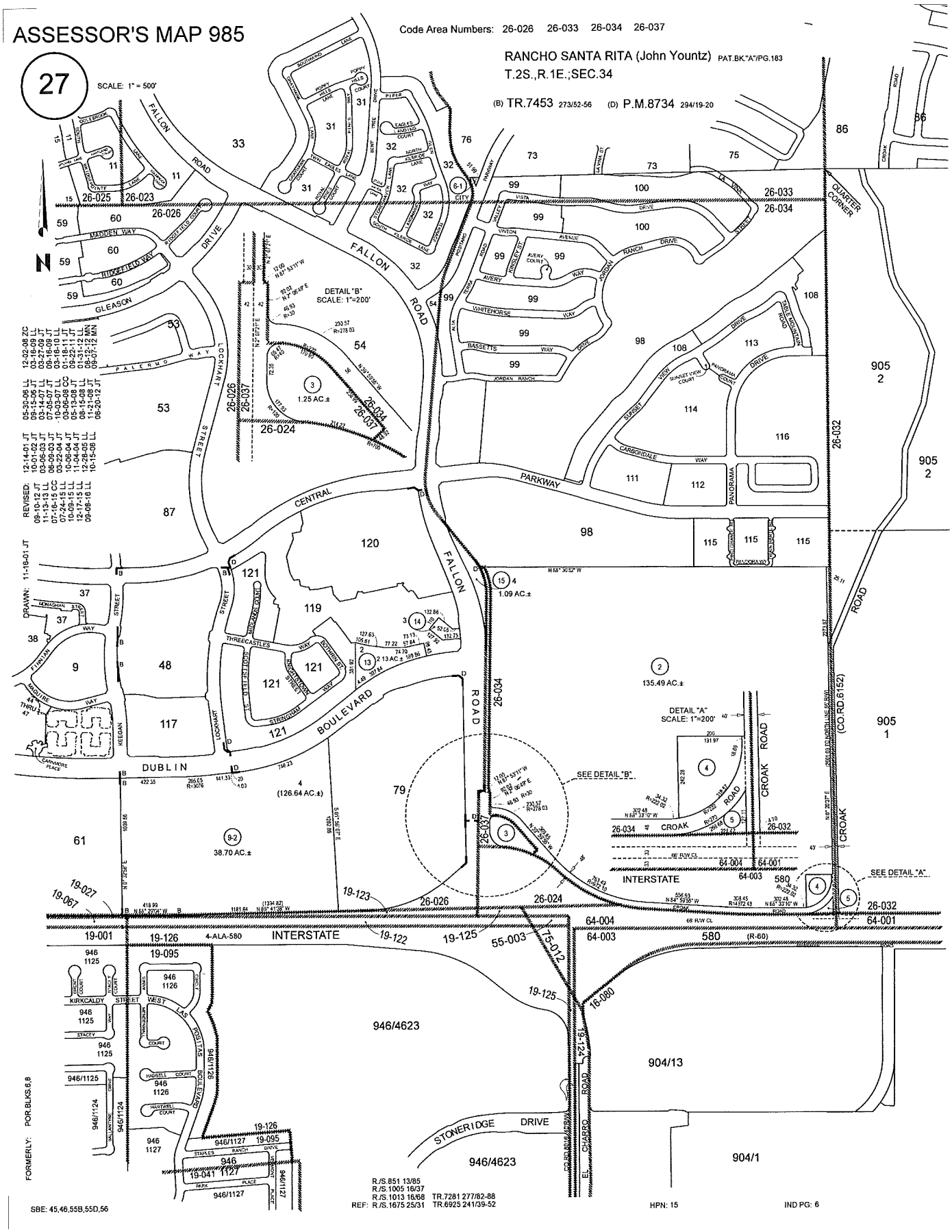
Photo 16 –Casino 580, SE Corner of North Canyons Parkway and Collier Canyon Road

Photo 17 –Croak Road Looking South from Site

Photo 18 – Fallon Road Looking West from Site

APPENDIX A

For Assessment Use Only



ASSESSOR'S MAP 905

Code Area Nos. 64-001 26-032

1

Scale: 1" = 500'

Santa Rita Rancho-(J. Yountz, Admr. Est. J.D. Pacheco) (Bk. A Pats. Pg. 183)
Record of Survey No. 279 (R.S. Bk. 6 Pg. 24)
T. 3 S., R. 1 E. Section 2

Redrn. 7, '63 HN
Corrected: 5-7-75 RM
3-07-11 LL 2-26-86 PB
1-31-12 LL 7-1-94 BV
11-13-13 LL 4-12-95 BV
12-17-00 JT
3-6-03 JT
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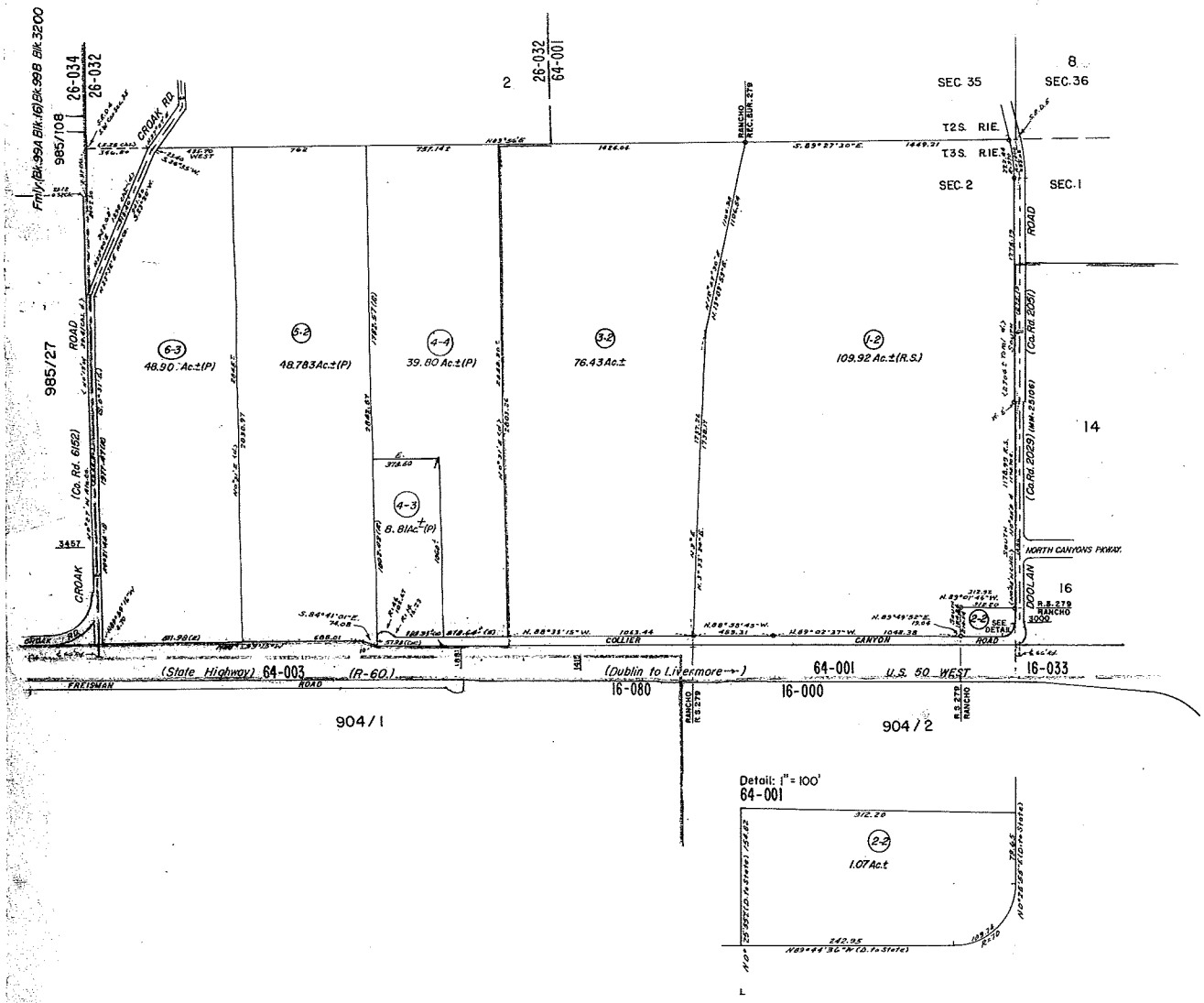

ACM 48

APPENDIX B

Site Owner Questionnaire
Croak Rd. Dublin, CA
(APN 985-27-2)

The following questions are for (1) the current owner of the property, (2) any major occupant of the property or, if the property does not have any major occupants, at least 10% of the occupants of the property, and (3) in addition to the current owner and the occupants identified in (2), any occupant likely to be using, treating, generating, storing, or disposing of hazardous substances or petroleum products on or from the property. A major occupant is any occupant using at least 40% of the leasable area of the property or any anchor tenant when the property is a shopping center. In a multi-family property containing both residential and commercial uses, residential occupants do not need to respond to this questionnaire unless they are involved in or have knowledge of the commercial or other uses.

Description of Site: Address:
Fallon Road, Dublin, CA 94568 (Chen Property)

Question	Owner			Occupants (if applicable)		
1a. Is the property used for an industrial use?	Yes	No	Unk	Yes	No	Unk
1b. Is any adjoining property used for an industrial use?	Yes	No	Unk	Yes	No	Unk
2a. Have you observed evidence of or do you have any knowledge that the property has been used for an industrial use in the past?	Yes	No	Unk	Yes	No	Unk
2b. Have you observed evidence of or do you have any knowledge that any adjoining property has been used for an industrial use in the past?	Yes	No	Unk	Yes	No	Unk
3a. Is the property used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility (if applicable, identify which)?	Yes	No	Unk	Yes	No	Unk
3b. Is any adjoining property used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility (if applicable, identify which)?	Yes	No	Unk	Yes	No	Unk
4a. Have you observed evidence of or do you have any knowledge that the property has been used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility (if applicable, identify which)?	Yes	No	Unk	Yes	No	Unk

Question	Owner			Occupants (if applicable)		
4b. Have you observed evidence of or do you have any knowledge that any adjoining property has been used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility (if applicable, identify which)?	Yes	No	Unk	Yes	No	Unk
5a. Are there currently any damaged or discarded automotive or industrial batteries, pesticides, paints or other chemicals in individual containers of > 5gal (19L) in volume or 50gal (190L) in the aggregate, stored on or used at the property or facility?	Yes	No	Unk	Yes	No	Unk
5b. Have you observed evidence of or do you have any knowledge that there have been previously any damaged or discarded automotive or industrial batteries, pesticides, paints or other chemicals in individual containers of > 5gal (19L) in volume or 50gal (190L) in the aggregate, stored on or used at the property or facility?	Yes	No	Unk	Yes	No	Unk
6a. Are there currently any industrial drums (typically 55 gal [208L]) or sacks of chemicals located on the property or at the facility?	Yes	No	Unk	Yes	No	Unk
6b. Have you observed evidence of or do you have any knowledge that there have been previously any industrial drums (typically 55 gal [208L]) or sacks of chemicals located on the property or at the facility?	Yes	No	Unk	Yes	No	Unk
7a. Have you observed evidence of or do you have any knowledge that fill dirt has been brought onto the property that originated from a contaminated site?	Yes	No	Unk	Yes	No	Unk
7b. Have you observed evidence of or do you have any knowledge that fill dirt has been brought onto the property that is of an unknown origin?	Yes	No	Unk	Yes	No	Unk
8a. Are there currently any pits, ponds, or lagoons located on the property in connection with waste treatment or waste disposal?	Yes	No	Unk	Yes	No	Unk
8b. Have you observed evidence of or do you have any knowledge that there previously have been any pits, ponds, or lagoons located on the property in connection with waste treatment or waste disposal?	Yes	No	Unk	Yes	No	Unk
9a. Is there currently any stained soil on the property?	Yes	No	Unk	Yes	No	Unk
9b. Have you observed evidence of or do you have any knowledge that there previously has been any stained soil on the property?	Yes	No	Unk	Yes	No	Unk

Question	Owner			Occupants (if applicable)		
10a. Are there currently any registered or unregistered storage tanks (above or underground) located on the property?	Yes	No	Unk	Yes	No	Unk
10b. Have you observed evidence of or do you have any knowledge that there previously have been any registered or unregistered storage tanks (above or underground) located on the property?	Yes	No	Unk	Yes	No	Unk
11a. Are there currently any vent pipe, fill pipes, or access ways indicating a fill pipe protruding from the ground on the property or adjacent to any structure located on the property?	Yes	No	Unk	Yes	No	Unk
11b. Have you observed evidence of or do you have any knowledge that there previously have been any vent pipe, fill pipes, or access ways indicating a fill pipe protruding from the ground on the property or adjacent to any structure located on the property?	Yes	No	Unk	Yes	No	Unk
12a. Are there currently any flooring, drains, or walls located within the facility that are stained by substances other than water or were emitting foul odors?	Yes	No	Unk	Yes	No	Unk
12b. Have you observed evidence of or do you have any knowledge that there previously have been any flooring, drains, or walls located within the facility that are stained by substances other than water or were emitting foul odors?	Yes	No	Unk	Yes	No	Unk
13a. If the property is served by a private well or non-public water system, is there evidence of or do you have knowledge that contaminants have been identified in the well or system that exceed guidelines applicable to the water system?	Yes	No	Unk	Yes	No	Unk
13b. If the property is served by a private well or non-public water system, is there evidence of or do you have knowledge that the well has been designated as contaminated by any government/health agency?	Yes	No	Unk	Yes	No	Unk
14. Do you have any knowledge of environmental liens of governmental notification relating to past or recurrent violations of environmental laws with respect to the property or any facility located on the property?	Yes	No	Unk	Yes	No	Unk
15a. Have you been informed of the past existence of hazardous substances or petroleum products with respect to the property or any facility located on the property?	Yes	No	Unk	Yes	No	Unk
15b. Have you been informed of the current existence of hazardous substances or petroleum products with respect to the property or any facility located on the property?	Yes	No	Unk	Yes	No	Unk

Question	Owner			Occupants (if applicable)		
15c. Have you been informed of the past existence of environmental violations with respect to the property or any facility located on the property?	Yes	No	Unk	Yes	No	Unk
15d. Have you been informed of the current existence of environmental violations with respect to the property or any facility located on the property?	Yes	No	Unk	Yes	No	Unk
16. Do you have any knowledge of any environmental site assessment of the property or facility that indicated the presence of hazardous substances or petroleum products on, or contamination of, the property or recommended further assessment of the property?	Yes	No	Unk	Yes	No	Unk
17. Do you know of any past, threatened, or pending lawsuits or administrative proceedings concerning a release or threatened release of any hazardous substances or petroleum products involving the property by any owner or occupant of the property?	Yes	No	Unk	Yes	No	Unk
18a. Does the property discharge wastewater, on or adjacent to the property, other than stormwater, into a stormwater sewer system?	Yes	No	Unk	Yes	No	Unk
18b. Does the property discharge wastewater, on or adjacent to the property, other than stormwater, into a sanitary sewer system?	Yes	No	Unk	Yes	No	Unk
19. Have you observed evidence of or do you have any knowledge that any hazardous substances or petroleum products, unidentified waste materials, tires, automotive or industrial batteries, or any other waste materials have been dumped above grade, buried and/or burned on the property?	Yes	No	Unk	Yes	No	Unk
20. Is there a transformer, capacitor, or any hydraulic equipment for which there are records indicating the presence of PCBs?	Yes	No	Unk	Yes	No	Unk

Unk – "unknown" or "no response"

This questionnaire was completed by:

Name	Jay Greenwood
Title	VP Real Estate Development
Address	3000 Executive Parkway # 375
	San Ramon, CA 94583
Phone number	(925) 261-3876
Date	3/30/18

Please return completed questionnaire by email or mail to:

Email: gsweet@bkf.com
Gordon C. Sweet, PE
Vice President
BKF Engineers

or: beadle@geoconinc.com
Luann Beadle
Project Scientist
Geocon Consultants

U.S. Mail: Luann Beadle
Geocon Consultants
6671 Brisa Street
Livermore, CA 94550

For questions regarding this form, please feel free to call Luann Beadle at (925) 371-5900.

Site Owner Questionnaire
3457 Croak Rd. Dublin, CA
(APN 905-1-6-3)

The following questions are for (1) the current owner of the property, (2) any major occupant of the property or, if the property does not have any major occupants, at least 10% of the occupants of the property, and (3) in addition to the current owner and the occupants identified in (2), any occupant likely to be using, treating, generating, storing, or disposing of hazardous substances or petroleum products on or from the property. A major occupant is any occupant using at least 40% of the leasable area of the property or any anchor tenant when the property is a shopping center. In a multi-family property containing both residential and commercial uses, residential occupants do not need to respond to this questionnaire unless they are involved in or have knowledge of the commercial or other uses.

Description of Site: Address:
3457 Croak Road, Dublin, CA 94568 (Anderson property)

Question	Owner			Occupants (if applicable)		
1a. Is the property used for an industrial use?	Yes	No	Unk	Yes	No	Unk
1b. Is any adjoining property used for an industrial use?	Yes	No	Unk	Yes	No	Unk
2a. Have you observed evidence of or do you have any knowledge that the property has been used for an industrial use in the past?	Yes	No	Unk	Yes	No	Unk
2b. Have you observed evidence of or do you have any knowledge that any adjoining property has been used for an industrial use in the past?	Yes	No	Unk	Yes	No	Unk
3a. Is the property used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility (if applicable, identify which)?	Yes	No	Unk	Yes	No	Unk
3b. Is any adjoining property used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility (if applicable, identify which)?	Yes	No	Unk	Yes	No	Unk
4a. Have you observed evidence of or do you have any knowledge that the property has been used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility (if applicable, identify which)?	Yes	No	Unk	Yes	No	Unk

Question	Owner			Occupants (if applicable)		
4b. Have you observed evidence of or do you have any knowledge that any adjoining property has been used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility (if applicable, identify which)?	Yes	No	Unk	Yes	No	Unk
5a. Are there currently any damaged or discarded automotive or industrial batteries, pesticides, paints or other chemicals in individual containers of > 5gal (19L) in volume or 50gal (190L) in the aggregate, stored on or used at the property or facility?	Yes	No	Unk	Yes	No	Unk
5b. Have you observed evidence of or do you have any knowledge that there have been previously any damaged or discarded automotive or industrial batteries, pesticides, paints or other chemicals in individual containers of > 5gal (19L) in volume or 50gal (190L) in the aggregate, stored on or used at the property or facility?	Yes	No	Unk	Yes	No	Unk
6a. Are there currently any industrial drums (typically 55 gal [208L]) or sacks of chemicals located on the property or at the facility?	Yes	No	Unk	Yes	No	Unk
6b. Have you observed evidence of or do you have any knowledge that there have been previously any industrial drums (typically 55 gal [208L]) or sacks of chemicals located on the property or at the facility?	Yes	No	Unk	Yes	No	Unk
7a. Have you observed evidence of or do you have any knowledge that fill dirt has been brought onto the property that originated from a contaminated site?	Yes	No	Unk	Yes	No	Unk
7b. Have you observed evidence of or do you have any knowledge that fill dirt has been brought onto the property that is of an unknown origin?	Yes	No	Unk	Yes	No	Unk
8a. Are there currently any pits, ponds, or lagoons located on the property in connection with waste treatment or waste disposal?	Yes	No	Unk	Yes	No	Unk
8b. Have you observed evidence of or do you have any knowledge that there previously have been any pits, ponds, or lagoons located on the property in connection with waste treatment or waste disposal?	Yes	No	Unk	Yes	No	Unk
9a. Is there currently any stained soil on the property?	Yes	No	Unk	Yes	No	Unk
9b. Have you observed evidence of or do you have any knowledge that there previously has been any stained soil on the property?	Yes	No	Unk	Yes	No	Unk

Question	Owner			Occupants (if applicable)		
10a. Are there currently any registered or unregistered storage tanks (above or underground) located on the property?	Yes	No	Unk	Yes	No	Unk
10b. Have you observed evidence of or do you have any knowledge that there previously have been any registered or unregistered storage tanks (above or underground) located on the property?	Yes	No	Unk	Yes	No	Unk
11a. Are there currently any vent pipe, fill pipes, or access ways indicating a fill pipe protruding from the ground on the property or adjacent to any structure located on the property?	Yes	No	Unk	Yes	No	Unk
11b. Have you observed evidence of or do you have any knowledge that there previously have been any vent pipe, fill pipes, or access ways indicating a fill pipe protruding from the ground on the property or adjacent to any structure located on the property?	Yes	No	Unk	Yes	No	Unk
12a. Are there currently any flooring, drains, or walls located within the facility that are stained by substances other than water or were emitting foul odors?	Yes	No	Unk	Yes	No	Unk
12b. Have you observed evidence of or do you have any knowledge that there previously have been any flooring, drains, or walls located within the facility that are stained by substances other than water or were emitting foul odors?	Yes	No	Unk	Yes	No	Unk
13a. If the property is served by a private well or non-public water system, is there evidence of or do you have knowledge that contaminants have been identified in the well or system that exceed guidelines applicable to the water system?	Yes	No	Unk	Yes	No	Unk
13b. If the property is served by a private well or non-public water system, is there evidence of or do you have knowledge that the well has been designated as contaminated by any government/health agency?	Yes	No	Unk	Yes	No	Unk
14. Do you have any knowledge of environmental liens of governmental notification relating to past or recurrent violations of environmental laws with respect to the property or any facility located on the property?	Yes	No	Unk	Yes	No	Unk
15a. Have you been informed of the past existence of hazardous substances or petroleum products with respect to the property or any facility located on the property?	Yes	No	Unk	Yes	No	Unk
15b. Have you been informed of the current existence of hazardous substances or petroleum products with respect to the property or any facility located on the property?	Yes	No	Unk	Yes	No	Unk

Question	Owner			Occupants (if applicable)		
15c. Have you been informed of the past existence of environmental violations with respect to the property or any facility located on the property?	Yes	No	Unk	Yes	No	Unk
15d. Have you been informed of the current existence of environmental violations with respect to the property or any facility located on the property?	Yes	No	Unk	Yes	No	Unk
16. Do you have any knowledge of any environmental site assessment of the property or facility that indicated the presence of hazardous substances or petroleum products on, or contamination of, the property or recommended further assessment of the property?	Yes	No	Unk	Yes	No	Unk
17. Do you know of any past, threatened, or pending lawsuits or administrative proceedings concerning a release or threatened release of any hazardous substances or petroleum products involving the property by any owner or occupant of the property?	Yes	No	Unk	Yes	No	Unk
18a. Does the property discharge wastewater, on or adjacent to the property, other than stormwater, into a stormwater sewer system?	Yes	No	Unk	Yes	No	Unk
18b. Does the property discharge wastewater, on or adjacent to the property, other than stormwater, into a sanitary sewer system?	Yes	No	Unk	Yes	No	Unk
19. Have you observed evidence of or do you have any knowledge that any hazardous substances or petroleum products, unidentified waste materials, tires, automotive or industrial batteries, or any other waste materials have been dumped above grade, buried and/or burned on the property?	Yes	No	Unk	Yes	No	Unk
20. Is there a transformer, capacitor, or any hydraulic equipment for which there are records indicating the presence of PCBs?	Yes	No	Unk	Yes	No	Unk

Unk – "unknown" or "no response"

This questionnaire was completed by:

Name	Jay Greenwood
Title	VP Real Estate Development
Address	3000 Executive Parkway # 375
	San Ramon, CA 94583
Phone number	(925) 261-3876
Date	3/20/18

Please return completed questionnaire by email or mail to:

Email: gsweet@bkf.com
Gordon C. Sweet, PE
Vice President
BKF Engineers

or: beadle@geoconinc.com
Luann Beadle
Project Scientist
Geocon Consultants

U.S. Mail: Luann Beadle
Geocon Consultants
6671 Brisa Street
Livermore, CA 94550

For questions regarding this form, please feel free to call Luann Beadle at (925) 371-5900.

Site Owner Questionnaire
1881 Collier Canyon Rd, Dublin, CA
(APN 905-1-4-4)

The following questions are for (1) the current owner of the property, (2) any major occupant of the property or, if the property does not have any major occupants, at least 10% of the occupants of the property, and (3) in addition to the current owner and the occupants identified in (2), any occupant likely to be using, treating, generating, storing, or disposing of hazardous substances or petroleum products on or from the property. A major occupant is any occupant using at least 40% of the leasable area of the property or any anchor tenant when the property is a shopping center. In a multi-family property containing both residential and commercial uses, residential occupants do not need to respond to this questionnaire unless they are involved in or have knowledge of the commercial or other uses.

Description of Site: Address:
1881 Collier Canyon Road

Question	Owner			Occupants (if applicable)		
1a. Is the property used for an industrial use?	Yes ✓	No	Unk	Yes	No	Unk
1b. Is any adjoining property used for an industrial use?	Yes	No	Unk ✓	Yes	No	Unk
2a. Have you observed evidence of or do you have any knowledge that the property has been used for an industrial use in the past?	Yes ✓	No	Unk	Yes	No	Unk
2b. Have you observed evidence of or do you have any knowledge that any adjoining property has been used for an industrial use in the past?	Yes	No	Unk ✓	Yes	No	Unk
3a. Is the property used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility (if applicable, identify which)?	Yes ✓	No	Unk	Yes	No	Unk
3b. Is any adjoining property used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility (if applicable, identify which)?	Yes	No	Unk ✓	Yes	No	Unk
4a. Have you observed evidence of or do you have any knowledge that the property has been used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility (if applicable, identify which)?	Yes ✓	No	Unk	Yes	No	Unk

Question	Owner			Occupants (if applicable)		
4b. Have you observed evidence of or do you have any knowledge that any adjoining property has been used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility (if applicable, identify which)?	Yes	No	Unk ✓	Yes	No	Unk
5a. Are there currently any damaged or discarded automotive or industrial batteries, pesticides, paints or other chemicals in individual containers of > 5gal (19L) in volume or 50gal (190L) in the aggregate, stored on or used at the property or facility?	Yes	No	Unk ✓	Yes	No	Unk
5b. Have you observed evidence of or do you have any knowledge that there have been previously any damaged or discarded automotive or industrial batteries, pesticides, paints or other chemicals in individual containers of > 5gal (19L) in volume or 50gal (190L) in the aggregate, stored on or used at the property or facility?	Yes	No	Unk ✓	Yes	No	Unk
6a. Are there currently any industrial drums (typically 55 gal [208L]) or sacks of chemicals located on the property or at the facility?	Yes ✓	No	Unk	Yes	No	Unk
6b. Have you observed evidence of or do you have any knowledge that there have been previously any industrial drums (typically 55 gal [208L]) or sacks of chemicals located on the property or at the facility?	Yes ✓	No	Unk	Yes	No	Unk
7a. Have you observed evidence of or do you have any knowledge that fill dirt has been brought onto the property that originated from a contaminated site?	Yes	No ✓	Unk	Yes	No	Unk
7b. Have you observed evidence of or do you have any knowledge that fill dirt has been brought onto the property that is of an unknown origin?	Yes	No ✓	Unk	Yes	No	Unk
8a. Are there currently any pits, ponds, or lagoons located on the property in connection with waste treatment or waste disposal?	Yes	No ✓	Unk	Yes	No	Unk
8b. Have you observed evidence of or do you have any knowledge that there previously have been any pits, ponds, or lagoons located on the property in connection with waste treatment or waste disposal?	Yes	No ✓	Unk	Yes	No	Unk
9a. Is there currently any stained soil on the property?	Yes ✓	No	Unk	Yes	No	Unk
9b. Have you observed evidence of or do you have any knowledge that there previously has been any stained soil on the property?	Yes ✓	No	Unk	Yes	No	Unk

Question	Owner			Occupants (if applicable)		
10a. Are there currently any registered or unregistered storage tanks (above or underground) located on the property?	Yes	No ✓	Unk	Yes	No	Unk
10b. Have you observed evidence of or do you have any knowledge that there previously have been any registered or unregistered storage tanks (above or underground) located on the property?	Yes ✓	No	Unk	Yes	No	Unk
11a. Are there currently any vent pipe, fill pipes, or access ways indicating a fill pipe protruding from the ground on the property or adjacent to any structure located on the property?	Yes	No ✓	Unk	Yes	No	Unk
11b. Have you observed evidence of or do you have any knowledge that there previously have been any vent pipe, fill pipes, or access ways indicating a fill pipe protruding from the ground on the property or adjacent to any structure located on the property?	Yes	No ✓	Unk	Yes	No	Unk
12a. Are there currently any flooring, drains, or walls located within the facility that are stained by substances other than water or were emitting foul odors?	Yes	No ✓	Unk	Yes	No	Unk
12b. Have you observed evidence of or do you have any knowledge that there previously have been any flooring, drains, or walls located within the facility that are stained by substances other than water or were emitting foul odors?	Yes	No ✓	Unk	Yes	No	Unk
13a. If the property is served by a private well or non-public water system, is there evidence of or do you have knowledge that contaminants have been identified in the well or system that exceed guidelines applicable to the water system?	Yes	No ✓	Unk	Yes	No	Unk
13b. If the property is served by a private well or non-public water system, is there evidence of or do you have knowledge that the well has been designated as contaminated by any government/health agency?	Yes	No ✓	Unk	Yes	No	Unk
14. Do you have any knowledge of environmental liens of governmental notification relating to past or recurrent violations of environmental laws with respect to the property or any facility located on the property?	Yes	No ✓	Unk	Yes	No	Unk
15a. Have you been informed of the past existence of hazardous substances or petroleum products with respect to the property or any facility located on the property?	Yes ✓	No	Unk	Yes	No	Unk
15b. Have you been informed of the current existence of hazardous substances or petroleum products with respect to the property or any facility located on the property?	Yes ✓	No	Unk	Yes	No	Unk

This questionnaire was completed by:

Name RANDY BRANAUGH
Title TRUSTEE
Address 19077 MADISON AVE
CASTRO VALLEY CA
Phone number 510-821-1834
Date 4-1-2018

Please return completed questionnaire by email or mail to:

Email: gsweet@bkf.com
Gordon C. Sweet, PE
Vice President
BKF Engineers

or: beadle@geoconinc.com
Luann Beadle
Project Scientist
Geocon Consultants

U.S. Mail: Luann Beadle
Geocon Consultants
6671 Brisa Street
Livermore, CA 94550

For questions regarding this form, please feel free to call Luann Beadle at (925) 371-5900.

User Questionnaire
Dublin Blvd Extension, Alameda County, CA
Assessor's Parcel Numbers:
905-1-3-2 and 905-1-1-2

Please answer the following questions as they apply to all parcels if responses are consistent. If conditions apply to a single parcel or sub-group of parcels, please specify by APN. Use additional sheets if necessary.

1. Are you aware of any environmental cleanup liens against the property that are filed or recorded under federal, tribal, state or local law?
   NO

2. Are you aware of any activity and land use limitations, such as engineering controls, land use restrictions or institutional controls that are in place at the site and/or have been filed or recorded in a registry under federal, tribal, state or local law?
   East County Area Plan-Measure D

3. Do you have any specialized knowledge related to the property or nearby properties?
   NO

4. Does the purchase price reasonably reflect the fair market value of the property?

   Unknown

5. Do you know the past uses of the property?
   NO

6. Do you know of specific chemicals that are present or once were present at the property?
   NO

7. Do you know of spills or other chemical releases that have taken place at the property?
   NO

8. Do you know of any environmental cleanups that have taken place at the property?
   NO

9. Do you know whether any helpful documents exist and, if so, whether copies can and will be provided for this assessment? These documents may include: Environmental site assessment reports, Environmental compliance audit reports, Environmental permits, Registrations for storage tanks, Registrations for underground injection systems, or any other documents related to the property.
   NO

This questionnaire was completed by:

Name	Ruben Izon
Title	Associate Engineer
Phone number	(510) 670-5827
Date	April 9, 2018
Signature	

User Questionnaire
Dublin Blvd Extension, Dublin and Livermore, CA
Assessor's Parcel Numbers:

905-1-4-4, 905-1-5-2, 985-27-2, and 905-1-6-3

Please answer the following questions as they apply to all parcels if responses are consistent. If conditions apply to a single parcel or sub-group of parcels, please specify by APN. Use additional sheets if necessary.

1. Are you aware of any environmental cleanup liens against the property that are filed or recorded under federal, tribal, state or local law? NO / FIRE

2. Are you aware of any activity and land use limitations, such as engineering controls, land use restrictions or institutional controls that are in place at the site and/or have been filed or recorded in a registry under federal, tribal, state or local law? NO / FIRE

3. Do you have any specialized knowledge related to the property or nearby properties?
   NO / FIRE

4. Does the purchase price reasonably reflect the fair market value of the property?
   UNKNOWN / FIRE

5. Do you know the past uses of the property? AGRICULTURAL / FIRE

6. Do you know of specific chemicals that are present or once were present at the property?
   NONE REPORTED / FIRE

7. Do you know of spills or other chemical releases that have taken place at the property?
   NONE REPORTED / FIRE

8. Do you know of any environmental cleanups that have taken place at the property?
   NONE REPORTED / FIRE

9. Do you know whether any helpful documents exist and, if so, whether copies can and will be provided for this assessment? These documents may include: Environmental site assessment reports, Environmental compliance audit reports, Environmental permits, Registrations for storage tanks, Registrations for underground injection systems, or any other documents related to the property.

NO / FIRE

This questionnaire was completed by:

Name	DARRELL JONES
Title	DEPUTY FIRE MARSHAL - ALAMEDA COUNTY FIRE
Phone number	(925) 833-6606
Date	4/2/2018
Signature	Darrell Jones

APPENDIX C

Dublin Blvd Extension
Baywood Cmn
Pleasanton, CA 94588

Inquiry Number: 5173965.2s
January 31, 2018

The EDR Radius Map™ Report with GeoCheck®

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

BAYWOOD CMN
PLEASANTON, CA 94588

COORDINATES

Latitude (North):	37.7044680 - 37˚ 42' 16.08''
Longitude (West):	121.8375570 - 121˚ 50' 15.20''
Universal Tranverse Mercator:	Zone 10
UTM X (Meters):	602471.9
UTM Y (Meters):	4173456.8
Elevation:	410 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5640392 LIVERMORE, CA
Version Date:	2012

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20140606
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
BAYWOOD CMN
PLEASANTON, CA 94588

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
1	E-5 ALTERNATIVE SCHO	S OF CENTRAL PARKWAY	ENVIROSTOR, SCH	Lower	1105, 0.209, WNW
2	TARGET T2771	2800 DUBLIN BLVD	RCRA-LQG, FINDS, ECHO	Lower	1178, 0.223, West
3	CVS PHARMACY #17628	2800 DUBLIN BLVD STE	RCRA-CESQG, FINDS, ECHO	Lower	1271, 0.241, West
4	CITY OF LIVERMORE AI	1800 FRIESMAN	LUST, Alameda County CS	Lower	1288, 0.244, SSW
5	AIRPORT/LOS POSITAS	1800 FRIESMAN	Notify 65	Lower	1322, 0.250, SSE
6	BERNARD'S	1051 AIRWAY BLVD	LUST, Alameda County CS	Higher	1549, 0.293, East
7	WINDWOOD AT JORDAN R	4233 FALLON ROAD	SLIC, Alameda County CS, NPDES	Higher	1829, 0.346, NW
8	LAS POSITAS GOLF COU	909 CLUBHOUSE	LUST, Alameda County CS, HIST UST, ENF, HIST...	Lower	1956, 0.370, ESE
9	FREISMAN RANCH	1600 FRIESMAN RD	SLIC, Alameda County CS	Lower	2050, 0.388, WSW
10	PROPOSED NEW ES, JOR	E OF FALLON RD AND N	ENVIROSTOR, SCH	Higher	2273, 0.430, NNW
A11	LIVERMORE MUNICIPAL	1800 FRIESMAN	LUST	Lower	2418, 0.458, ESE
A12	LIVERMORE MUNICIPAL	1800 FIRESMAN	HIST CORTESE	Lower	2418, 0.458, ESE
13	PROPOSED KOLB ELEMEN	PALERMO WAY	ENVIROSTOR, SCH	Higher	2942, 0.557, WNW
B14	M-1 MIDDLE SCHOOL	PARCEL O-TRACT 6725/	ENVIROSTOR, SCH	Higher	3535, 0.670, WNW
B15	E-2 ELEMENTARY SCHOO	PARCEL O-TRACT 6960/	ENVIROSTOR, SCH	Higher	3535, 0.670, WNW
16	PROPOSED ELEMENTARY	5781 FALLON ROAD	ENVIROSTOR, SCH	Higher	4745, 0.899, NNW

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ..... National Priority List
Proposed NPL ..... Proposed National Priority List Sites
NPL LIENS ..... Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ..... National Priority List Deletions

Federal CERCLIS list

FEDERAL FACILITY ..... Federal Facility Site Information listing
SEMS ..... Superfund Enterprise Management System

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE ..... Superfund Enterprise Management System Archive

Federal RCRA CORRACTS facilities list

CORRACTS ..... Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ..... RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-SQG ..... RCRA - Small Quantity Generators

Federal institutional controls / engineering controls registries

LUCIS ..... Land Use Control Information System
US ENG CONTROLS ..... Engineering Controls Sites List
US INST CONTROL ..... Sites with Institutional Controls

Federal ERNS list

ERNS ..... Emergency Response Notification System

State- and tribal - equivalent NPL

RESPONSE..... State Response Sites

State and tribal landfill and/or solid waste disposal site lists

SWF/LF..... Solid Waste Information System

State and tribal leaking storage tank lists

INDIAN LUST..... Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

FEMA UST..... Underground Storage Tank Listing
UST..... Active UST Facilities
AST..... Aboveground Petroleum Storage Tank Facilities
INDIAN UST..... Underground Storage Tanks on Indian Land

State and tribal voluntary cleanup sites

VCP..... Voluntary Cleanup Program Properties
INDIAN VCP..... Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS..... Considered Brownfieds Sites Listing

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS..... A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

WMUDS/SWAT..... Waste Management Unit Database
SWRCY..... Recycler Database
HAULERS..... Registered Waste Tire Haulers Listing
INDIAN ODI..... Report on the Status of Open Dumps on Indian Lands
DEBRIS REGION 9..... Torres Martinez Reservation Illegal Dump Site Locations
ODI..... Open Dump Inventory
IHS OPEN DUMPS..... Open Dumps on Indian Land

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL..... Delisted National Clandestine Laboratory Register
HIST Cal-Sites..... Historical Calsites Database
CDL..... Clandestine Drug Labs
Toxic Pits..... Toxic Pits Cleanup Act Sites
US CDL..... National Clandestine Laboratory Register

Local Lists of Registered Storage Tanks

SWEEPS UST..... SWEEPS UST Listing

HIST UST	Hazardous Substance Storage Container Database
CA FID UST	Facility Inventory Database

Local Land Records

LIENS	Environmental Liens Listing
LIENS 2	CERCLA Lien Information
DEED	Deed Restriction Listing

Records of Emergency Release Reports

HMIRS	Hazardous Materials Information Reporting System
CHMIRS	California Hazardous Material Incident Report System
LDS	Land Disposal Sites Listing
MCS	Military Cleanup Sites Listing
SPILLS 90	SPILLS 90 data from FirstSearch

Other Ascertainable Records

RCRA NonGen / NLR	RCRA - Non Generators / No Longer Regulated
FUDS	Formerly Used Defense Sites
DOD	Department of Defense Sites
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
US FIN ASSUR	Financial Assurance Information
EPA WATCH LIST	EPA WATCH LIST
2020 COR ACTION	2020 Corrective Action Program List
TSCA	Toxic Substances Control Act
TRIS	Toxic Chemical Release Inventory System
SSTS	Section 7 Tracking Systems
ROD	Records Of Decision
RMP	Risk Management Plans
RAATS	RCRA Administrative Action Tracking System
PRP	Potentially Responsible Parties
PADS	PCB Activity Database System
ICIS	Integrated Compliance Information System
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
MLTS	Material Licensing Tracking System
COAL ASH DOE	Steam-Electric Plant Operation Data
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER	PCB Transformer Registration Database
RADINFO	Radiation Information Database
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
DOT OPS	Incident and Accident Data
CONSENT	Superfund (CERCLA) Consent Decrees
INDIAN RESERV	Indian Reservations
FUSRAP	Formerly Utilized Sites Remedial Action Program
UMTRA	Uranium Mill Tailings Sites
LEAD SMELTERS	Lead Smelter Sites
US AIRS	Aerometric Information Retrieval System Facility Subsystem
US MINES	Mines Master Index File
ABANDONED MINES	Abandoned Mines
FINDS	Facility Index System/Facility Registry System
DOCKET HWC	Hazardous Waste Compliance Docket Listing
ECHO	Enforcement & Compliance History Information

EXECUTIVE SUMMARY

UXO	Unexploded Ordnance Sites
FUELS PROGRAM	EPA Fuels Program Registered Listing
CA BOND EXP. PLAN	Bond Expenditure Plan
Cortese	"Cortese" Hazardous Waste & Substances Sites List
CUPA Listings	CUPA Resources List
DRYCLEANERS	Cleaner Facilities
EMI	Emissions Inventory Data
ENF	Enforcement Action Listing
Financial Assurance	Financial Assurance Information Listing
HAZNET	Facility and Manifest Data
ICE	ICE
HWP	EnviroStor Permitted Facilities Listing
HWT	Registered Hazardous Waste Transporter Database
MINES	Mines Site Location Listing
MWMP	Medical Waste Management Program Listing
NPDES	NPDES Permits Listing
PEST LIC	Pesticide Regulation Licenses Listing
PROC	Certified Processors Database
UIC	UIC Listing
WASTEWATER PITS	Oil Wastewater Pits Listing
WDS	Waste Discharge System
WIP	Well Investigation Program Case List

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP	EDR Proprietary Manufactured Gas Plants
EDR Hist Auto	EDR Exclusive Historical Auto Stations
EDR Hist Cleaner	EDR Exclusive Historical Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF	Recovered Government Archive Solid Waste Facilities List
RGA LUST	Recovered Government Archive Leaking Underground Storage Tank

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

STANDARD ENVIRONMENTAL RECORDS

Federal RCRA generators list

RCRA-LQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

A review of the RCRA-LQG list, as provided by EDR, and dated 09/13/2017 has revealed that there is 1 RCRA-LQG site within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
TARGET T2771	***2800 DUBLIN BLVD***	***W 1/8 - 1/4 (0.223 mi.)***	***2***	***11***

RCRA-CESQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

A review of the RCRA-CESQG list, as provided by EDR, and dated 09/13/2017 has revealed that there is 1 RCRA-CESQG site within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
CVS PHARMACY #17628	***2800 DUBLIN BLVD STE***	***W 1/8 - 1/4 (0.241 mi.)***	***3***	***18***

State- and tribal - equivalent CERCLIS

ENVIROSTOR: The Department of Toxic Substances Control's (DTSC's) Site Mitigation and Brownfields Reuse Program's (SMBRP's) EnviroStor database identifes sites that have known contamination or sites for which there may be reasons to investigate further. The database includes the following site types: Federal Superfund sites (National Priorities List (NPL)); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. EnviroStor provides similar information to the information that was available in CalSites, and provides additional site information, including, but not limited to, identification of formerly-contaminated properties that have been released for reuse, properties where environmental deed restrictions have been recorded to prevent inappropriate land uses, and risk characterization information that is used to assess potential impacts to public health and the environment at contaminated sites.

A review of the ENVIROSTOR list, as provided by EDR, and dated 10/30/2017 has revealed that there are 6 ENVIROSTOR sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
PROPOSED NEW ES, JOR Facility Id: 60002037	***E OF FALLON RD AND N***	***NNW 1/4 - 1/2 (0.430 mi.)***	***10***	***44***

Status: No Action Required				
PROPOSED KOLB ELEMEN	***PALERMO WAY***	***WNW 1/2 - 1 (0.557 mi.)***	***13***	***47***
Facility Id: 60000686 Status: No Further Action				
M-1 MIDDLE SCHOOL	***PARCEL O-TRACT 6725/***	***WNW 1/2 - 1 (0.670 mi.)***	***B14***	***49***
Facility Id: 1020001 Status: No Action Required				
E-2 ELEMENTARY SCHOO	***PARCEL O-TRACT 6960/***	***WNW 1/2 - 1 (0.670 mi.)***	***B15***	***51***
Facility Id: 1020002 Status: No Action Required				
PROPOSED ELEMENTARY	***5781 FALLON ROAD***	***NNW 1/2 - 1 (0.899 mi.)***	***16***	***53***
Facility Id: 60001311 Status: No Action Required				

Lower Elevation	Address	Direction / Distance	Map ID	Page
E-5 ALTERNATIVE SCHO	***S OF CENTRAL PARKWAY***	***WNW 1/8 - 1/4 (0.209 mi.)***	***1***	***8***
Facility Id: 60002169 Status: No Further Action				

State and tribal leaking storage tank lists

LUST: Leaking Underground Storage Tank (LUST) Sites included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

A review of the LUST list, as provided by EDR, has revealed that there are 4 LUST sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
BERNARD'S	***1051 AIRWAY BLVD***	***E 1/4 - 1/2 (0.293 mi.)***	***6***	***23***
Database: LUST, Date of Government Version: 12/11/2017 Status: Completed - Case Closed Global Id: T0600148042				

Lower Elevation	Address	Direction / Distance	Map ID	Page
CITY OF LIVERMORE AI	***1800 FRIESMAN***	***SSW 1/8 - 1/4 (0.244 mi.)***	***4***	***22***
Database: LUST, Date of Government Version: 12/11/2017 Status: Completed - Case Closed Global Id: T0600101626				
LAS POSITAS GOLF COU	***909 CLUBHOUSE***	***ESE 1/4 - 1/2 (0.370 mi.)***	***8***	***34***
Database: LUST REG 2, Date of Government Version: 09/30/2004 Database: LUST, Date of Government Version: 12/11/2017 Status: Completed - Case Closed Facility Id: 01-0883 Facility Status: Case Closed Global Id: T0600100816 date9: 6/1/1998				
LIVERMORE MUNICIPAL	1800 FRIESMAN	ESE 1/4 - 1/2 (0.458 mi.)	A11	46
Database: LUST REG 2, Date of Government Version: 09/30/2004				

Facility Id: 01-1758
Facility Status: Case Closed
date9: 9/23/1996

SLIC: Cleanup Program Sites (CPS; also known as Site Cleanups [SC] and formerly known as Spills, Leaks, Investigations, and Cleanups [SLIC] sites) included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

A review of the SLIC list, as provided by EDR, has revealed that there are 2 SLIC sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
WINDWOOD AT JORDAN R	***4233 FALLON ROAD***	***NW 1/4 - 1/2 (0.346 mi.)***	***7***	***25***
Database: SLIC, Date of Government Version: 12/11/2017 Facility Status: Completed - Case Closed Global Id: T06019797353				

Lower Elevation	Address	Direction / Distance	Map ID	Page
FREISMAN RANCH	***1600 FRIESMAN RD***	***WSW 1/4 - 1/2 (0.388 mi.)***	***9***	***44***
Database: SLIC, Date of Government Version: 12/11/2017 Facility Status: Completed - Case Closed Global Id: T0600143091				

Alameda County CS: A listing of contaminated sites overseen by the Toxic Release Program (oil and groundwater contamination from chemical releases and spills) and the Leaking Underground Storage Tank Program (soil and ground water contamination from leaking petroleum USTs).

A review of the Alameda County CS list, as provided by EDR, and dated 09/22/2017 has revealed that there are 5 Alameda County CS sites within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
BERNARD'S	***1051 AIRWAY BLVD***	***E 1/4 - 1/2 (0.293 mi.)***	***6***	***23***
Record Id: RO0002440 Status: Case Closed Status: Leak Confirmation Status: Pollution Characterization Status: Verificaiton Monitoring Underway				
WINDWOOD AT JORDAN R	***4233 FALLON ROAD***	***NW 1/4 - 1/2 (0.346 mi.)***	***7***	***25***
Record Id: RO0002918 Status: Case Closed Status: Preliminary Site Assessment Underway Status: Pollution Characterization				

Lower Elevation	Address	Direction / Distance	Map ID	Page
CITY OF LIVERMORE AI	***1800 FRIESMAN***	***SSW 1/8 - 1/4 (0.244 mi.)***	***4***	***22***
Record Id: RO0001175 Status: Case Closed				
LAS POSITAS GOLF COU	***909 CLUBHOUSE***	***ESE 1/4 - 1/2 (0.370 mi.)***	***8***	***34***

Record Id: RO0000997 Status: Case Closed				
FREISMAN RANCH Record Id: RO0002484 Status: Case Closed Status: Pollution Characterization	***1600 FRIESMAN RD***	***WSW 1/4 - 1/2 (0.388 mi.)***	***9***	***44***

ADDITIONAL ENVIRONMENTAL RECORDS

Local Lists of Hazardous waste / Contaminated Sites

SCH: This category contains proposed and existing school sites that are being evaluated by DTSC for possible hazardous materials contamination. In some cases, these properties may be listed in the CalSites category. depending on the level of threat to public health and safety or the. environment they pose.

A review of the SCH list, as provided by EDR, and dated 10/30/2017 has revealed that there is 1 SCH site within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
E-5 ALTERNATIVE SCHO Facility Id: 60002169 Status: No Further Action	***S OF CENTRAL PARKWAY***	***WNW 1/8 - 1/4 (0.209 mi.)***	***1***	***8***

Other Ascertainable Records

HIST CORTESE: The sites for the list are designated by the State Water Resource Control Board [LUST], the Integrated Waste Board [SWF/LS], and the Department of Toxic Substances Control [CALSITES]. This listing is no longer updated by the state agency.

A review of the HIST CORTESE list, as provided by EDR, and dated 04/01/2001 has revealed that there are 2 HIST CORTESE sites within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
LAS POSITAS GOLF COU Reg Id: 01-0883	***909 CLUBHOUSE***	***ESE 1/4 - 1/2 (0.370 mi.)***	***8***	***34***
LIVERMORE MUNICIPAL Reg Id: 01-1758	1800 FIRESMAN	ESE 1/4 - 1/2 (0.458 mi.)	A12	47

Notify 65: Listings of all Proposition 65 incidents reported to counties by the State Water Resources Control Board and the Regional Water Quality Control Board. This database is no longer updated by the reporting agency.

A review of the Notify 65 list, as provided by EDR, and dated 12/14/2017 has revealed that there is 1 Notify 65 site within approximately 1 mile of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
AIRPORT/LOS POSITAS	1800 FRIESMAN	SSE 1/4 - 1/2 (0.250 mi.)	5	23

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 1 records.

Site Name	Database(s)
SANTA RITA PROPERTY	SLIC

OVERVIEW MAP - 5173965.2S

Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

National Priority List Sites

Dept. Defense Sites

0 1/4 1/2 1 Miles

Indian Reservations BIA

Power transmission lines

100-year flood zone

500-year flood zone

National Wetland Inventory

State Wetlands

Upgradient Area

Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Dublin Blvd Extension	CLIENT: GeoCon Environmental Cons.
ADDRESS: Baywood Cmn Pleasanton CA 94588	CONTACT: Luann Beadle INQUIRY #: 5173965.2s
LAT/LONG: 37.704468 / 121.837557	DATE: January 31, 2018 4:29 pm

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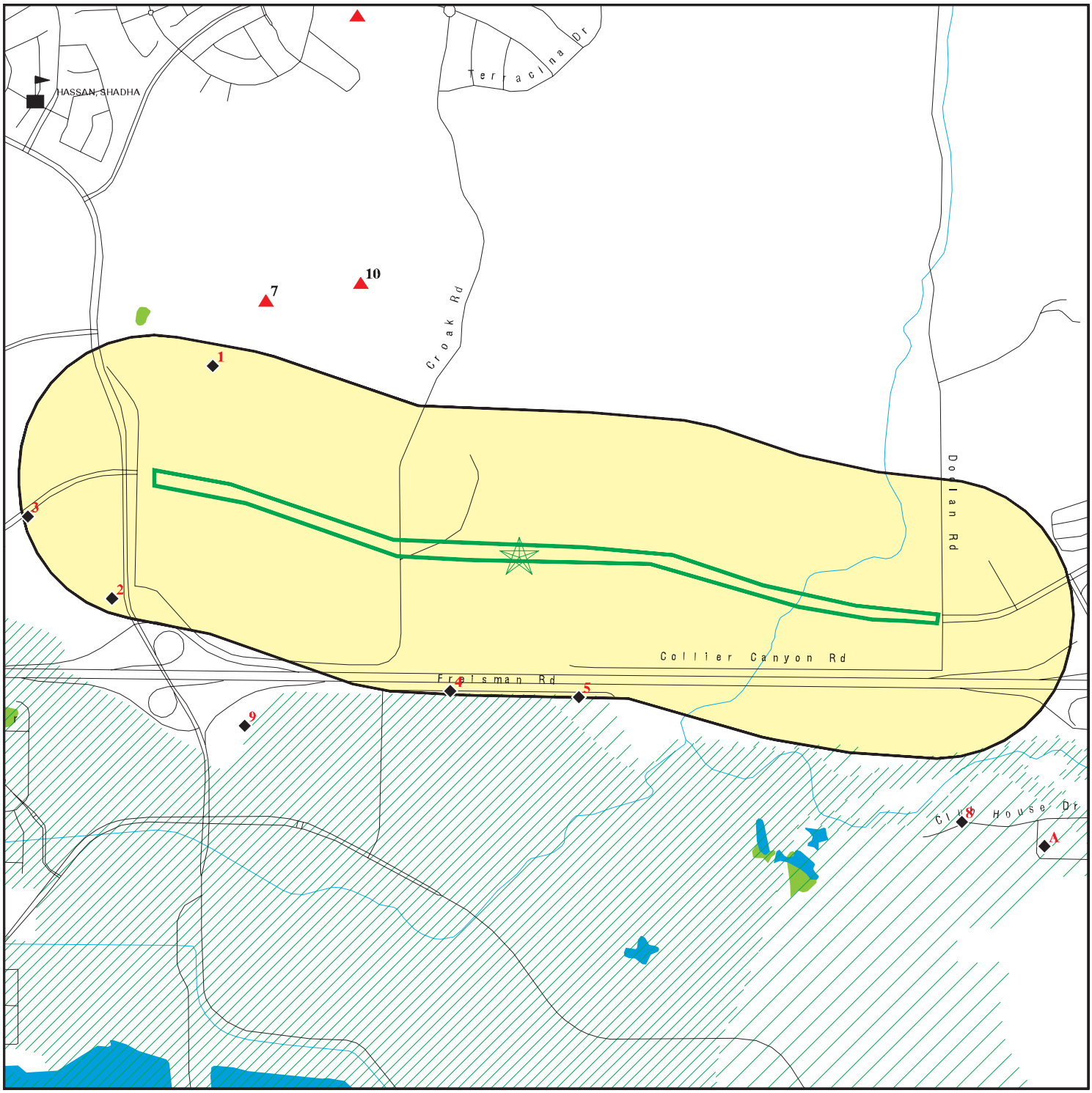
DETAIL MAP - 5173965.2S



0 1/4 1/2 1 Miles

- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands
- Areas of Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Dublin Blvd Extension	CLIENT: GeoCon Environmental Cons.
ADDRESS: Baywood Cmn Pleasanton CA 94588	CONTACT: Luann Beadle
LAT/LONG: 37.704468 / 121.837557	INQUIRY #: 5173965.2s
	DATE: January 31, 2018 4:31 pm

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MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	0.001		0	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site list								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	1	NR	NR	NR	1
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-CESQG	0.250		0	1	NR	NR	NR	1
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	0.001		0	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
RESPONSE	1.000		0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
ENVIROSTOR	1.000		0	1	1	4	NR	6
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LUST	0.500		0	1	3	NR	NR	4

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
INDIAN LUST	0.500		0	0	0	NR	NR	0
SLIC	0.500		0	0	2	NR	NR	2
Alameda County CS	0.500		0	1	4	NR	NR	5
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250		0	0	NR	NR	NR	0
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal voluntary cleanup sites								
VCP	0.500		0	0	0	NR	NR	0
INDIAN VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
WMUDS/SWAT	0.500		0	0	0	NR	NR	0
SWRCY	0.500		0	0	0	NR	NR	0
HAULERS	0.001		0	NR	NR	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	0.001		0	NR	NR	NR	NR	0
HIST Cal-Sites	1.000		0	0	0	0	NR	0
SCH	0.250		0	1	NR	NR	NR	1
CDL	0.001		0	NR	NR	NR	NR	0
Toxic Pits	1.000		0	0	0	0	NR	0
US CDL	0.001		0	NR	NR	NR	NR	0
Local Lists of Registered Storage Tanks								
SWEEPS UST	0.250		0	0	NR	NR	NR	0
HIST UST	0.250		0	0	NR	NR	NR	0
CA FID UST	0.250		0	0	NR	NR	NR	0
Local Land Records								
LIENS	0.001		0	NR	NR	NR	NR	0
LIENS 2	0.001		0	NR	NR	NR	NR	0
DEED	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
Records of Emergency Release Reports								
HMIRS	0.001		0	NR	NR	NR	NR	0
CHMIRS	0.001		0	NR	NR	NR	NR	0
LDS	0.001		0	NR	NR	NR	NR	0
MCS	0.001		0	NR	NR	NR	NR	0
SPILLS 90	0.001		0	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	0.001		0	NR	NR	NR	NR	0
EPA WATCH LIST	0.001		0	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	0.001		0	NR	NR	NR	NR	0
TRIS	0.001		0	NR	NR	NR	NR	0
SSTS	0.001		0	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	0.001		0	NR	NR	NR	NR	0
RAATS	0.001		0	NR	NR	NR	NR	0
PRP	0.001		0	NR	NR	NR	NR	0
PADS	0.001		0	NR	NR	NR	NR	0
ICIS	0.001		0	NR	NR	NR	NR	0
FTTS	0.001		0	NR	NR	NR	NR	0
MLTS	0.001		0	NR	NR	NR	NR	0
COAL ASH DOE	0.001		0	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	0.001		0	NR	NR	NR	NR	0
RADINFO	0.001		0	NR	NR	NR	NR	0
HIST FTTS	0.001		0	NR	NR	NR	NR	0
DOT OPS	0.001		0	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	0.001		0	NR	NR	NR	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	0.001		0	NR	NR	NR	NR	0
US AIRS	0.001		0	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.001		0	NR	NR	NR	NR	0
FINDS	0.001		0	NR	NR	NR	NR	0
DOCKET HWC	0.001		0	NR	NR	NR	NR	0
ECHO	0.001		0	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
CA BOND EXP. PLAN	1.000		0	0	0	0	NR	0
Cortese	0.500		0	0	0	NR	NR	0
CUPA Listings	0.250		0	0	NR	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
EMI	0.001		0	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
ENF	0.001		0	NR	NR	NR	NR	0
Financial Assurance	0.001		0	NR	NR	NR	NR	0
HAZNET	0.001		0	NR	NR	NR	NR	0
ICE	0.001		0	NR	NR	NR	NR	0
HIST CORTESE	0.500		0	0	2	NR	NR	2
HWP	1.000		0	0	0	0	NR	0
HWT	0.250		0	0	NR	NR	NR	0
MINES	0.001		0	NR	NR	NR	NR	0
MWMP	0.250		0	0	NR	NR	NR	0
NPDES	0.001		0	NR	NR	NR	NR	0
PEST LIC	0.001		0	NR	NR	NR	NR	0
PROC	0.500		0	0	0	NR	NR	0
Notify 65	1.000		0	0	1	0	NR	1
UIC	0.001		0	NR	NR	NR	NR	0
WASTEWATER PITS	0.500		0	0	0	NR	NR	0
WDS	0.001		0	NR	NR	NR	NR	0
WIP	0.250		0	0	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		0	NR	NR	NR	NR	0
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA LF	0.001		0	NR	NR	NR	NR	0
RGA LUST	0.001		0	NR	NR	NR	NR	0
- Totals --		0	0	6	13	4	0	23

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

1 WNW 1/8-1/4 0.209 mi. 1105 ft. | **E-5 ALTERNATIVE SCHOOL SITE**
S OF CENTRAL PARKWAY & E OF FALLON ROAD
DUBLIN, CA 94588 | **ENVIROSTOR SCH** | **S117731556 N/A**

Relative: Lower

Actual: 406 ft.

ENVIROSTOR:

Facility ID:	60002169
Status:	No Further Action
Status Date:	06/14/2016
Site Code:	204274
Site Type:	School Investigation
Site Type Detailed:	School
Acres:	10
NPL:	NO
Regulatory Agencies:	SMBRP
Lead Agency:	SMBRP
Program Manager:	Craig Sanchez
Supervisor:	Jose Salcedo
Division Branch:	Northern California Schools & Santa Susana
Assembly:	16
Senate:	07
Special Program:	Not reported
Restricted Use:	NO
Site Mgmt Req:	NONE SPECIFIED
Funding:	School District
Latitude:	37.70954
Longitude:	-121.8479
APN:	985-98-2
Past Use:	AGRICULTURAL - LIVESTOCK
Potential COC:	Polynuclear aromatic hydrocarbons (PAHs
Confirmed COC:	Polynuclear aromatic hydrocarbons (PAHs
Potential Description:	SOIL
Alias Name:	985-98-2
Alias Type:	APN
Alias Name:	204274
Alias Type:	Project Code (Site Code)
Alias Name:	60002169
Alias Type:	Envirostor ID Number

Completed Info:

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Phase 1
Completed Date:	06/17/2015
Comments:	Not reported
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Environmental Oversight Agreement Application
Completed Date:	07/02/2015
Comments:	Not reported
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Preliminary Endangerment Assessment Workplan
Completed Date:	12/04/2015
Comments:	Not reported
Completed Area Name:	PROJECT WIDE

E-5 ALTERNATIVE SCHOOL SITE (Continued) **S117731556**

Completed Sub Area Name: Not reported
Completed Document Type: Preliminary Endangerment Assessment Report
Completed Date: 06/14/2016
Comments: Not reported

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Environmental Oversight Agreement
Completed Date: 07/13/2015
Comments: Not reported

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Pre-HARP Form
Completed Date: 06/02/2015
Comments: Not reported

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Pre-HARP Form
Completed Date: 07/07/2015
Comments: Not reported

Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported

SCH:

Facility ID: 60002169
Site Type: School Investigation
Site Type Detail: School
Site Mgmt. Req.: NONE SPECIFIED
Acres: 10
National Priorities List: NO
Cleanup Oversight Agencies: SMBRP
Lead Agency: SMBRP
Lead Agency Description: DTSC - Site Cleanup Program
Project Manager: Craig Sanchez
Supervisor: Jose Salcedo
Division Branch: Northern California Schools & Santa Susana
Site Code: 204274
Assembly: 16
Senate: 07
Special Program Status: Not reported
Status: No Further Action
Status Date: 06/14/2016
Restricted Use: NO
Funding: School District
Latitude: 37.70954
Longitude: -121.8479

E-5 ALTERNATIVE SCHOOL SITE (Continued) **S117731556**

APN:	985-98-2
Past Use:	AGRICULTURAL - LIVESTOCK
Potential COC:	Polynuclear aromatic hydrocarbons (PAHs
Confirmed COC:	Polynuclear aromatic hydrocarbons (PAHs
Potential Description:	SOIL
Alias Name:	985-98-2
Alias Type:	APN
Alias Name:	204274
Alias Type:	Project Code (Site Code)
Alias Name:	60002169
Alias Type:	Envirostor ID Number

Completed Info:

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Phase 1
Completed Date:	06/17/2015
Comments:	Not reported
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Environmental Oversight Agreement Application
Completed Date:	07/02/2015
Comments:	Not reported
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Preliminary Endangerment Assessment Workplan
Completed Date:	12/04/2015
Comments:	Not reported
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Preliminary Endangerment Assessment Report
Completed Date:	06/14/2016
Comments:	Not reported
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Environmental Oversight Agreement
Completed Date:	07/13/2015
Comments:	Not reported
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Pre-HARP Form
Completed Date:	06/02/2015
Comments:	Not reported
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Pre-HARP Form
Completed Date:	07/07/2015
Comments:	Not reported
Future Area Name:	Not reported
Future Sub Area Name:	Not reported
Future Document Type:	Not reported

E-5 ALTERNATIVE SCHOOL SITE (Continued) **S117731556**

Future Due Date:	Not reported
Schedule Area Name:	Not reported
Schedule Sub Area Name:	Not reported
Schedule Document Type:	Not reported
Schedule Due Date:	Not reported
Schedule Revised Date:	Not reported

2
West
1/8-1/4
0.223 mi.
1178 ft.

TARGET T2771
2800 DUBLIN BLVD
DUBLIN, CA 94568

RCRA-LQG **1014915658**
FINDS **CAR000221184**
ECHO

Relative:
Lower

Actual:
355 ft.

RCRA-LQG:

Date form received by agency:	02/18/2016
Facility name:	TARGET STORE T2771
Facility address:	2800 DUBLIN BLVD DUBLIN, CA 94568
EPA ID:	CAR000221184
Mailing address:	PO BOX 111 MINNEAPOLIS, MN 55440
Contact:	STEVE MUSSER
Contact address:	PO BOX 111 MINNEAPOLIS, MN 55440
Contact country:	US
Contact telephone:	800-587-2228
Contact email:	POC@TARGET.COM
EPA Region:	09
Classification:	Large Quantity Generator
Description:	Handler: generates 1,000 kg or more of hazardous waste during any calendar month; or generates more than 1 kg of acutely hazardous waste during any calendar month; or generates more than 100 kg of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month; or generates 1 kg or less of acutely hazardous waste during any calendar month, and accumulates more than 1 kg of acutely hazardous waste at any time; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates more than 100 kg of that material at any time

Owner/Operator Summary:

Owner/operator name:	TARGET CORPORATION
Owner/operator address:	PO BOX 111 MINNEAPOLIS, MN 55440
Owner/operator country:	US
Owner/operator telephone:	800-587-2228
Owner/operator email:	Not reported
Owner/operator fax:	Not reported
Owner/operator extension:	Not reported
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	10/05/2011
Owner/Op end date:	Not reported
Owner/operator name:	TARGET CORPORATION

TARGET T2771 (Continued) **1014915658**

Owner/operator address: Not reported
Not reported
Owner/operator country: Not reported
Owner/operator telephone: Not reported
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 10/05/2011
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No
On-site burner exemption: No
Furnace exemption: No
Used oil fuel burner: No
Used oil processor: No
User oil refiner: No
Used oil fuel marketer to burner: No
Used oil Specification marketer: No
Used oil transfer facility: No
Used oil transporter: No

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: D004
. Waste name: ARSENIC

. Waste code: D005
. Waste name: BARIUM

. Waste code: D006
. Waste name: CADMIUM

. Waste code: D007
. Waste name: CHROMIUM

. Waste code: D008
. Waste name: LEAD

. Waste code: D009
. Waste name: MERCURY

. Waste code: D010
. Waste name: SELENIUM

. Waste code: D011

TARGET T2771 (Continued) **1014915658**

. Waste name: SILVER

. Waste code: D016
. Waste name: 2,4-D (2,4-DICHLOROPHENOXYACETIC ACID)

. Waste code: D018
. Waste name: BENZENE

. Waste code: D024
. Waste name: M-CRESOL

. Waste code: D026
. Waste name: CRESOL

. Waste code: D035
. Waste name: METHYL ETHYL KETONE

. Waste code: P001
. Waste name: 2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYLBUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3% (OR) WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3%

. Waste code: P042
. Waste name: 1,2-BENZENEDIOL, 4-[1-HYDROXY-2-(METHYLAMINO)ETHYL]-, (R)- (OR) EPINEPHRINE

. Waste code: P075
. Waste name: NICOTINE, & SALTS (OR) PYRIDINE, 3-(1-METHYL-2-PYRROLIDINYL)-,(S)-, & SALTS

. Waste code: P081
. Waste name: 1,2,3-PROPANETRIOL, TRINITRATE (R) (OR) NITROGLYCERINE (R)

. Waste code: U002
. Waste name: 2-PROPANONE (I) (OR) ACETONE (I)

. Waste code: U034
. Waste name: ACETALDEHYDE, TRICHLORO- (OR) CHLORAL

. Waste code: U035
. Waste name: BENZENEBUTANOIC ACID, 4-[BIS(2-CHLOROETHYL)AMINO]- (OR) CHLORAMBUCIL

. Waste code: U044
. Waste name: CHLOROFORM (OR) METHANE, TRICHLORO-

. Waste code: U058
. Waste name: 2H-1,3,2-OXAZAPHOSPHORIN-2-AMINE, N,N-BIS(2-CHLOROETHYL)TETRAHYDRO-, 2-OXIDE (OR) CYCLOPHOSPHAMIDE

. Waste code: U072
. Waste name: BENZENE, 1,4-DICHLORO- (OR) P-DICHLOROBENZENE

. Waste code: U122
. Waste name: FORMALDEHYDE

. Waste code: U129
. Waste name: CYCLOHEXANE, 1,2,3,4,5,6-HEXACHLORO-, (1ALPHA, 2ALPHA, 3BETA, 4ALPHA,

TARGET T2771 (Continued) **1014915658**

5ALPHA, 6BETA)- (OR) LINDANE

. Waste code: U150
. Waste name: L-PHENYLALANINE, 4-[BIS(2-CHLOROETHYL)AMINO]- (OR) MELPHALAN

. Waste code: U154
. Waste name: METHANOL (I) (OR) METHYL ALCOHOL (I)

. Waste code: U188
. Waste name: PHENOL

. Waste code: U200
. Waste name: RESERPINE (OR) YOHIMBAN-16-CARBOXYLIC ACID, 11,17-DIMETHOXY-18-[(3,4,5-TRIMETHOXYBENZOYL)OXY]-, METHYL ESTER, (3BETA, 16BETA, 17ALPHA, 18BETA, 20ALPHA)-

. Waste code: U201
. Waste name: 1,3-BENZENEDIOL (OR) RESORCINOL

. Waste code: U279
. Waste name: CARBARYL (OR) 1-NAPHTHALENOL, METHYLCARBAMATE

Historical Generators:
Date form received by agency: 03/01/2014
Site name: TARGET STORE T2771
Classification: Small Quantity Generator

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: D003
. Waste name: REACTIVE WASTE

. Waste code: D004
. Waste name: ARSENIC

. Waste code: D005
. Waste name: BARIUM

. Waste code: D006
. Waste name: CADMIUM

. Waste code: D007
. Waste name: CHROMIUM

. Waste code: D008
. Waste name: LEAD

. Waste code: D009
. Waste name: MERCURY

. Waste code: D010
. Waste name: SELENIUM

TARGET T2771 (Continued) **1014915658**

. Waste code: D011
. Waste name: SILVER

. Waste code: D016
. Waste name: 2,4-D (2,4-DICHLOROPHENOXYACETIC ACID)

. Waste code: D018
. Waste name: BENZENE

. Waste code: D024
. Waste name: M-CRESOL

. Waste code: D026
. Waste name: CRESOL

. Waste code: D028
. Waste name: 1,2-DICHLOROETHANE

. Waste code: D035
. Waste name: METHYL ETHYL KETONE

. Waste code: P001
. Waste name: 2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYLBUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3% (OR) WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3%

. Waste code: P042
. Waste name: 1,2-BENZENEDIOL, 4-[1-HYDROXY-2-(METHYLAMINO)ETHYL]-, (R)- (OR) EPINEPHRINE

. Waste code: P075
. Waste name: NICOTINE, & SALTS (OR) PYRIDINE, 3-(1-METHYL-2-PYRROLIDINYL)-,(S)-, & SALTS

. Waste code: P081
. Waste name: 1,2,3-PROPANETRIOL, TRINITRATE (R) (OR) NITROGLYCERINE (R)

. Waste code: U002
. Waste name: 2-PROPANONE (I) (OR) ACETONE (I)

. Waste code: U034
. Waste name: ACETALDEHYDE, TRICHLORO- (OR) CHLORAL

. Waste code: U035
. Waste name: BENZENEBUTANOIC ACID, 4-[BIS(2-CHLOROETHYL)AMINO]- (OR) CHLORAMBUCIL

. Waste code: U044
. Waste name: CHLOROFORM (OR) METHANE, TRICHLORO-

. Waste code: U058
. Waste name: 2H-1,3,2-OXAZAPHOSPHORIN-2-AMINE, N,N-BIS(2-CHLOROETHYL)TETRAHYDRO-, 2-OXIDE (OR) CYCLOPHOSPHAMIDE

. Waste code: U072
. Waste name: BENZENE, 1,4-DICHLORO- (OR) P-DICHLOROBENZENE

. Waste code: U122

TARGET T2771 (Continued) **1014915658**

. Waste name: FORMALDEHYDE

. Waste code: U129
. Waste name: CYCLOHEXANE, 1,2,3,4,5,6-HEXACHLORO-, (1ALPHA, 2ALPHA, 3BETA, 4ALPHA, 5ALPHA, 6BETA)- (OR) LINDANE

. Waste code: U150
. Waste name: L-PHENYLALANINE, 4-[BIS(2-CHLOROETHYL)AMINO]- (OR) MELPHALAN

. Waste code: U154
. Waste name: METHANOL (I) (OR) METHYL ALCOHOL (I)

. Waste code: U188
. Waste name: PHENOL

. Waste code: U200
. Waste name: RESERPINE (OR) YOHIMBAN-16-CARBOXYLIC ACID, 11,17-DIMETHOXY-18-[(3,4,5-TRIMETHOXYBENZOYL)OXY]-, METHYL ESTER, (3BETA, 16BETA, 17ALPHA, 18BETA, 20ALPHA)-

. Waste code: U201
. Waste name: 1,3-BENZENEDIOL (OR) RESORCINOL

. Waste code: U279
. Waste name: CARBARYL (OR) 1-NAPHTHALENOL, METHYLCARBAMATE

Date form received by agency: 08/15/2011
Site name: TARGET STORE NO 2771
Classification: Small Quantity Generator

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: D005
. Waste name: BARIUM

. Waste code: D008
. Waste name: LEAD

. Waste code: D009
. Waste name: MERCURY

. Waste code: D011
. Waste name: SILVER

. Waste code: D016
. Waste name: 2,4-D (2,4-DICHLOROPHENOXYACETIC ACID)

. Waste code: P001
. Waste name: 2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYLBUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3% (OR) WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3%

. Waste code: P046

TARGET T2771 (Continued) **1014915658**

. Waste name: ALPHA,ALPHA-DIMETHYLPHENETHYLAMINE (OR) BENZENEETHANAMINE, ALPHA, ALPHA-DIMETHYL-

. Waste code: P075
. Waste name: NICOTINE, & SALTS (OR) PYRIDINE, 3-(1-METHYL-2-PYRROLIDINYL)-,(S)-, & SALTS

Biennial Reports:

Last Biennial Reporting Year: 2017

Annual Waste Handled:

Waste code: D001
Waste name: IGNITABLE HAZARDOUS WASTES ARE THOSE WASTES WHICH HAVE A FLASHPOINT OF LESS THAN 140 DEGREES FAHRENHEIT AS DETERMINED BY A PENSKY-MARTENS CLOSED CUP FLASH POINT TESTER. ANOTHER METHOD OF DETERMINING THE FLASH POINT OF A WASTE IS TO REVIEW THE MATERIAL SAFETY DATA SHEET, WHICH CAN BE OBTAINED FROM THE MANUFACTURER OR DISTRIBUTOR OF THE MATERIAL. LACQUER THINNER IS AN EXAMPLE OF A COMMONLY USED SOLVENT WHICH WOULD BE CONSIDERED AS IGNITABLE HAZARDOUS WASTE.
Amount (Lbs): 1515

Waste code: D002
Waste name: A WASTE WHICH HAS A PH OF LESS THAN 2 OR GREATER THAN 12.5 IS CONSIDERED TO BE A CORROSIVE HAZARDOUS WASTE. SODIUM HYDROXIDE, A CAUSTIC SOLUTION WITH A HIGH PH, IS OFTEN USED BY INDUSTRIES TO CLEAN OR DEGREASE PARTS. HYDROCHLORIC ACID, A SOLUTION WITH A LOW PH, IS USED BY MANY INDUSTRIES TO CLEAN METAL PARTS PRIOR TO PAINTING. WHEN THESE CAUSTIC OR ACID SOLUTIONS BECOME CONTAMINATED AND MUST BE DISPOSED, THE WASTE WOULD BE A CORROSIVE HAZARDOUS WASTE.
Amount (Lbs): 740

Waste code: D005
Waste name: BARIUM
Amount (Lbs): 588

Waste code: D007
Waste name: CHROMIUM
Amount (Lbs): 588

Waste code: D009
Waste name: MERCURY
Amount (Lbs): 63

Waste code: D011
Waste name: SILVER
Amount (Lbs): 588

Waste code: D018
Waste name: BENZENE
Amount (Lbs): 588

Waste code: D035
Waste name: METHYL ETHYL KETONE
Amount (Lbs): 1456

Waste code: P001
Waste name: 2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYLBUTYL)-, & SALTS,

TARGET T2771 (Continued) **1014915658**

WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3%
Amount (Lbs): 78

Waste code: P075
Waste name: NICOTINE, & SALTS
Amount (Lbs): 78

Waste code: U002
Waste name: ACETONE (I)
Amount (Lbs): 588

Waste code: U154
Waste name: METHANOL (I)
Amount (Lbs): 588

Violation Status: No violations found

FINDS:

Registry ID: 110055715409

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

STATE MASTER

HAZARDOUS WASTE BIENNIAL REPORTER

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1014915658
Registry ID: 110055715409
DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110055715409

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3 West 1/8-1/4 0.241 mi. 1271 ft. | **CVS PHARMACY #17628**
2800 DUBLIN BLVD STE B
DUBLIN, CA 94568 | **RCRA-CESQG FINDS ECHO** | **1018273700 CAR000258731**

Relative: Lower

Actual: 358 ft.

RCRA-CESQG:
Date form received by agency: 02/16/2016
Facility name: CVS PHARMACY #17628
Facility address: 2800 DUBLIN BLVD STE B
DUBLIN, CA 94568
EPA ID: CAR000258731
Mailing address: ONE CVS DR
WOONSOCKET, RI 02895
Contact: NICOLE WILKINSON

CVS PHARMACY #17628 (Continued) **1018273700**

Contact address: ONE CVS DR MAIL CODE 2340
WOONSOCKET, RI 02895
Contact country: US
Contact telephone: 401-770-7132
Contact email: NICOLE.WILKINSON@CVSHEALTH.COM
EPA Region: 09
Classification: Conditionally Exempt Small Quantity Generator
Description: Handler: generates 100 kg or less of hazardous waste per calendar month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste

Owner/Operator Summary:
Owner/operator name: TARGET CORP
Owner/operator address: NICOLLET MALL
MINNEAPOLIS, MN 55403
Owner/operator country: US
Owner/operator telephone: 612-304-6073
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Owner
Owner/Op start date: 03/05/2014
Owner/Op end date: Not reported

Owner/operator name: GARFIELD BEACH CVS LLC
Owner/operator address: Not reported
Not reported
Owner/operator country: US
Owner/operator telephone: Not reported
Owner/operator email: Not reported
Owner/operator fax: Not reported
Owner/operator extension: Not reported
Legal status: Private
Owner/Operator Type: Operator
Owner/Op start date: 12/16/2015
Owner/Op end date: Not reported

Handler Activities Summary:
U.S. importer of hazardous waste: No
Mixed waste (haz. and radioactive): No
Recycler of hazardous waste: No
Transporter of hazardous waste: No
Treater, storer or disposer of HW: No
Underground injection activity: No

CVS PHARMACY #17628 (Continued) **1018273700**

On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

. Waste code: 122
. Waste name: Alkaline solution without metals (pH > 12.5)

. Waste code: 123
. Waste name: Unspecified alkaline solution

. Waste code: 134
. Waste name: Aqueous solution with <10% total organic residues

. Waste code: 141
. Waste name: Off-specification, aged, or surplus inorganics

. Waste code: 181
. Waste name: Other inorganic solid waste

. Waste code: 214
. Waste name: Unspecified solvent mixture

. Waste code: 311
. Waste name: Pharmaceutical waste

. Waste code: 331
. Waste name: Off-specification, aged, or surplus organics

. Waste code: 352
. Waste name: Other organic solids

. Waste code: 541
. Waste name: Photochemicals / photo processing waste

. Waste code: 561
. Waste name: Detergent and soap

. Waste code: 791
. Waste name: Liquids with pH < 2

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: D007
. Waste name: CHROMIUM

. Waste code: D009
. Waste name: MERCURY

CVS PHARMACY #17628 (Continued) **1018273700**

. Waste code: D010
. Waste name: SELENIUM

. Waste code: D011
. Waste name: SILVER

. Waste code: D024
. Waste name: M-CRESOL

. Waste code: P001
. Waste name: 2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYLBUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3% (OR) WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3%

. Waste code: U034
. Waste name: ACETALDEHYDE, TRICHLORO- (OR) CHLORAL

. Waste code: U044
. Waste name: CHLOROFORM (OR) METHANE, TRICHLORO-

. Waste code: U122
. Waste name: FORMALDEHYDE

. Waste code: U129
. Waste name: CYCLOHEXANE, 1,2,3,4,5,6-HEXACHLORO-, (1ALPHA, 2ALPHA, 3BETA, 4ALPHA, 5ALPHA, 6BETA)- (OR) LINDANE

. Waste code: U188
. Waste name: PHENOL

. Waste code: U201
. Waste name: 1,3-BENZENEDIOL (OR) RESORCINOL

. Waste code: U205
. Waste name: SELENIUM SULFIDE (OR) SELENIUM SULFIDE SES2 (R,T)

Violation Status: No violations found

FINDS:

Registry ID: 110067552712

Environmental Interest/Information System
RCRAInfo is a national information system that supports the Resource Conservation and Recovery Act (RCRA) program through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Click this hyperlink while viewing on your computer to access additional FINDS: detail in the EDR Site Report.

ECHO:
Envid: 1018273700
Registry ID: 110067552712

CVS PHARMACY #17628 (Continued) **1018273700**

DFR URL: http://echo.epa.gov/detailed-facility-report?fid=110067552712

4
SSW
1/8-1/4
0.244 mi.
1288 ft.

CITY OF LIVERMORE AIRPORT
1800 FRIESMAN
LIVERMORE, CA 94550

LUST **S106661033**
Alameda County CS **N/A**

Relative:
Lower

Actual:
368 ft.

LUST:

Lead Agency:	ALAMEDA COUNTY LOP
Case Type:	LUST Cleanup Site
Geo Track:	http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T0600101626
Global Id:	T0600101626
Latitude:	37.6973939289232
Longitude:	-121.825177494598
Status:	Completed - Case Closed
Status Date:	09/23/1996
Case Worker:	Not reported
RB Case Number:	01-1758
Local Agency:	Not reported
File Location:	All Files are on GeoTracker or in the Local Agency Database
Local Case Number:	RO0001175
Potential Media Affect:	Other Groundwater (uses other than drinking water)
Potential Contaminants of Concern:	Gasoline
Site History:	Not reported

LUST:

Global Id:	T0600101626
Contact Type:	Regional Board Caseworker
Contact Name:	Regional Water Board
Organization Name:	SAN FRANCISCO BAY RWQCB (REGION 2)
Address:	1515 CLAY ST SUITE 1400
City:	OAKLAND
Email:	Not reported
Phone Number:	Not reported

LUST:

Global Id:	T0600101626
Action Type:	REMEDIATION
Date:	09/09/9999
Action:	Excavation
Global Id:	T0600101626
Action Type:	Other
Date:	07/27/1989
Action:	Leak Reported
Global Id:	T0600101626
Action Type:	ENFORCEMENT
Date:	09/23/2014
Action:	Closure/No Further Action Letter - #20140923

LUST:

Global Id:	T0600101626
Status:	Open - Case Begin Date
Status Date:	07/26/1989

CITY OF LIVERMORE AIRPORT (Continued) **S106661033**

Global Id: T0600101626
Status: Completed - Case Closed
Status Date: 09/23/1996

Alameda County CS:
Status: Case Closed
Record Id: RO0001175
PE: 5602
Facility Status: Case Closed
Latitude: 37.596485293
Longitude: -121.70596128

---

5 SSE 1/4-1/2 0.250 mi. 1322 ft.

AIRPORT/LOS POSITAS GOLFCOURSE **Notify 65** **S100179218**
1800 FRIESMAN **N/A**
PLEASANTON, CA 92561

Relative: Lower

Actual: 376 ft.

NOTIFY 65:
Date Reported: Not reported
Staff Initials: Not reported
Board File Number: Not reported
Facility Type: Not reported
Discharge Date: Not reported
Issue Date: Not reported
Incident Description: Not reported

---

6 East 1/4-1/2 0.293 mi. 1549 ft.

BERNARD'S **LUST** **S107472859**
1051 AIRWAY BLVD **Alameda County CS** **N/A**
LIVERMORE, CA 94550

Relative: Higher

Actual: 436 ft.

LUST:
Lead Agency: ALAMEDA COUNTY LOP
Case Type: LUST Cleanup Site
Geo Track: http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T0600148042
Global Id: T0600148042
Latitude: 37.703619
Longitude: -121.818129
Status: Completed - Case Closed
Status Date: 11/07/2008
Case Worker: Not reported
RB Case Number: NA
Local Agency: Not reported
File Location: All Files are on GeoTracker or in the Local Agency Database
Local Case Number: RO0002440
Potential Media Affect: Aquifer used for drinking water supply
Potential Contaminants of Concern: Gasoline
Site History: Not reported

LUST:
Global Id: T0600148042
Contact Type: Regional Board Caseworker
Contact Name: Regional Water Board

BERNARD'S (Continued) **S107472859**

Organization Name: SAN FRANCISCO BAY RWQCB (REGION 2)
Address: 1515 CLAY ST SUITE 1400
City: OAKLAND
Email: Not reported
Phone Number: Not reported

LUST:
Global Id: T0600148042
Action Type: ENFORCEMENT
Date: 07/30/2008
Action: Technical Correspondence / Assistance / Other - #20080730

Global Id: T0600148042
Action Type: ENFORCEMENT
Date: 11/07/2008
Action: Closure/No Further Action Letter - #20081107

Global Id: T0600148042
Action Type: ENFORCEMENT
Date: 11/16/2001
Action: Notice of Responsibility - #UNK

Global Id: T0600148042
Action Type: Other
Date: 06/19/2001
Action: Leak Discovery

Global Id: T0600148042
Action Type: Other
Date: 01/03/2002
Action: Leak Reported

Global Id: T0600148042
Action Type: REMEDIATION
Date: 09/09/9999
Action: Not reported

LUST:
Global Id: T0600148042
Status: Open - Case Begin Date
Status Date: 06/19/2001

Global Id: T0600148042
Status: Open - Site Assessment
Status Date: 11/09/2001

Global Id: T0600148042
Status: Open - Site Assessment
Status Date: 06/12/2002

Global Id: T0600148042
Status: Open - Verification Monitoring
Status Date: 03/27/2008

Global Id: T0600148042
Status: Completed - Case Closed

BERNARD'S (Continued) **S107472859**

Status Date: 11/07/2008

Alameda County CS:

Status: Leak Confirmation
Record Id: RO0002440
PE: 5602
Facility Status: Leak Confirmation
Latitude: 37.696255507
Longitude: -121.78532166

Status: Pollution Characterization
Record Id: RO0002440
PE: 5602
Facility Status: Pollution Charaterization
Latitude: 37.696255507
Longitude: -121.78532166

Status: Verificaiton Monitoring Underway
Record Id: RO0002440
PE: 5602
Facility Status: Verification Monitoring Underway
Latitude: 37.696255507
Longitude: -121.78532166

Status: Case Closed
Record Id: RO0002440
PE: 5602
Facility Status: Case Closed
Latitude: 37.696255507
Longitude: -121.78532166

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7 **WINDWOOD AT JORDAN RANCH** **SLIC** **S107998231**
NW **4233 FALLON ROAD** **Alameda County CS** **N/A**
1/4-1/2 **DUBLIN, CA 94568** **NPDES**
0.346 mi.
1829 ft.

Relative:
Higher

Actual:
449 ft.

SLIC:

Region: STATE
Facility Status: **Completed - Case Closed**
Status Date: 01/14/2016
Global Id: T06019797353
Lead Agency: ALAMEDA COUNTY LOP
Lead Agency Case Number: RO0002918
Latitude: 37.7113931879984
Longitude: -121.850738525391
Case Type: Cleanup Program Site
Case Worker: Not reported
Local Agency: Not reported
RB Case Number: NA
File Location: All Files are on GeoTracker or in the Local Agency Database
Potential Media Affected: Aquifer used for drinking water supply
Potential Contaminants of Concern: Gasoline
Site History: The site is a former ranch complex. A Phase I Environmental Site Assessment (ESA) conducted in 2000 identified potential soil or groundwater contamination source areas including a former underground

WINDWOOD AT JORDAN RANCH (Continued) **S107998231**

storage tank (UST), a diesel fuel drum-storage area, empty above ground storage tanks, 55-gallon waste oil drum, and circular "bare-earth zones identified in historic photographs. Results of a Phase II ESA performed in 2001 indicated an unauthorized release of petroleum hydrocarbons had occurred from the former UST. In 2006, a soil and groundwater investigation was conducted including installation of 5 groundwater monitoring wells and collection of soil, sediment, groundwater, and soil vapor samples to assess the potential presence of pesticides and herbicides in shallow soil, impacts related to two debris disposal areas, and soil vapor impacts related to the UST. The investigation results indicate elevated levels of petroleum hydrocarbons as gasoline in soil and groundwater, and elevated levels of benzene in groundwater and soil vapor samples. In 2006 a supplemental site investigation was conducted to delineate the horizontal extent of petroleum constituents detected in soil and groundwater. Based on results of three soil samples and three grab groundwater samples collected from three test pits, it was concluded that impacts are limited to the immediate vicinity of the former UST. Implementation of the CAP began in September 2011 and included soil excavation and ex-situ soil treatment in an on-site cell. Due to significant soil staining throughout the base and sidewalls of the initial excavation beginning at 14 feet bgs (PID reading of 2,000 ppm). The excavation extended to a depth of 25 feet which resulted in removal of approximately 200 cubic yards of impacted soil below the water table. Due to site access constraints, impacted soil below the water table was left in place. Maximum concentrations of TPHd and TPg detected in confirmation base samples were 790 mg/kg and 3,700 mg/kg, respectively. Due to geotechnical concerns, the excavation was immediately backfilled with drain rock below the water table and therefore groundwater extraction activities as proposed in the CAP (removal of 40,000 gallons of impacted groundwater from the open excavation pit) were not implemented. In total, approximately 450 cubic yards of impacted soil was excavated and placed in the ex-situ bioaugmentation treatment cell. In October 2011 groundwater remediation activities commenced with advancement of 27 injection points and pumping of the bioaugmentation liquid reagent BioCritters into the saturated zone. Five rounds of soil vapor sampling was completed in the area of the former UST tank pit between June 2012 and June 2014 to assess the potential for vapor intrusion to indoor air for future buildings. Based on the results of the soil vapor sampling, the residual contamination does not appear to pose a risk for vapor intrusion to indoor air for the planned development. The case was closed on January 14, 2016

Click here to access the California GeoTracker records for this facility:

Alameda County CS:

Status:	Preliminary Site Assessment Underway
Record Id:	RO0002918
PE:	5502
Facility Status:	Preliminary Site Assessment Underway
Latitude:	37.710466757
Longitude:	-121.8516891

Status:	Pollution Characterization
Record Id:	RO0002918
PE:	5502

WINDWOOD AT JORDAN RANCH (Continued) **S107998231**

Facility Status: Pollution Charaterization
Latitude: 37.710466757
Longitude: -121.8516891

Status: Case Closed
Record Id: RO0002918
PE: 5502
Facility Status: Case Closed
Latitude: 37.710466757
Longitude: -121.8516891

NPDES:

Npdes Number:	CAS000002
Facility Status:	Terminated
Agency Id:	0
Region:	2
Regulatory Measure Id:	414334
Order No:	2009-0009-DWQ
Regulatory Measure Type:	Enrollee
Place Id:	Not reported
WDID:	2 01C360859
Program Type:	Construction
Adoption Date Of Regulatory Measure:	Not reported
Effective Date Of Regulatory Measure:	04/22/2011
Expiration Date Of Regulatory Measure:	Not reported
Termination Date Of Regulatory Measure:	07/08/2016
Discharge Name:	BJP ROF Jordan Ranch LLC
Discharge Address:	5000 Hopyard Road Suite 170
Discharge City:	Pleasanton
Discharge State:	California
Discharge Zip:	94588
RECEIVED DATE:	Not reported
PROCESSED DATE:	Not reported
STATUS CODE NAME:	Not reported
STATUS DATE:	Not reported
PLACE SIZE:	Not reported
PLACE SIZE UNIT:	Not reported
FACILITY CONTACT NAME:	Not reported
FACILITY CONTACT TITLE:	Not reported
FACILITY CONTACT PHONE:	Not reported
FACILITY CONTACT PHONE EXT:	Not reported
FACILITY CONTACT EMAIL:	Not reported
OPERATOR NAME:	Not reported
OPERATOR ADDRESS:	Not reported
OPERATOR CITY:	Not reported
OPERATOR STATE:	Not reported
OPERATOR ZIP:	Not reported
OPERATOR CONTACT NAME:	Not reported
OPERATOR CONTACT TITLE:	Not reported
OPERATOR CONTACT PHONE:	Not reported
OPERATOR CONTACT PHONE EXT:	Not reported
OPERATOR CONTACT EMAIL:	Not reported
OPERATOR TYPE:	Not reported
DEVELOPER NAME:	Not reported
DEVELOPER ADDRESS:	Not reported
DEVELOPER CITY:	Not reported
DEVELOPER STATE:	Not reported

WINDWOOD AT JORDAN RANCH (Continued) **S107998231**

DEVELOPER ZIP:	Not reported
DEVELOPER CONTACT NAME:	Not reported
DEVELOPER CONTACT TITLE:	Not reported
CONSTYPE LINEAR UTILITY IND:	Not reported
EMERGENCY PHONE NO:	Not reported
EMERGENCY PHONE EXT:	Not reported
CONSTYPE ABOVE GROUND IND:	Not reported
CONSTYPE BELOW GROUND IND:	Not reported
CONSTYPE CABLE LINE IND:	Not reported
CONSTYPE COMM LINE IND:	Not reported
CONSTYPE COMMERTIAL IND:	Not reported
CONSTYPE ELECTRICAL LINE IND:	Not reported
CONSTYPE GAS LINE IND:	Not reported
CONSTYPE INDUSTRIAL IND:	Not reported
CONSTYPE OTHER DESRIPTION:	Not reported
CONSTYPE OTHER IND:	Not reported
CONSTYPE RECONS IND:	Not reported
CONSTYPE RESIDENTIAL IND:	Not reported
CONSTYPE TRANSPORT IND:	Not reported
CONSTYPE UTILITY DESCRIPTION:	Not reported
CONSTYPE UTILITY IND:	Not reported
CONSTYPE WATER SEWER IND:	Not reported
DIR DISCHARGE USWATER IND:	Not reported
RECEIVING WATER NAME:	Not reported
CERTIFIER NAME:	Not reported
CERTIFIER TITLE:	Not reported
CERTIFICATION DATE:	Not reported
PRIMARY SIC:	Not reported
SECONDARY SIC:	Not reported
TERTIARY SIC:	Not reported
Npdes Number:	Not reported
Facility Status:	Not reported
Agency Id:	Not reported
Region:	2
Regulatory Measure Id:	414334
Order No:	Not reported
Regulatory Measure Type:	Construction
Place Id:	Not reported
WDID:	2 01C360859
Program Type:	Not reported
Adoption Date Of Regulatory Measure:	Not reported
Effective Date Of Regulatory Measure:	Not reported
Expiration Date Of Regulatory Measure:	Not reported
Termination Date Of Regulatory Measure:	07/08/2016
Discharge Name:	Not reported
Discharge Address:	Not reported
Discharge City:	Not reported
Discharge State:	Not reported
Discharge Zip:	Not reported
RECEIVED DATE:	04/19/2011
PROCESSED DATE:	04/22/2011
STATUS CODE NAME:	Terminated
STATUS DATE:	07/15/2016
PLACE SIZE:	189.4
PLACE SIZE UNIT:	Acres
FACILITY CONTACT NAME:	Ravi Nandwana

WINDWOOD AT JORDAN RANCH (Continued) **S107998231**

FACILITY CONTACT TITLE:	Not reported
FACILITY CONTACT PHONE:	925-467-9900
FACILITY CONTACT PHONE EXT:	Not reported
FACILITY CONTACT EMAIL:	ravi@missionvalleyhomes.com
OPERATOR NAME:	BJP ROF Jordan Ranch LLC
OPERATOR ADDRESS:	5000 Hopyard Road Suite 170
OPERATOR CITY:	Pleasanton
OPERATOR STATE:	California
OPERATOR ZIP:	94588
OPERATOR CONTACT NAME:	Ravi Nandwana
OPERATOR CONTACT TITLE:	Not reported
OPERATOR CONTACT PHONE:	925-467-9900
OPERATOR CONTACT PHONE EXT:	Not reported
OPERATOR CONTACT EMAIL:	ravi@missionvalleyhomes.com
OPERATOR TYPE:	Private Business
DEVELOPER NAME:	Mission Valley Properties
DEVELOPER ADDRESS:	5000 Hopyard Road suite 170
DEVELOPER CITY:	Pleasanton
DEVELOPER STATE:	California
DEVELOPER ZIP:	94588
DEVELOPER CONTACT NAME:	Ravi Nandwana
DEVELOPER CONTACT TITLE:	Not reported
CONSTYPE LINEAR UTILITY IND:	N
EMERGENCY PHONE NO:	Not reported
EMERGENCY PHONE EXT:	Not reported
CONSTYPE ABOVE GROUND IND:	Not reported
CONSTYPE BELOW GROUND IND:	Not reported
CONSTYPE CABLE LINE IND:	Not reported
CONSTYPE COMM LINE IND:	Not reported
CONSTYPE COMMERTIAL IND:	Not reported
CONSTYPE ELECTRICAL LINE IND:	Not reported
CONSTYPE GAS LINE IND:	Not reported
CONSTYPE INDUSTRIAL IND:	Not reported
CONSTYPE OTHER DESRIPTION:	Not reported
CONSTYPE OTHER IND:	Not reported
CONSTYPE RECONS IND:	Not reported
CONSTYPE RESIDENTIAL IND:	Y
CONSTYPE TRANSPORT IND:	Not reported
CONSTYPE UTILITY DESCRIPTION:	Not reported
CONSTYPE UTILITY IND:	Not reported
CONSTYPE WATER SEWER IND:	Not reported
DIR DISCHARGE USWATER IND:	N
RECEIVING WATER NAME:	Not reported
CERTIFIER NAME:	Robert Radanovich
CERTIFIER TITLE:	Not reported
CERTIFICATION DATE:	19-APR-11
PRIMARY SIC:	Not reported
SECONDARY SIC:	Not reported
TERTIARY SIC:	Not reported
Npdes Number:	CAS000002
Facility Status:	Terminated
Agency Id:	0
Region:	2
Regulatory Measure Id:	423735
Order No:	2009-0009-DWQ
Regulatory Measure Type:	Enrollee

WINDWOOD AT JORDAN RANCH (Continued) **S107998231**

Place Id:	Not reported
WDID:	2 01C362893
Program Type:	Construction
Adoption Date Of Regulatory Measure:	Not reported
Effective Date Of Regulatory Measure:	01/30/2012
Expiration Date Of Regulatory Measure:	Not reported
Termination Date Of Regulatory Measure:	09/10/2015
Discharge Name:	Brookfield Windwood LLC
Discharge Address:	500 La Gonda Way
Discharge City:	Danville
Discharge State:	California
Discharge Zip:	94526
RECEIVED DATE:	Not reported
PROCESSED DATE:	Not reported
STATUS CODE NAME:	Not reported
STATUS DATE:	Not reported
PLACE SIZE:	Not reported
PLACE SIZE UNIT:	Not reported
FACILITY CONTACT NAME:	Not reported
FACILITY CONTACT TITLE:	Not reported
FACILITY CONTACT PHONE:	Not reported
FACILITY CONTACT PHONE EXT:	Not reported
FACILITY CONTACT EMAIL:	Not reported
OPERATOR NAME:	Not reported
OPERATOR ADDRESS:	Not reported
OPERATOR CITY:	Not reported
OPERATOR STATE:	Not reported
OPERATOR ZIP:	Not reported
OPERATOR CONTACT NAME:	Not reported
OPERATOR CONTACT TITLE:	Not reported
OPERATOR CONTACT PHONE:	Not reported
OPERATOR CONTACT PHONE EXT:	Not reported
OPERATOR CONTACT EMAIL:	Not reported
OPERATOR TYPE:	Not reported
DEVELOPER NAME:	Not reported
DEVELOPER ADDRESS:	Not reported
DEVELOPER CITY:	Not reported
DEVELOPER STATE:	Not reported
DEVELOPER ZIP:	Not reported
DEVELOPER CONTACT NAME:	Not reported
DEVELOPER CONTACT TITLE:	Not reported
CONSTYPE LINEAR UTILITY IND:	Not reported
EMERGENCY PHONE NO:	Not reported
EMERGENCY PHONE EXT:	Not reported
CONSTYPE ABOVE GROUND IND:	Not reported
CONSTYPE BELOW GROUND IND:	Not reported
CONSTYPE CABLE LINE IND:	Not reported
CONSTYPE COMM LINE IND:	Not reported
CONSTYPE COMMERTIAL IND:	Not reported
CONSTYPE ELECTRICAL LINE IND:	Not reported
CONSTYPE GAS LINE IND:	Not reported
CONSTYPE INDUSTRIAL IND:	Not reported
CONSTYPE OTHER DESRIPTION:	Not reported
CONSTYPE OTHER IND:	Not reported
CONSTYPE RECONS IND:	Not reported
CONSTYPE RESIDENTIAL IND:	Not reported
CONSTYPE TRANSPORT IND:	Not reported

WINDWOOD AT JORDAN RANCH (Continued) **S107998231**

CONSTYPE UTILITY DESCRIPTION:	Not reported
CONSTYPE UTILITY IND:	Not reported
CONSTYPE WATER SEWER IND:	Not reported
DIR DISCHARGE USWATER IND:	Not reported
RECEIVING WATER NAME:	Not reported
CERTIFIER NAME:	Not reported
CERTIFIER TITLE:	Not reported
CERTIFICATION DATE:	Not reported
PRIMARY SIC:	Not reported
SECONDARY SIC:	Not reported
TERTIARY SIC:	Not reported
Npdes Number:	Not reported
Facility Status:	Not reported
Agency Id:	Not reported
Region:	2
Regulatory Measure Id:	423735
Order No:	Not reported
Regulatory Measure Type:	Construction
Place Id:	Not reported
WDID:	2 01C362893
Program Type:	Not reported
Adoption Date Of Regulatory Measure:	Not reported
Effective Date Of Regulatory Measure:	Not reported
Expiration Date Of Regulatory Measure:	Not reported
Termination Date Of Regulatory Measure:	09/10/2015
Discharge Name:	Not reported
Discharge Address:	Not reported
Discharge City:	Not reported
Discharge State:	Not reported
Discharge Zip:	Not reported
RECEIVED DATE:	01/26/2012
PROCESSED DATE:	01/30/2012
STATUS CODE NAME:	Terminated
STATUS DATE:	10/23/2015
PLACE SIZE:	4.3
PLACE SIZE UNIT:	Acres
FACILITY CONTACT NAME:	Mark Saracco
FACILITY CONTACT TITLE:	Director of Operations
FACILITY CONTACT PHONE:	925-743-8000
FACILITY CONTACT PHONE EXT:	Not reported
FACILITY CONTACT EMAIL:	dluebkeman@brookfieldnorcal.com
OPERATOR NAME:	Brookfield Windwood LLC
OPERATOR ADDRESS:	500 La Gonda Way
OPERATOR CITY:	Danville
OPERATOR STATE:	California
OPERATOR ZIP:	94526
OPERATOR CONTACT NAME:	Dave Luebkeman
OPERATOR CONTACT TITLE:	CFO
OPERATOR CONTACT PHONE:	925-743-8000
OPERATOR CONTACT PHONE EXT:	Not reported
OPERATOR CONTACT EMAIL:	dluebkeman@brookfieldnorcal.com
OPERATOR TYPE:	Private Business
DEVELOPER NAME:	Brookfield Bay Area Builders Inc
DEVELOPER ADDRESS:	500 La Gonda Way
DEVELOPER CITY:	Danville
DEVELOPER STATE:	California

WINDWOOD AT JORDAN RANCH (Continued) **S107998231**

DEVELOPER ZIP:	94526
DEVELOPER CONTACT NAME:	Mark Saracco
DEVELOPER CONTACT TITLE:	Director of Operations
CONSTYPE LINEAR UTILITY IND:	N
EMERGENCY PHONE NO:	925-250-3352
EMERGENCY PHONE EXT:	Not reported
CONSTYPE ABOVE GROUND IND:	Not reported
CONSTYPE BELOW GROUND IND:	Not reported
CONSTYPE CABLE LINE IND:	Not reported
CONSTYPE COMM LINE IND:	Not reported
CONSTYPE COMMERTIAL IND:	Not reported
CONSTYPE ELECTRICAL LINE IND:	Not reported
CONSTYPE GAS LINE IND:	Not reported
CONSTYPE INDUSTRIAL IND:	Not reported
CONSTYPE OTHER DESRIPTION:	Not reported
CONSTYPE OTHER IND:	Not reported
CONSTYPE RECONS IND:	Not reported
CONSTYPE RESIDENTIAL IND:	Y
CONSTYPE TRANSPORT IND:	Not reported
CONSTYPE UTILITY DESCRIPTION:	Not reported
CONSTYPE UTILITY IND:	Not reported
CONSTYPE WATER SEWER IND:	Not reported
DIR DISCHARGE USWATER IND:	N
RECEIVING WATER NAME:	Arroyo Mocho Canal
CERTIFIER NAME:	MARK SARACCO
CERTIFIER TITLE:	Not reported
CERTIFICATION DATE:	26-JAN-12
PRIMARY SIC:	Not reported
SECONDARY SIC:	Not reported
TERTIARY SIC:	Not reported
Npdes Number:	Not reported
Facility Status:	Not reported
Agency Id:	Not reported
Region:	2
Regulatory Measure Id:	423732
Order No:	Not reported
Regulatory Measure Type:	Construction
Place Id:	Not reported
WDID:	2 01C362899
Program Type:	Not reported
Adoption Date Of Regulatory Measure:	Not reported
Effective Date Of Regulatory Measure:	Not reported
Expiration Date Of Regulatory Measure:	Not reported
Termination Date Of Regulatory Measure:	04/04/2014
Discharge Name:	Not reported
Discharge Address:	Not reported
Discharge City:	Not reported
Discharge State:	Not reported
Discharge Zip:	Not reported
RECEIVED DATE:	01/27/2012
PROCESSED DATE:	01/30/2012
STATUS CODE NAME:	Terminated
STATUS DATE:	04/07/2014
PLACE SIZE:	3.1
PLACE SIZE UNIT:	Acres
FACILITY CONTACT NAME:	Mark Saracco

WINDWOOD AT JORDAN RANCH (Continued) **S107998231**

FACILITY CONTACT TITLE:	Director of Operations
FACILITY CONTACT PHONE:	925-743-8000
FACILITY CONTACT PHONE EXT:	Not reported
FACILITY CONTACT EMAIL:	mark.saracco@brookfieldhomes.com
OPERATOR NAME:	Brookfield Mariposa LLC
OPERATOR ADDRESS:	500 La Gonda Way
OPERATOR CITY:	Danville
OPERATOR STATE:	California
OPERATOR ZIP:	94526
OPERATOR CONTACT NAME:	MARK SARACCO
OPERATOR CONTACT TITLE:	CFO
OPERATOR CONTACT PHONE:	925-743-8000
OPERATOR CONTACT PHONE EXT:	Not reported
OPERATOR CONTACT EMAIL:	mark.saracco@brookfieldhomes.com
OPERATOR TYPE:	Private Business
DEVELOPER NAME:	Brookfield Bay Area Builders Inc
DEVELOPER ADDRESS:	500 La Gonda Way
DEVELOPER CITY:	Danville
DEVELOPER STATE:	California
DEVELOPER ZIP:	94526
DEVELOPER CONTACT NAME:	Mark Saracco
DEVELOPER CONTACT TITLE:	Director of Operations
CONSTYPE LINEAR UTILITY IND:	N
EMERGENCY PHONE NO:	925-580-8647
EMERGENCY PHONE EXT:	Not reported
CONSTYPE ABOVE GROUND IND:	N
CONSTYPE BELOW GROUND IND:	N
CONSTYPE CABLE LINE IND:	N
CONSTYPE COMM LINE IND:	N
CONSTYPE COMMERTIAL IND:	N
CONSTYPE ELECTRICAL LINE IND:	N
CONSTYPE GAS LINE IND:	N
CONSTYPE INDUSTRIAL IND:	N
CONSTYPE OTHER DESRIPTION:	Not reported
CONSTYPE OTHER IND:	N
CONSTYPE RECONS IND:	N
CONSTYPE RESIDENTIAL IND:	Y
CONSTYPE TRANSPORT IND:	N
CONSTYPE UTILITY DESCRIPTION:	Not reported
CONSTYPE UTILITY IND:	N
CONSTYPE WATER SEWER IND:	N
DIR DISCHARGE USWATER IND:	N
RECEIVING WATER NAME:	Arroyo Mocho Canal
CERTIFIER NAME:	MARK SARACCO
CERTIFIER TITLE:	Not reported
CERTIFICATION DATE:	27-JAN-12
PRIMARY SIC:	Not reported
SECONDARY SIC:	Not reported
TERTIARY SIC:	Not reported

8 ESE 1/4-1/2 0.370 mi. 1956 ft.

LAS POSITAS GOLF COURSE
909 CLUBHOUSE
LIVERMORE, CA 94566

LUST
Alameda County CS
HIST UST
ENF
HIST CORTESE

U001597324
N/A

Relative: Lower

Actual: 383 ft.

LUST:

Lead Agency:	ALAMEDA COUNTY LOP
Case Type:	LUST Cleanup Site
Geo Track:	http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T0600100816
Global Id:	T0600100816
Latitude:	37.697079
Longitude:	-121.820303
Status:	Completed - Case Closed
Status Date:	06/01/1998
Case Worker:	Not reported
RB Case Number:	01-0883
Local Agency:	Not reported
File Location:	All Files are on GeoTracker or in the Local Agency Database
Local Case Number:	RO0000997
Potential Media Affect:	Other Groundwater (uses other than drinking water)
Potential Contaminants of Concern:	Diesel
Site History:	Not reported

LUST:

Global Id:	T0600100816
Contact Type:	Regional Board Caseworker
Contact Name:	Regional Water Board
Organization Name:	SAN FRANCISCO BAY RWQCB (REGION 2)
Address:	1515 CLAY ST SUITE 1400
City:	OAKLAND
Email:	Not reported
Phone Number:	Not reported

LUST:

Global Id:	T0600100816
Action Type:	Other
Date:	07/07/1993
Action:	Leak Reported
Global Id:	T0600100816
Action Type:	REMEDIATION
Date:	09/09/9999
Action:	Not reported

LUST:

Global Id:	T0600100816
Status:	Open - Case Begin Date
Status Date:	07/07/1993
Global Id:	T0600100816
Status:	Completed - Case Closed
Status Date:	06/01/1998

LUST REG 2:

Region:	2
Facility Id:	01-0883

LAS POSITAS GOLF COURSE (Continued) **U001597324**

Facility Status: Case Closed
Case Number: 2979
How Discovered: Tank Closure
Leak Cause: Structure Failure
Leak Source: Tank
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: Not reported
Preliminary Site Assesment Began: 11/14/1989
Pollution Characterization Began: 4/29/1991
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

Alameda County CS:
Status: Case Closed
Record Id: RO0000997
PE: 5602
Facility Status: Case Closed
Latitude: 37.697367308
Longitude: -121.82273944

HIST UST:
File Number: 00035E7C
URL: http://geotracker.waterboards.ca.gov/ustpdfs/pdf/00035E7C.pdf
Region: STATE
Facility ID: 00000037518
Facility Type: Other
Other Type: GOLF COURSE
Contact Name: MULKH RAJ
Telephone: 4154494025
Owner Name: CITY OF LIVERMORE
Owner Address: 1052 SO. LIVERMORE AVE
Owner City,St,Zip: LIVERMORE, CA 94550
Total Tanks: 0003

Tank Num: 001
Container Num: #1
Year Installed: 1966
Tank Capacity: 00001000
Tank Used for: PRODUCT
Type of Fuel: REGULAR
Container Construction Thickness: Not reported
Leak Detection: None

Tank Num: 002
Container Num: 2
Year Installed: Not reported
Tank Capacity: 00000250
Tank Used for: PRODUCT
Type of Fuel: DIESEL
Container Construction Thickness: Not reported
Leak Detection: None

Tank Num: 003
Container Num: 3

LAS POSITAS GOLF COURSE (Continued) **U001597324**

Year Installed:	Not reported
Tank Capacity:	00000100
Tank Used for:	PRODUCT
Type of Fuel:	Not reported
Container Construction Thickness:	Not reported
Leak Detection:	None

Click here for Geo Tracker PDF:

ENF:

Region:	2
Facility Id:	238076
Agency Name:	Las Positas Golf Course
Place Type:	Facility
Place Subtype:	Not reported
Facility Type:	All other facilities
Agency Type:	Privately-Owned Business
# Of Agencies:	1
Place Latitude:	Not reported
Place Longitude:	Not reported
SIC Code 1:	Not reported
SIC Desc 1:	Not reported
SIC Code 2:	Not reported
SIC Desc 2:	Not reported
SIC Code 3:	Not reported
SIC Desc 3:	Not reported
NAICS Code 1:	Not reported
NAICS Desc 1:	Not reported
NAICS Code 2:	Not reported
NAICS Desc 2:	Not reported
NAICS Code 3:	Not reported
NAICS Desc 3:	Not reported
# Of Places:	1
Source Of Facility:	Reg Meas
Design Flow:	Not reported
Threat To Water Quality:	Not reported
Complexity:	Not reported
Pretreatment:	Not reported
Facility Waste Type:	Not reported
Facility Waste Type 2:	Not reported
Facility Waste Type 3:	Not reported
Facility Waste Type 4:	Not reported
Program:	AGT
Program Category1:	TANKS
Program Category2:	TANKS
# Of Programs:	1
WDID:	2 01AGT205U
Reg Measure Id:	168771
Reg Measure Type:	Unregulated
Region:	2
Order #:	Not reported
Npdes# CA#:	Not reported
Major-Minor:	Not reported
Npdes Type:	Not reported
Reclamation:	Not reported
Dredge Fill Fee:	Not reported
301H:	Not reported

LAS POSITAS GOLF COURSE (Continued) **U001597324**

Application Fee Amt Received:	Not reported
Status:	Never Active
Status Date:	02/20/2013
Effective Date:	Not reported
Expiration/Review Date:	Not reported
Termination Date:	Not reported
WDR Review - Amend:	Not reported
WDR Review - Revise/Renew:	Not reported
WDR Review - Rescind:	Not reported
WDR Review - No Action Required:	Not reported
WDR Review - Pending:	Not reported
WDR Review - Planned:	Not reported
Status Enrollee:	N
Individual/General:	I
Fee Code:	Not reported
Direction/Voice:	Passive
Enforcement Id(EID):	239113
Region:	2
Order / Resolution Number:	UNKNOWN
Enforcement Action Type:	Notice of Violation
Effective Date:	10/15/2001
Adoption/Issuance Date:	Not reported
Achieve Date:	Not reported
Termination Date:	Not reported
ACL Issuance Date:	Not reported
EPL Issuance Date:	Not reported
Status:	Historical
Title:	Enforcement - 2 01AGT205U
Description:	Not reported
Program:	AGT
Latest Milestone Completion Date:	Not reported
# Of Programs1:	1
Total Assessment Amount:	0
Initial Assessed Amount:	0
Liability $ Amount:	0
Project $ Amount:	0
Liability $ Paid:	0
Project $ Completed:	0
Total $ Paid/Completed Amount:	0

Region:	2
Facility Id:	238076
Agency Name:	Las Positas Golf Course
Place Type:	Facility
Place Subtype:	Not reported
Facility Type:	All other facilities
Agency Type:	Privately-Owned Business
# Of Agencies:	1
Place Latitude:	Not reported
Place Longitude:	Not reported
SIC Code 1:	Not reported
SIC Desc 1:	Not reported
SIC Code 2:	Not reported
SIC Desc 2:	Not reported
SIC Code 3:	Not reported
SIC Desc 3:	Not reported
NAICS Code 1:	Not reported

LAS POSITAS GOLF COURSE (Continued) **U001597324**

NAICS Desc 1:	Not reported
NAICS Code 2:	Not reported
NAICS Desc 2:	Not reported
NAICS Code 3:	Not reported
NAICS Desc 3:	Not reported
# Of Places:	1
Source Of Facility:	Reg Meas
Design Flow:	Not reported
Threat To Water Quality:	Not reported
Complexity:	Not reported
Pretreatment:	Not reported
Facility Waste Type:	Not reported
Facility Waste Type 2:	Not reported
Facility Waste Type 3:	Not reported
Facility Waste Type 4:	Not reported
Program:	AGT
Program Category1:	TANKS
Program Category2:	TANKS
# Of Programs:	1
WDID:	2 01AGT205U
Reg Measure Id:	168771
Reg Measure Type:	Unregulated
Region:	2
Order #:	Not reported
Npdes# CA#:	Not reported
Major-Minor:	Not reported
Npdes Type:	Not reported
Reclamation:	Not reported
Dredge Fill Fee:	Not reported
301H:	Not reported
Application Fee Amt Received:	Not reported
Status:	Never Active
Status Date:	02/20/2013
Effective Date:	Not reported
Expiration/Review Date:	Not reported
Termination Date:	Not reported
WDR Review - Amend:	Not reported
WDR Review - Revise/Renew:	Not reported
WDR Review - Rescind:	Not reported
WDR Review - No Action Required:	Not reported
WDR Review - Pending:	Not reported
WDR Review - Planned:	Not reported
Status Enrollee:	N
Individual/General:	I
Fee Code:	Not reported
Direction/Voice:	Passive
Enforcement Id(EID):	239112
Region:	2
Order / Resolution Number:	UNKNOWN
Enforcement Action Type:	Staff Enforcement Letter
Effective Date:	08/18/2000
Adoption/Issuance Date:	Not reported
Achieve Date:	Not reported
Termination Date:	Not reported
ACL Issuance Date:	Not reported
EPL Issuance Date:	Not reported
Status:	Historical

LAS POSITAS GOLF COURSE (Continued) **U001597324**

Title:	Enforcement - 2 01AGT205U
Description:	Not reported
Program:	AGT
Latest Milestone Completion Date:	Not reported
# Of Programs1:	1
Total Assessment Amount:	0
Initial Assessed Amount:	0
Liability $ Amount:	0
Project $ Amount:	0
Liability $ Paid:	0
Project $ Completed:	0
Total $ Paid/Completed Amount:	0

Region:	2
Facility Id:	238076
Agency Name:	Las Positas Golf Course
Place Type:	Facility
Place Subtype:	Not reported
Facility Type:	All other facilities
Agency Type:	Privately-Owned Business
# Of Agencies:	1
Place Latitude:	Not reported
Place Longitude:	Not reported
SIC Code 1:	Not reported
SIC Desc 1:	Not reported
SIC Code 2:	Not reported
SIC Desc 2:	Not reported
SIC Code 3:	Not reported
SIC Desc 3:	Not reported
NAICS Code 1:	Not reported
NAICS Desc 1:	Not reported
NAICS Code 2:	Not reported
NAICS Desc 2:	Not reported
NAICS Code 3:	Not reported
NAICS Desc 3:	Not reported
# Of Places:	1
Source Of Facility:	Reg Meas
Design Flow:	Not reported
Threat To Water Quality:	Not reported
Complexity:	Not reported
Pretreatment:	Not reported
Facility Waste Type:	Not reported
Facility Waste Type 2:	Not reported
Facility Waste Type 3:	Not reported
Facility Waste Type 4:	Not reported
Program:	AGT
Program Category1:	TANKS
Program Category2:	TANKS
# Of Programs:	1
WDID:	2 01AGT205U
Reg Measure Id:	168771
Reg Measure Type:	Unregulated
Region:	2
Order #:	Not reported
Npdes# CA#:	Not reported
Major-Minor:	Not reported
Npdes Type:	Not reported

LAS POSITAS GOLF COURSE (Continued) **U001597324**

Reclamation:	Not reported
Dredge Fill Fee:	Not reported
301H:	Not reported
Application Fee Amt Received:	Not reported
Status:	Never Active
Status Date:	02/20/2013
Effective Date:	Not reported
Expiration/Review Date:	Not reported
Termination Date:	Not reported
WDR Review - Amend:	Not reported
WDR Review - Revise/Renew:	Not reported
WDR Review - Rescind:	Not reported
WDR Review - No Action Required:	Not reported
WDR Review - Pending:	Not reported
WDR Review - Planned:	Not reported
Status Enrollee:	N
Individual/General:	I
Fee Code:	Not reported
Direction/Voice:	Passive
Enforcement Id(EID):	239111
Region:	2
Order / Resolution Number:	UNKNOWN
Enforcement Action Type:	Oral Communication
Effective Date:	10/01/2001
Adoption/Issuance Date:	Not reported
Achieve Date:	Not reported
Termination Date:	Not reported
ACL Issuance Date:	Not reported
EPL Issuance Date:	Not reported
Status:	Historical
Title:	Enforcement - 2 01AGT205U
Description:	Not reported
Program:	AGT
Latest Milestone Completion Date:	Not reported
# Of Programs1:	1
Total Assessment Amount:	0
Initial Assessed Amount:	0
Liability $ Amount:	0
Project $ Amount:	0
Liability $ Paid:	0
Project $ Completed:	0
Total $ Paid/Completed Amount:	0

Region:	2
Facility Id:	238076
Agency Name:	Las Positas Golf Course
Place Type:	Facility
Place Subtype:	Not reported
Facility Type:	All other facilities
Agency Type:	Privately-Owned Business
# Of Agencies:	1
Place Latitude:	Not reported
Place Longitude:	Not reported
SIC Code 1:	Not reported
SIC Desc 1:	Not reported
SIC Code 2:	Not reported
SIC Desc 2:	Not reported

LAS POSITAS GOLF COURSE (Continued) **U001597324**

SIC Code 3:	Not reported
SIC Desc 3:	Not reported
NAICS Code 1:	Not reported
NAICS Desc 1:	Not reported
NAICS Code 2:	Not reported
NAICS Desc 2:	Not reported
NAICS Code 3:	Not reported
NAICS Desc 3:	Not reported
# Of Places:	1
Source Of Facility:	Reg Meas
Design Flow:	Not reported
Threat To Water Quality:	Not reported
Complexity:	Not reported
Pretreatment:	Not reported
Facility Waste Type:	Not reported
Facility Waste Type 2:	Not reported
Facility Waste Type 3:	Not reported
Facility Waste Type 4:	Not reported
Program:	AGT
Program Category1:	TANKS
Program Category2:	TANKS
# Of Programs:	1
WDID:	2 01AGT205U
Reg Measure Id:	168771
Reg Measure Type:	Unregulated
Region:	2
Order #:	Not reported
Npdes# CA#:	Not reported
Major-Minor:	Not reported
Npdes Type:	Not reported
Reclamation:	Not reported
Dredge Fill Fee:	Not reported
301H:	Not reported
Application Fee Amt Received:	Not reported
Status:	Never Active
Status Date:	02/20/2013
Effective Date:	Not reported
Expiration/Review Date:	Not reported
Termination Date:	Not reported
WDR Review - Amend:	Not reported
WDR Review - Revise/Renew:	Not reported
WDR Review - Rescind:	Not reported
WDR Review - No Action Required:	Not reported
WDR Review - Pending:	Not reported
WDR Review - Planned:	Not reported
Status Enrollee:	N
Individual/General:	I
Fee Code:	Not reported
Direction/Voice:	Passive
Enforcement Id(EID):	238241
Region:	2
Order / Resolution Number:	UNKNOWN
Enforcement Action Type:	Notice of Violation
Effective Date:	10/15/2001
Adoption/Issuance Date:	Not reported
Achieve Date:	Not reported
Termination Date:	10/15/2006

LAS POSITAS GOLF COURSE (Continued) **U001597324**

ACL Issuance Date:	Not reported
EPL Issuance Date:	Not reported
Status:	Historical
Title:	Enforcement - 2 01AGT205U
Description:	NOV/13267 requiring storage statement and fee.
Program:	AGT
Latest Milestone Completion Date:	Not reported
# Of Programs1:	1
Total Assessment Amount:	0
Initial Assessed Amount:	0
Liability $ Amount:	0
Project $ Amount:	0
Liability $ Paid:	0
Project $ Completed:	0
Total $ Paid/Completed Amount:	0
Region:	2
Facility Id:	238076
Agency Name:	Las Positas Golf Course
Place Type:	Facility
Place Subtype:	Not reported
Facility Type:	All other facilities
Agency Type:	Privately-Owned Business
# Of Agencies:	1
Place Latitude:	Not reported
Place Longitude:	Not reported
SIC Code 1:	Not reported
SIC Desc 1:	Not reported
SIC Code 2:	Not reported
SIC Desc 2:	Not reported
SIC Code 3:	Not reported
SIC Desc 3:	Not reported
NAICS Code 1:	Not reported
NAICS Desc 1:	Not reported
NAICS Code 2:	Not reported
NAICS Desc 2:	Not reported
NAICS Code 3:	Not reported
NAICS Desc 3:	Not reported
# Of Places:	1
Source Of Facility:	Reg Meas
Design Flow:	Not reported
Threat To Water Quality:	Not reported
Complexity:	Not reported
Pretreatment:	Not reported
Facility Waste Type:	Not reported
Facility Waste Type 2:	Not reported
Facility Waste Type 3:	Not reported
Facility Waste Type 4:	Not reported
Program:	AGT
Program Category1:	TANKS
Program Category2:	TANKS
# Of Programs:	1
WDID:	2 01AGT205U
Reg Measure Id:	168771
Reg Measure Type:	Unregulated
Region:	2
Order #:	Not reported

LAS POSITAS GOLF COURSE (Continued) **U001597324**

Npdes# CA#:	Not reported
Major-Minor:	Not reported
Npdes Type:	Not reported
Reclamation:	Not reported
Dredge Fill Fee:	Not reported
301H:	Not reported
Application Fee Amt Received:	Not reported
Status:	Never Active
Status Date:	02/20/2013
Effective Date:	Not reported
Expiration/Review Date:	Not reported
Termination Date:	Not reported
WDR Review - Amend:	Not reported
WDR Review - Revise/Renew:	Not reported
WDR Review - Rescind:	Not reported
WDR Review - No Action Required:	Not reported
WDR Review - Pending:	Not reported
WDR Review - Planned:	Not reported
Status Enrollee:	N
Individual/General:	I
Fee Code:	Not reported
Direction/Voice:	Passive
Enforcement Id(EID):	238240
Region:	2
Order / Resolution Number:	UNKNOWN
Enforcement Action Type:	Staff Enforcement Letter
Effective Date:	08/18/2000
Adoption/Issuance Date:	Not reported
Achieve Date:	Not reported
Termination Date:	08/18/2000
ACL Issuance Date:	Not reported
EPL Issuance Date:	Not reported
Status:	Historical
Title:	Enforcement - 2 01AGT205U
Description:	Letter informing facility that storage statement and fee required.
Program:	AGT
Latest Milestone Completion Date:	Not reported
# Of Programs1:	1
Total Assessment Amount:	0
Initial Assessed Amount:	0
Liability $ Amount:	0
Project $ Amount:	0
Liability $ Paid:	0
Project $ Completed:	0
Total $ Paid/Completed Amount:	0

HIST CORTESE:

Region:	CORTESE
Facility County Code:	1
Reg By:	LTNKA
Reg Id:	01-0883

9 WSW 1/4-1/2 0.388 mi. 2050 ft.

FREISMAN RANCH
1600 FRIESMAN RD
LIVERMORE, CA 94550

SLIC **S109284042**
Alameda County CS **N/A**

Relative: Lower

Actual: 357 ft.

SLIC:

Region:	STATE
Facility Status:	**Completed - Case Closed**
Status Date:	07/02/2008
Global Id:	T0600143091
Lead Agency:	ALAMEDA COUNTY LOP
Lead Agency Case Number:	RO0002484
Latitude:	37.6984099131159
Longitude:	-121.833792193024
Case Type:	Cleanup Program Site
Case Worker:	Not reported
Local Agency:	Not reported
RB Case Number:	NA
File Location:	All Files are on GeoTracker or in the Local Agency Database
Potential Media Affected:	Aquifer used for drinking water supply
Potential Contaminants of Concern:	Gasoline
Site History:	Not reported

Click here to access the California GeoTracker records for this facility:

Alameda County CS:

Status:	Pollution Characterization
Record Id:	RO0002484
PE:	5502
Facility Status:	Pollution Charaterization
Latitude:	37.700688942
Longitude:	-121.83459288

Status:	Case Closed
Record Id:	RO0002484
PE:	5502
Facility Status:	Case Closed
Latitude:	37.700688942
Longitude:	-121.83459288

---

10 NNW 1/4-1/2 0.430 mi. 2273 ft.

PROPOSED NEW ES, JORDAN RANCH E-5 SITE
E OF FALLON RD AND N OF INTERSTATE HWY 580
DUBLIN, CA 94588

ENVIROSTOR **S118757283**
SCH **N/A**

Relative: Higher

Actual: 470 ft.

ENVIROSTOR:

Facility ID:	60002037
Status:	No Action Required
Status Date:	12/15/2014
Site Code:	204266
Site Type:	School Investigation
Site Type Detailed:	School
Acres:	11
NPL:	NO
Regulatory Agencies:	SMBRP
Lead Agency:	SMBRP
Program Manager:	Jose Luevano

PROPOSED NEW ES, JORDAN RANCH E-5 SITE (Continued) **S118757283**

Supervisor:	Jose Salcedo
Division Branch:	Northern California Schools & Santa Susana
Assembly:	16
Senate:	07
Special Program:	Not reported
Restricted Use:	NO
Site Mgmt Req:	NONE SPECIFIED
Funding:	School District
Latitude:	37.71177
Longitude:	-121.8429
APN:	985-98-9
Past Use:	NONE, UNKNOWN
Potential COC:	Naturally Occurring Asbestos (NOA
Confirmed COC:	No Contaminants found 40002-NO
Potential Description:	NMA, SOIL
Alias Name:	985-98-9
Alias Type:	APN
Alias Name:	204266
Alias Type:	Project Code (Site Code)
Alias Name:	60002037
Alias Type:	Envirostor ID Number

Completed Info:

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Phase 1 Addendum
Completed Date:	12/15/2014
Comments:	Not reported
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Cost Recovery Closeout Memo
Completed Date:	03/19/2015
Comments:	Not reported
Future Area Name:	Not reported
Future Sub Area Name:	Not reported
Future Document Type:	Not reported
Future Due Date:	Not reported
Schedule Area Name:	Not reported
Schedule Sub Area Name:	Not reported
Schedule Document Type:	Not reported
Schedule Due Date:	Not reported
Schedule Revised Date:	Not reported

SCH:

Facility ID:	60002037
Site Type:	School Investigation
Site Type Detail:	School
Site Mgmt. Req.:	NONE SPECIFIED
Acres:	11
National Priorities List:	NO
Cleanup Oversight Agencies:	SMBRP
Lead Agency:	SMBRP
Lead Agency Description:	DTSC - Site Cleanup Program
Project Manager:	Jose Luevano

PROPOSED NEW ES, JORDAN RANCH E-5 SITE (Continued) **S118757283**

Supervisor:	Jose Salcedo
Division Branch:	Northern California Schools & Santa Susana
Site Code:	204266
Assembly:	16
Senate:	07
Special Program Status:	Not reported
Status:	No Action Required
Status Date:	12/15/2014
Restricted Use:	NO
Funding:	School District
Latitude:	37.71177
Longitude:	-121.8429
APN:	985-98-9
Past Use:	NONE, UNKNOWN
Potential COC:	Naturally Occurring Asbestos (NOA
Confirmed COC:	No Contaminants found, 40002-NO
Potential Description:	NMA, SOIL
Alias Name:	985-98-9
Alias Type:	APN
Alias Name:	204266
Alias Type:	Project Code (Site Code)
Alias Name:	60002037
Alias Type:	Envirostor ID Number

Completed Info:

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Phase 1 Addendum
Completed Date:	12/15/2014
Comments:	Not reported
Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Cost Recovery Closeout Memo
Completed Date:	03/19/2015
Comments:	Not reported
Future Area Name:	Not reported
Future Sub Area Name:	Not reported
Future Document Type:	Not reported
Future Due Date:	Not reported
Schedule Area Name:	Not reported
Schedule Sub Area Name:	Not reported
Schedule Document Type:	Not reported
Schedule Due Date:	Not reported
Schedule Revised Date:	Not reported

A11 **LIVERMORE MUNICIPAL AIRPORT** **LUST** **S103890896**
ESE **1800 FRIESMAN** **N/A**
1/4-1/2 **LIVERMORE, CA 94550**
0.458 mi.
2418 ft. **Site 1 of 2 in cluster A**

Relative:
Lower

Actual:
386 ft.

LUST REG 2:

Region:	2
Facility Id:	01-1758
Facility Status:	Case Closed
Case Number:	3760

LIVERMORE MUNICIPAL AIRPORT (Continued) **S103890896**

How Discovered: Tank Closure
Leak Cause: UNK
Leak Source: UNK
Date Leak Confirmed: Not reported
Oversight Program: LUST
Prelim. Site Assesment Wokplan Submitted: 4/25/1990
Preliminary Site Assesment Began: Not reported
Pollution Characterization Began: Not reported
Pollution Remediation Plan Submitted: Not reported
Date Remediation Action Underway: Not reported
Date Post Remedial Action Monitoring Began: Not reported

A12
ESE
1/4-1/2
0.458 mi.
2418 ft.

LIVERMORE MUNICIPAL AIRPO **HIST CORTESE** **S105024481**
1800 FIRESMAN **N/A**
LIVERMORE, CA 94550

Site 2 of 2 in cluster A

Relative:
Lower

Actual:
386 ft.

HIST CORTESE:
Region: CORTESE
Facility County Code: 1
Reg By: LTNKA
Reg Id: 01-1758

13
WNW
1/2-1
0.557 mi.
2942 ft.

PROPOSED KOLB ELEMENTARY SCHOOL **ENVIROSTOR SCH** **S108649782**
PALERMO WAY **N/A**
DUBLIN, CA 94568

Relative:
Higher

Actual:
412 ft.

ENVIROSTOR:
Facility ID: 60000686
Status: No Further Action
Status Date: 09/28/2007
Site Code: 204207
Site Type: School Investigation
Site Type Detailed: School
Acres: 10
NPL: NO
Regulatory Agencies: SMBRP
Lead Agency: SMBRP
Program Manager: Harold (Bud) Duke
Supervisor: Mark Malinowski
Division Branch: Northern California Schools & Santa Susana
Assembly: 16
Senate: 07
Special Program: Not reported
Restricted Use: NO
Site Mgmt Req: NONE SPECIFIED
Funding: School District
Latitude: 37.7115
Longitude: -121.8581
APN: 8
Past Use: NONE
Potential COC: NONE SPECIFIED No Contaminants found
Confirmed COC: No Contaminants found

PROPOSED KOLB ELEMENTARY SCHOOL (Continued) **S108649782**

Potential Description: NMA
Alias Name: Lockhart Street and Palermo Way, Dublin, CA, 94568
Alias Type: Alternate Name
Alias Name: 8
Alias Type: APN
Alias Name: 204207
Alias Type: Project Code (Site Code)
Alias Name: 60000686
Alias Type: Envirostor ID Number

Completed Info:
Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Cost Recovery Closeout Memo
Completed Date: 11/05/2007
Comments: A Cost Recovery Memorandum was sent to Accounting and the project is considered complete.

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Phase 1
Completed Date: 09/28/2007
Comments: Following a review of the Phase 1 and a site visit, DTSC determined no action is necessary for the site.

Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported

SCH:

Facility ID: 60000686
Site Type: School Investigation
Site Type Detail: School
Site Mgmt. Req.: NONE SPECIFIED
Acres: 10
National Priorities List: NO
Cleanup Oversight Agencies: SMBRP
Lead Agency: SMBRP
Lead Agency Description: DTSC - Site Cleanup Program
Project Manager: Harold (Bud) Duke
Supervisor: Mark Malinowski
Division Branch: Northern California Schools & Santa Susana
Site Code: 204207
Assembly: 16
Senate: 07
Special Program Status: Not reported
Status: No Further Action
Status Date: 09/28/2007
Restricted Use: NO
Funding: School District

PROPOSED KOLB ELEMENTARY SCHOOL (Continued) **S108649782**

Latitude:	37.7115
Longitude:	-121.8581
APN:	8
Past Use:	NONE
Potential COC:	NONE SPECIFIED, No Contaminants found
Confirmed COC:	No Contaminants found
Potential Description:	NMA
Alias Name:	Lockhart Street and Palermo Way, Dublin, CA, 94568
Alias Type:	Alternate Name
Alias Name:	8
Alias Type:	APN
Alias Name:	204207
Alias Type:	Project Code (Site Code)
Alias Name:	60000686
Alias Type:	Envirostor ID Number

Completed Info:

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Cost Recovery Closeout Memo
Completed Date:	11/05/2007
Comments:	A Cost Recovery Memorandum was sent to Accounting and the project is considered complete.

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Phase 1
Completed Date:	09/28/2007
Comments:	Following a review of the Phase 1 and a site visit, DTSC determined no action is necessary for the site.

Future Area Name:	Not reported
Future Sub Area Name:	Not reported
Future Document Type:	Not reported
Future Due Date:	Not reported
Schedule Area Name:	Not reported
Schedule Sub Area Name:	Not reported
Schedule Document Type:	Not reported
Schedule Due Date:	Not reported
Schedule Revised Date:	Not reported

B14 **M-1 MIDDLE SCHOOL** **ENVIROSTOR** **S118756453**
WNW **PARCEL O-TRACT 6725/S. DUBLIN RANCH DRIVE** **SCH** **N/A**
1/2-1 **DUBLIN, CA 94588**
0.670 mi.
3535 ft. **Site 1 of 2 in cluster B**

Relative:
Higher

Actual:
435 ft.

ENVIROSTOR:

Facility ID:	1020001
Status:	No Action Required
Status Date:	10/15/2001
Site Code:	204049
Site Type:	School Investigation
Site Type Detailed:	School
Acres:	44
NPL:	NO
Regulatory Agencies:	DTSC
Lead Agency:	DTSC

M-1 MIDDLE SCHOOL (Continued) **S118756453**

Program Manager:	Not reported
Supervisor:	Charles Ridenour
Division Branch:	Northern California Schools & Santa Susana
Assembly:	16
Senate:	07
Special Program:	Not reported
Restricted Use:	NO
Site Mgmt Req:	NONE SPECIFIED
Funding:	School District
Latitude:	37.71338
Longitude:	-121.8588
APN:	NONE SPECIFIED
Past Use:	AGRICULTURAL - LIVESTOCK
Potential COC:	NONE SPECIFIED No Contaminants found
Confirmed COC:	NONE SPECIFIED
Potential Description:	NMA
Alias Name:	Not reported
Alias Type:	Not reported

Completed Info:

Completed Area Name:	Not reported
Completed Sub Area Name:	Not reported
Completed Document Type:	Not reported
Completed Date:	Not reported
Comments:	Not reported
Future Area Name:	Not reported
Future Sub Area Name:	Not reported
Future Document Type:	Not reported
Future Due Date:	Not reported
Schedule Area Name:	Not reported
Schedule Sub Area Name:	Not reported
Schedule Document Type:	Not reported
Schedule Due Date:	Not reported
Schedule Revised Date:	Not reported

SCH:

Facility ID:	1020001
Site Type:	School Investigation
Site Type Detail:	School
Site Mgmt. Req.:	NONE SPECIFIED
Acres:	44
National Priorities List:	NO
Cleanup Oversight Agencies:	DTSC
Lead Agency:	DTSC
Lead Agency Description:	* DTSC
Project Manager:	Not reported
Supervisor:	Charles Ridenour
Division Branch:	Northern California Schools & Santa Susana
Site Code:	204049
Assembly:	16
Senate:	07
Special Program Status:	Not reported
Status:	No Action Required
Status Date:	10/15/2001
Restricted Use:	NO

M-1 MIDDLE SCHOOL (Continued) **S118756453**

Funding:	School District
Latitude:	37.71338
Longitude:	-121.8588
APN:	NONE SPECIFIED
Past Use:	AGRICULTURAL - LIVESTOCK
Potential COC:	NONE SPECIFIED, No Contaminants found
Confirmed COC:	NONE SPECIFIED
Potential Description:	NMA
Alias Name:	Not reported
Alias Type:	Not reported

Completed Info:

Completed Area Name:	Not reported
Completed Sub Area Name:	Not reported
Completed Document Type:	Not reported
Completed Date:	Not reported
Comments:	Not reported
Future Area Name:	Not reported
Future Sub Area Name:	Not reported
Future Document Type:	Not reported
Future Due Date:	Not reported
Schedule Area Name:	Not reported
Schedule Sub Area Name:	Not reported
Schedule Document Type:	Not reported
Schedule Due Date:	Not reported
Schedule Revised Date:	Not reported

B15 **E-2 ELEMENTARY SCHOOL** **ENVIROSTOR** **S118756454**
WNW **PARCEL O-TRACT 6960/ANTONE WAY** **SCH** **N/A**
1/2-1 **DUBLIN, CA 94588**
0.670 mi.
3535 ft. **Site 2 of 2 in cluster B**

Relative:
Higher

Actual:
435 ft.

ENVIROSTOR:

Facility ID:	1020002
Status:	No Action Required
Status Date:	04/18/2001
Site Code:	204048
Site Type:	School Investigation
Site Type Detailed:	School
Acres:	14
NPL:	NO
Regulatory Agencies:	SMBRP
Lead Agency:	SMBRP
Program Manager:	Not reported
Supervisor:	Mark Malinowski
Division Branch:	Northern California Schools & Santa Susana
Assembly:	16
Senate:	07
Special Program:	Not reported
Restricted Use:	NO
Site Mgmt Req:	NONE SPECIFIED
Funding:	School District
Latitude:	37.71338
Longitude:	-121.8588
APN:	NONE SPECIFIED
Past Use:	AGRICULTURAL - LIVESTOCK

E-2 ELEMENTARY SCHOOL (Continued) **S118756454**

Potential COC: NONE SPECIFIED No Contaminants found
Confirmed COC: NONE SPECIFIED
Potential Description: NMA
Alias Name: Not reported
Alias Type: Not reported

Completed Info:
Completed Area Name: Not reported
Completed Sub Area Name: Not reported
Completed Document Type: Not reported
Completed Date: Not reported
Comments: Not reported

Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported

SCH:

Facility ID: 1020002
Site Type: School Investigation
Site Type Detail: School
Site Mgmt. Req.: NONE SPECIFIED
Acres: 14
National Priorities List: NO
Cleanup Oversight Agencies: SMBRP
Lead Agency: SMBRP
Lead Agency Description: DTSC - Site Cleanup Program
Project Manager: Not reported
Supervisor: Mark Malinowski
Division Branch: Northern California Schools & Santa Susana
Site Code: 204048
Assembly: 16
Senate: 07
Special Program Status: Not reported
Status: No Action Required
Status Date: 04/18/2001
Restricted Use: NO
Funding: School District
Latitude: 37.71338
Longitude: -121.8588
APN: NONE SPECIFIED
Past Use: AGRICULTURAL - LIVESTOCK
Potential COC: NONE SPECIFIED, No Contaminants found
Confirmed COC: NONE SPECIFIED
Potential Description: NMA
Alias Name: Not reported
Alias Type: Not reported

Completed Info:
Completed Area Name: Not reported
Completed Sub Area Name: Not reported

E-2 ELEMENTARY SCHOOL (Continued) **S118756454**

Completed Document Type:	Not reported
Completed Date:	Not reported
Comments:	Not reported
Future Area Name:	Not reported
Future Sub Area Name:	Not reported
Future Document Type:	Not reported
Future Due Date:	Not reported
Schedule Area Name:	Not reported
Schedule Sub Area Name:	Not reported
Schedule Document Type:	Not reported
Schedule Due Date:	Not reported
Schedule Revised Date:	Not reported

16
NNW
1/2-1
0.899 mi.
4745 ft.

PROPOSED ELEMENTARY SCHOOL E-4 **ENVIROSTOR** **S118757221**
5781 FALLON ROAD **SCH** **N/A**
DUBLIN, CA 94568

Relative:
Higher

Actual:
579 ft.

ENVIROSTOR:

Facility ID:	60001311
Status:	No Action Required
Status Date:	11/15/2010
Site Code:	204242
Site Type:	School Investigation
Site Type Detailed:	School
Acres:	11.14
NPL:	NO
Regulatory Agencies:	SMBRP
Lead Agency:	SMBRP
Program Manager:	Harold (Bud) Duke
Supervisor:	Juan Koponen
Division Branch:	Northern California Schools & Santa Susana
Assembly:	16
Senate:	07
Special Program:	Not reported
Restricted Use:	NO
Site Mgmt Req:	NONE SPECIFIED
Funding:	School District
Latitude:	37.71760
Longitude:	-121.8438
APN:	905-002-003, 985-075-010
Past Use:	NONE
Potential COC:	NONE SPECIFIED No Contaminants found
Confirmed COC:	No Contaminants found
Potential Description:	NMA
Alias Name:	905-002-003
Alias Type:	APN
Alias Name:	985-075-010
Alias Type:	APN
Alias Name:	204242
Alias Type:	Project Code (Site Code)
Alias Name:	60001311
Alias Type:	Envirostor ID Number

Completed Info:

Completed Area Name:	PROJECT WIDE

PROPOSED ELEMENTARY SCHOOL E-4 (Continued) **S118757221**

Completed Sub Area Name:	Not reported
Completed Document Type:	Phase 1
Completed Date:	09/15/2010
Comments:	DTSC approved the Phase 1 with a no further action determination

Completed Area Name:	PROJECT WIDE
Completed Sub Area Name:	Not reported
Completed Document Type:	Cost Recovery Closeout Memo
Completed Date:	11/15/2010
Comments:	DTSC sent a CRU to the accounting unit to summarize cost associated with the Phase 1.

Future Area Name:	Not reported
Future Sub Area Name:	Not reported
Future Document Type:	Not reported
Future Due Date:	Not reported
Schedule Area Name:	Not reported
Schedule Sub Area Name:	Not reported
Schedule Document Type:	Not reported
Schedule Due Date:	Not reported
Schedule Revised Date:	Not reported

SCH:

Facility ID:	60001311
Site Type:	School Investigation
Site Type Detail:	School
Site Mgmt. Req.:	NONE SPECIFIED
Acres:	11.14
National Priorities List:	NO
Cleanup Oversight Agencies:	SMBRP
Lead Agency:	SMBRP
Lead Agency Description:	DTSC - Site Cleanup Program
Project Manager:	Harold (Bud) Duke
Supervisor:	Juan Koponen
Division Branch:	Northern California Schools & Santa Susana
Site Code:	204242
Assembly:	16
Senate:	07
Special Program Status:	Not reported
Status:	No Action Required
Status Date:	11/15/2010
Restricted Use:	NO
Funding:	School District
Latitude:	37.71760
Longitude:	-121.8438
APN:	905-002-003, 985-075-010
Past Use:	NONE
Potential COC:	NONE SPECIFIED, No Contaminants found
Confirmed COC:	No Contaminants found
Potential Description:	NMA
Alias Name:	905-002-003
Alias Type:	APN
Alias Name:	985-075-010
Alias Type:	APN
Alias Name:	204242
Alias Type:	Project Code (Site Code)

PROPOSED ELEMENTARY SCHOOL E-4 (Continued) **S118757221**

Alias Name: 60001311
Alias Type: Envirostor ID Number

Completed Info:
Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Phase 1
Completed Date: 09/15/2010
Comments: DTSC approved the Phase 1 with a no further action determination

Completed Area Name: PROJECT WIDE
Completed Sub Area Name: Not reported
Completed Document Type: Cost Recovery Closeout Memo
Completed Date: 11/15/2010
Comments: DTSC sent a CRU to the accounting unit to summarize cost associated with the Phase 1.

Future Area Name: Not reported
Future Sub Area Name: Not reported
Future Document Type: Not reported
Future Due Date: Not reported
Schedule Area Name: Not reported
Schedule Sub Area Name: Not reported
Schedule Document Type: Not reported
Schedule Due Date: Not reported
Schedule Revised Date: Not reported

Count: 1 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
ALAMEDA COUNTY	S106235193	SANTA RITA PROPERTY	PARCEL 15 DUBLIN BLVD & HACIEN		SLIC

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/22/2017
Date Made Active in Reports: 01/05/2018
Number of Days to Update: 14

Source: EPA
Telephone: N/A
Last EDR Contact: 12/22/2017
Next Scheduled EDR Contact: 04/16/2018
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/22/2017
Date Made Active in Reports: 01/05/2018
Number of Days to Update: 14

Source: EPA
Telephone: N/A
Last EDR Contact: 12/22/2017
Next Scheduled EDR Contact: 04/16/2018
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

Federal Delisted NPL site list

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 12/11/2017	Source: EPA
Date Data Arrived at EDR: 12/22/2017	Telephone: N/A
Date Made Active in Reports: 01/05/2018	Last EDR Contact: 12/22/2017
Number of Days to Update: 14	Next Scheduled EDR Contact: 04/16/2018
	Data Release Frequency: Quarterly

Federal CERCLIS list

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 11/07/2016	Source: Environmental Protection Agency
Date Data Arrived at EDR: 01/05/2017	Telephone: 703-603-8704
Date Made Active in Reports: 04/07/2017	Last EDR Contact: 01/05/2018
Number of Days to Update: 92	Next Scheduled EDR Contact: 04/16/2018
	Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 12/11/2017	Source: EPA
Date Data Arrived at EDR: 12/22/2017	Telephone: 800-424-9346
Date Made Active in Reports: 01/12/2018	Last EDR Contact: 01/17/2018
Number of Days to Update: 21	Next Scheduled EDR Contact: 04/30/2018
	Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/22/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 21

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 01/17/2018
Next Scheduled EDR Contact: 04/30/2018
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report
CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 09/13/2017
Date Data Arrived at EDR: 09/26/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 10

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal
RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 09/13/2017
Date Data Arrived at EDR: 09/26/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 10

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators
RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 09/13/2017
Date Data Arrived at EDR: 09/26/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 10

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 09/13/2017
Date Data Arrived at EDR: 09/26/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 10

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 09/13/2017
Date Data Arrived at EDR: 09/26/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 10

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Quarterly

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 05/22/2017
Date Data Arrived at EDR: 06/13/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 94

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 11/08/2017
Next Scheduled EDR Contact: 02/26/2018
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 08/10/2017
Date Data Arrived at EDR: 08/30/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 08/10/2017
Date Data Arrived at EDR: 08/30/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 09/18/2017
Date Data Arrived at EDR: 09/21/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 22

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Quarterly

State- and tribal - equivalent NPL

RESPONSE: State Response Sites

Identifies confirmed release sites where DTSC is involved in remediation, either in a lead or oversight capacity. These confirmed release sites are generally high-priority and high potential risk.

Date of Government Version: 10/30/2017
Date Data Arrived at EDR: 10/31/2017
Date Made Active in Reports: 12/15/2017
Number of Days to Update: 45

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 10/31/2017
Next Scheduled EDR Contact: 02/12/2018
Data Release Frequency: Quarterly

State- and tribal - equivalent CERCLIS

ENVIROSTOR: EnviroStor Database

The Department of Toxic Substances Control's (DTSC's) Site Mitigation and Brownfields Reuse Program's (SMBRP's) EnviroStor database identifes sites that have known contamination or sites for which there may be reasons to investigate further. The database includes the following site types: Federal Superfund sites (National Priorities List (NPL)); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. EnviroStor provides similar information to the information that was available in CalSites, and provides additional site information, including, but not limited to, identification of formerly-contaminated properties that have been released for reuse, properties where environmental deed restrictions have been recorded to prevent inappropriate land uses, and risk characterization information that is used to assess potential impacts to public health and the environment at contaminated sites.

Date of Government Version: 10/30/2017
Date Data Arrived at EDR: 10/31/2017
Date Made Active in Reports: 12/15/2017
Number of Days to Update: 45

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 10/31/2017
Next Scheduled EDR Contact: 02/12/2018
Data Release Frequency: Quarterly

State and tribal landfill and/or solid waste disposal site lists

SWF/LF (SWIS): Solid Waste Information System

Active, Closed and Inactive Landfills. SWF/LF records typically contain an inve ntory of solid waste disposal facilities or landfills. These may be active or i nactive facilities or open dumps that failed to meet RCRA Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 11/13/2017
Date Data Arrived at EDR: 11/14/2017
Date Made Active in Reports: 12/07/2017
Number of Days to Update: 23

Source: Department of Resources Recycling and Recovery
Telephone: 916-341-6320
Last EDR Contact: 11/14/2017
Next Scheduled EDR Contact: 02/26/2018
Data Release Frequency: Quarterly

State and tribal leaking storage tank lists

LUST REG 4: Underground Storage Tank Leak List
Los Angeles, Ventura counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35

Source: California Regional Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6710
Last EDR Contact: 09/06/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: No Update Planned

LUST REG 9: Leaking Underground Storage Tank Report
Orange, Riverside, San Diego counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 03/01/2001
Date Data Arrived at EDR: 04/23/2001
Date Made Active in Reports: 05/21/2001
Number of Days to Update: 28

Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-637-5595
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: No Update Planned

LUST: Leaking Underground Fuel Tank Report (GEOTRACKER)
Leaking Underground Storage Tank (LUST) Sites included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/12/2017
Date Made Active in Reports: 01/11/2018
Number of Days to Update: 30

Source: State Water Resources Control Board
Telephone: see region list
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 03/26/2018
Data Release Frequency: Quarterly

LUST REG 7: Leaking Underground Storage Tank Case Listing
Leaking Underground Storage Tank locations. Imperial, Riverside, San Diego, Santa Barbara counties.

Date of Government Version: 02/26/2004
Date Data Arrived at EDR: 02/26/2004
Date Made Active in Reports: 03/24/2004
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Colorado River Basin Region (7)
Telephone: 760-776-8943
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

LUST REG 6V: Leaking Underground Storage Tank Case Listing
Leaking Underground Storage Tank locations. Inyo, Kern, Los Angeles, Mono, San Bernardino counties.

Date of Government Version: 06/07/2005
Date Data Arrived at EDR: 06/07/2005
Date Made Active in Reports: 06/29/2005
Number of Days to Update: 22

Source: California Regional Water Quality Control Board Victorville Branch Office (6)
Telephone: 760-241-7365
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

LUST REG 6L: Leaking Underground Storage Tank Case Listing
For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/09/2003
Date Data Arrived at EDR: 09/10/2003
Date Made Active in Reports: 10/07/2003
Number of Days to Update: 27

Source: California Regional Water Quality Control Board Lahontan Region (6)
Telephone: 530-542-5572
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: No Update Planned

LUST REG 5: Leaking Underground Storage Tank Database
Leaking Underground Storage Tank locations. Alameda, Alpine, Amador, Butte, Colusa, Contra Costa, Calveras, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Lassen, Madera, Mariposa, Merced, Modoc, Napa, Nevada, Placer, Plumas, Sacramento, San Joaquin, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba counties.

Date of Government Version: 07/01/2008
Date Data Arrived at EDR: 07/22/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 9

Source: California Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-4834
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: No Update Planned

LUST REG 8: Leaking Underground Storage Tanks
California Regional Water Quality Control Board Santa Ana Region (8). For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/14/2005
Date Data Arrived at EDR: 02/15/2005
Date Made Active in Reports: 03/28/2005
Number of Days to Update: 41

Source: California Regional Water Quality Control Board Santa Ana Region (8)
Telephone: 909-782-4496
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Varies

LUST REG 3: Leaking Underground Storage Tank Database
Leaking Underground Storage Tank locations. Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz counties.

Date of Government Version: 05/19/2003
Date Data Arrived at EDR: 05/19/2003
Date Made Active in Reports: 06/02/2003
Number of Days to Update: 14

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-542-4786
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: No Update Planned

LUST REG 2: Fuel Leak List
Leaking Underground Storage Tank locations. Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma counties.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: California Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-622-2433
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

LUST REG 1: Active Toxic Site Investigation
Del Norte, Humboldt, Lake, Mendocino, Modoc, Siskiyou, Sonoma, Trinity counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/01/2001
Date Data Arrived at EDR: 02/28/2001
Date Made Active in Reports: 03/29/2001
Number of Days to Update: 29

Source: California Regional Water Quality Control Board North Coast (1)
Telephone: 707-570-3769
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 04/14/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 04/24/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 04/14/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 05/01/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 04/13/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 04/26/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78

Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 10/14/2016
Date Data Arrived at EDR: 01/27/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 98

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Semi-Annually

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 04/25/2017
Date Data Arrived at EDR: 11/07/2017
Date Made Active in Reports: 12/08/2017
Number of Days to Update: 31

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

SLIC: Statewide SLIC Cases (GEOTRACKER)
Cleanup Program Sites (CPS; also known as Site Cleanups [SC] and formerly known as Spills, Leaks, Investigations, and Cleanups [SLIC] sites) included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/12/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 31

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 03/26/2018
Data Release Frequency: Varies

SLIC REG 1: Active Toxic Site Investigations
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2003
Date Data Arrived at EDR: 04/07/2003
Date Made Active in Reports: 04/25/2003
Number of Days to Update: 18

Source: California Regional Water Quality Control Board, North Coast Region (1)
Telephone: 707-576-2220
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC REG 2: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/30/2004
Date Data Arrived at EDR: 10/20/2004
Date Made Active in Reports: 11/19/2004
Number of Days to Update: 30

Source: Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-286-0457
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Quarterly

SLIC REG 3: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/18/2006
Date Data Arrived at EDR: 05/18/2006
Date Made Active in Reports: 06/15/2006
Number of Days to Update: 28

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-549-3147
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: Semi-Annually

SLIC REG 4: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/17/2004
Date Data Arrived at EDR: 11/18/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 47

Source: Region Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6600
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

SLIC REG 5: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/01/2005
Date Data Arrived at EDR: 04/05/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 16

Source: Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-3291
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Semi-Annually

SLIC REG 6V: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/24/2005
Date Data Arrived at EDR: 05/25/2005
Date Made Active in Reports: 06/16/2005
Number of Days to Update: 22

Source: Regional Water Quality Control Board, Victorville Branch
Telephone: 619-241-6583
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Semi-Annually

SLIC REG 6L: SLIC Sites
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/07/2004
Date Data Arrived at EDR: 09/07/2004
Date Made Active in Reports: 10/12/2004
Number of Days to Update: 35

Source: California Regional Water Quality Control Board, Lahontan Region
Telephone: 530-542-5574
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

SLIC REG 7: SLIC List
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/24/2004
Date Data Arrived at EDR: 11/29/2004
Date Made Active in Reports: 01/04/2005
Number of Days to Update: 36

Source: California Regional Quality Control Board, Colorado River Basin Region
Telephone: 760-346-7491
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: No Update Planned

SLIC REG 8: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2008
Date Data Arrived at EDR: 04/03/2008
Date Made Active in Reports: 04/14/2008
Number of Days to Update: 11

Source: California Region Water Quality Control Board Santa Ana Region (8)
Telephone: 951-782-3298
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Semi-Annually

SLIC REG 9: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/10/2007
Date Data Arrived at EDR: 09/11/2007
Date Made Active in Reports: 09/28/2007
Number of Days to Update: 17

Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-467-2980
Last EDR Contact: 08/08/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Annually

State and tribal registered storage tank lists

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 05/15/2017
Date Data Arrived at EDR: 05/30/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 136

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 01/09/2018
Next Scheduled EDR Contact: 04/23/2018
Data Release Frequency: Varies

UST: Active UST Facilities
Active UST facilities gathered from the local regulatory agencies

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/12/2017
Date Made Active in Reports: 01/17/2018
Number of Days to Update: 36

Source: SWRCB
Telephone: 916-341-5851
Last EDR Contact: 12/12/2017
Next Scheduled EDR Contact: 03/26/2018
Data Release Frequency: Semi-Annually

AST: Aboveground Petroleum Storage Tank Facilities
A listing of aboveground storage tank petroleum storage tank locations.

Date of Government Version: 07/06/2016
Date Data Arrived at EDR: 07/12/2016
Date Made Active in Reports: 09/19/2016
Number of Days to Update: 69

Source: California Environmental Protection Agency
Telephone: 916-327-5092
Last EDR Contact: 12/26/2017
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Quarterly

INDIAN UST R7: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 05/02/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 04/24/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 12/08/2017
Number of Days to Update: 134

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 10/14/2016
Date Data Arrived at EDR: 01/27/2017
Date Made Active in Reports: 05/05/2017
Number of Days to Update: 98

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 04/26/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 05/01/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 04/14/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 71

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 04/13/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 04/25/2017
Date Data Arrived at EDR: 07/27/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 78

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/23/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

State and tribal voluntary cleanup sites

VCP: Voluntary Cleanup Program Properties

Contains low threat level properties with either confirmed or unconfirmed releases and the project proponents have request that DTSC oversee investigation and/or cleanup activities and have agreed to provide coverage for DTSC's costs.

Date of Government Version: 10/30/2017
Date Data Arrived at EDR: 10/31/2017
Date Made Active in Reports: 12/15/2017
Number of Days to Update: 45

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 10/31/2017
Next Scheduled EDR Contact: 02/12/2018
Data Release Frequency: Quarterly

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 142

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 12/20/2017
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Considered Brownfieds Sites Listing
A listing of sites the SWRCB considers to be Brownfields since these are sites have come to them through the MOA Process.

Date of Government Version: 09/21/2017
Date Data Arrived at EDR: 09/21/2017
Date Made Active in Reports: 11/09/2017
Number of Days to Update: 49

Source: State Water Resources Control Board
Telephone: 916-323-7905
Last EDR Contact: 12/26/2017
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Quarterly

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites
Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 08/21/2017
Date Data Arrived at EDR: 09/20/2017
Date Made Active in Reports: 12/08/2017
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 04/02/2018
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

WMUDS/SWAT: Waste Management Unit Database
Waste Management Unit Database System. WMUDS is used by the State Water Resources Control Board staff and the Regional Water Quality Control Boards for program tracking and inventory of waste management units. WMUDS is composed of the following databases: Facility Information, Scheduled Inspections Information, Waste Management Unit Information, SWAT Program Information, SWAT Report Summary Information, SWAT Report Summary Data, Chapter 15 (formerly Subchapter 15) Information, Chapter 15 Monitoring Parameters, TPCA Program Information, RCRA Program Information, Closure Information, and Interested Parties Information.

Date of Government Version: 04/01/2000
Date Data Arrived at EDR: 04/10/2000
Date Made Active in Reports: 05/10/2000
Number of Days to Update: 30

Source: State Water Resources Control Board
Telephone: 916-227-4448
Last EDR Contact: 11/06/2017
Next Scheduled EDR Contact: 02/19/2018
Data Release Frequency: No Update Planned

SWRCY: Recycler Database
A listing of recycling facilities in California.

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/12/2017
Date Made Active in Reports: 01/17/2018
Number of Days to Update: 36

Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 12/12/2017
Next Scheduled EDR Contact: 03/26/2018
Data Release Frequency: Quarterly

HAULERS: Registered Waste Tire Haulers Listing
A listing of registered waste tire haulers.

Date of Government Version: 05/30/2017
Date Data Arrived at EDR: 05/31/2017
Date Made Active in Reports: 08/15/2017
Number of Days to Update: 76

Source: Integrated Waste Management Board
Telephone: 916-341-6422
Last EDR Contact: 11/09/2017
Next Scheduled EDR Contact: 02/26/2018
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 01/30/2018
Next Scheduled EDR Contact: 05/14/2018
Data Release Frequency: Varies

ODI: Open Dump Inventory
An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 01/22/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: No Update Planned

IHS OPEN DUMPS: Open Dumps on Indian Land
A listing of all open dumps located on Indian Land in the United States.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 08/06/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 176

Source: Department of Health & Human Serivces, Indian Health Service
Telephone: 301-443-1452
Last EDR Contact: 11/03/2017
Next Scheduled EDR Contact: 02/12/2018
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register
A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 07/13/2017
Date Data Arrived at EDR: 09/06/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 30

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 11/28/2017
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: No Update Planned

HIST CAL-SITES: Calsites Database
The Calsites database contains potential or confirmed hazardous substance release properties. In 1996, California EPA reevaluated and significantly reduced the number of sites in the Calsites database. No longer updated by the state agency. It has been replaced by ENVIROSTOR.

Date of Government Version: 08/08/2005
Date Data Arrived at EDR: 08/03/2006
Date Made Active in Reports: 08/24/2006
Number of Days to Update: 21

Source: Department of Toxic Substance Control
Telephone: 916-323-3400
Last EDR Contact: 02/23/2009
Next Scheduled EDR Contact: 05/25/2009
Data Release Frequency: No Update Planned

SCH: School Property Evaluation Program

This category contains proposed and existing school sites that are being evaluated by DTSC for possible hazardous materials contamination. In some cases, these properties may be listed in the CalSites category depending on the level of threat to public health and safety or the environment they pose.

Date of Government Version: 10/30/2017
Date Data Arrived at EDR: 10/31/2017
Date Made Active in Reports: 12/15/2017
Number of Days to Update: 45

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 10/31/2017
Next Scheduled EDR Contact: 02/12/2018
Data Release Frequency: Quarterly

CDL: Clandestine Drug Labs

A listing of drug lab locations. Listing of a location in this database does not indicate that any illegal drug lab materials were or were not present there, and does not constitute a determination that the location either requires or does not require additional cleanup work.

Date of Government Version: 06/30/2017
Date Data Arrived at EDR: 08/18/2017
Date Made Active in Reports: 09/21/2017
Number of Days to Update: 34

Source: Department of Toxic Substances Control
Telephone: 916-255-6504
Last EDR Contact: 01/08/2018
Next Scheduled EDR Contact: 04/23/2018
Data Release Frequency: Varies

TOXIC PITS: Toxic Pits Cleanup Act Sites

Toxic PITS Cleanup Act Sites. TOXIC PITS identifies sites suspected of containing hazardous substances where cleanup has not yet been completed.

Date of Government Version: 07/01/1995
Date Data Arrived at EDR: 08/30/1995
Date Made Active in Reports: 09/26/1995
Number of Days to Update: 27

Source: State Water Resources Control Board
Telephone: 916-227-4364
Last EDR Contact: 01/26/2009
Next Scheduled EDR Contact: 04/27/2009
Data Release Frequency: No Update Planned

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 07/13/2017
Date Data Arrived at EDR: 09/06/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 30

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: Quarterly

Local Lists of Registered Storage Tanks

SWEEPS UST: SWEEPS UST Listing

Statewide Environmental Evaluation and Planning System. This underground storage tank listing was updated and maintained by a company contacted by the SWRCB in the early 1990's. The listing is no longer updated or maintained. The local agency is the contact for more information on a site on the SWEEPS list.

Date of Government Version: 06/01/1994
Date Data Arrived at EDR: 07/07/2005
Date Made Active in Reports: 08/11/2005
Number of Days to Update: 35

Source: State Water Resources Control Board
Telephone: N/A
Last EDR Contact: 06/03/2005
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

UST MENDOCINO: Mendocino County UST Database
A listing of underground storage tank locations in Mendocino County.

Date of Government Version: 11/27/2017
Date Data Arrived at EDR: 11/29/2017
Date Made Active in Reports: 12/18/2017
Number of Days to Update: 19

Source: Department of Public Health
Telephone: 707-463-4466
Last EDR Contact: 11/28/2017
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: Annually

HIST UST: Hazardous Substance Storage Container Database
The Hazardous Substance Storage Container Database is a historical listing of UST sites. Refer to local/county source for current data.

Date of Government Version: 10/15/1990
Date Data Arrived at EDR: 01/25/1991
Date Made Active in Reports: 02/12/1991
Number of Days to Update: 18

Source: State Water Resources Control Board
Telephone: 916-341-5851
Last EDR Contact: 07/26/2001
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

CA FID UST: Facility Inventory Database
The Facility Inventory Database (FID) contains a historical listing of active and inactive underground storage tank locations from the State Water Resource Control Board. Refer to local/county source for current data.

Date of Government Version: 10/31/1994
Date Data Arrived at EDR: 09/05/1995
Date Made Active in Reports: 09/29/1995
Number of Days to Update: 24

Source: California Environmental Protection Agency
Telephone: 916-341-5851
Last EDR Contact: 12/28/1998
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Local Land Records

LIENS: Environmental Liens Listing
A listing of property locations with environmental liens for California where DTSC is a lien holder.

Date of Government Version: 11/30/2017
Date Data Arrived at EDR: 12/01/2017
Date Made Active in Reports: 01/11/2018
Number of Days to Update: 41

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 11/30/2017
Next Scheduled EDR Contact: 03/19/2018
Data Release Frequency: Varies

LIENS 2: CERCLA Lien Information
A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/22/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 21

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 12/22/2017
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Semi-Annually

DEED: Deed Restriction Listing

Site Mitigation and Brownfields Reuse Program Facility Sites with Deed Restrictions & Hazardous Waste Management Program Facility Sites with Deed / Land Use Restriction. The DTSC Site Mitigation and Brownfields Reuse Program (SMBRP) list includes sites cleaned up under the program's oversight and generally does not include current or former hazardous waste facilities that required a hazardous waste facility permit. The list represents deed restrictions that are active. Some sites have multiple deed restrictions. The DTSC Hazardous Waste Management Program (HWMP) has developed a list of current or former hazardous waste facilities that have a recorded land use restriction at the local county recorder's office. The land use restrictions on this list were required by the DTSC HWMP as a result of the presence of hazardous substances that remain on site after the facility (or part of the facility) has been closed or cleaned up. The types of land use restriction include deed notice, deed restriction, or a land use restriction that binds current and future owners.

Date of Government Version: 12/04/2017
Date Data Arrived at EDR: 12/05/2017
Date Made Active in Reports: 01/11/2018
Number of Days to Update: 37

Source: DTSC and SWRCB
Telephone: 916-323-3400
Last EDR Contact: 12/05/2017
Next Scheduled EDR Contact: 03/19/2018
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 09/21/2017
Date Data Arrived at EDR: 09/21/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 22

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Quarterly

CHMIRS: California Hazardous Material Incident Report System

California Hazardous Material Incident Reporting System. CHMIRS contains information on reported hazardous material incidents (accidental releases or spills).

Date of Government Version: 05/09/2017
Date Data Arrived at EDR: 07/26/2017
Date Made Active in Reports: 09/21/2017
Number of Days to Update: 57

Source: Office of Emergency Services
Telephone: 916-845-8400
Last EDR Contact: 01/26/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

LDS: Land Disposal Sites Listing (GEOTRACKER)

Land Disposal sites (Landfills) included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/12/2017
Date Made Active in Reports: 01/11/2018
Number of Days to Update: 30

Source: State Water Qualilty Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 03/26/2018
Data Release Frequency: Quarterly

MCS: Military Cleanup Sites Listing (GEOTRACKER)

Military sites (consisting of: Military UST sites; Military Privatized sites; and Military Cleanup sites [formerly known as DoD non UST]) included in GeoTracker. GeoTracker is the Water Boards data management system for sites that impact, or have the potential to impact, water quality in California, with emphasis on groundwater.

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/12/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 31

Source: State Water Resources Control Board
Telephone: 866-480-1028
Last EDR Contact: 12/12/2018
Next Scheduled EDR Contact: 03/26/2018
Data Release Frequency: Quarterly

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 06/06/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/22/2013
Number of Days to Update: 50

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 09/13/2017
Date Data Arrived at EDR: 09/26/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 10

Source: Environmental Protection Agency
Telephone: (415) 495-8895
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Quarterly

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 01/31/2015
Date Data Arrived at EDR: 07/08/2015
Date Made Active in Reports: 10/13/2015
Number of Days to Update: 97

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 11/22/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 10/13/2017
Next Scheduled EDR Contact: 01/22/2018
Data Release Frequency: Semi-Annually

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 10/11/2017
Next Scheduled EDR Contact: 01/22/2018
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 01/01/2017
Date Data Arrived at EDR: 02/03/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 63

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 11/17/2017
Next Scheduled EDR Contact: 02/26/2018
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 10/17/2017
Date Data Arrived at EDR: 11/01/2017
Date Made Active in Reports: 12/08/2017
Number of Days to Update: 37

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 11/06/2017
Next Scheduled EDR Contact: 02/19/2018
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 04/22/2013
Date Data Arrived at EDR: 03/03/2015
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 11/09/2017
Next Scheduled EDR Contact: 02/19/2018
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 06/21/2017
Date Made Active in Reports: 01/05/2018
Number of Days to Update: 198

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 12/22/2017
Next Scheduled EDR Contact: 04/02/2018
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 01/10/2018
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 2

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 01/10/2018
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 01/25/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/22/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 21

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 12/22/2017
Next Scheduled EDR Contact: 03/19/2018
Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 11/02/2017
Date Data Arrived at EDR: 11/17/2017
Date Made Active in Reports: 12/08/2017
Number of Days to Update: 21

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties
A listing of verified Potentially Responsible Parties

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 10/17/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 3

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 12/22/2017
Next Scheduled EDR Contact: 02/19/2018
Data Release Frequency: Quarterly

PADS: PCB Activity Database System
PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 06/01/2017
Date Data Arrived at EDR: 06/09/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 126

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 01/12/2018
Next Scheduled EDR Contact: 04/23/2018
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System
The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 11/18/2016
Date Data Arrived at EDR: 11/23/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 01/09/2018
Next Scheduled EDR Contact: 04/23/2018
Data Release Frequency: Quarterly

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: Quarterly

MLTS: Material Licensing Tracking System
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 08/30/2016
Date Data Arrived at EDR: 09/08/2016
Date Made Active in Reports: 10/21/2016
Number of Days to Update: 43

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 11/20/2017
Data Release Frequency: Quarterly

COAL ASH DOE: Steam-Electric Plant Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 12/05/2017
Next Scheduled EDR Contact: 03/19/2018
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 12/08/2017
Next Scheduled EDR Contact: 03/19/2018
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 05/24/2017
Date Data Arrived at EDR: 11/30/2017
Date Made Active in Reports: 12/15/2017
Number of Days to Update: 15

Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 01/26/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

RADINFO: Radiation Information Database
The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 10/02/2017
Date Data Arrived at EDR: 10/05/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 8

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 01/04/2018
Next Scheduled EDR Contact: 04/16/2018
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 08/07/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 42

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 05/14/2018
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 11/10/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 63

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 01/04/2018
Next Scheduled EDR Contact: 04/02/2018
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 02/22/2017
Date Made Active in Reports: 09/28/2017
Number of Days to Update: 218

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 11/20/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 07/14/2015
Date Made Active in Reports: 01/10/2017
Number of Days to Update: 546

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 01/09/2018
Next Scheduled EDR Contact: 04/23/2018
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 12/23/2016
Date Data Arrived at EDR: 12/27/2016
Date Made Active in Reports: 02/17/2017
Number of Days to Update: 52

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 02/19/2018
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 06/23/2017
Date Data Arrived at EDR: 10/11/2017
Date Made Active in Reports: 11/03/2017
Number of Days to Update: 23

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 11/22/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites
A listing of former lead smelter site locations.

Date of Government Version: 10/10/2017
Date Data Arrived at EDR: 11/03/2017
Date Made Active in Reports: 12/15/2017
Number of Days to Update: 42

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 12/22/2017
Next Scheduled EDR Contact: 04/16/2018
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites
A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)
The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data
A listing of minor source facilities.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US MINES: Mines Master Index File
Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 10/29/2017
Date Data Arrived at EDR: 11/28/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 45

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 11/28/2017
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing
This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 12/05/2005
Date Data Arrived at EDR: 02/29/2008
Date Made Active in Reports: 04/18/2008
Number of Days to Update: 49

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 12/01/2017
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 12/01/2017
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: Varies

ABANDONED MINES: Abandoned Mines

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Date of Government Version: 09/25/2017
Date Data Arrived at EDR: 09/26/2017
Date Made Active in Reports: 10/20/2017
Number of Days to Update: 24

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 12/19/2017
Next Scheduled EDR Contact: 03/26/2018
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 07/23/2017
Date Data Arrived at EDR: 09/06/2017
Date Made Active in Reports: 09/15/2017
Number of Days to Update: 9

Source: EPA
Telephone: (415) 947-8000
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 03/19/2018
Data Release Frequency: Quarterly

DOCKET HWC: Hazardous Waste Compliance Docket Listing

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 06/27/2017
Date Data Arrived at EDR: 11/21/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: Varies

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 09/30/2016
Date Data Arrived at EDR: 10/31/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 73

Source: Department of Defense
Telephone: 703-704-1564
Last EDR Contact: 01/02/2018
Next Scheduled EDR Contact: 04/30/2018
Data Release Frequency: Varies

ECHO: Enforcement & Compliance History Information
ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 09/02/2017
Date Data Arrived at EDR: 09/06/2017
Date Made Active in Reports: 10/20/2017
Number of Days to Update: 44

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 03/19/2018
Data Release Frequency: Quarterly

FUELS PROGRAM: EPA Fuels Program Registered Listing
This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 11/20/2017
Date Data Arrived at EDR: 11/20/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 53

Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 01/19/2018
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Quarterly

CA BOND EXP. PLAN: Bond Expenditure Plan
Department of Health Services developed a site-specific expenditure plan as the basis for an appropriation of Hazardous Substance Cleanup Bond Act funds. It is not updated.

Date of Government Version: 01/01/1989
Date Data Arrived at EDR: 07/27/1994
Date Made Active in Reports: 08/02/1994
Number of Days to Update: 6

Source: Department of Health Services
Telephone: 916-255-2118
Last EDR Contact: 05/31/1994
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

CORTESE: "Cortese" Hazardous Waste & Substances Sites List
The sites for the list are designated by the State Water Resource Control Board (LUST), the Integrated Waste Board (SWF/LS), and the Department of Toxic Substances Control (Cal-Sites).

Date of Government Version: 09/21/2017
Date Data Arrived at EDR: 09/21/2017
Date Made Active in Reports: 10/13/2017
Number of Days to Update: 22

Source: CAL EPA/Office of Emergency Information
Telephone: 916-323-3400
Last EDR Contact: 12/26/2017
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Quarterly

DRYCLEANERS: Cleaner Facilities
A list of drycleaner related facilities that have EPA ID numbers. These are facilities with certain SIC codes: power laundries, family and commercial; garment pressing and cleaner's agents; linen supply; coin-operated laundries and cleaning; drycleaning plants, except rugs; carpet and upholster cleaning; industrial launderers; laundry and garment services.

Date of Government Version: 08/02/2017
Date Data Arrived at EDR: 08/08/2017
Date Made Active in Reports: 10/16/2017
Number of Days to Update: 69

Source: Department of Toxic Substance Control
Telephone: 916-327-4498
Last EDR Contact: 11/30/2017
Next Scheduled EDR Contact: 03/19/2018
Data Release Frequency: Annually

EMI: Emissions Inventory Data
Toxics and criteria pollutant emissions data collected by the ARB and local air pollution agencies.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 03/21/2017
Date Made Active in Reports: 08/15/2017
Number of Days to Update: 147

Source: California Air Resources Board
Telephone: 916-322-2990
Last EDR Contact: 12/22/2017
Next Scheduled EDR Contact: 04/02/2018
Data Release Frequency: Varies

ENF: Enforcement Action Listing

A listing of Water Board Enforcement Actions. Formal is everything except Oral/Verbal Communication, Notice of Violation, Expedited Payment Letter, and Staff Enforcement Letter.

Date of Government Version: 11/01/2017
Date Data Arrived at EDR: 11/03/2017
Date Made Active in Reports: 12/07/2017
Number of Days to Update: 34

Source: State Water Resoruces Control Board
Telephone: 916-445-9379
Last EDR Contact: 01/22/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

Financial Assurance 1: Financial Assurance Information Listing

Financial Assurance information

Date of Government Version: 10/23/2017
Date Data Arrived at EDR: 10/24/2017
Date Made Active in Reports: 12/15/2017
Number of Days to Update: 52

Source: Department of Toxic Substances Control
Telephone: 916-255-3628
Last EDR Contact: 01/22/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

Financial Assurance 2: Financial Assurance Information Listing

A listing of financial assurance information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 11/14/2017
Date Data Arrived at EDR: 11/17/2017
Date Made Active in Reports: 12/18/2017
Number of Days to Update: 31

Source: California Integrated Waste Management Board
Telephone: 916-341-6066
Last EDR Contact: 11/09/2017
Next Scheduled EDR Contact: 02/26/2018
Data Release Frequency: Varies

HAZNET: Facility and Manifest Data

Facility and Manifest Data. The data is extracted from the copies of hazardous waste manifests received each year by the DTSC. The annual volume of manifests is typically 700,000 - 1,000,000 annually, representing approximately 350,000 - 500,000 shipments. Data are from the manifests submitted without correction, and therefore many contain some invalid values for data elements such as generator ID, TSD ID, waste category, and disposal method. This database begins with calendar year 1993.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 07/12/2017
Date Made Active in Reports: 10/17/2017
Number of Days to Update: 97

Source: California Environmental Protection Agency
Telephone: 916-255-1136
Last EDR Contact: 01/08/2018
Next Scheduled EDR Contact: 04/23/2018
Data Release Frequency: Annually

ICE: ICE

Contains data pertaining to the Permitted Facilities with Inspections / Enforcements sites tracked in Envirostor.

Date of Government Version: 11/20/2017
Date Data Arrived at EDR: 11/20/2017
Date Made Active in Reports: 12/27/2017
Number of Days to Update: 37

Source: Department of Toxic Subsances Control
Telephone: 877-786-9427
Last EDR Contact: 11/20/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Quarterly

HIST CORTESE: Hazardous Waste & Substance Site List

The sites for the list are designated by the State Water Resource Control Board [LUST], the Integrated Waste Board [SWF/LS], and the Department of Toxic Substances Control [CALSITES]. This listing is no longer updated by the state agency.

Date of Government Version: 04/01/2001
Date Data Arrived at EDR: 01/22/2009
Date Made Active in Reports: 04/08/2009
Number of Days to Update: 76

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 01/22/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

HWP: EnviroStor Permitted Facilities Listing
Detailed information on permitted hazardous waste facilities and corrective action ("cleanups") tracked in EnviroStor.

Date of Government Version: 11/20/2017
Date Data Arrived at EDR: 11/20/2017
Date Made Active in Reports: 12/27/2017
Number of Days to Update: 37

Source: Department of Toxic Substances Control
Telephone: 916-323-3400
Last EDR Contact: 11/20/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Quarterly

HWT: Registered Hazardous Waste Transporter Database
A listing of hazardous waste transporters. In California, unless specifically exempted, it is unlawful for any person to transport hazardous wastes unless the person holds a valid registration issued by DTSC. A hazardous waste transporter registration is valid for one year and is assigned a unique registration number.

Date of Government Version: 10/10/2017
Date Data Arrived at EDR: 10/10/2017
Date Made Active in Reports: 10/17/2017
Number of Days to Update: 7

Source: Department of Toxic Substances Control
Telephone: 916-440-7145
Last EDR Contact: 01/09/2018
Next Scheduled EDR Contact: 04/23/2018
Data Release Frequency: Quarterly

MINES: Mines Site Location Listing
A listing of mine site locations from the Office of Mine Reclamation.

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/12/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 31

Source: Department of Conservation
Telephone: 916-322-1080
Last EDR Contact: 12/12/2017
Next Scheduled EDR Contact: 03/26/2018
Data Release Frequency: Quarterly

MWMP: Medical Waste Management Program Listing
The Medical Waste Management Program (MWMP) ensures the proper handling and disposal of medical waste by permitting and inspecting medical waste Offsite Treatment Facilities (PDF) and Transfer Stations (PDF) throughout the state. MWMP also oversees all Medical Waste Transporters.

Date of Government Version: 11/29/2017
Date Data Arrived at EDR: 12/05/2017
Date Made Active in Reports: 01/16/2018
Number of Days to Update: 42

Source: Department of Public Health
Telephone: 916-558-1784
Last EDR Contact: 12/05/2017
Next Scheduled EDR Contact: 03/19/2018
Data Release Frequency: Varies

NPDES: NPDES Permits Listing
A listing of NPDES permits, including stormwater.

Date of Government Version: 11/13/2017
Date Data Arrived at EDR: 11/14/2017
Date Made Active in Reports: 12/07/2017
Number of Days to Update: 23

Source: State Water Resources Control Board
Telephone: 916-445-9379
Last EDR Contact: 11/14/2017
Next Scheduled EDR Contact: 02/26/2018
Data Release Frequency: Quarterly

PEST LIC: Pesticide Regulation Licenses Listing
A listing of licenses and certificates issued by the Department of Pesticide Regulation. The DPR issues licenses and/or certificates to: Persons and businesses that apply or sell pesticides; Pest control dealers and brokers; Persons who advise on agricultural pesticide applications.

Date of Government Version: 12/04/2017
Date Data Arrived at EDR: 12/05/2017
Date Made Active in Reports: 01/16/2018
Number of Days to Update: 42

Source: Department of Pesticide Regulation
Telephone: 916-445-4038
Last EDR Contact: 12/05/2017
Next Scheduled EDR Contact: 03/19/2018
Data Release Frequency: Quarterly

PROC: Certified Processors Database
A listing of certified processors.

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/12/2017
Date Made Active in Reports: 01/16/2018
Number of Days to Update: 35

Source: Department of Conservation
Telephone: 916-323-3836
Last EDR Contact: 12/12/2017
Next Scheduled EDR Contact: 03/26/2018
Data Release Frequency: Quarterly

NOTIFY 65: Proposition 65 Records
Listings of all Proposition 65 incidents reported to counties by the State Water Resources Control Board and the Regional Water Quality Control Board. This database is no longer updated by the reporting agency.

Date of Government Version: 12/14/2017
Date Data Arrived at EDR: 12/15/2017
Date Made Active in Reports: 01/16/2018
Number of Days to Update: 32

Source: State Water Resources Control Board
Telephone: 916-445-3846
Last EDR Contact: 12/13/2017
Next Scheduled EDR Contact: 04/02/2018
Data Release Frequency: No Update Planned

UIC: UIC Listing
A listing of wells identified as underground injection wells, in the California Oil and Gas Wells database.

Date of Government Version: 12/11/2017
Date Data Arrived at EDR: 12/12/2017
Date Made Active in Reports: 01/17/2018
Number of Days to Update: 36

Source: Deaprtment of Conservation
Telephone: 916-445-2408
Last EDR Contact: 12/12/2017
Next Scheduled EDR Contact: 03/26/2018
Data Release Frequency: Varies

WASTEWATER PITS: Oil Wastewater Pits Listing
Water officials discovered that oil producers have been dumping chemical-laden wastewater into hundreds of unlined pits that are operating without proper permits. Inspections completed by the Central Valley Regional Water Quality Control Board revealed the existence of previously unidentified waste sites. The water board?s review found that more than one-third of the region?s active disposal pits are operating without permission.

Date of Government Version: 04/15/2015
Date Data Arrived at EDR: 04/17/2015
Date Made Active in Reports: 06/23/2015
Number of Days to Update: 67

Source: RWQCB, Central Valley Region
Telephone: 559-445-5577
Last EDR Contact: 01/12/2018
Next Scheduled EDR Contact: 04/23/2018
Data Release Frequency: Varies

WDS: Waste Discharge System
Sites which have been issued waste discharge requirements.

Date of Government Version: 06/19/2007
Date Data Arrived at EDR: 06/20/2007
Date Made Active in Reports: 06/29/2007
Number of Days to Update: 9

Source: State Water Resources Control Board
Telephone: 916-341-5227
Last EDR Contact: 11/14/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Quarterly

WIP: Well Investigation Program Case List
Well Investigation Program case in the San Gabriel and San Fernando Valley area.

Date of Government Version: 07/03/2009
Date Data Arrived at EDR: 07/21/2009
Date Made Active in Reports: 08/03/2009
Number of Days to Update: 13

Source: Los Angeles Water Quality Control Board
Telephone: 213-576-6726
Last EDR Contact: 12/19/2017
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Varies

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Hist Auto: EDR Exclusive Historical Auto Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historical Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Resources Recycling and Recovery in California.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/13/2014
Number of Days to Update: 196

Source: Department of Resources Recycling and Recovery
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the State Water Resources Control Board in California.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 12/30/2013
Number of Days to Update: 182

Source: State Water Resources Control Board
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

COUNTY RECORDS

ALAMEDA COUNTY:

Contaminated Sites

A listing of contaminated sites overseen by the Toxic Release Program (oil and groundwater contamination from chemical releases and spills) and the Leaking Underground Storage Tank Program (soil and ground water contamination from leaking petroleum USTs).

Date of Government Version: 09/22/2017
Date Data Arrived at EDR: 09/22/2017
Date Made Active in Reports: 10/10/2017
Number of Days to Update: 18

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 01/04/2018
Next Scheduled EDR Contact: 04/23/2018
Data Release Frequency: Semi-Annually

Underground Tanks

Underground storage tank sites located in Alameda county.

Date of Government Version: 10/11/2017
Date Data Arrived at EDR: 10/12/2017
Date Made Active in Reports: 11/08/2017
Number of Days to Update: 27

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700
Last EDR Contact: 01/22/2018
Next Scheduled EDR Contact: 04/24/2047
Data Release Frequency: Semi-Annually

AMADOR COUNTY:

CUPA Facility List

Cupa Facility List

Date of Government Version: 12/08/2017
Date Data Arrived at EDR: 12/12/2017
Date Made Active in Reports: 12/27/2017
Number of Days to Update: 15

Source: Amador County Environmental Health
Telephone: 209-223-6439
Last EDR Contact: 11/30/2017
Next Scheduled EDR Contact: 03/19/2018
Data Release Frequency: Varies

BUTTE COUNTY:

CUPA Facility Listing

Cupa facility list.

Date of Government Version: 04/21/2017
Date Data Arrived at EDR: 04/25/2017
Date Made Active in Reports: 08/09/2017
Number of Days to Update: 106

Source: Public Health Department
Telephone: 530-538-7149
Last EDR Contact: 01/04/2018
Next Scheduled EDR Contact: 04/23/2018
Data Release Frequency: No Update Planned

CALVERAS COUNTY:

CUPA Facility Listing
Cupa Facility Listing

Date of Government Version: 08/31/2017
Date Data Arrived at EDR: 09/05/2017
Date Made Active in Reports: 11/08/2017
Number of Days to Update: 64

Source: Calveras County Environmental Health
Telephone: 209-754-6399
Last EDR Contact: 12/20/2017
Next Scheduled EDR Contact: 10/09/2017
Data Release Frequency: Quarterly

COLUSA COUNTY:

CUPA Facility List
Cupa facility list.

Date of Government Version: 08/07/2017
Date Data Arrived at EDR: 08/08/2017
Date Made Active in Reports: 10/16/2017
Number of Days to Update: 69

Source: Health & Human Services
Telephone: 530-458-0396
Last EDR Contact: 11/01/2017
Next Scheduled EDR Contact: 02/19/2018
Data Release Frequency: Semi-Annually

CONTRA COSTA COUNTY:

Site List
List includes sites from the underground tank, hazardous waste generator and business plan/2185 programs.

Date of Government Version: 11/20/2017
Date Data Arrived at EDR: 11/29/2017
Date Made Active in Reports: 01/19/2018
Number of Days to Update: 51

Source: Contra Costa Health Services Department
Telephone: 925-646-2286
Last EDR Contact: 01/29/2018
Next Scheduled EDR Contact: 05/14/2018
Data Release Frequency: Semi-Annually

DEL NORTE COUNTY:

CUPA Facility List
Cupa Facility list

Date of Government Version: 10/31/2017
Date Data Arrived at EDR: 11/01/2017
Date Made Active in Reports: 11/14/2017
Number of Days to Update: 13

Source: Del Norte County Environmental Health Division
Telephone: 707-465-0426
Last EDR Contact: 01/29/2018
Next Scheduled EDR Contact: 05/14/2018
Data Release Frequency: Varies

EL DORADO COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 12/04/2017
Date Data Arrived at EDR: 12/06/2017
Date Made Active in Reports: 12/27/2017
Number of Days to Update: 21

Source: El Dorado County Environmental Management Department
Telephone: 530-621-6623
Last EDR Contact: 01/29/2018
Next Scheduled EDR Contact: 05/14/2018
Data Release Frequency: Varies

FRESNO COUNTY:

CUPA Resources List

Certified Unified Program Agency. CUPA's are responsible for implementing a unified hazardous materials and hazardous waste management regulatory program. The agency provides oversight of businesses that deal with hazardous materials, operate underground storage tanks or aboveground storage tanks.

Date of Government Version: 10/03/2017
Date Data Arrived at EDR: 10/06/2017
Date Made Active in Reports: 11/15/2017
Number of Days to Update: 40

Source: Dept. of Community Health
Telephone: 559-445-3271
Last EDR Contact: 01/29/2018
Next Scheduled EDR Contact: 04/16/2018
Data Release Frequency: Semi-Annually

GLENN COUNTY:

CUPA Facility List

Cupa facility list

Date of Government Version: 10/25/2017
Date Data Arrived at EDR: 10/27/2017
Date Made Active in Reports: 11/15/2017
Number of Days to Update: 19

Source: Glenn County Air Pollution Control District
Telephone: 830-934-6500
Last EDR Contact: 01/22/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

HUMBOLDT COUNTY:

CUPA Facility List

CUPA facility list.

Date of Government Version: 08/03/2017
Date Data Arrived at EDR: 08/08/2017
Date Made Active in Reports: 10/16/2017
Number of Days to Update: 69

Source: Humboldt County Environmental Health
Telephone: N/A
Last EDR Contact: 11/14/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Semi-Annually

IMPERIAL COUNTY:

CUPA Facility List

Cupa facility list.

Date of Government Version: 10/23/2017
Date Data Arrived at EDR: 10/24/2017
Date Made Active in Reports: 11/15/2017
Number of Days to Update: 22

Source: San Diego Border Field Office
Telephone: 760-339-2777
Last EDR Contact: 01/22/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

INYO COUNTY:

CUPA Facility List
Cupa facility list.

Date of Government Version: 06/08/2017
Date Data Arrived at EDR: 06/09/2017
Date Made Active in Reports: 08/04/2017
Number of Days to Update: 56

Source: Inyo County Environmental Health Services
Telephone: 760-878-0238
Last EDR Contact: 11/14/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Varies

KERN COUNTY:

Underground Storage Tank Sites & Tank Listing
Kern County Sites and Tanks Listing.

Date of Government Version: 11/02/2017
Date Data Arrived at EDR: 11/07/2017
Date Made Active in Reports: 12/20/2017
Number of Days to Update: 43

Source: Kern County Environment Health Services Department
Telephone: 661-862-8700
Last EDR Contact: 11/01/2017
Next Scheduled EDR Contact: 02/19/2018
Data Release Frequency: Quarterly

KINGS COUNTY:

CUPA Facility List
A listing of sites included in the county's Certified Unified Program Agency database. California's Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 11/14/2017
Date Data Arrived at EDR: 11/17/2017
Date Made Active in Reports: 12/15/2017
Number of Days to Update: 28

Source: Kings County Department of Public Health
Telephone: 559-584-1411
Last EDR Contact: 11/14/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Varies

LAKE COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 11/09/2017
Date Data Arrived at EDR: 11/10/2017
Date Made Active in Reports: 11/15/2017
Number of Days to Update: 5

Source: Lake County Environmental Health
Telephone: 707-263-1164
Last EDR Contact: 01/16/2018
Next Scheduled EDR Contact: 04/30/2018
Data Release Frequency: Varies

LASSEN COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 07/24/2017
Date Data Arrived at EDR: 07/26/2017
Date Made Active in Reports: 10/16/2017
Number of Days to Update: 82

Source: Lassen County Environmental Health
Telephone: 530-251-8528
Last EDR Contact: 01/22/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

LOS ANGELES COUNTY:

San Gabriel Valley Areas of Concern
San Gabriel Valley areas where VOC contamination is at or above the MCL as designated by region 9 EPA office.

Date of Government Version: 03/30/2009
Date Data Arrived at EDR: 03/31/2009
Date Made Active in Reports: 10/23/2009
Number of Days to Update: 206

Source: EPA Region 9
Telephone: 415-972-3178
Last EDR Contact: 12/13/2017
Next Scheduled EDR Contact: 04/02/2018
Data Release Frequency: No Update Planned

HMS: Street Number List
Industrial Waste and Underground Storage Tank Sites.

Date of Government Version: 10/11/2017
Date Data Arrived at EDR: 10/12/2017
Date Made Active in Reports: 10/17/2017
Number of Days to Update: 5

Source: Department of Public Works
Telephone: 626-458-3517
Last EDR Contact: 01/04/2018
Next Scheduled EDR Contact: 04/23/2018
Data Release Frequency: Semi-Annually

List of Solid Waste Facilities
Solid Waste Facilities in Los Angeles County.

Date of Government Version: 10/16/2017
Date Data Arrived at EDR: 10/17/2017
Date Made Active in Reports: 12/07/2017
Number of Days to Update: 51

Source: La County Department of Public Works
Telephone: 818-458-5185
Last EDR Contact: 01/16/2018
Next Scheduled EDR Contact: 04/30/2018
Data Release Frequency: Varies

City of Los Angeles Landfills
Landfills owned and maintained by the City of Los Angeles.

Date of Government Version: 01/01/2017
Date Data Arrived at EDR: 04/21/2017
Date Made Active in Reports: 10/09/2017
Number of Days to Update: 171

Source: Engineering & Construction Division
Telephone: 213-473-7869
Last EDR Contact: 01/10/2018
Next Scheduled EDR Contact: 04/30/2018
Data Release Frequency: Varies

Site Mitigation List
Industrial sites that have had some sort of spill or complaint.

Date of Government Version: 11/01/2017
Date Data Arrived at EDR: 11/14/2017
Date Made Active in Reports: 12/15/2017
Number of Days to Update: 31

Source: Community Health Services
Telephone: 323-890-7806
Last EDR Contact: 01/17/2018
Next Scheduled EDR Contact: 04/30/2018
Data Release Frequency: Annually

City of El Segundo Underground Storage Tank
Underground storage tank sites located in El Segundo city.

Date of Government Version: 01/21/2017
Date Data Arrived at EDR: 04/19/2017
Date Made Active in Reports: 05/10/2017
Number of Days to Update: 21

Source: City of El Segundo Fire Department
Telephone: 310-524-2236
Last EDR Contact: 01/10/2018
Next Scheduled EDR Contact: 04/30/2018
Data Release Frequency: Semi-Annually

City of Long Beach Underground Storage Tank
Underground storage tank sites located in the city of Long Beach.

Date of Government Version: 03/09/2017
Date Data Arrived at EDR: 03/10/2017
Date Made Active in Reports: 05/03/2017
Number of Days to Update: 54

Source: City of Long Beach Fire Department
Telephone: 562-570-2563
Last EDR Contact: 01/22/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Annually

City of Torrance Underground Storage Tank
Underground storage tank sites located in the city of Torrance.

Date of Government Version: 01/04/2018
Date Data Arrived at EDR: 01/05/2018
Date Made Active in Reports: 01/18/2018
Number of Days to Update: 13

Source: City of Torrance Fire Department
Telephone: 310-618-2973
Last EDR Contact: 01/04/2018
Next Scheduled EDR Contact: 04/23/2018
Data Release Frequency: Semi-Annually

MADERA COUNTY:

CUPA Facility List
A listing of sites included in the county's Certified Unified Program Agency database. California's Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 10/26/2017
Date Data Arrived at EDR: 10/27/2017
Date Made Active in Reports: 11/06/2017
Number of Days to Update: 10

Source: Madera County Environmental Health
Telephone: 559-675-7823
Last EDR Contact: 11/14/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Varies

MARIN COUNTY:

Underground Storage Tank Sites
Currently permitted USTs in Marin County.

Date of Government Version: 01/02/2018
Date Data Arrived at EDR: 01/05/2018
Date Made Active in Reports: 01/17/2018
Number of Days to Update: 12

Source: Public Works Department Waste Management
Telephone: 415-473-6647
Last EDR Contact: 01/02/2018
Next Scheduled EDR Contact: 04/16/2018
Data Release Frequency: Semi-Annually

MERCED COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 10/02/2017
Date Data Arrived at EDR: 10/03/2017
Date Made Active in Reports: 10/17/2017
Number of Days to Update: 14

Source: Merced County Environmental Health
Telephone: 209-381-1094
Last EDR Contact: 11/30/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Varies

MONO COUNTY:

CUPA Facility List
CUPA Facility List

Date of Government Version: 11/21/2017
Date Data Arrived at EDR: 11/27/2017
Date Made Active in Reports: 12/27/2017
Number of Days to Update: 30

Source: Mono County Health Department
Telephone: 760-932-5580
Last EDR Contact: 11/21/2017
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: Varies

MONTEREY COUNTY:

CUPA Facility Listing
CUPA Program listing from the Environmental Health Division.

Date of Government Version: 09/11/2017
Date Data Arrived at EDR: 09/15/2017
Date Made Active in Reports: 11/28/2017
Number of Days to Update: 74

Source: Monterey County Health Department
Telephone: 831-796-1297
Last EDR Contact: 11/20/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Varies

NAPA COUNTY:

Sites With Reported Contamination
A listing of leaking underground storage tank sites located in Napa county.

Date of Government Version: 01/09/2017
Date Data Arrived at EDR: 01/11/2017
Date Made Active in Reports: 03/02/2017
Number of Days to Update: 50

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 11/21/2017
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: No Update Planned

Closed and Operating Underground Storage Tank Sites
Underground storage tank sites located in Napa county.

Date of Government Version: 11/22/2017
Date Data Arrived at EDR: 11/27/2017
Date Made Active in Reports: 12/19/2017
Number of Days to Update: 22

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269
Last EDR Contact: 11/21/2017
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: No Update Planned

NEVADA COUNTY:

CUPA Facility List
CUPA facility list.

Date of Government Version: 11/02/2017
Date Data Arrived at EDR: 11/07/2017
Date Made Active in Reports: 11/15/2017
Number of Days to Update: 8

Source: Community Development Agency
Telephone: 530-265-1467
Last EDR Contact: 01/29/2018
Next Scheduled EDR Contact: 05/14/2018
Data Release Frequency: Varies

ORANGE COUNTY:

List of Industrial Site Cleanups
Petroleum and non-petroleum spills.

Date of Government Version: 11/02/2017
Date Data Arrived at EDR: 11/09/2017
Date Made Active in Reports: 12/07/2017
Number of Days to Update: 28

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 11/06/2017
Next Scheduled EDR Contact: 02/19/2018
Data Release Frequency: Annually

List of Underground Storage Tank Cleanups
Orange County Underground Storage Tank Cleanups (LUST).

Date of Government Version: 11/02/2017
Date Data Arrived at EDR: 11/09/2017
Date Made Active in Reports: 12/15/2017
Number of Days to Update: 36

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 11/06/2017
Next Scheduled EDR Contact: 02/19/2018
Data Release Frequency: Quarterly

List of Underground Storage Tank Facilities
Orange County Underground Storage Tank Facilities (UST).

Date of Government Version: 11/02/2017
Date Data Arrived at EDR: 11/07/2017
Date Made Active in Reports: 12/19/2017
Number of Days to Update: 42

Source: Health Care Agency
Telephone: 714-834-3446
Last EDR Contact: 11/07/2017
Next Scheduled EDR Contact: 02/19/2018
Data Release Frequency: Quarterly

PLACER COUNTY:

Master List of Facilities
List includes aboveground tanks, underground tanks and cleanup sites.

Date of Government Version: 09/05/2017
Date Data Arrived at EDR: 09/06/2017
Date Made Active in Reports: 11/08/2017
Number of Days to Update: 63

Source: Placer County Health and Human Services
Telephone: 530-745-2363
Last EDR Contact: 11/30/2017
Next Scheduled EDR Contact: 03/19/2018
Data Release Frequency: Semi-Annually

PLUMAS COUNTY:

CUPA Facility List
Plumas County CUPA Program facilities.

Date of Government Version: 10/23/2017
Date Data Arrived at EDR: 11/03/2017
Date Made Active in Reports: 11/15/2017
Number of Days to Update: 12

Source: Plumas County Environmental Health
Telephone: 530-283-6355
Last EDR Contact: 01/22/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

RIVERSIDE COUNTY:

Listing of Underground Tank Cleanup Sites
Riverside County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 10/11/2017
Date Data Arrived at EDR: 10/12/2017
Date Made Active in Reports: 11/09/2017
Number of Days to Update: 28

Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 12/15/2017
Next Scheduled EDR Contact: 04/02/2018
Data Release Frequency: Quarterly

Underground Storage Tank Tank List
Underground storage tank sites located in Riverside county.

Date of Government Version: 10/12/2017
Date Data Arrived at EDR: 10/12/2017
Date Made Active in Reports: 11/08/2017
Number of Days to Update: 27

Source: Department of Environmental Health
Telephone: 951-358-5055
Last EDR Contact: 12/15/2017
Next Scheduled EDR Contact: 04/02/2018
Data Release Frequency: Quarterly

SACRAMENTO COUNTY:

Toxic Site Clean-Up List
List of sites where unauthorized releases of potentially hazardous materials have occurred.

Date of Government Version: 08/02/2017
Date Data Arrived at EDR: 10/03/2017
Date Made Active in Reports: 10/06/2017
Number of Days to Update: 3

Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 01/03/2018
Next Scheduled EDR Contact: 04/16/2018
Data Release Frequency: Quarterly

Master Hazardous Materials Facility List

Any business that has hazardous materials on site - hazardous material storage sites, underground storage tanks, waste generators.

Date of Government Version: 08/02/2017
Date Data Arrived at EDR: 10/03/2017
Date Made Active in Reports: 11/16/2017
Number of Days to Update: 44

Source: Sacramento County Environmental Management
Telephone: 916-875-8406
Last EDR Contact: 01/03/2018
Next Scheduled EDR Contact: 04/16/2018
Data Release Frequency: Quarterly

SAN BENITO COUNTY:

CUPA Facility List

Cupa facility list

Date of Government Version: 11/01/2017
Date Data Arrived at EDR: 11/03/2017
Date Made Active in Reports: 11/17/2017
Number of Days to Update: 14

Source: San Benito County Environmental Health
Telephone: N/A
Last EDR Contact: 11/01/2017
Next Scheduled EDR Contact: 02/19/2018
Data Release Frequency: Varies

SAN BERNARDINO COUNTY:

Hazardous Material Permits

This listing includes underground storage tanks, medical waste handlers/generators, hazardous materials handlers, hazardous waste generators, and waste oil generators/handlers.

Date of Government Version: 11/30/2017
Date Data Arrived at EDR: 12/01/2017
Date Made Active in Reports: 01/16/2018
Number of Days to Update: 46

Source: San Bernardino County Fire Department Hazardous Materials Division
Telephone: 909-387-3041
Last EDR Contact: 11/06/2017
Next Scheduled EDR Contact: 02/19/2018
Data Release Frequency: Quarterly

SAN DIEGO COUNTY:

Hazardous Materials Management Division Database

The database includes: HE58 - This report contains the business name, site address, business phone number, establishment 'H' permit number, type of permit, and the business status. HE17 - In addition to providing the same information provided in the HE58 listing, HE17 provides inspection dates, violations received by the establishment, hazardous waste generated, the quantity, method of storage, treatment/disposal of waste and the hauler, and information on underground storage tanks. Unauthorized Release List - Includes a summary of environmental contamination cases in San Diego County (underground tank cases, non-tank cases, groundwater contamination, and soil contamination are included.)

Date of Government Version: 12/04/2017
Date Data Arrived at EDR: 12/05/2017
Date Made Active in Reports: 01/11/2018
Number of Days to Update: 37

Source: Hazardous Materials Management Division
Telephone: 619-338-2268
Last EDR Contact: 12/05/2017
Next Scheduled EDR Contact: 03/19/2018
Data Release Frequency: Quarterly

Solid Waste Facilities
San Diego County Solid Waste Facilities.

Date of Government Version: 10/31/2015
Date Data Arrived at EDR: 11/07/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 58

Source: Department of Health Services
Telephone: 619-338-2209
Last EDR Contact: 01/22/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

Environmental Case Listing
The listing contains all underground tank release cases and projects pertaining to properties contaminated with hazardous substances that are actively under review by the Site Assessment and Mitigation Program.

Date of Government Version: 03/23/2010
Date Data Arrived at EDR: 06/15/2010
Date Made Active in Reports: 07/09/2010
Number of Days to Update: 24

Source: San Diego County Department of Environmental Health
Telephone: 619-338-2371
Last EDR Contact: 11/29/2017
Next Scheduled EDR Contact: 03/19/2018
Data Release Frequency: No Update Planned

SAN FRANCISCO COUNTY:

Local Oversite Facilities
A listing of leaking underground storage tank sites located in San Francisco county.

Date of Government Version: 09/19/2008
Date Data Arrived at EDR: 09/19/2008
Date Made Active in Reports: 09/29/2008
Number of Days to Update: 10

Source: Department Of Public Health San Francisco County
Telephone: 415-252-3920
Last EDR Contact: 11/01/2017
Next Scheduled EDR Contact: 02/19/2018
Data Release Frequency: Quarterly

Underground Storage Tank Information
Underground storage tank sites located in San Francisco county.

Date of Government Version: 11/02/2017
Date Data Arrived at EDR: 11/07/2017
Date Made Active in Reports: 12/19/2017
Number of Days to Update: 42

Source: Department of Public Health
Telephone: 415-252-3920
Last EDR Contact: 11/01/2017
Next Scheduled EDR Contact: 02/19/2018
Data Release Frequency: Quarterly

SAN JOAQUIN COUNTY:

San Joaquin Co. UST
A listing of underground storage tank locations in San Joaquin county.

Date of Government Version: 10/03/2017
Date Data Arrived at EDR: 10/06/2017
Date Made Active in Reports: 10/10/2017
Number of Days to Update: 4

Source: Environmental Health Department
Telephone: N/A
Last EDR Contact: 12/13/2017
Next Scheduled EDR Contact: 04/02/2018
Data Release Frequency: Semi-Annually

SAN LUIS OBISPO COUNTY:

CUPA Facility List
Cupa Facility List.

Date of Government Version: 11/16/2017
Date Data Arrived at EDR: 11/17/2017
Date Made Active in Reports: 12/18/2017
Number of Days to Update: 31

Source: San Luis Obispo County Public Health Department
Telephone: 805-781-5596
Last EDR Contact: 11/14/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Varies

SAN MATEO COUNTY:

Business Inventory
List includes Hazardous Materials Business Plan, hazardous waste generators, and underground storage tanks.

Date of Government Version: 12/12/2017
Date Data Arrived at EDR: 12/14/2017
Date Made Active in Reports: 01/11/2018
Number of Days to Update: 28

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 12/06/2017
Next Scheduled EDR Contact: 03/26/2018
Data Release Frequency: Annually

Fuel Leak List
A listing of leaking underground storage tank sites located in San Mateo county.

Date of Government Version: 12/12/2017
Date Data Arrived at EDR: 12/14/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 29

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
Last EDR Contact: 01/22/2018
Next Scheduled EDR Contact: 03/26/2018
Data Release Frequency: Semi-Annually

SANTA BARBARA COUNTY:

CUPA Facility Listing
CUPA Program Listing from the Environmental Health Services division.

Date of Government Version: 09/08/2011
Date Data Arrived at EDR: 09/09/2011
Date Made Active in Reports: 10/07/2011
Number of Days to Update: 28

Source: Santa Barbara County Public Health Department
Telephone: 805-686-8167
Last EDR Contact: 12/13/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Varies

SANTA CLARA COUNTY:

Cupa Facility List
Cupa facility list

Date of Government Version: 11/14/2017
Date Data Arrived at EDR: 11/16/2017
Date Made Active in Reports: 01/04/2018
Number of Days to Update: 49

Source: Department of Environmental Health
Telephone: 408-918-1973
Last EDR Contact: 11/14/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Varies

HIST LUST - Fuel Leak Site Activity Report
A listing of open and closed leaking underground storage tanks. This listing is no longer updated by the county. Leaking underground storage tanks are now handled by the Department of Environmental Health.

Date of Government Version: 03/29/2005
Date Data Arrived at EDR: 03/30/2005
Date Made Active in Reports: 04/21/2005
Number of Days to Update: 22

Source: Santa Clara Valley Water District
Telephone: 408-265-2600
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

LOP Listing
A listing of leaking underground storage tanks located in Santa Clara county.

Date of Government Version: 03/03/2014
Date Data Arrived at EDR: 03/05/2014
Date Made Active in Reports: 03/18/2014
Number of Days to Update: 13

Source: Department of Environmental Health
Telephone: 408-918-3417
Last EDR Contact: 11/21/2017
Next Scheduled EDR Contact: 03/12/2018
Data Release Frequency: Annually

Hazardous Material Facilities
Hazardous material facilities, including underground storage tank sites.

Date of Government Version: 11/01/2017
Date Data Arrived at EDR: 11/03/2017
Date Made Active in Reports: 12/07/2017
Number of Days to Update: 34

Source: City of San Jose Fire Department
Telephone: 408-535-7694
Last EDR Contact: 11/01/2017
Next Scheduled EDR Contact: 02/19/2018
Data Release Frequency: Annually

SANTA CRUZ COUNTY:

CUPA Facility List
CUPA facility listing.

Date of Government Version: 01/21/2017
Date Data Arrived at EDR: 02/22/2017
Date Made Active in Reports: 05/23/2017
Number of Days to Update: 90

Source: Santa Cruz County Environmental Health
Telephone: 831-464-2761
Last EDR Contact: 11/14/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Varies

SHASTA COUNTY:

CUPA Facility List
Cupa Facility List.

Date of Government Version: 06/15/2017
Date Data Arrived at EDR: 06/19/2017
Date Made Active in Reports: 08/09/2017
Number of Days to Update: 51

Source: Shasta County Department of Resource Management
Telephone: 530-225-5789
Last EDR Contact: 11/14/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Varies

SOLANO COUNTY:

Leaking Underground Storage Tanks
A listing of leaking underground storage tank sites located in Solano county.

Date of Government Version: 12/14/2017
Date Data Arrived at EDR: 12/15/2017
Date Made Active in Reports: 01/12/2018
Number of Days to Update: 28

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 12/08/2017
Next Scheduled EDR Contact: 03/19/2018
Data Release Frequency: Quarterly

Underground Storage Tanks
Underground storage tank sites located in Solano county.

Date of Government Version: 12/14/2017
Date Data Arrived at EDR: 12/15/2017
Date Made Active in Reports: 01/18/2018
Number of Days to Update: 34

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770
Last EDR Contact: 12/08/2017
Next Scheduled EDR Contact: 03/19/2018
Data Release Frequency: Quarterly

SONOMA COUNTY:

Cupa Facility List
Cupa Facility list

Date of Government Version: 09/25/2017
Date Data Arrived at EDR: 09/27/2017
Date Made Active in Reports: 11/16/2017
Number of Days to Update: 50

Source: County of Sonoma Fire & Emergency Services Department
Telephone: 707-565-1174
Last EDR Contact: 12/19/2017
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Varies

Leaking Underground Storage Tank Sites
A listing of leaking underground storage tank sites located in Sonoma county.

Date of Government Version: 10/03/2017
Date Data Arrived at EDR: 10/06/2017
Date Made Active in Reports: 11/10/2017
Number of Days to Update: 35

Source: Department of Health Services
Telephone: 707-565-6565
Last EDR Contact: 01/04/2018
Next Scheduled EDR Contact: 04/09/2018
Data Release Frequency: Quarterly

STANISLAUS COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 11/01/2017
Date Data Arrived at EDR: 11/10/2017
Date Made Active in Reports: 11/16/2017
Number of Days to Update: 6

Source: Stanislaus County Department of Ennvironmental Protection
Telephone: 209-525-6751
Last EDR Contact: 01/16/2018
Next Scheduled EDR Contact: 04/30/2018
Data Release Frequency: Varies

SUTTER COUNTY:

Underground Storage Tanks
Underground storage tank sites located in Sutter county.

Date of Government Version: 12/01/2017
Date Data Arrived at EDR: 12/04/2017
Date Made Active in Reports: 12/19/2017
Number of Days to Update: 15

Source: Sutter County Department of Agriculture
Telephone: 530-822-7500
Last EDR Contact: 12/01/2017
Next Scheduled EDR Contact: 03/19/2018
Data Release Frequency: Semi-Annually

TEHAMA COUNTY:

CUPA Facility List
Cupa facilities

Date of Government Version: 11/16/2017
Date Data Arrived at EDR: 11/17/2017
Date Made Active in Reports: 12/18/2017
Number of Days to Update: 31

Source: Tehama County Department of Environmental Health
Telephone: 530-527-8020
Last EDR Contact: 11/14/2017
Next Scheduled EDR Contact: 02/19/2018
Data Release Frequency: Varies

TRINITY COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 10/23/2017
Date Data Arrived at EDR: 10/24/2017
Date Made Active in Reports: 11/16/2017
Number of Days to Update: 23

Source: Department of Toxic Substances Control
Telephone: 760-352-0381
Last EDR Contact: 01/22/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

TULARE COUNTY:

CUPA Facility List
Cupa program facilities

Date of Government Version: 09/27/2017
Date Data Arrived at EDR: 09/28/2017
Date Made Active in Reports: 10/16/2017
Number of Days to Update: 18

Source: Tulare County Environmental Health Services Division
Telephone: 559-624-7400
Last EDR Contact: 12/18/2017
Next Scheduled EDR Contact: 02/19/2018
Data Release Frequency: Varies

TUOLUMNE COUNTY:

CUPA Facility List
Cupa facility list

Date of Government Version: 10/24/2017
Date Data Arrived at EDR: 10/25/2017
Date Made Active in Reports: 11/16/2017
Number of Days to Update: 22

Source: Divison of Environmental Health
Telephone: 209-533-5633
Last EDR Contact: 01/22/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Varies

VENTURA COUNTY:

Business Plan, Hazardous Waste Producers, and Operating Underground Tanks
The BWT list indicates by site address whether the Environmental Health Division has Business Plan (B), Waste Producer (W), and/or Underground Tank (T) information.

Date of Government Version: 09/26/2017
Date Data Arrived at EDR: 10/25/2017
Date Made Active in Reports: 12/07/2017
Number of Days to Update: 43

Source: Ventura County Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 01/22/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Quarterly

Inventory of Illegal Abandoned and Inactive Sites
Ventura County Inventory of Closed, Illegal Abandoned, and Inactive Sites.

Date of Government Version: 12/01/2011
Date Data Arrived at EDR: 12/01/2011
Date Made Active in Reports: 01/19/2012
Number of Days to Update: 49

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 12/26/2017
Next Scheduled EDR Contact: 04/16/2018
Data Release Frequency: Annually

Listing of Underground Tank Cleanup Sites
Ventura County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 05/29/2008
Date Data Arrived at EDR: 06/24/2008
Date Made Active in Reports: 07/31/2008
Number of Days to Update: 37

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 11/08/2017
Next Scheduled EDR Contact: 02/26/2018
Data Release Frequency: Quarterly

Medical Waste Program List
To protect public health and safety and the environment from potential exposure to disease causing agents, the Environmental Health Division Medical Waste Program regulates the generation, handling, storage, treatment and disposal of medical waste throughout the County.

Date of Government Version: 09/26/2017
Date Data Arrived at EDR: 10/25/2017
Date Made Active in Reports: 12/07/2017
Number of Days to Update: 43

Source: Ventura County Resource Management Agency
Telephone: 805-654-2813
Last EDR Contact: 01/22/2018
Next Scheduled EDR Contact: 05/07/2018
Data Release Frequency: Quarterly

Underground Tank Closed Sites List
Ventura County Operating Underground Storage Tank Sites (UST)/Underground Tank Closed Sites List.

Date of Government Version: 11/27/2017
Date Data Arrived at EDR: 12/13/2017
Date Made Active in Reports: 01/19/2018
Number of Days to Update: 37

Source: Environmental Health Division
Telephone: 805-654-2813
Last EDR Contact: 12/11/2017
Next Scheduled EDR Contact: 03/26/2018
Data Release Frequency: Quarterly

YOLO COUNTY:

Underground Storage Tank Comprehensive Facility Report
Underground storage tank sites located in Yolo county.

Date of Government Version: 01/02/2018
Date Data Arrived at EDR: 01/09/2018
Date Made Active in Reports: 01/19/2018
Number of Days to Update: 10

Source: Yolo County Department of Health
Telephone: 530-666-8646
Last EDR Contact: 01/02/2018
Next Scheduled EDR Contact: 04/16/2018
Data Release Frequency: Annually

YUBA COUNTY:

CUPA Facility List
CUPA facility listing for Yuba County.

Date of Government Version: 11/08/2017
Date Data Arrived at EDR: 11/10/2017
Date Made Active in Reports: 11/16/2017
Number of Days to Update: 6

Source: Yuba County Environmental Health Department
Telephone: 530-749-7523
Last EDR Contact: 01/29/2018
Next Scheduled EDR Contact: 05/14/2018
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data
Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 11/11/2017
Date Data Arrived at EDR: 11/14/2017
Date Made Active in Reports: 12/18/2017
Number of Days to Update: 34

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 11/14/2017
Next Scheduled EDR Contact: 02/26/2018
Data Release Frequency: No Update Planned

NJ MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 04/11/2017
Date Made Active in Reports: 07/27/2017
Number of Days to Update: 107

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 01/05/2018
Next Scheduled EDR Contact: 04/23/2018
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 10/01/2017
Date Data Arrived at EDR: 11/01/2017
Date Made Active in Reports: 11/13/2017
Number of Days to Update: 12

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 11/01/2017
Next Scheduled EDR Contact: 02/12/2018
Data Release Frequency: Quarterly

PA MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 07/25/2017
Date Made Active in Reports: 09/25/2017
Number of Days to Update: 62

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 01/16/2018
Next Scheduled EDR Contact: 04/30/2018
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 06/19/2015
Date Made Active in Reports: 07/15/2015
Number of Days to Update: 26

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 11/16/2017
Next Scheduled EDR Contact: 03/05/2018
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 04/13/2017
Date Made Active in Reports: 07/14/2017
Number of Days to Update: 92

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 12/11/2017
Next Scheduled EDR Contact: 03/26/2018
Data Release Frequency: Annually

Oil/Gas Pipelines
Source: PennWell Corporation
Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Electric Power Transmission Line Data
Source: PennWell Corporation
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Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Licensed Facilities
Source: Department of Social Services
Telephone: 916-657-4041

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: Department of Fish & Game
Telephone: 916-445-0411

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

STREET AND ADDRESS INFORMATION

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GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

DUBLIN BLVD EXTENSION
BAYWOOD CMN
PLEASANTON, CA 94588

TARGET PROPERTY COORDINATES

Latitude (North):	37.704468 - 37˚ 42' 16.08''
Longitude (West):	121.837557 - 121˚ 50' 15.21''
Universal Tranverse Mercator:	Zone 10
UTM X (Meters):	602471.9
UTM Y (Meters):	4173456.8
Elevation:	410 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	5640392 LIVERMORE, CA
Version Date:	2012

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principal investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

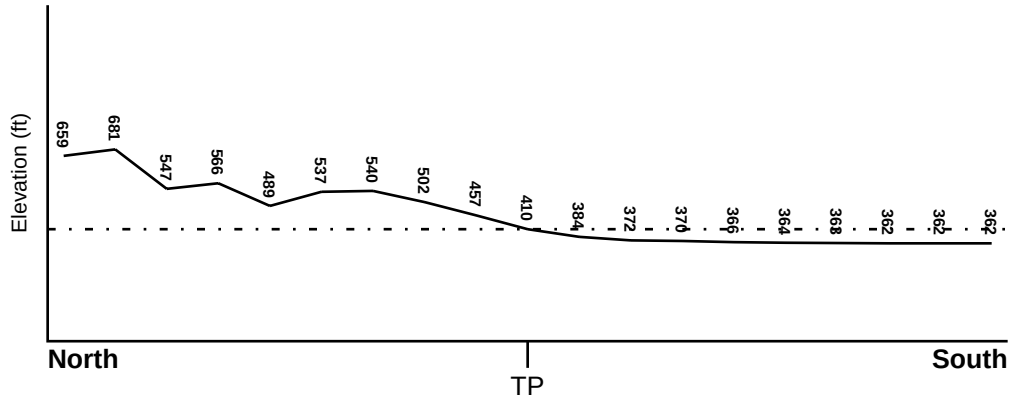
TOPOGRAPHIC INFORMATION

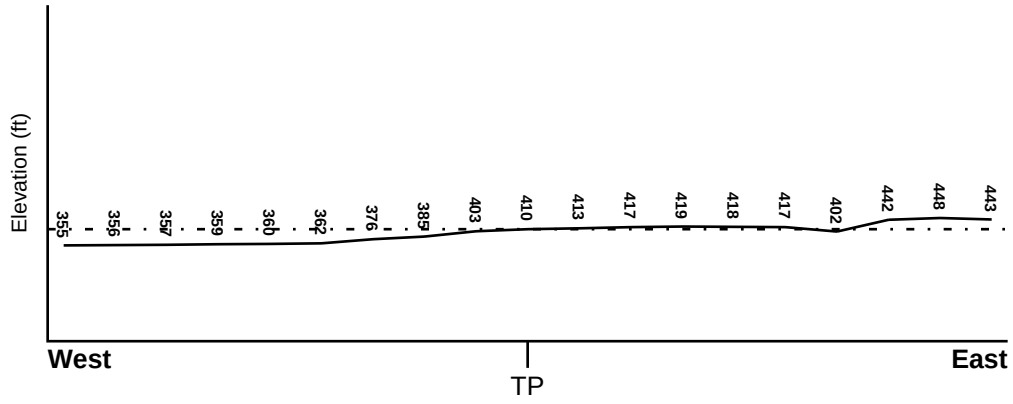
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General SSW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





Target Property Elevation: 410 ft.

0 1/2 1 Miles

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Flood Plain Panel at Target Property	FEMA Source Type
06001C0329G	FEMA FIRM Flood data

Additional Panels in search area:	FEMA Source Type
06013C0602F	FEMA FIRM Flood data
06001C0328G	FEMA FIRM Flood data

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
LIVERMORE	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:

Search Radius:	1.25 miles
Status:	Not found

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
13	1/2 - 1 Mile SW	SW
1G	1/2 - 1 Mile SW	SW

For additional site information, refer to Physical Setting Source Map Findings.

* ©1996 Site−specific hydrogeological data gathered by CERCLIS Alerts, Inc., Bainbridge Island, WA. All rights reserved. All of the information and opinions presented are those of the cited EPA report(s), which were completed under a Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) investigation.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

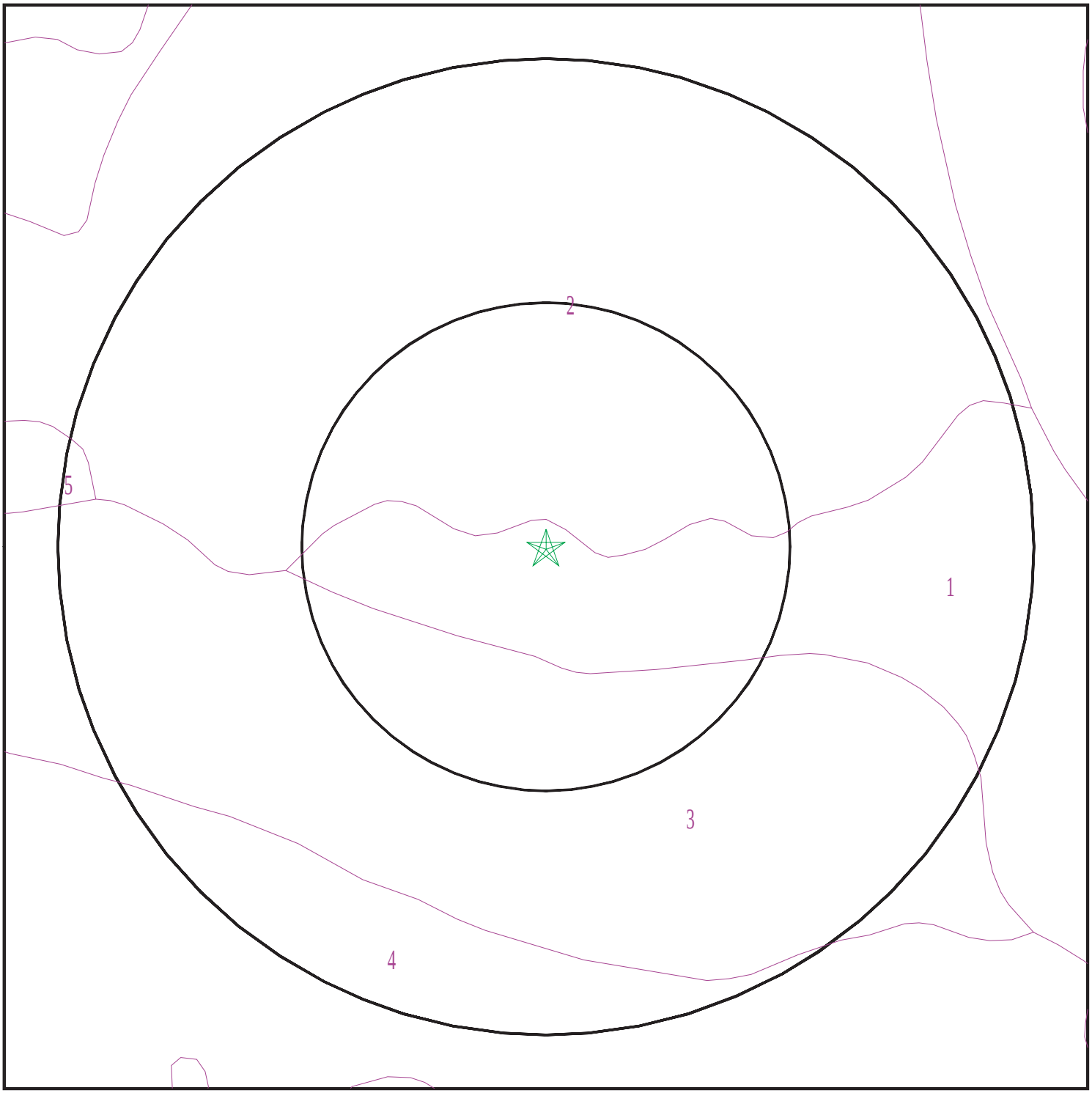
Era:	Cenozoic
System:	Tertiary
Series:	Pliocene
Code:	Tpc *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Continental Deposits

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 5173965.2s



Target Property
SSURGO Soil
Water

0 1/16 1/8 1/4 Miles

N

SITE NAME:	Dublin Blvd Extension	CLIENT:	GeoCon Environmental Cons.
ADDRESS:	Baywood Cmn Pleasanton CA 94588	CONTACT:	Luann Beadle
		INQUIRY #:	5173965.2s
LAT/LONG:	37.704468 / 121.837557	DATE:	January 31, 2018 4:31 pm

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GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Diablo

Soil Surface Texture: clay

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Well drained

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	14 inches	clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit 50% or more), Fat Clay.	Max: 1.4 Min: 0.42	Max: 8.4 Min: 7.4
2	14 inches	42 inches	silty clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit 50% or more), Fat Clay.	Max: 1.4 Min: 0.42	Max: 8.4 Min: 7.4
3	42 inches	59 inches	silty clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit 50% or more), Fat Clay.	Max: 4 Min: 1.4	Max: 8.4 Min: 7.9

Soil Map ID: 2

Soil Component Name: Linne

Soil Surface Texture: clay loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	35 inches	clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 4 Min: 1.4	Max: 8.4 Min: 7.9
2	35 inches	40 inches	weathered bedrock	Not reported	Not reported	Max: 0 Min: 0	Max: Min:

Soil Map ID: 3

Soil Component Name: Rincon

Soil Surface Texture: clay loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	16 inches	clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 4 Min: 1.4	Max: 7.8 Min: 6.6
2	16 inches	51 inches	sandy clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 1.4 Min: 0.42	Max: 7.8 Min: 6.6
3	51 inches	59 inches	stratified sandy loam to clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 4 Min: 1.4	Max: 8.4 Min: 7.9

Soil Map ID: 4

Soil Component Name: Rincon

Soil Surface Texture: clay loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	16 inches	clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 4 Min: 1.4	Max: 7.3 Min: 6.6
2	16 inches	51 inches	sandy clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 1.4 Min: 0.42	Max: 7.8 Min: 6.6
3	51 inches	59 inches	stratified sandy loam to clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 4 Min: 1.4	Max: 8.4 Min: 7.9

Soil Map ID: 5

Soil Component Name: Linne

Soil Surface Texture: clay loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	35 inches	clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 4 Min: 1.4	Max: 8.4 Min: 7.9
2	35 inches	40 inches	weathered bedrock	Not reported	Not reported	Max: 0 Min: 0	Max: Min:

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 0.001 miles
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
2	USGS40000185003	1/4 - 1/2 Mile SSW
3	USGS40000185000	1/2 - 1 Mile SSE
A5	USGS40000185023	1/2 - 1 Mile ESE
B7	USGS40000184959	1/2 - 1 Mile South
C9	USGS40000185046	1/2 - 1 Mile West
16	USGS40000185107	1/2 - 1 Mile NW
17	USGS40000184976	1/2 - 1 Mile SW
D18	USGS40000184987	1/2 - 1 Mile SE
E19	USGS40000184922	1/2 - 1 Mile SSW
21	USGS40000184928	1/2 - 1 Mile SSW
F23	USGS40000184921	1/2 - 1 Mile SSE

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

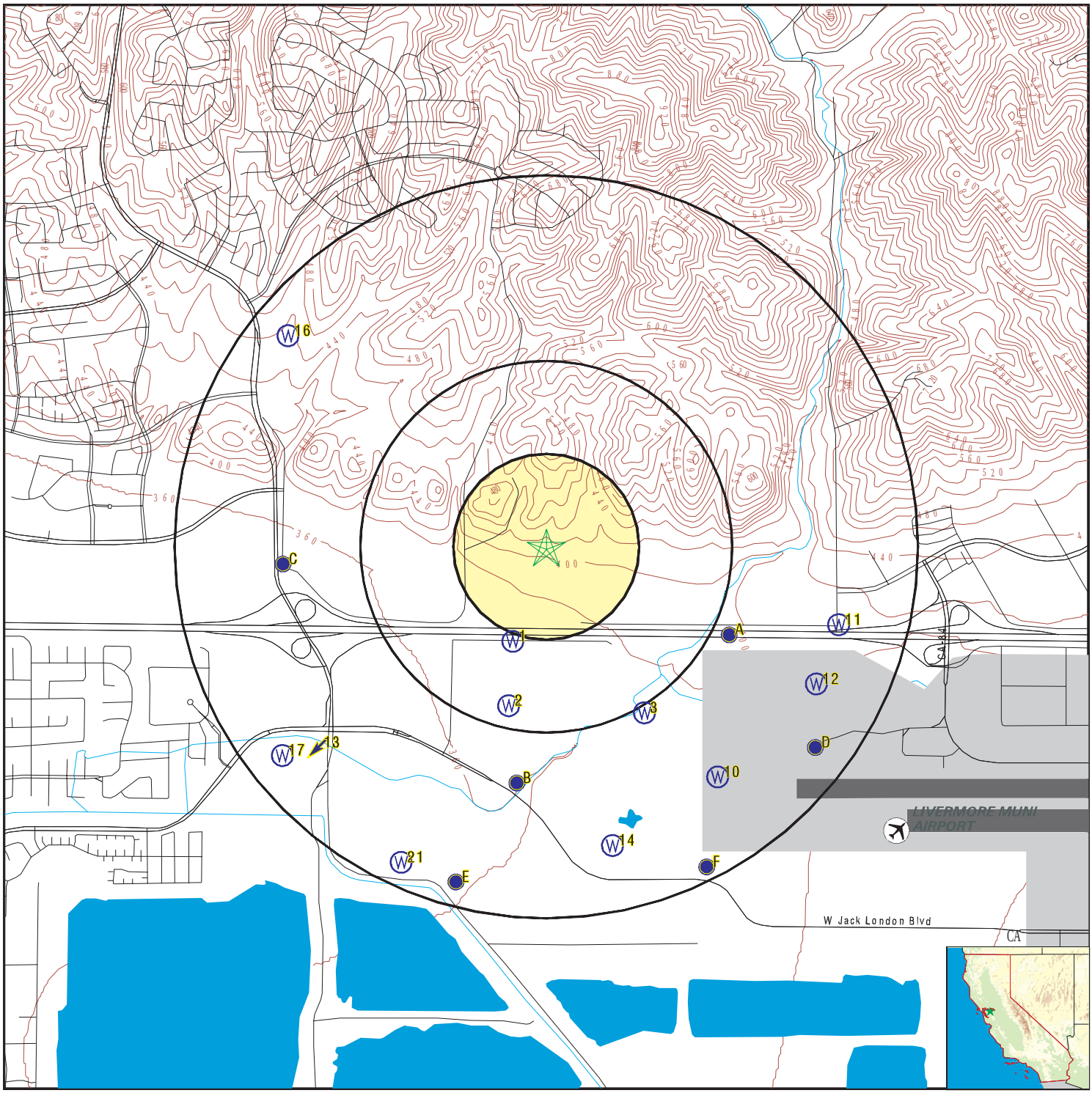
MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
1	CADW60000003650	1/4 - 1/2 Mile SSW
A4	CADW60000003649	1/2 - 1 Mile ESE
B6	CADW60000003651	1/2 - 1 Mile South
C8	CADW60000003654	1/2 - 1 Mile West
10	CADW60000003652	1/2 - 1 Mile SE
11	CADW60000003648	1/2 - 1 Mile ESE
12	CADW60000003647	1/2 - 1 Mile ESE
14	CADW60000003696	1/2 - 1 Mile SSE
D15	CADW60000003653	1/2 - 1 Mile SE
F20	CADW60000003695	1/2 - 1 Mile SSE
E22	CADW60000003688	1/2 - 1 Mile SSW

PHYSICAL SETTING SOURCE MAP - 5173965.2s



0 1/4 1/2 1 Miles

- County Boundary
- Major Roads
- Contour Lines
- Earthquake Fault Lines
- Airports
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons
- Groundwater Flow Direction
- GI Indeterminate Groundwater Flow at Location
- GV Groundwater Flow Varies at Location
- HD Closest Hydrogeological Data
- Oil, gas or related wells

SITE NAME: Dublin Blvd Extension	CLIENT: GeoCon Environmental Cons.
ADDRESS: Baywood Cmn Pleasanton CA 94588	CONTACT: Luann Beadle
LAT/LONG: 37.704468 / 121.837557	INQUIRY #: 5173965.2s DATE: January 31, 2018 4:31 pm

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Map ID Direction Distance Elevation	Database	EDR ID Number
1 **SSW** **1/4 - 1/2 Mile** **Lower**	**CA WELLS**	**CADW60000003650**

Objectid:	3650
Latitude:	37.700777
Longitude:	-121.839195
Site code:	377008N1218392W001
State well numbe:	03S01E02M003M
Local well name:	'3S/1E 2M 3'
Well use id:	1
Well use descrip:	Observation
County id:	1
County name:	Alameda
Basin code:	'2-10'
Basin desc:	Livermore Valley
Dwr region id:	80236
Dwr region:	North Central Region Office
Site id:	CADW60000003650

---

2 **SSW** **1/4 - 1/2 Mile** **Lower**	**FED USGS**	**USGS40000185003**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-374154121501801		
Monloc name:	003S001E02N002M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18050004	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	37.6982631
Longitude:	-121.8394	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	360.10
Vert measure units:	feet	Vertacc measure val:	.1
Vert accmeasure units:	feet		
Vertcollection method:	Level or other surveying method		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	California Coastal Basin aquifers		
Formation type:	Quaternary Alluvium		
Aquifer type:	Not Reported		
Construction date:	19300101	Welldepth:	80
Welldepth units:	ft	Wellholedepth:	80
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 71

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1981-12-21	19.1		1981-11-18	19.0	
1981-10-26	18.7		1981-09-30	18.9	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1981-09-08	19.1		1981-09-04	19.7	
1981-08-10	19.3		1981-07-13	19.5	
1981-06-29	19.4		1981-06-08	19.6	
1981-05-20	19.6		1981-04-22	19.4	
1981-03-25	20.3		1981-03-16	20.4	
1981-02-26	20.7		1981-01-28	21.2	
1980-12-30	22.3		1980-12-03	22.2	
1980-11-12	22.0		1980-11-04	21.7	
1980-10-20	21.5		1980-10-06	21.3	
1980-09-22	21.0		1980-09-09	20.7	
1980-08-25	20.3		1980-08-12	19.9	
1980-08-07	19.6		1980-07-28	19.3	
1980-07-16	18.9		1980-06-23	18.5	
1980-06-09	18.2		1980-05-29	18.0	
1980-05-26	17.8		1980-05-12	17.5	
1980-04-27	17.2		1980-04-14	16.8	
1980-03-31	16.1		1980-03-17	15.5	
1980-03-03	15.6		1980-02-18	19.1	
1980-02-04	19.2		1980-01-21	19.7	
1980-01-07	21.1		1979-12-24	21.1	
1979-12-10	21.1		1979-11-13	20.8	
1979-10-29	20.7		1979-10-15	20.6	
1979-09-17	20.4		1979-09-10	20.3	
1979-08-27	20.3		1979-08-20	20.3	
1979-08-13	20.0		1979-07-30	19.9	
1979-07-09	19.5		1979-06-26	19.4	
1979-05-14	19.4		1979-04-06	18.6	
1979-03-13	17.9		1979-01-16	19.0	
1979-01-08	19.7		1978-10-26	17.4	
1978-08-24	15.3		1978-06-23	17.3	
1978-06-12	16.9		1978-03-30	15.4	
1977-09-26	20.1		1977-08-04	20.9	
1961-05-04	24.0		1960-04-07	21.0	
1959-10-02	22.0				

3
SSE **FED USGS** **USGS40000185000**
1/2 - 1 Mile
Lower

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-374153121495401		
Monloc name:	003S001E02P003M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18050004	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	37.6979854
Longitude:	-121.832733	Sourcemap scale:	24000

Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	380.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	California Coastal Basin aquifers		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19751003	Welldepth:	380
Welldepth units:	ft	Wellholedepth:	380
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 6

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1981-05-05	79.7		1980-10-08	76.4	
1980-04-16	70.5		1979-04-06	75.5	
1978-08-21	102		1977-09-26	120.5	

A4
ESE
1/2 - 1 Mile
Lower

CA WELLS **CADW60000003649**

Objectid:	3649
Latitude:	37.701305
Longitude:	-121.828845
Site code:	377013N1218288W001
State well numbe:	03S01E02K002M
Local well name:	'3S/1E 2K 2'
Well use id:	1
Well use descrip:	Observation
County id:	1
County name:	Alameda
Basin code:	'2-10'
Basin desc:	Livermore Valley
Dwr region id:	80236
Dwr region:	North Central Region Office
Site id:	CADW60000003649

A5
ESE
1/2 - 1 Mile
Lower

FED USGS **USGS40000185023**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-374203121493801		
Monloc name:	003S001E02K002M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18050004	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	37.700763
Longitude:	-121.8282885	Sourcemap scale:	24000

Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	394.40
Vert measure units:	feet	Vertacc measure val:	.1
Vert accmeasure units:	feet		
Vertcollection method:	Level or other surveying method		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	California Coastal Basin aquifers		
Formation type:	Quaternary Alluvium		
Aquifer type:	Not Reported		
Construction date:	19751110	Welldepth:	46.5
Welldepth units:	ft	Wellholedepth:	46.5
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 100

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1981-08-27	30.6		1980-12-12	29.4	
1980-10-20	29.7		1980-10-06	29.5	
1980-10-01	29.3		1980-09-22	29.2	
1980-09-09	28.9		1980-08-25	28.6	
1980-08-19	28.7		1980-08-12	28.6	
1980-07-28	28.1		1980-07-18	27.8	
1980-06-26	27.6		1980-06-23	27.5	
1980-06-09	27.1		1980-06-02	29.5	
1980-05-26	26.8		1980-05-12	26.6	
1980-05-07	26.4		1980-04-27	26.1	
1980-04-14	26.0		1980-04-10	29.0	
1980-03-31	25.8		1980-03-17	25.4	
1980-03-05	28.9		1980-03-03	25.7	
1980-02-29	25.8		1980-02-18	28.0	
1980-02-04	28.8		1980-01-21	29.0	
1980-01-07	30.6		1979-12-24	31.7	
1979-12-10	31.8		1979-11-28	31.5	
1979-11-26	31.7		1979-11-13	31.6	
1979-10-29	31.5		1979-10-15	31.4	
1979-10-10	31.1		1979-09-24	30.9	
1979-09-17	30.8		1979-09-10	30.7	
1979-09-06	30.7		1979-09-04	30.6	
1979-08-30	30.6		1979-08-28	30.8	
1979-08-27	30.5		1979-08-13	30.3	
1979-08-01	30.3		1979-07-30	30.1	
1979-07-09	29.7		1979-06-25	29.5	
1979-06-18	29.3		1979-06-06	29.1	
1979-06-04	28.9		1979-05-21	28.6	
1979-05-07	28.1		1979-04-30	28.3	
1979-04-26	28.1		1979-04-09	28.2	
1979-04-02	28.2		1979-03-27	28.3	
1979-03-23	28.4		1979-03-12	28.2	
1979-02-27	38.4		1979-02-20	29.0	
1979-02-14	29.4		1979-02-05	29.8	
1979-01-30	29.8		1979-01-23	30.0	
1979-01-16	30.6		1979-01-08	31.6	
1978-12-20	30.2		1978-12-06	31.3	
1978-10-02	30.6		1978-08-04	29.7	
1978-06-06	28.3		1978-05-01	27.7	
1978-02-09	29.9		1977-12-05	34.4	
1977-10-19	34.1		1977-09-29	34.0	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1977-08-19	33.7		1977-06-14	33.2	
1977-04-12	32.6		1977-03-29	32.6	
1977-02-16	32.55		1977-02-02	32.4	
1977-01-21	32.15		1976-12-06	32.3	
1976-11-09	32.1		1976-10-14	31.8	
1976-09-02	31.7		1976-08-10	31.6	
1976-07-14	31.1		1976-06-07	30.4	
1976-05-11	29.9		1976-04-14	29.1	
1976-03-11	29.0		1976-02-25	29.7	

B6
South **CA WELLS** **CADW60000003651**
1/2 - 1 Mile
Lower

Objectid:	3651
Latitude:	37.695298
Longitude:	-121.839155
Site code:	376953N1218392W001
State well numbe:	03S01E02N006M
Local well name:	'3S/1E 2N 6'
Well use id:	1
Well use descrip:	Observation
County id:	1
County name:	Alameda
Basin code:	'2-10'
Basin desc:	Livermore Valley
Dwr region id:	80236
Dwr region:	North Central Region Office
Site id:	CADW60000003651

B7
South **FED USGS** **USGS40000184959**
1/2 - 1 Mile
Lower

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-374143121501601		
Monloc name:	003S001E02N003M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18050004	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	37.6952077
Longitude:	-121.8388444	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	365.00
Vert measure units:	feet	Vertacc measure val:	.1
Vert accmeasure units:	feet		
Vertcollection method:	Level or other surveying method		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	California Coastal Basin aquifers		
Formation type:	Quaternary Alluvium		

Aquifer type:	Not Reported		
Construction date:	19611003	Welldepth:	316
Welldepth units:	ft	Wellholedepth:	316
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 47

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1981-12-17	71.4		1981-09-08	82.4	
1981-08-19	79.0		1981-08-10	80.9	
1981-07-13	81.5		1981-06-08	80.5	
1981-05-20	77.6		1981-04-22	74.0	
1981-03-30	71.7		1981-03-25	72.0	
1981-02-26	71.7		1981-01-28	71.9	
1980-12-30	73.0		1980-12-03	72.6	
1980-11-12	75.0		1980-10-08	74.5	
1980-08-19	75.0		1980-06-17	72.5	
1980-04-16	69.7		1980-03-07	71.6	
1979-11-06	76.1		1979-08-13	86.3	
1979-05-23	80.1		1979-04-06	74.9	
1979-02-07	79.5		1978-11-13	90.8	
1978-07-28	103.5		1978-05-19	98.5	
1978-03-06	96.1		1977-11-22	107.6	
1977-08-17	119.15		1977-04-28	108.0	
1977-03-21	101.1		1977-02-18	96.6	
1977-01-18	97.4		1976-12-21	99.8	
1976-11-23	100.3		1976-10-20	101.4	
1976-09-24	108.0		1976-08-26	108.0	
1976-07-22	105.0		1976-06-17	101.3	
1976-05-27	100.2		1976-04-28	100.2	
1976-03-25	91.4		1976-02-24	90.3	
1976-01-28	89.9				

C8
West
1/2 - 1 Mile
Lower

CA WELLS **CADW60000003654**

Objectid:	3654
Latitude:	37.703778
Longitude:	-121.850453
Site code:	377038N1218505W001
State well numbe:	03S01E03G002M
Local well name:	'3S/1E 3G 2'
Well use id:	1
Well use descrip:	Observation
County id:	1
County name:	Alameda
Basin code:	'2-10'
Basin desc:	Livermore Valley
Dwr region id:	80236
Dwr region:	North Central Region Office
Site id:	CADW60000003654

Map ID Direction Distance Elevation	Database	EDR ID Number
C9 **West** **1/2 - 1 Mile** **Lower**	**FED USGS**	**USGS40000185046**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-374214121505801		
Monloc name:	003S001E03G002M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18050004	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	37.7038185
Longitude:	-121.8505114	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	334.50
Vert measure units:	feet	Vertacc measure val:	.1
Vert accmeasure units:	feet		
Vertcollection method:	Level or other surveying method		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	California Coastal Basin aquifers		
Formation type:	Quaternary Alluvium		
Aquifer type:	Not Reported		
Construction date:	19771205	Welldepth:	50
Welldepth units:	ft	Wellholedepth:	50
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 42

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1981-09-08	27.8		1981-08-10	27.4	
1981-08-03	27.4		1981-07-13	27.1	
1981-06-08	26.3		1981-05-20	25.9	
1981-05-19	25.9		1981-04-22	24.9	
1981-03-25	24.5		1981-02-26	25.1	
1981-01-28	26.5		1981-01-27	26.9	
1980-12-30	27.2		1980-12-03	27.4	
1980-11-12	27.2		1980-10-08	26.6	
1980-07-17	25.5		1980-06-17	23.9	
1980-04-14	22.2		1980-02-27	23.6	
1979-10-19	27.3		1979-07-17	26.7	
1979-06-12	25.8		1979-06-04	25.7	
1979-05-21	25.2		1979-05-14	25.0	
1979-04-30	24.7		1979-04-26	24.6	
1979-04-09	24.0		1979-04-06	23.8	
1979-04-02	23.7		1979-03-27	23.8	
1979-03-19	24.6		1979-03-12	23.7	
1979-02-07	25.5		1979-01-18	25.2	
1978-10-25	27.9		1978-07-28	26.6	
1978-06-19	25.7		1978-05-19	25.0	
1978-01-18	28.6		1977-12-13	29.7	

Map ID Direction Distance Elevation	Database	EDR ID Number
10 **SE** **1/2 - 1 Mile** **Lower**	**CA WELLS**	**CADW60000003652**

Objectid:	3652
Latitude:	37.695484
Longitude:	-121.829136
Site code:	376955N1218291W001
State well numbe:	03S01E02Q001M
Local well name:	'3S/1E 2Q 1'
Well use id:	1
Well use descrip:	Observation
County id:	1
County name:	Alameda
Basin code:	'2-10'
Basin desc:	Livermore Valley
Dwr region id:	80236
Dwr region:	North Central Region Office
Site id:	CADW60000003652

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11 **ESE** **1/2 - 1 Mile** **Higher**	**CA WELLS**	**CADW60000003648**

Objectid:	3648
Latitude:	37.701425
Longitude:	-121.823194
Site code:	377014N1218232W001
State well numbe:	03S01E02J003M
Local well name:	'3S/1E 2J 3'
Well use id:	1
Well use descrip:	Observation
County id:	1
County name:	Alameda
Basin code:	'2-10'
Basin desc:	Livermore Valley
Dwr region id:	80236
Dwr region:	North Central Region Office
Site id:	CADW60000003648

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12 **ESE** **1/2 - 1 Mile** **Lower**	**CA WELLS**	**CADW60000003647**

Objectid:	3647
Latitude:	37.699113
Longitude:	-121.824291
Site code:	376991N1218243W001
State well numbe:	03S01E02J002M
Local well name:	'3S/1E 2J 2'
Well use id:	1
Well use descrip:	Observation
County id:	1
County name:	Alameda

Basin code:	'2-10'
Basin desc:	Livermore Valley
Dwr region id:	80236
Dwr region:	North Central Region Office
Site id:	CADW60000003647

13
SW
1/2 - 1 Mile
Lower

AQUIFLOW **51634**

Site ID:	01-1301
Groundwater Flow:	SW
Shallow Water Depth:	Not Reported
Deep Water Depth:	Not Reported
Average Water Depth:	15.3'
Date:	05/31/1988

14
SSE
1/2 - 1 Mile
Lower

CA WELLS **CADW60000003696**

Objectid:	3696
Latitude:	37.692804
Longitude:	-121.8343
Site code:	376928N1218343W001
State well numbe:	03S01E11C003M
Local well name:	'3S/1E 11C 3'
Well use id:	1
Well use descrip:	Observation
County id:	1
County name:	Alameda
Basin code:	'2-10'
Basin desc:	Livermore Valley
Dwr region id:	80236
Dwr region:	North Central Region Office
Site id:	CADW60000003696

D15
SE
1/2 - 1 Mile
Lower

CA WELLS **CADW60000003653**

Objectid:	3653
Latitude:	37.696675
Longitude:	-121.824563
Site code:	376967N1218246W001
State well numbe:	03S01E02R001M
Local well name:	'3S/1E 2R 1'
Well use id:	1
Well use descrip:	Observation
County id:	1
County name:	Alameda
Basin code:	'2-10'
Basin desc:	Livermore Valley
Dwr region id:	80236
Dwr region:	North Central Region Office
Site id:	CADW60000003653

Map ID Direction Distance Elevation	Database	EDR ID Number
16 **NW** **1/2 - 1 Mile** **Higher**	**FED USGS**	**USGS40000185107**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-374246121505701		
Monloc name:	002S001E34Q001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18050004	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	37.7127071
Longitude:	-121.8502336	Sourcemap scale:	Not Reported
Horiz Acc measure:	Unknown	Horiz Acc measure units:	Unknown
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	Not Reported
Vert measure units:	Not Reported	Vertacc measure val:	Not Reported
Vert accmeasure units:	Not Reported		
Vertcollection method:	Not Reported		
Vert coord refsys:	Not Reported	Countrycode:	US
Aquifername:	California Coastal Basin aquifers		
Formation type:	Livermore Gravel		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	104
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

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17 **SW** **1/2 - 1 Mile** **Lower**	**FED USGS**	**USGS40000184976**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-374147121505801		
Monloc name:	003S001E03Q001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18050004	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	37.6963188
Longitude:	-121.8505114	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	352.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	California Coastal Basin aquifers		
Formation type:	Not Reported		

Aquifer type:	Not Reported		
Construction date:	19260406	Welldepth:	350
Welldepth units:	ft	Wellholedepth:	350
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 22

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1981-10-22	72.7		1981-05-04	260.0	
1980-10-07	65.7		1980-04-16	62.0	
1979-09-20	72.2		1979-09-17	102.0	
1979-04-05	65.8		1978-03-16	84.4	
1977-09-26	100.6		1977-03-16	87.8	
1976-09-27	95.7		1976-03-09	78.3	
1975-09-15	96.2		1975-03-27	76.6	
1974-03-15	82.8		1973-09-26	108.0	
1973-03-15	93.3		1972-09-25	122.1	
1972-03-03	98.0		1971-09-13	132.0	
1971-04-05	95.0		1970-09-01	127.3	

D18
SE **FED USGS** **USGS40000184987**
1/2 - 1 Mile
Lower

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-374148121492301		
Monloc name:	003S001E02R001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18050004	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	37.6965965
Longitude:	-121.8241217	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	374.80
Vert measure units:	feet	Vertacc measure val:	.1
Vert accmeasure units:	feet		
Vertcollection method:	Level or other surveying method		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	California Coastal Basin aquifers		
Formation type:	Quaternary Alluvium		
Aquifer type:	Not Reported		
Construction date:	19751112	Welldepth:	33
Welldepth units:	ft	Wellholedepth:	33
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 60

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1981-12-21	16.4		1981-11-18	15.8	
1981-10-26	27.9		1981-10-01	16.2	
1981-09-30	16.4		1981-08-27	15.6	
1981-06-01	18.0		1981-04-13	17.7	
1981-03-05	17.5		1980-12-11	21.2	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1980-10-08	20.8		1980-10-01	20.6	
1980-09-12	19.5		1980-06-25	18.3	
1980-05-06	17.2		1980-04-14	15.7	
1980-02-29	12.4		1979-11-28	14.3	
1979-10-10	13.4		1979-09-24	13.2	
1979-09-17	13.1		1979-09-13	13.3	
1979-09-10	13.1		1979-09-06	13.2	
1979-09-04	13.3		1979-08-30	13.5	
1979-08-01	14.8		1979-06-05	15.4	
1979-05-05	20.1		1979-02-05	18.5	
1979-01-16	16.6		1979-01-08	20.0	
1978-12-04	18.6		1978-10-02	18.0	
1978-08-04	19.1		1978-06-06	17.7	
1978-05-01	16.2		1978-02-09	12.8	
1977-12-05	17.8		1977-10-20	18.7	
1977-09-29	19.0		1977-08-19	18.9	
1977-06-14	18.2		1977-04-05	17.7	
1977-03-29	17.3		1977-02-16	16.0	
1977-02-02	15.1		1977-01-21	14.25	
1976-12-06	15.4		1976-11-09	14.9	
1976-10-14	14.6		1976-09-02	15.2	
1976-08-10	17.3		1976-07-14	19.9	
1976-06-07	19.7		1976-05-11	19.3	
1976-04-14	18.7		1976-03-11	19.0	
1976-02-20	18.8		1975-12-11	17.2	

E19
SSW **FED USGS** **USGS40000184922**
1/2 - 1 Mile
Lower

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-374130121502701		
Monloc name:	003S001E10A002M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18050004	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	37.6915967
Longitude:	-121.8419	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	362.20
Vert measure units:	feet	Vertacc measure val:	.1
Vert accmeasure units:	feet		
Vertcollection method:	Level or other surveying method		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	California Coastal Basin aquifers		
Formation type:	Quaternary Alluvium		

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Aquifer type:	Not Reported		
Construction date:	19790502	Welldepth:	88
Welldepth units:	ft	Wellholedepth:	88
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 111

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1981-12-28	49.9		1981-11-18	50.1	
1981-10-26	48.8		1981-09-30	47.6	
1981-09-15	49.1		1981-09-08	49.2	
1981-08-19	61.0		1981-08-10	50.2	
1981-07-13	49.6		1981-06-08	49.4	
1981-05-26	49.9		1981-05-19	49.2	
1981-05-12	48.0		1981-05-05	48.6	
1981-04-28	48.1		1981-04-21	48.1	
1981-04-14	48.5		1981-04-07	48.6	
1981-03-31	49.2		1981-03-24	49.4	
1981-03-18	49.5		1981-03-17	49.8	
1981-03-10	49.9		1981-03-03	49.9	
1981-02-25	49.9		1981-02-17	50.6	
1981-02-10	51.1		1981-02-03	51.5	
1981-01-27	52.0		1981-01-19	52.2	
1981-01-12	52.2		1981-01-05	52.1	
1980-12-29	52.3		1980-12-22	52.1	
1980-12-16	51.6		1980-12-09	51.3	
1980-12-02	50.9		1980-11-25	51.6	
1980-11-18	51.1		1980-11-10	50.0	
1980-11-04	49.1		1980-11-03	49.0	
1980-10-24	48.9		1980-10-20	48.9	
1980-10-14	48.9		1980-10-06	49.2	
1980-09-29	49.2		1980-09-22	49.3	
1980-09-15	49.4		1980-09-09	50.0	
1980-09-02	49.2		1980-08-25	49.7	
1980-08-18	49.2		1980-08-12	49.5	
1980-08-06	50.0		1980-07-28	49.8	
1980-07-21	50.0		1980-07-16	50.5	
1980-07-15	50.6		1980-07-08	50.7	
1980-06-30	51.4		1980-06-23	52.1	
1980-06-16	51.9		1980-06-10	51.9	
1980-06-09	52.0		1980-06-02	51.8	
1980-05-26	51.8		1980-05-19	51.9	
1980-05-12	52.2		1980-05-05	52.0	
1980-04-28	51.2		1980-04-21	50.7	
1980-04-14	50.4		1980-04-07	50.0	
1980-03-31	49.3		1980-03-24	48.7	
1980-03-17	48.4		1980-03-10	48.0	
1980-03-03	48.0		1980-02-25	47.7	
1980-02-18	53.8		1980-02-11	54.0	
1980-02-04	53.6		1980-01-28	53.1	
1980-01-21	53.0		1980-01-14	56.4	
1980-01-07	59.3		1979-12-31	59.3	
1979-12-24	59.4		1979-12-18	59.3	
1979-12-10	58.9		1979-12-03	58.7	
1979-11-26	58.5		1979-11-19	58.2	
1979-11-13	58.1		1979-11-05	57.4	
1979-10-29	56.4		1979-10-22	55.7	
1979-10-15	56.2		1979-10-08	56.5	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1979-09-24	56.7		1979-09-10	57.5	
1979-09-04	58.2		1979-08-27	58.4	
1979-08-13	57.7		1979-07-30	56.6	
1979-07-16	56.9		1979-06-25	55.4	
1979-06-12	55.2		1979-05-31	55.6	
1979-05-10	55.2				

F20
SSE
1/2 - 1 Mile
Lower

CA WELLS **CADW60000003695**

Objectid:	3695
Latitude:	37.692356
Longitude:	-121.829944
Site code:	376924N1218299W001
State well numbe:	03S01E11B001M
Local well name:	'3S/1E 11B 1'
Well use id:	1
Well use descrip:	Observation
County id:	1
County name:	Alameda
Basin code:	'2-10'
Basin desc:	Livermore Valley
Dwr region id:	80236
Dwr region:	North Central Region Office
Site id:	CADW60000003695

21
SSW
1/2 - 1 Mile
Lower

FED USGS **USGS40000184928**

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-374132121503701		
Monloc name:	003S001E10A001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18050004	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	37.6921523
Longitude:	-121.8446779	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	355.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	California Coastal Basin aquifers		
Formation type:	Not Reported		

Aquifer type:	Not Reported		
Construction date:	19510601	Welldepth:	253
Welldepth units:	ft	Wellholedepth:	253
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 7

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1981-05-18	70.0		1980-10-07	67.8	
1980-04-16	63.0		1979-04-05	68.3	
1977-09-26	104.1		1969-09-23	124.0	
1969-09-10	126.0				

E22
SSW **CA WELLS** **CADW60000003688**
1/2 - 1 Mile
Lower

Objectid:	3688
Latitude:	37.691181
Longitude:	-121.84208
Site code:	376912N1218421W001
State well numbe:	03S01E10A002M
Local well name:	’3S/1E 10A 2’
Well use id:	1
Well use descrip:	Observation
County id:	1
County name:	Alameda
Basin code:	’2-10’
Basin desc:	Livermore Valley
Dwr region id:	80236
Dwr region:	North Central Region Office
Site id:	CADW60000003688

F23
SSE **FED USGS** **USGS40000184921**
1/2 - 1 Mile
Lower

Org. Identifier:	USGS-CA		
Formal name:	USGS California Water Science Center		
Monloc Identifier:	USGS-374130121494201		
Monloc name:	003S001E11B001M		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	18050004	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	37.6915967
Longitude:	-121.8293997	Sourcemap scale:	24000
Horiz Acc measure:	1	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	367.00
Vert measure units:	feet	Vertacc measure val:	.1
Vert accmeasure units:	feet		
Vertcollection method:	Level or other surveying method		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	California Coastal Basin aquifers		
Formation type:	Quaternary Alluvium		

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Aquifer type:	Not Reported		
Construction date:	19751106	Welldepth:	43
Welldepth units:	ft	Wellholedepth:	43
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 108

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1981-10-01	27.4		1981-09-08	27.2	
1981-08-27	27.5		1981-08-10	27.0	
1981-07-13	27.7		1981-06-08	29.1	
1981-06-02	29.3		1981-05-20	29.4	
1981-05-07	28.4		1981-04-22	31.1	
1981-04-13	31.2		1981-03-25	30.7	
1981-03-05	30.8		1981-02-26	30.4	
1981-01-28	31.0		1980-12-30	32.0	
1980-12-11	31.5		1980-12-03	31.3	
1980-11-12	30.5		1980-10-20	28.7	
1980-10-06	29.1		1980-10-01	28.8	
1980-09-22	28.9		1980-09-09	28.5	
1980-08-25	28.2		1980-08-15	27.8	
1980-08-12	27.9		1980-07-28	27.7	
1980-07-16	28.0		1980-06-25	28.0	
1980-06-23	28.0		1980-06-09	27.7	
1980-05-26	27.7		1980-05-12	27.9	
1980-05-06	27.9		1980-04-27	27.5	
1980-03-17	25.5		1980-03-10	24.8	
1980-03-03	24.2		1980-02-18	24.9	
1980-02-04	26.1		1980-01-21	25.0	
1980-01-07	28.1		1979-12-24	28.6	
1979-12-10	28.5		1979-11-13	28.0	
1979-10-29	27.8		1979-10-15	27.5	
1979-09-24	27.7		1979-09-17	27.7	
1979-09-10	28.3		1979-09-06	28.2	
1979-09-04	28.1		1979-08-30	28.3	
1979-08-27	28.1		1979-08-13	28.4	
1979-08-01	28.3		1979-07-30	27.6	
1979-07-09	29.2		1979-06-25	28.9	
1979-06-18	29.7		1979-06-06	29.9	
1979-06-04	29.9		1979-05-21	29.9	
1979-05-07	30.6		1979-05-04	30.9	
1979-04-30	30.8		1979-04-26	30.8	
1979-04-09	28.9		1979-04-06	29.7	
1979-04-02	29.6		1979-03-30	29.3	
1979-03-23	29.0		1979-03-12	28.3	
1979-02-27	27.2		1979-02-20	29.1	
1979-02-14	28.8		1979-02-06	28.4	
1979-02-05	28.4		1979-01-30	27.8	
1979-01-23	27.0		1979-01-16	23.1	
1979-01-08	31.1		1978-12-04	29.7	
1978-10-02	27.9		1978-08-04	29.0	
1978-06-06	27.8		1978-05-01	27.9	
1978-02-10	23.1		1977-12-05	30.4	
1977-10-20	28.0		1977-09-29	27.2	
1977-08-19	26.5		1977-06-14	28.8	
1977-04-05	29.9		1977-03-29	30.2	
1977-02-16	29.75		1977-01-21	29.5	
1976-12-06	28.9		1976-11-09	28.0	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1976-10-14	27.5		1976-09-03	26.2	
1976-08-10	26.9		1976-06-08	27.1	
1976-05-11	25.5		1976-04-13	29.1	
1976-03-11	30.0		1976-02-20	30.7	

1G
SW
1/2 - 1 Mile
Lower

AQUIFLOW **51634**

Site ID:	01-1301
Groundwater Flow:	SW
Shallow Water Depth:	Not Reported
Deep Water Depth:	Not Reported
Average Water Depth:	15.3’
Date:	05/31/1988

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RADON

AREA RADON INFORMATION

State Database: CA Radon

Radon Test Results

Zipcode	Num Tests	> 4 pCi/L
94588	25	0

Federal EPA Radon Zone for ALAMEDA County: 2

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for ALAMEDA COUNTY, CA

Number of sites tested: 49

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.776 pCi/L	100%	0%	0%
Living Area - 2nd Floor	-0.400 pCi/L	100%	0%	0%
Basement	1.338 pCi/L	100%	0%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

HYDROLOGIC INFORMATION

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: Department of Fish & Game
Telephone: 916-445-0411

HYDROGEOLOGIC INFORMATION

AQUIFLOW[R] Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Service, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Well Database
Source: Department of Water Resources
Telephone: 916-651-9648

California Drinking Water Quality Database
Source: Department of Public Health
Telephone: 916-324-2319
The database includes all drinking water compliance and special studies monitoring for the state of California since 1984. It consists of over 3,200,000 individual analyses along with well and water system information.

OTHER STATE DATABASE INFORMATION

California Oil and Gas Well Locations
Source: Department of Conservation
Telephone: 916-323-1779
Oil and Gas well locations in the state.

RADON

State Database: CA Radon
Source: Department of Health Services
Telephone: 916-324-2208
Radon Database for California

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

California Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary fault lines, prepared in 1975 by the United State Geological Survey. Additional information (also from 1975) regarding activity at specific fault lines comes from California's Preliminary Fault Activity Map prepared by the California Division of Mines and Geology.

STREET AND ADDRESS INFORMATION

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APPENDIX D

Dublin Blvd Extension

Baywood Cmn

Pleasanton, CA 94588

Inquiry Number: 5173965.3

January 31, 2018

Certified Sanborn® Map Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

01/31/18

Site Name:	Client Name:
Dublin Blvd Extension	GeoCon Environmental Cons.
Baywood Cmn	6671 Brisa Street
Pleasanton, CA 94588	Livermore, CA 94550
EDR Inquiry # 5173965.3	Contact: Luann Beadle

The Sanborn Library has been searched by EDR and maps covering the target property location as provided by GeoCon Environmental Cons. were identified for the years listed below. The Sanborn Library is the largest, most complete collection of fire insurance maps. The collection includes maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow, and others. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by the Sanborn Library LLC, the copyright holder for the collection. Results can be authenticated by visiting www.edrnet.com/sanborn.

The Sanborn Library is continually enhanced with newly identified map archives. This report accesses all maps in the collection as of the day this report was generated.

Certified Sanborn Results:

Certification # 0EED-4677-8581

PO # NA

Project E9027-04-01

UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.

Sanborn® Library search results

Certification #: 0EED-4677-8581

The Sanborn Library includes more than 1.2 million fire insurance maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow and others which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ✔ Library of Congress
- ✔ University Publications of America
- ✔ EDR Private Collection

The Sanborn Library LLC Since 1866™

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APPENDIX E

Dublin Blvd Extension

Baywood Cmn

Pleasanton, CA 94588

Inquiry Number: 5173965.9

February 05, 2018

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

02/05/18

Site Name:

Dublin Blvd Extension
Baywood Cmn
Pleasanton, CA 94588
EDR Inquiry # 5173965.9

Client Name:

GeoCon Environmental Cons.
6671 Brisa Street
Livermore, CA 94550
Contact: Luann Beadle

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

Search Results:

Year	*Scale*	*Details*	*Source*
2014	1"=1125'	Flight Year: 2014	USDA/NAIP
2010	1"=1125'	Flight Year: 2010	USDA/NAIP
2006	1"=1125'	Flight Year: 2006	USDA/NAIP
1998	1"=1125'	Flight Date: September 06, 1998	USDA
1993	1"=1125'	Acquisition Date: June 12, 1993	USGS/DOQQ
1982	1"=1125'	Flight Date: July 05, 1982	USDA
1979	1"=1125'	Flight Date: August 16, 1979	USDA
1968	1"=1125'	Flight Date: April 27, 1968	USGS
1950	1"=1125'	Flight Date: January 01, 1950	USGS
1949	1"=1125'	Flight Date: October 13, 1949	USGS
1940	1"=1125'	Flight Date: June 08, 1940	USDA

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.

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YEAR: 2014
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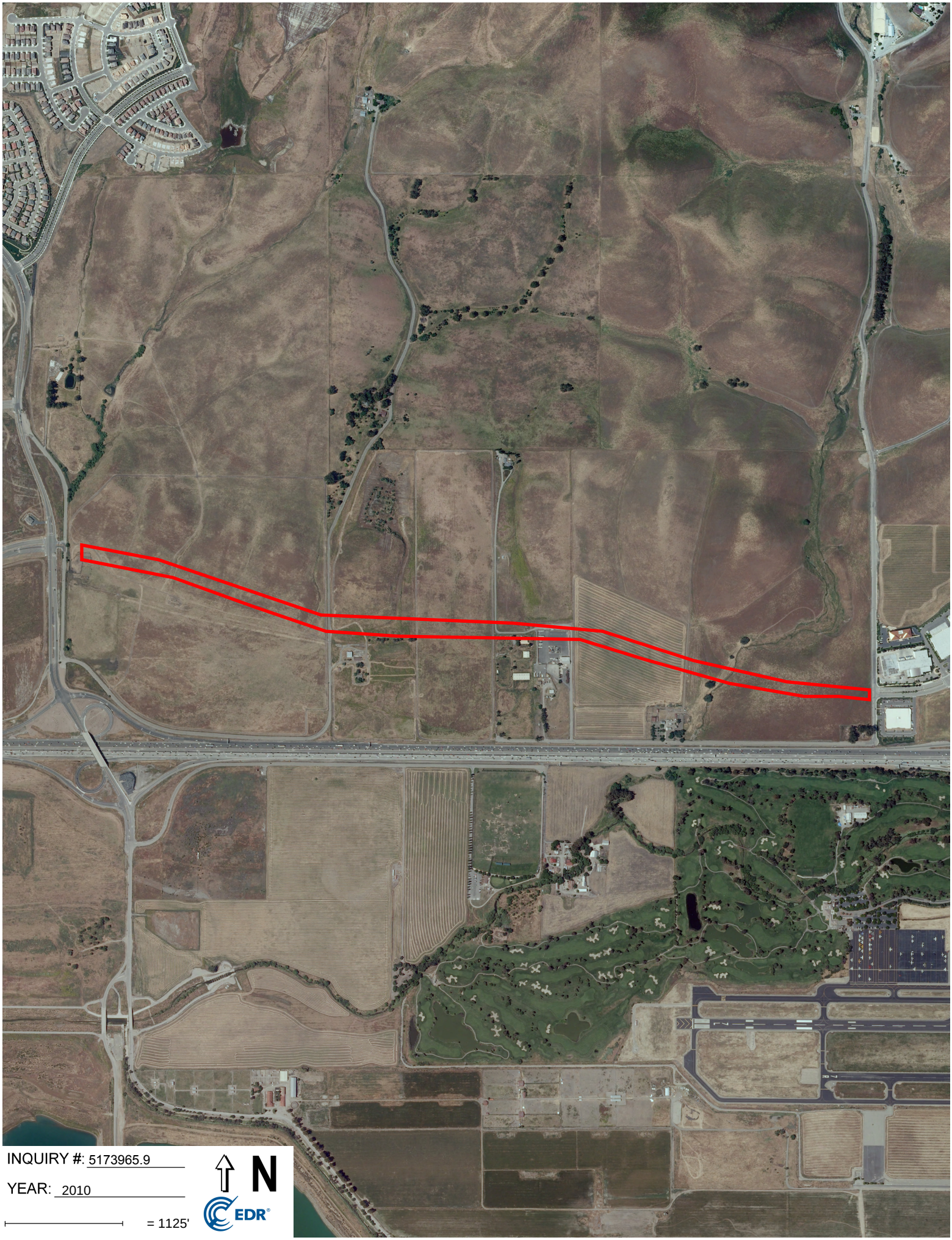
N
EDR



INQUIRY #: 5173965.9

YEAR: 2010

= 1125'

N

EDR

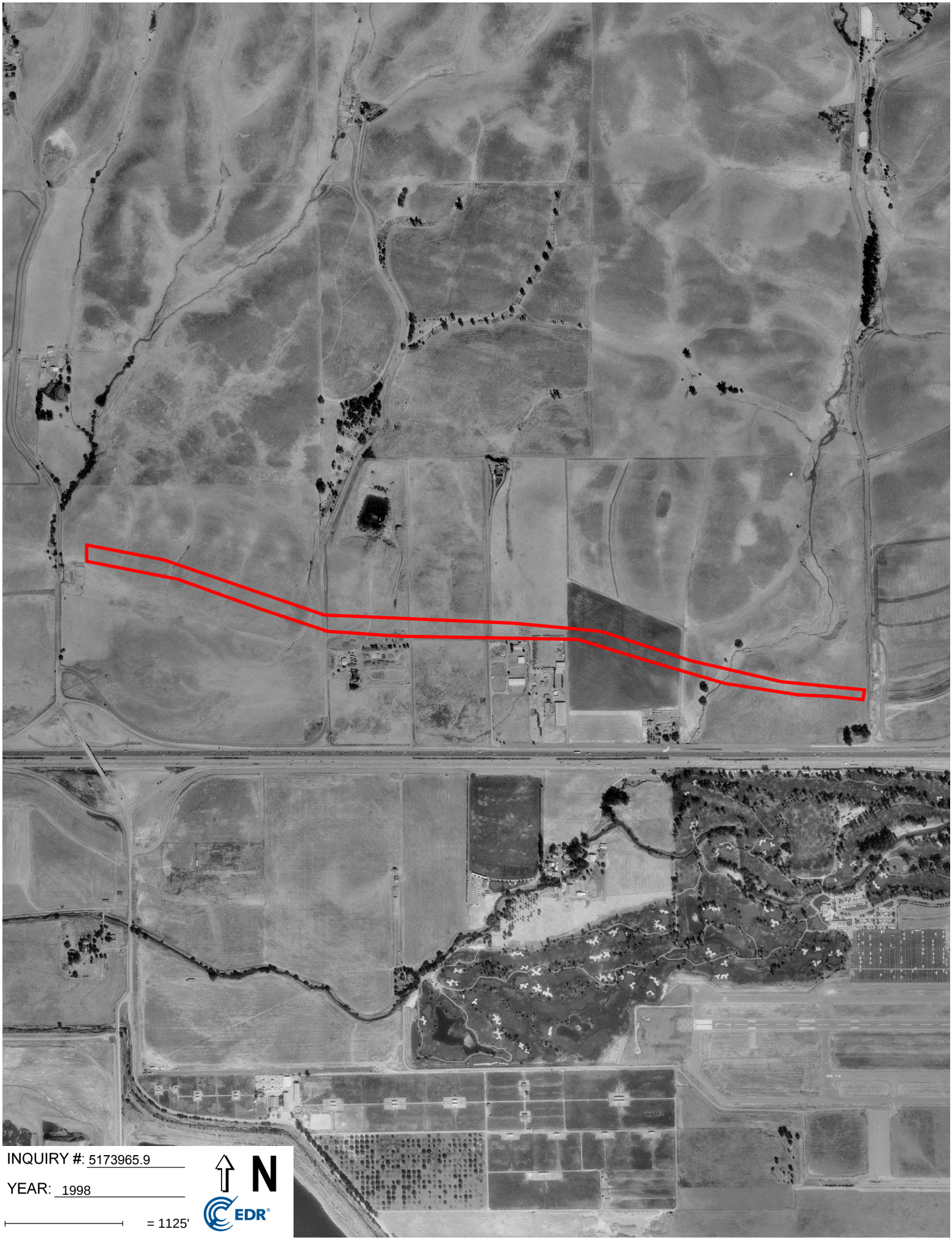
INQUIRY #: 5173965.9

YEAR: 2006

= 1125'

N

EDR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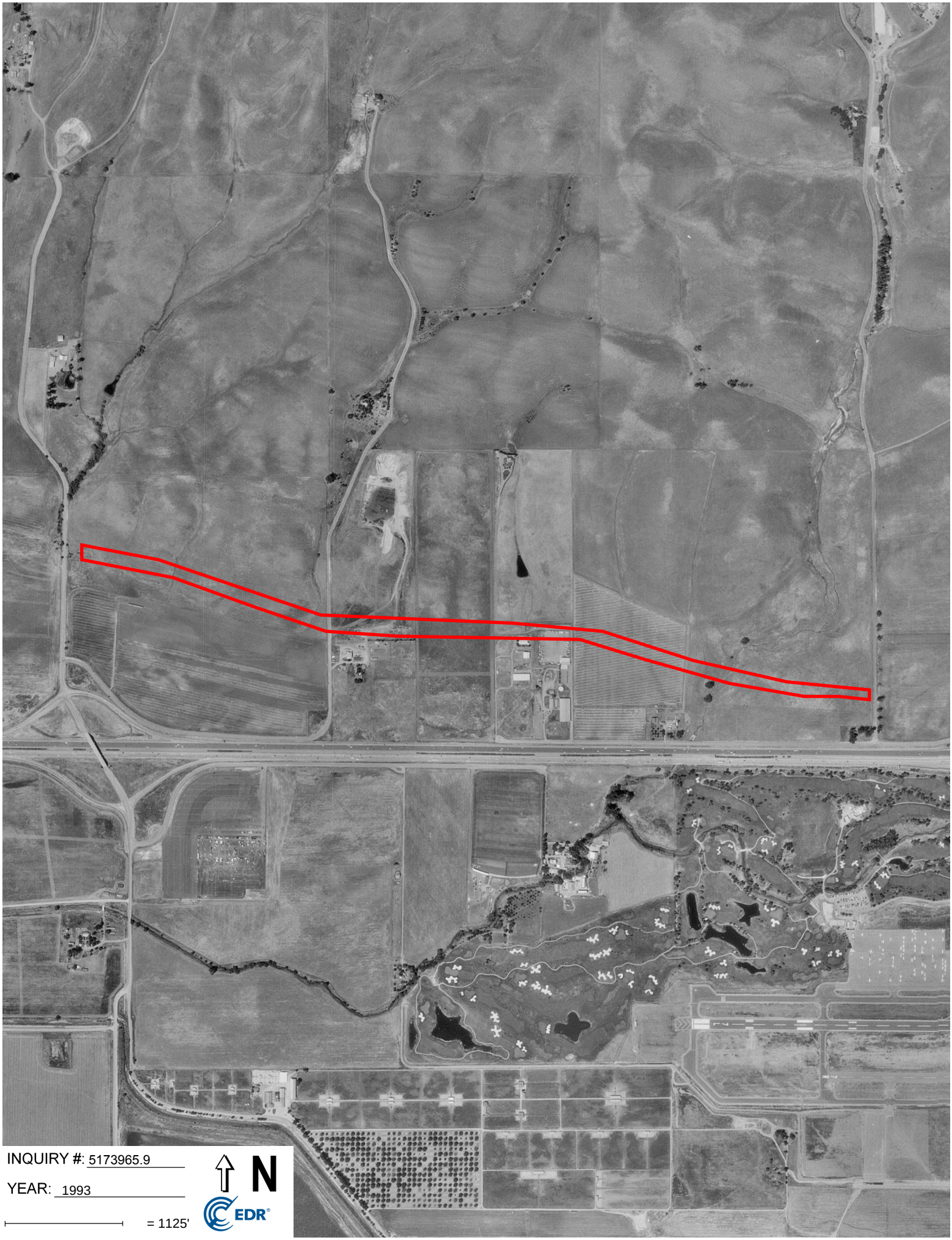
EDR



INQUIRY #: 5173965.9

YEAR: 1993

= 1125'

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EDR

INQUIRY #: 5173965.9

YEAR: 1982

= 1125'

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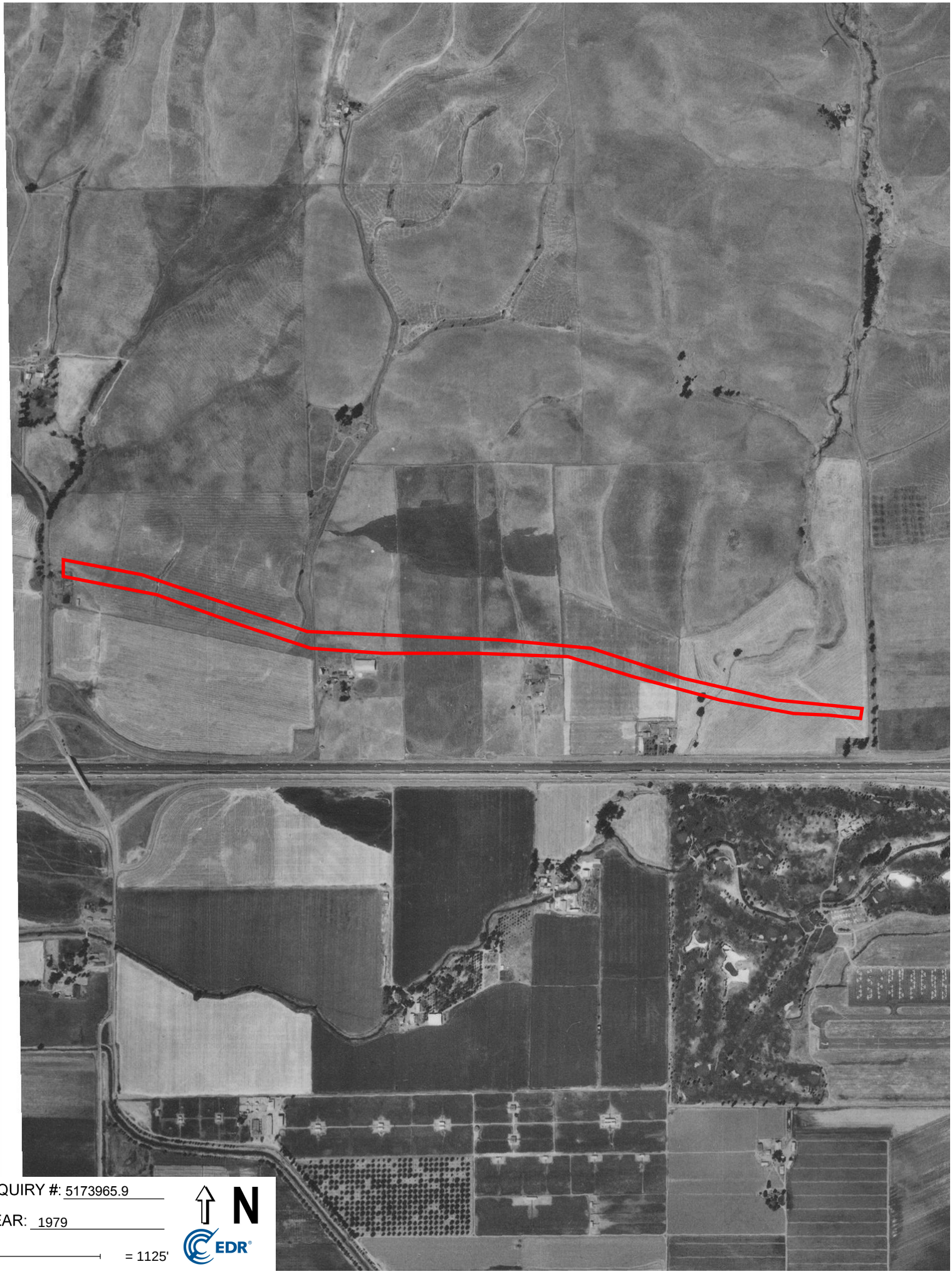
EDR



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YEAR: 1979

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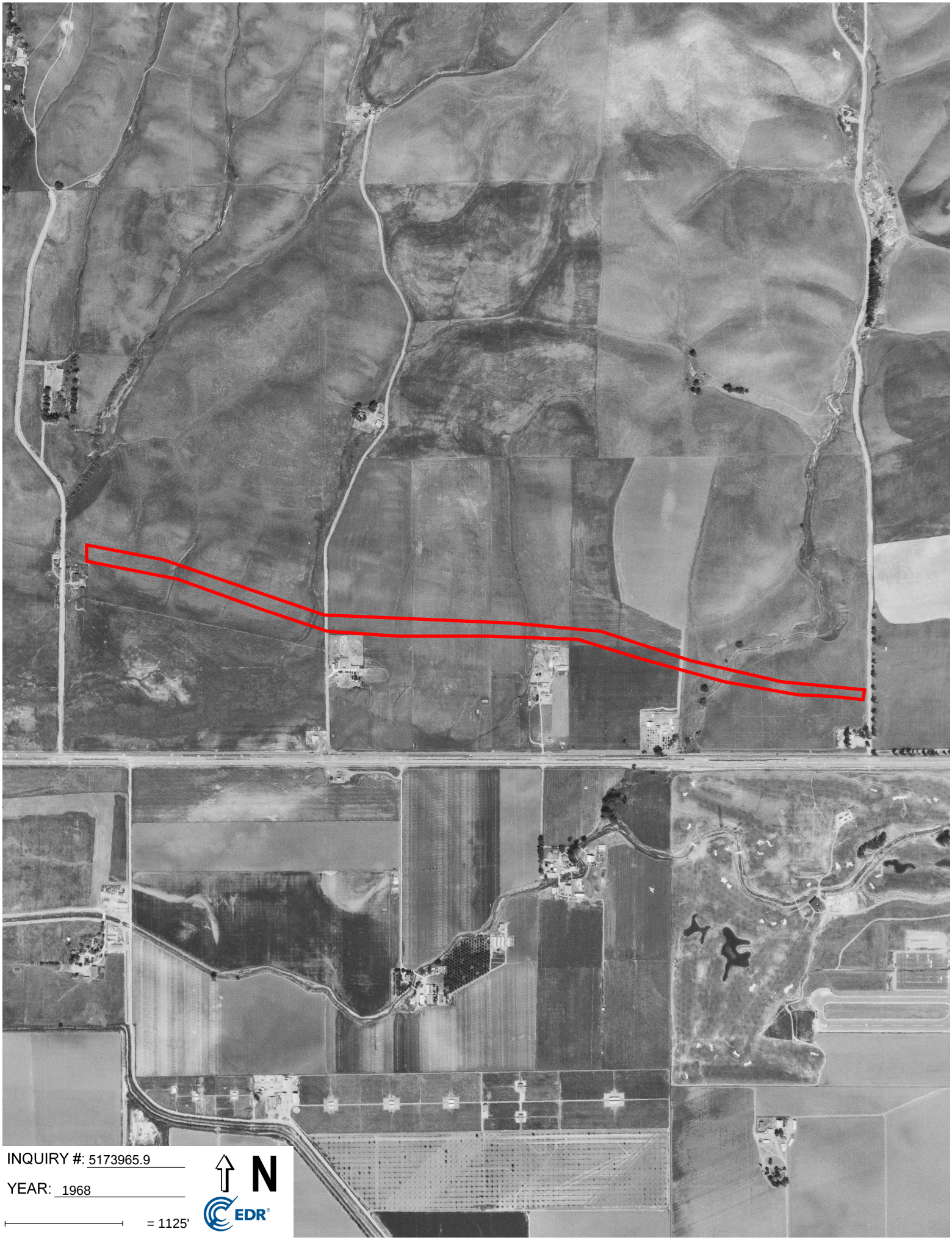
EDR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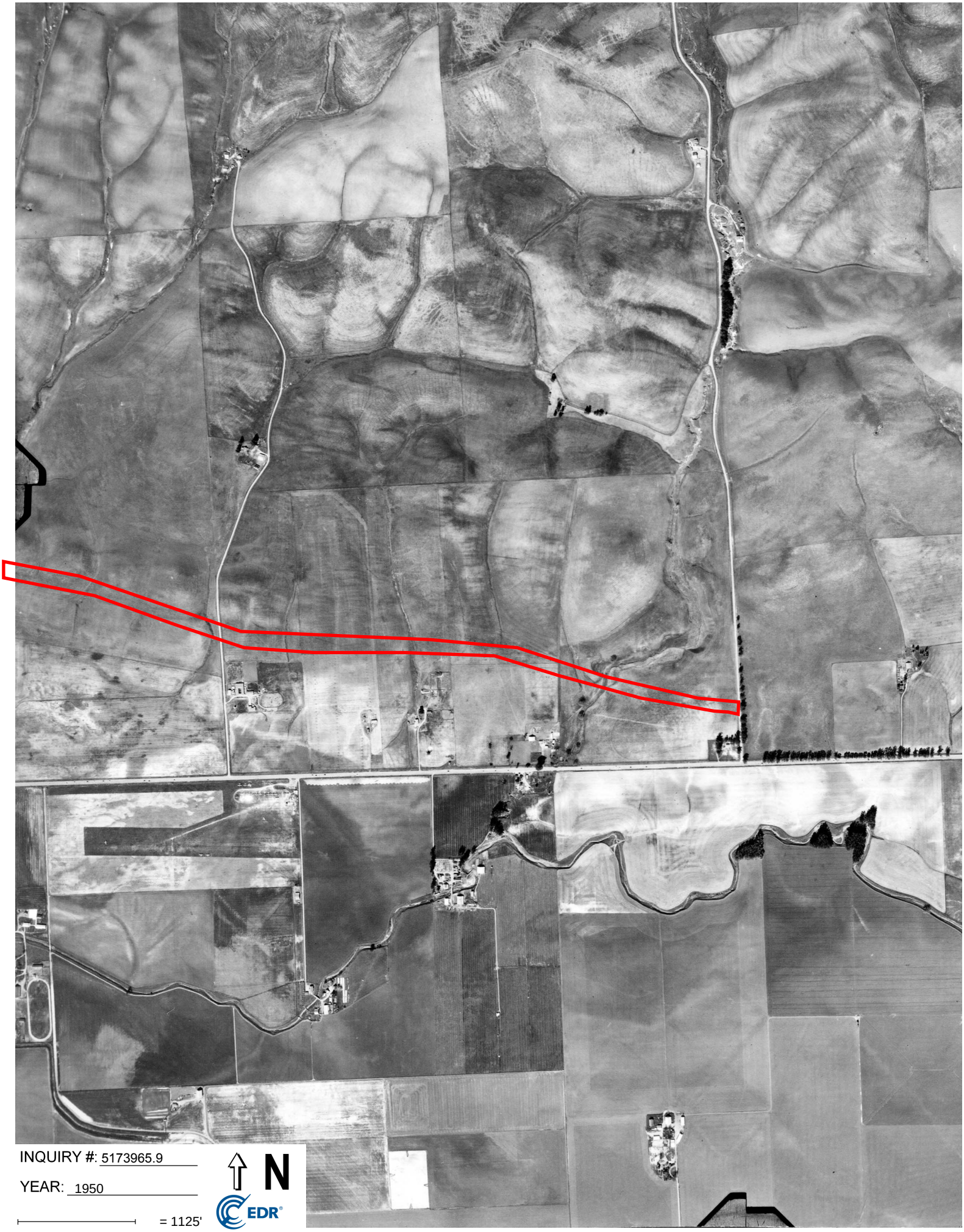
EDR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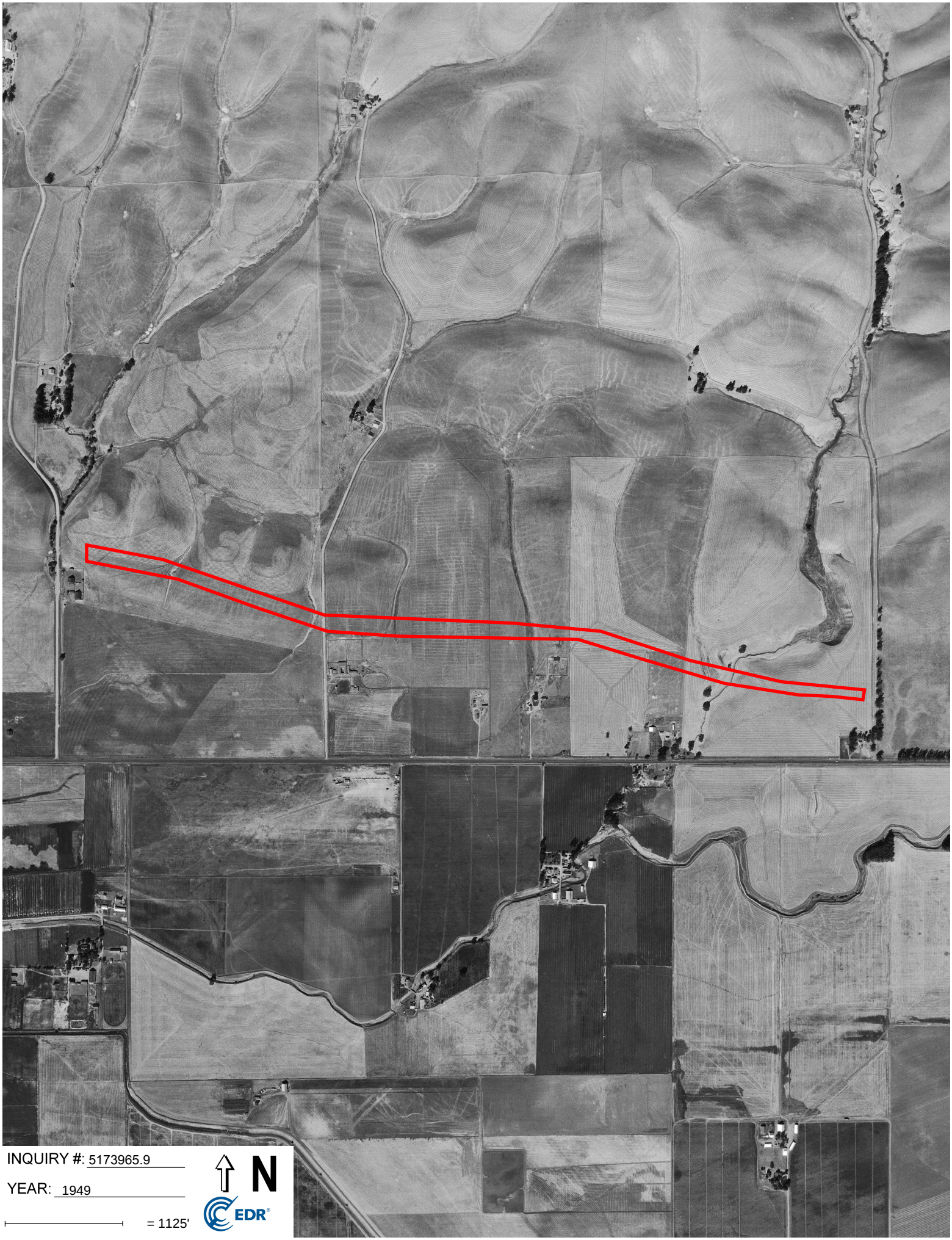
EDR



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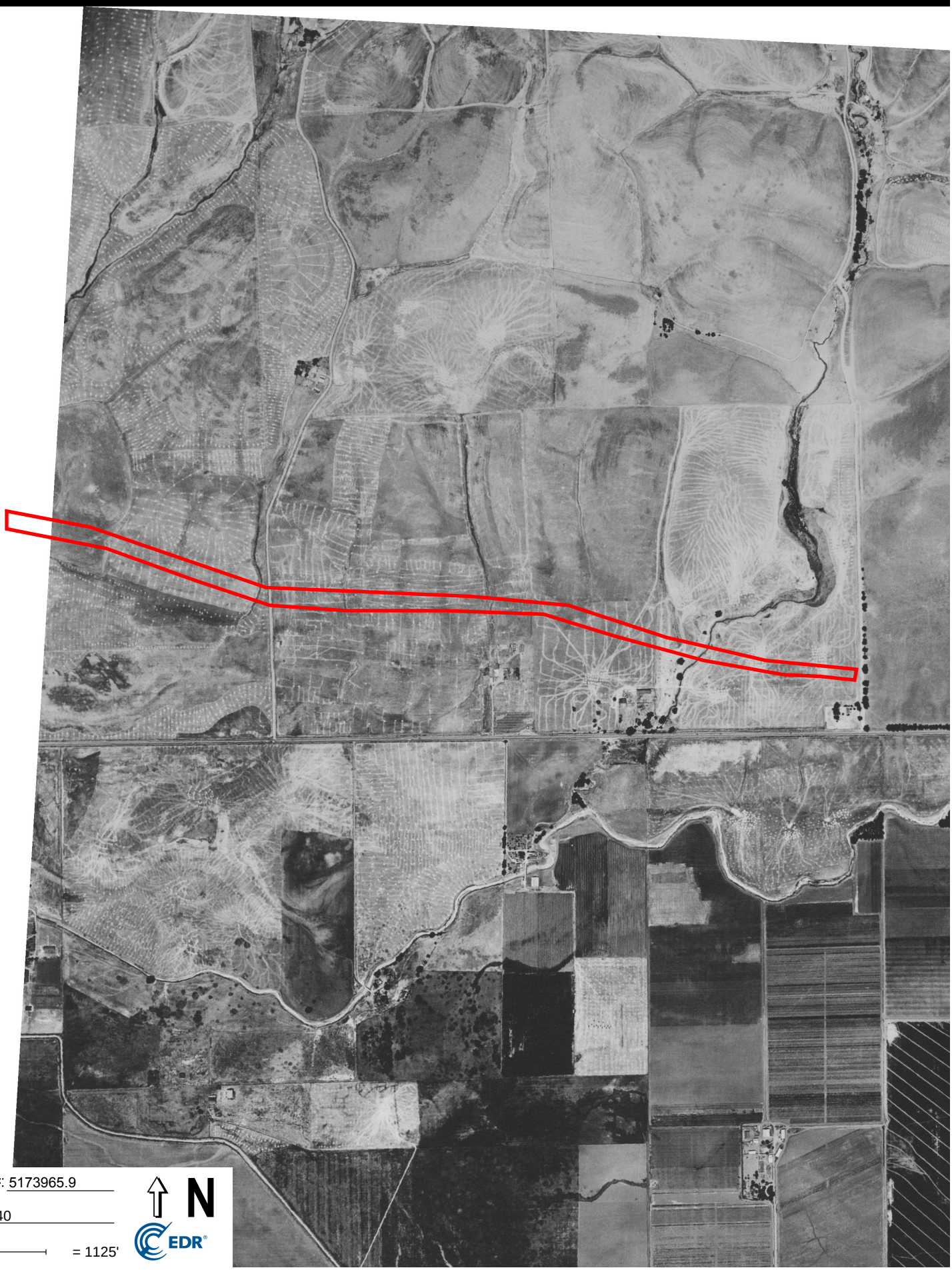
YEAR: 1949

= 1125'

N

EDR



INQUIRY #: 5173965.9

YEAR: 1940

= 1125'

N

EDR

APPENDIX F

Dublin Blvd Extension

Baywood Cmn

Pleasanton, CA 94588

Inquiry Number: 5173965.4

January 31, 2018

EDR Historical Topo Map Report

with QuadMatch™

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Historical Topo Map Report

01/31/18

Site Name:	Client Name:
Dublin Blvd Extension	GeoCon Environmental Cons.
Baywood Cmn	6671 Brisa Street
Pleasanton, CA 94588	Livermore, CA 94550
EDR Inquiry # 5173965.4	Contact: Luann Beadle

EDR Topographic Map Library has been searched by EDR and maps covering the target property location as provided by GeoCon Environmental Cons. were identified for the years listed below. EDR's Historical Topo Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topo Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the late 1800s.

Search Results:		*Coordinates:*	
P.O.#	NA	**Latitude:**	37.704468 37° 42' 16" North
Project:	E9027-04-01	**Longitude:**	-121.837557 -121° 50' 15" West
		UTM Zone:	Zone 10 North
		UTM X Meters:	602469.39
		UTM Y Meters:	4173661.74
		Elevation:	409.14' above sea level

Maps Provided:

2012	1906
1980	
1973	
1968	
1961	
1953	
1947	
1941	

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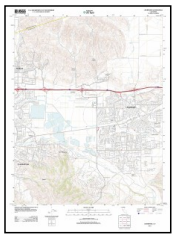
Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

2012 Source Sheets



Livermore
2012
7.5-minute, 24000

1980 Source Sheets

Livermore
1980
7.5-minute, 24000
Aerial Photo Revised 1978

1973 Source Sheets

Livermore
1973
7.5-minute, 24000
Aerial Photo Revised 1973

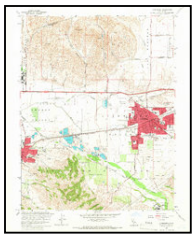
1968 Source Sheets

Livermore
1968
7.5-minute, 24000
Aerial Photo Revised 1968

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1961 Source Sheets



Livermore
1961
7.5-minute, 24000
Aerial Photo Revised 1960

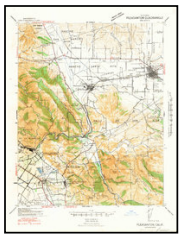
1953 Source Sheets

Livermore
1953
7.5-minute, 24000
Aerial Photo Revised 1949

1947 Source Sheets

PLEASANTON
1947
15-minute, 50000

1941 Source Sheets

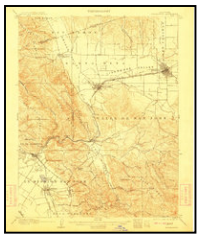


Pleasanton
1941
15-minute, 62500
Aerial Photo Revised 1937

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

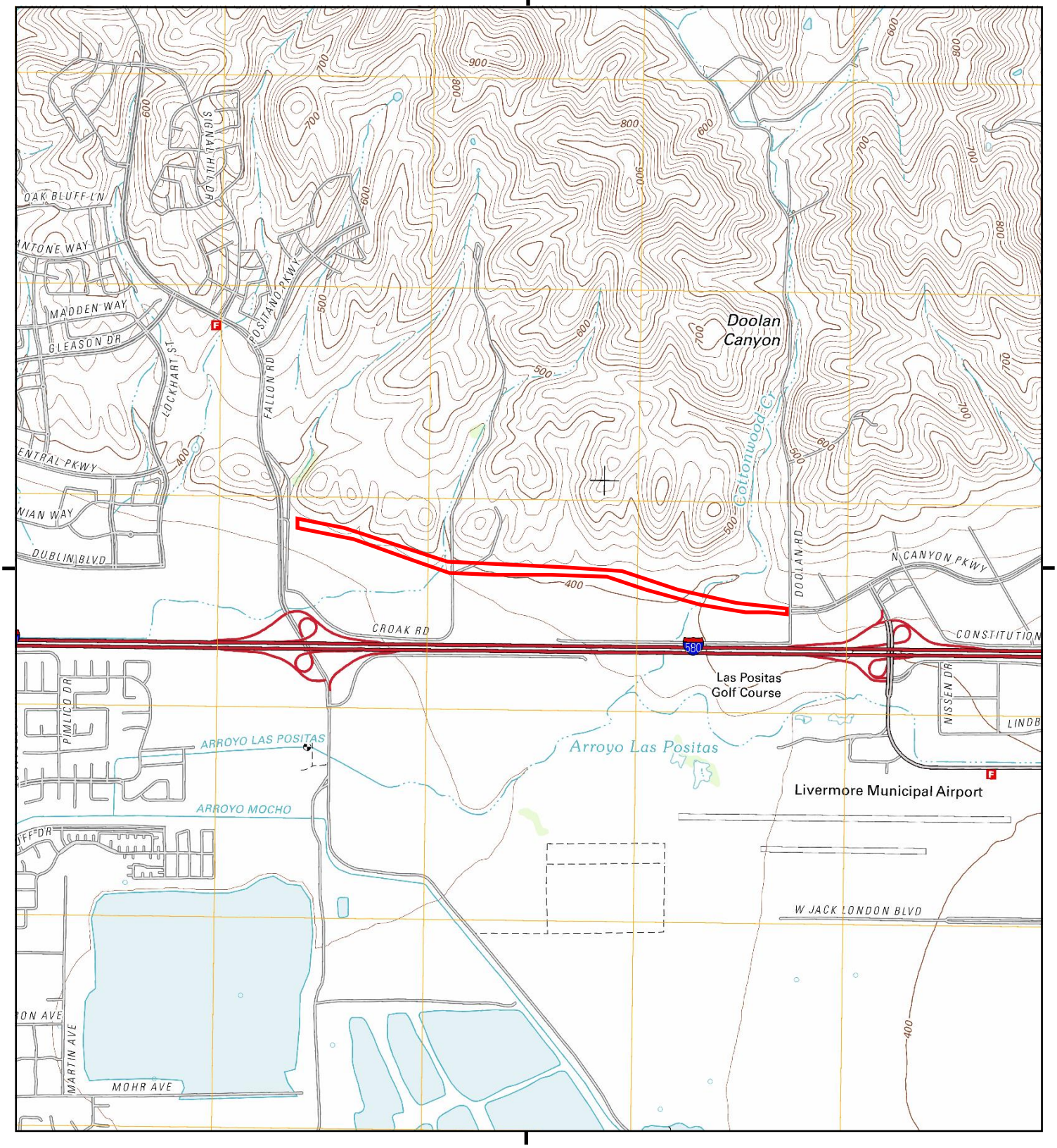
1906 Source Sheets



Pleasanton
1906
15-minute, 62500

Historical Topo Map

2012



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

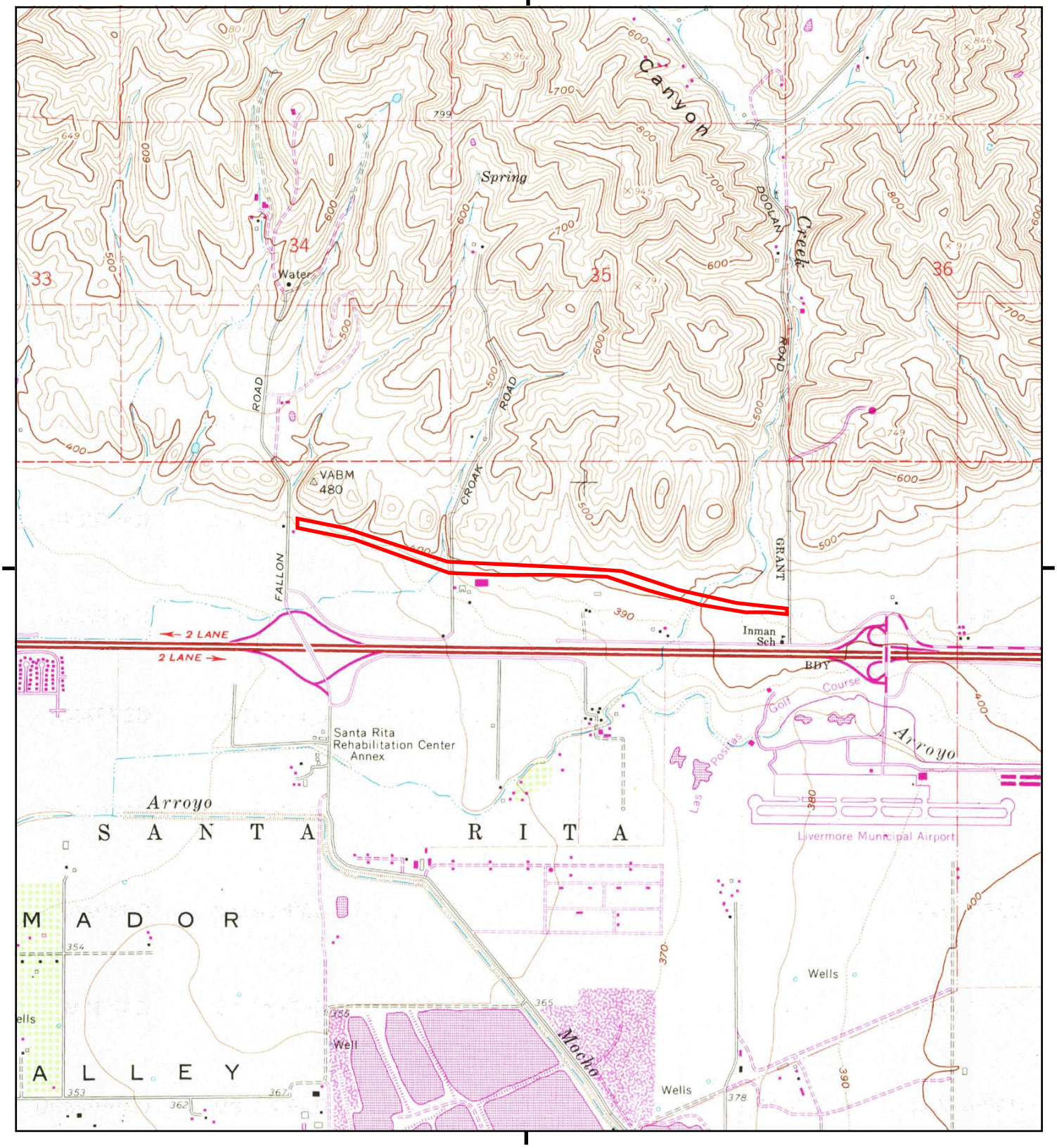
TP, Livermore, 2012, 7.5-minute

SITE NAME: Dublin Blvd Extension
ADDRESS: Baywood Cmn
Pleasanton, CA 94588
CLIENT: GeoCon Environmental Cons.

N

Historical Topo Map

1980



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

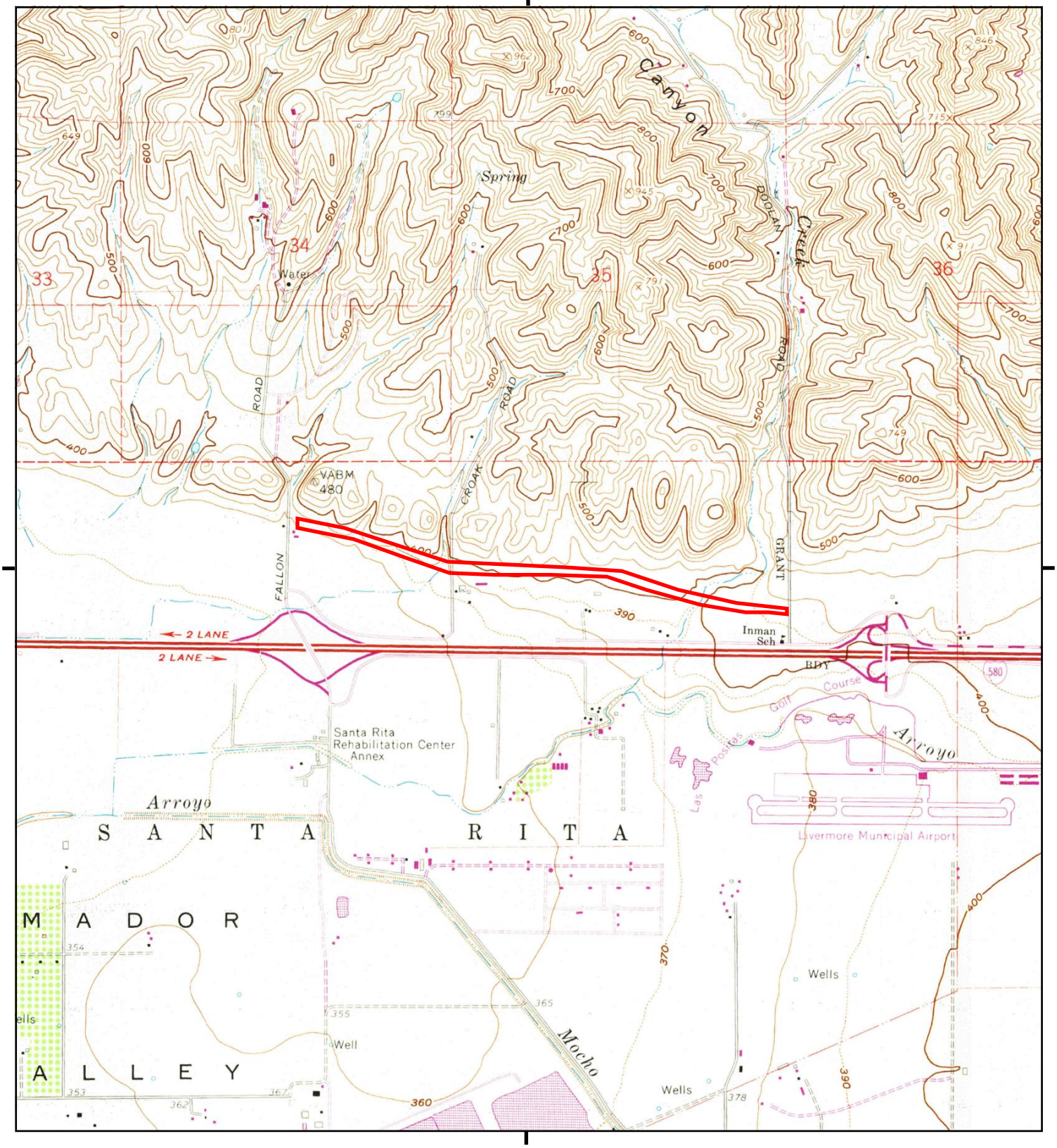
TP, Livermore, 1980, 7.5-minute

SITE NAME: Dublin Blvd Extension
ADDRESS: Baywood Cmn
Pleasanton, CA 94588
CLIENT: GeoCon Environmental Cons.

N

Historical Topo Map

1973



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

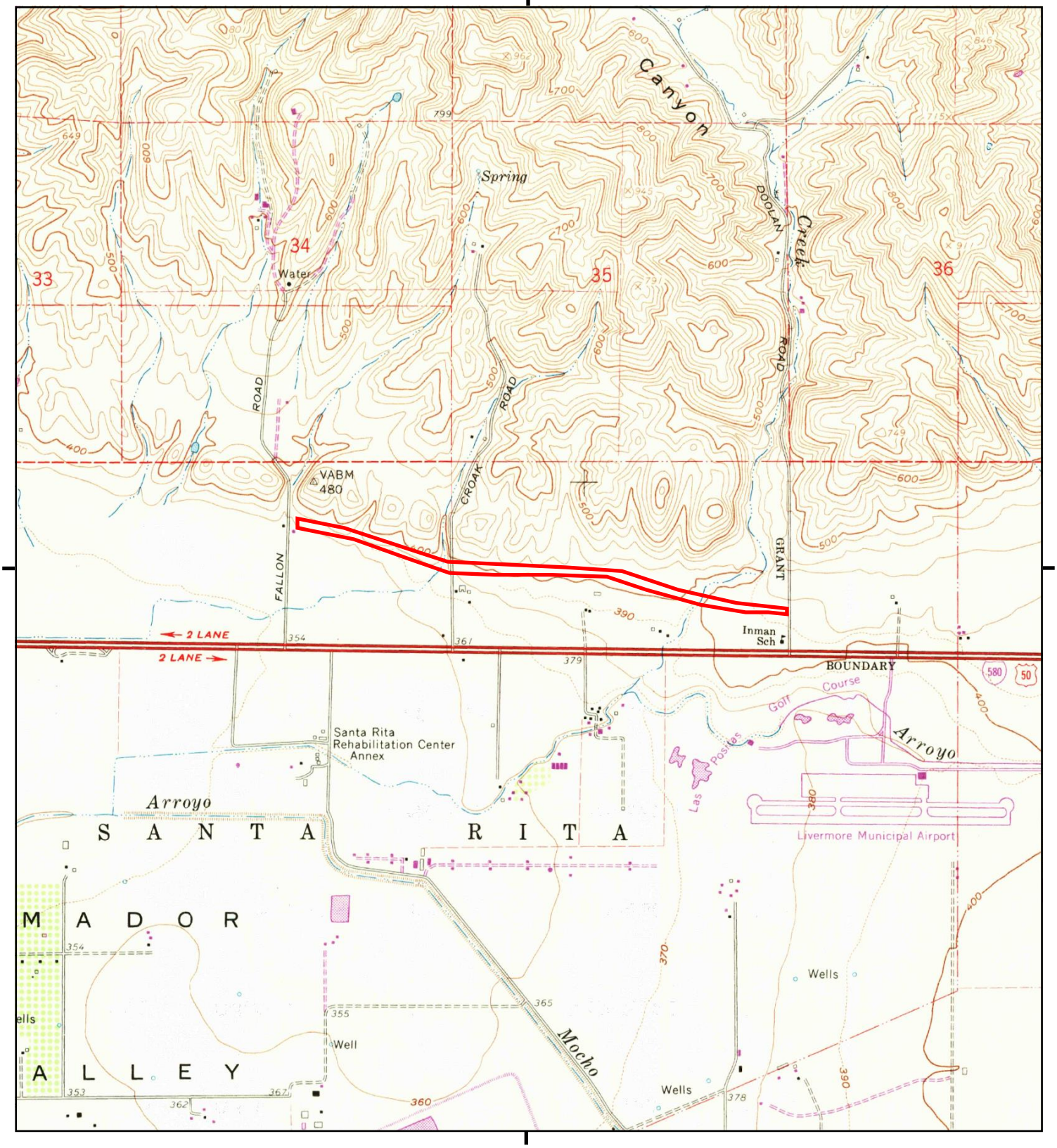
TP, Livermore, 1973, 7.5-minute

SITE NAME: Dublin Blvd Extension
ADDRESS: Baywood Cmn
Pleasanton, CA 94588
CLIENT: GeoCon Environmental Cons.

N

Historical Topo Map

1968



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

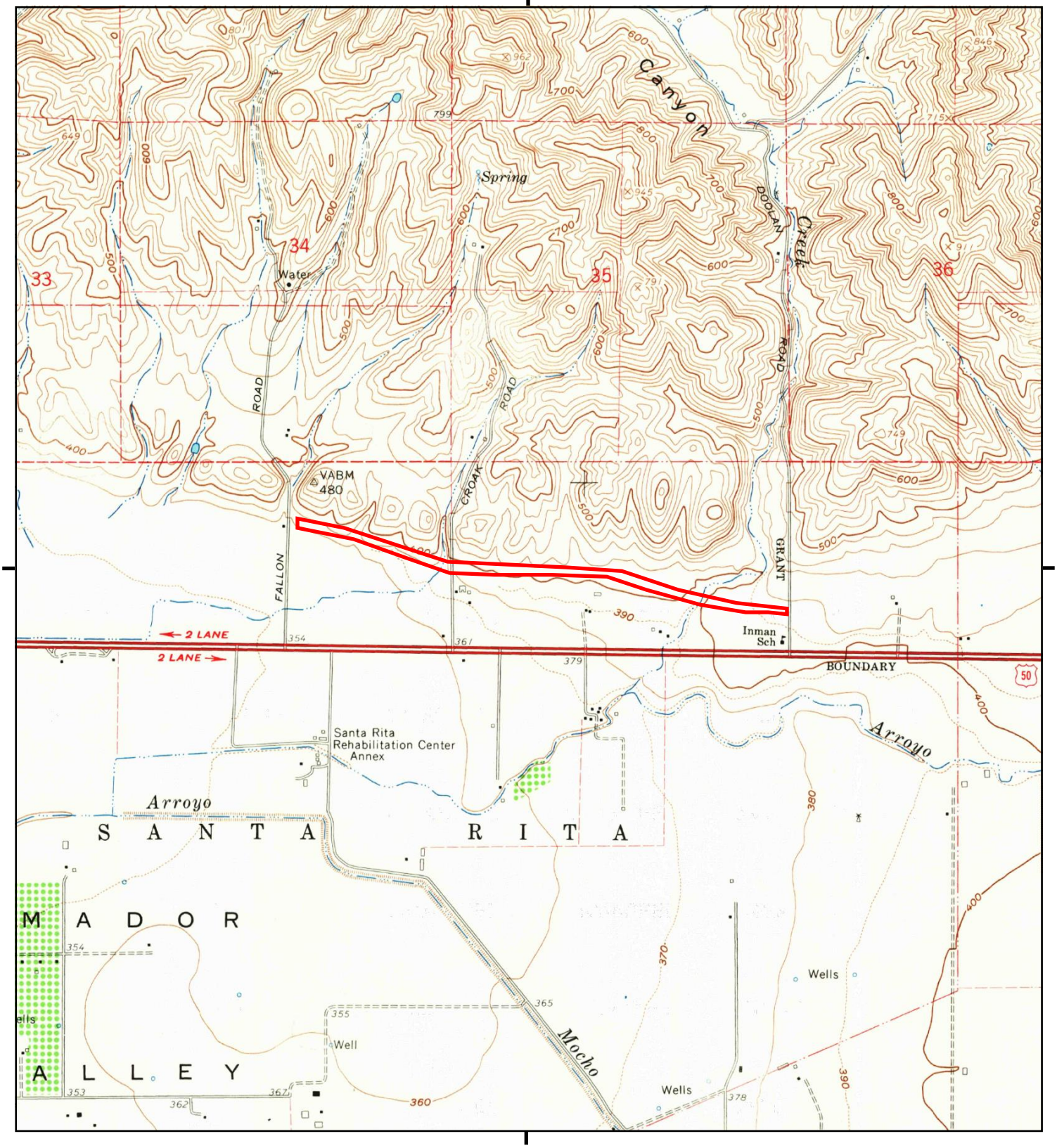
TP, Livermore, 1968, 7.5-minute

SITE NAME: Dublin Blvd Extension
ADDRESS: Baywood Cmn
Pleasanton, CA 94588
CLIENT: GeoCon Environmental Cons.

N

Historical Topo Map

1961



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

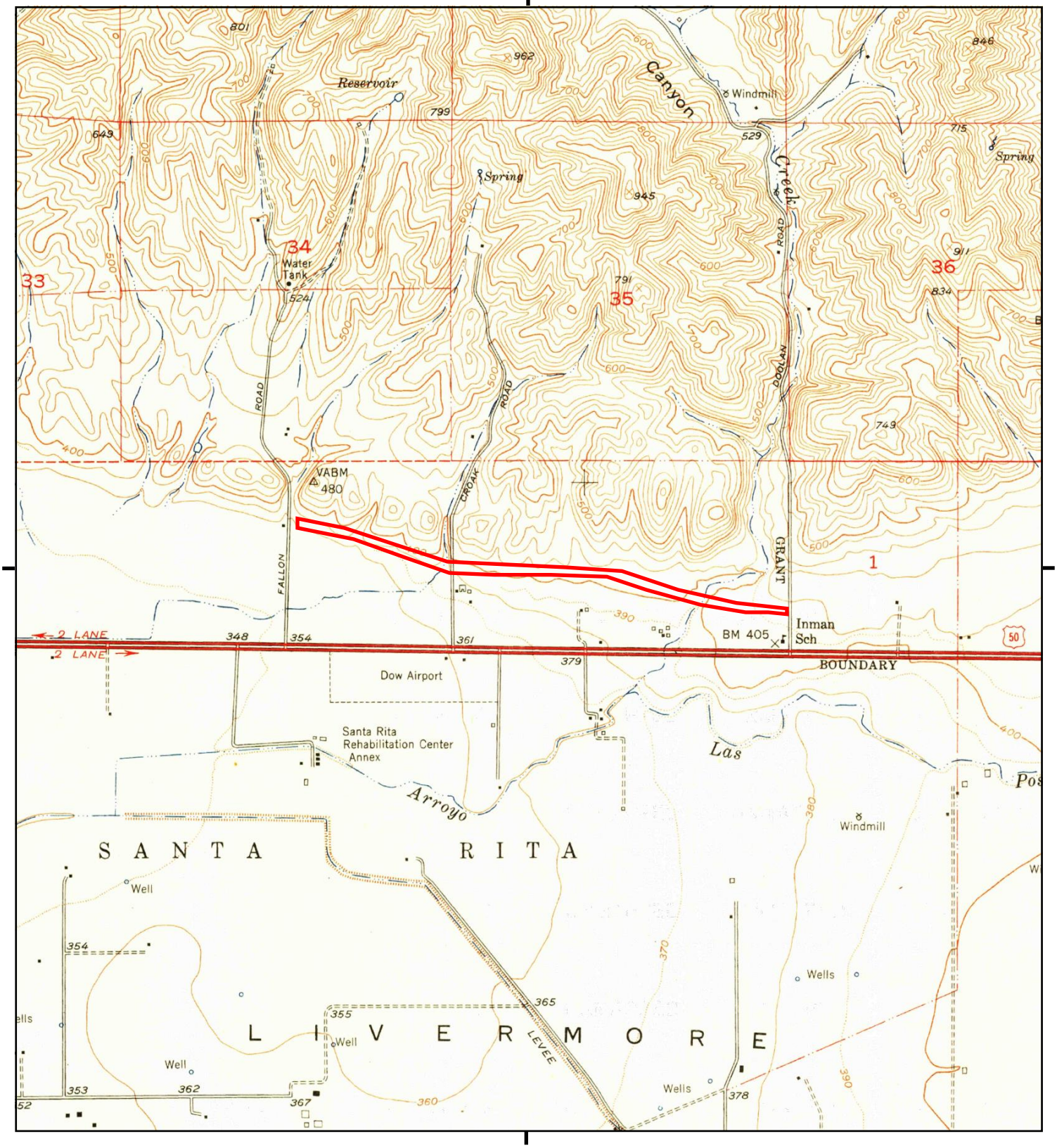
TP, Livermore, 1961, 7.5-minute

SITE NAME: Dublin Blvd Extension
ADDRESS: Baywood Cmn
Pleasanton, CA 94588
CLIENT: GeoCon Environmental Cons.

N

Historical Topo Map

1953



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

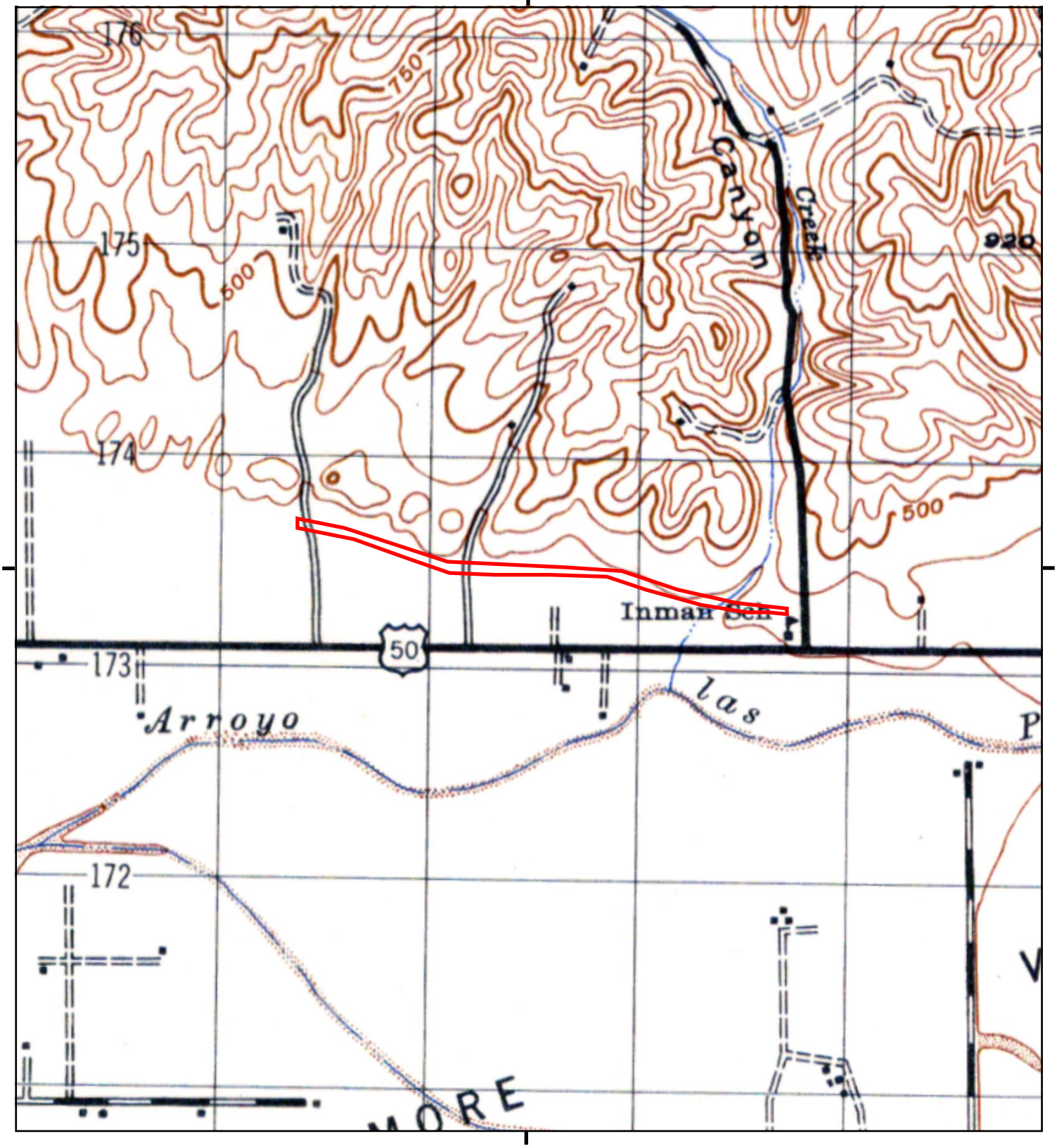
TP, Livermore, 1953, 7.5-minute

SITE NAME: Dublin Blvd Extension
ADDRESS: Baywood Cmn
Pleasanton, CA 94588
CLIENT: GeoCon Environmental Cons.

N

Historical Topo Map

1947



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

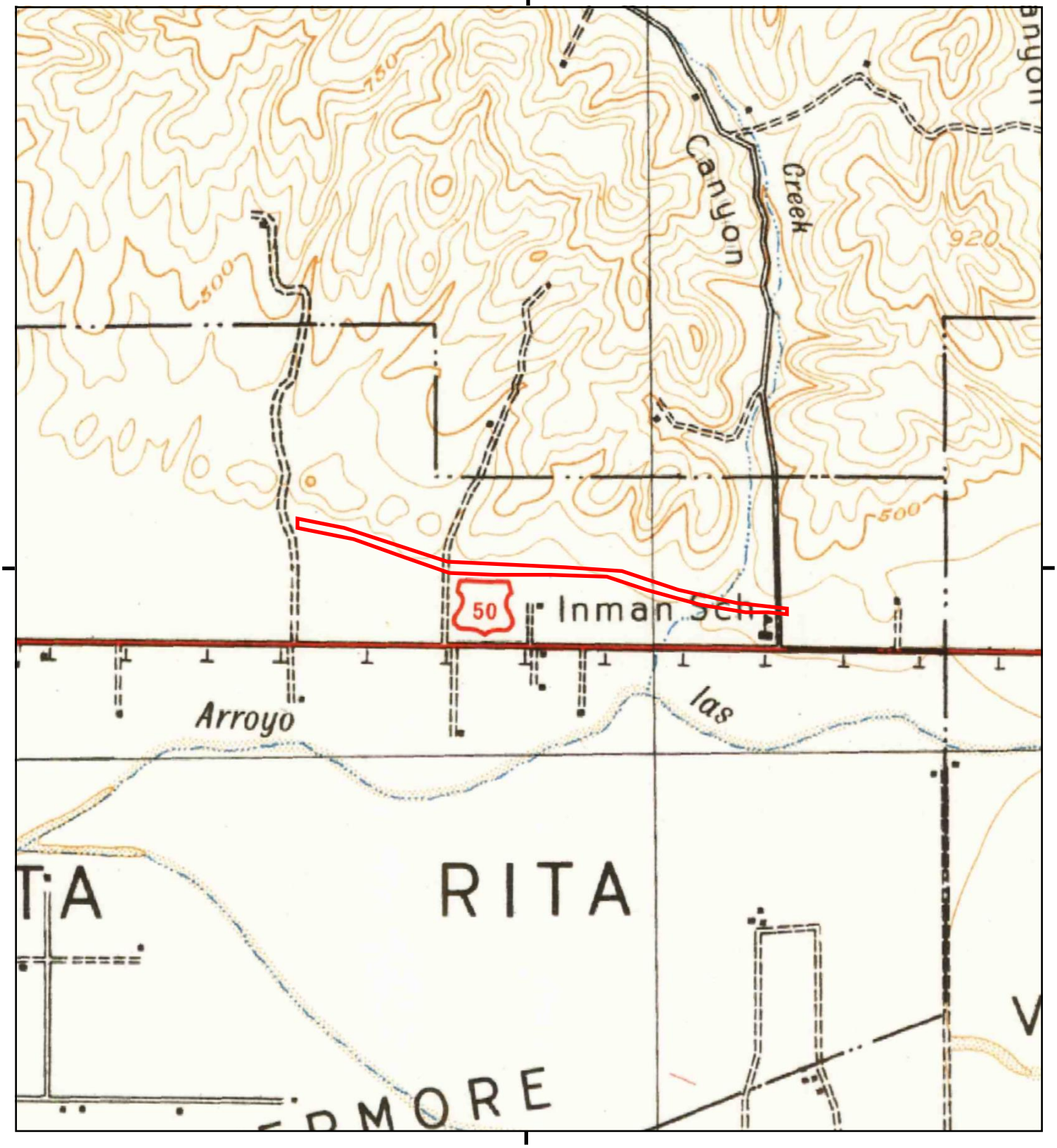
TP, PLEASANTON, 1947, 15-minute

SITE NAME: Dublin Blvd Extension
ADDRESS: Baywood Cmn
Pleasanton, CA 94588
CLIENT: GeoCon Environmental Cons.

N

Historical Topo Map

1941



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

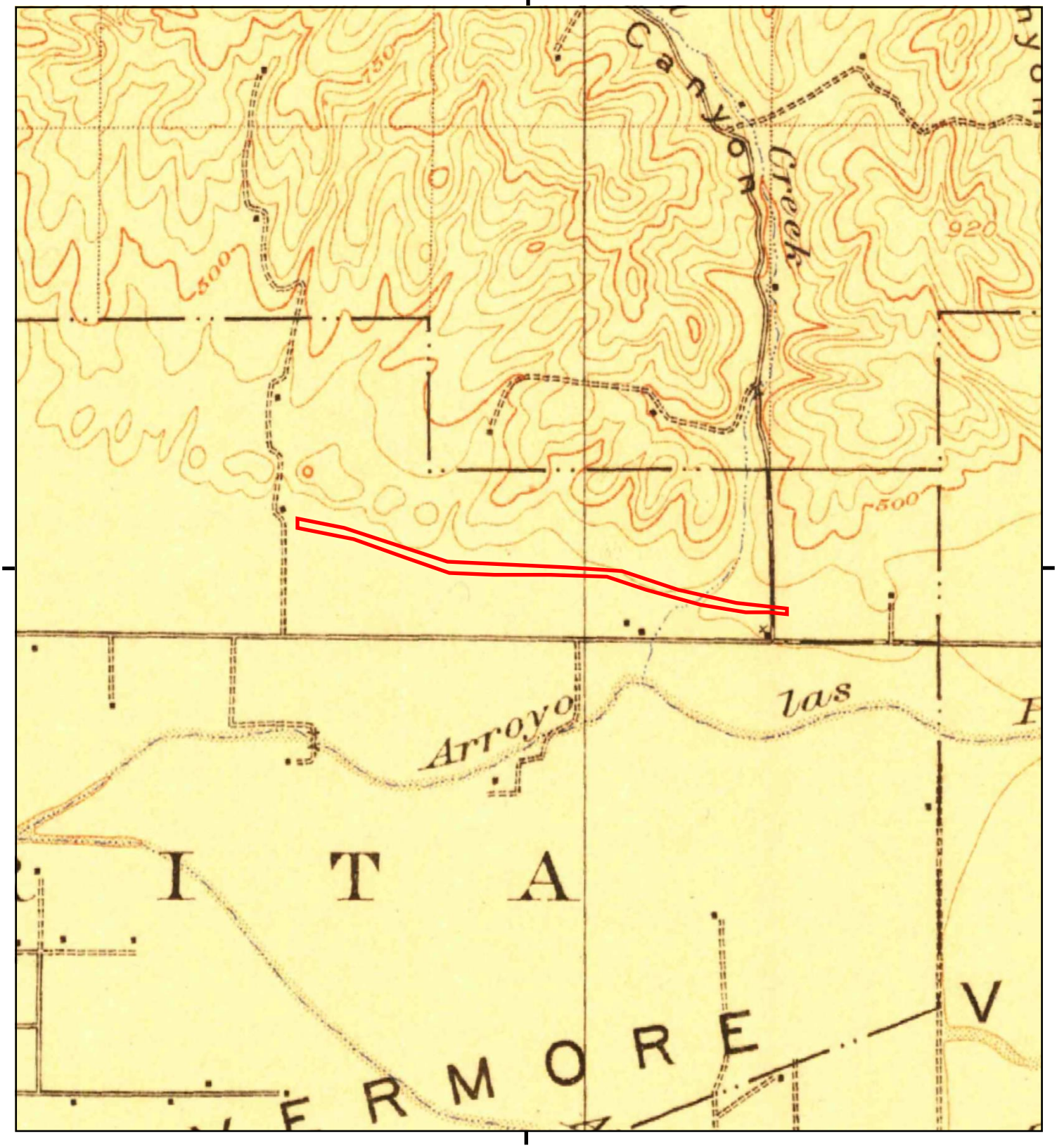
TP, Pleasanton, 1941, 15-minute

SITE NAME: Dublin Blvd Extension
ADDRESS: Baywood Cmn
Pleasanton, CA 94588
CLIENT: GeoCon Environmental Cons.

N

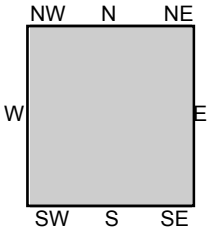
Historical Topo Map

1906



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5



TP, Pleasanton, 1906, 15-minute

SITE NAME: Dublin Blvd Extension
ADDRESS: Baywood Cmn
Pleasanton, CA 94588
CLIENT: GeoCon Environmental Cons.

N

APPENDIX G

Dublin Blvd Extension
Baywood Cmn
Pleasanton, CA 94588

Inquiry Number: 5173965.5
February 20, 2018

The EDR-City Directory Image Report

Environmental Data Resources Inc

6 Armstrong Road
Shelton, CT 06484
800.352.0050
www.edrnet.com

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EXECUTIVE SUMMARY

DESCRIPTION

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RECORD SOURCES

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RESEARCH SUMMARY

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Year	Target Street	Cross Street	Source
2014	☐	☑	EDR Digital Archive
2010	☐	☑	EDR Digital Archive
2005	☐	☑	EDR Digital Archive
2001	☐	☑	Haines Criss-Cross Directory
1994	☐	☑	Haines Criss-Cross Directory
1989	☐	☑	Haines Criss-Cross Directory
1985	☐	☑	Haines Criss-Cross Directory
1980	☐	☑	Haines Criss-Cross Directory
1975	☐	☑	Haines Criss-Cross Directory

FINDINGS

TARGET PROPERTY STREET

Baywood Cmn
Pleasanton, CA 94588

No Addresses Found

FINDINGS

CROSS STREETS

Year	*CD Image*	*Source*

DOOLAN RD

2014	pg. A1	EDR Digital Archive
2010	pg. A3	EDR Digital Archive
2005	pg. A5	EDR Digital Archive
2001	pg. A7	Haines Criss-Cross Directory
1994	pg. A9	Haines Criss-Cross Directory
1989	pg. A11	Haines Criss-Cross Directory
1989	pg. A12	Haines Criss-Cross Directory
1985	pg. A14	Haines Criss-Cross Directory
1980	pg. A16	Haines Criss-Cross Directory
1980	pg. A17	Haines Criss-Cross Directory
1975	pg. A19	Haines Criss-Cross Directory

FALLON RD

2014	pg. A2	EDR Digital Archive
2010	pg. A4	EDR Digital Archive
2005	pg. A6	EDR Digital Archive
2001	pg. A8	Haines Criss-Cross Directory
1994	pg. A10	Haines Criss-Cross Directory
1989	pg. A13	Haines Criss-Cross Directory
1985	pg. A15	Haines Criss-Cross Directory
1980	pg. A18	Haines Criss-Cross Directory
1975	pg. A20	Haines Criss-Cross Directory

City Directory Images

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

DOOLAN RD 2014

3201	CALIFORNIA JOINT POWERS RISK
	PALOMAR DIALYSIS LLC
	PENCON INC
	PREVENT LIFE SAFETY SVCS INC
3291	LUCAS, GREG
4351	FLANIGAN, DONNA K
4589	FLANIGAN LIVESTOCK
	FLANIGAN, DON V
4895	DOOLAN CANYON TRADING COMPANY
	TAYLOR KERRY CONSTRUCTION
	TAYLOR, KERRY D
5000	BURROW, TIFFANY N
5033	STEFFEN, ROBERT
5111	HORIZONS EAST
	OCCUPANT UNKNOWN,
5184	KARSTENS, KELLY D
5200	JOHNSON, INGRID E
5210	CLP LANDSCAPING
	PAYNTER, CHRISTOPHER L
5360	MCKINNON, THOMAS J
5388	ITECHINC
	THIND, RAMNIK
5661	PATTERSON TREVOR J

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

FALLON RD 2014

3620	BJS RESTAURANTS INC
3736	EHIKU CONSULTING LLC
	GRADIENT VISION LLC
	PRITY BHUPTENI
	SHUTTERPROS
3740	JERSEY MIKES SUBS
3742	MENCHIES FALLON GATEWAY
3746	DUBLIN HILLS DENTAL GROUP
	FALLON DENTAL GROUP
3762	BLUE GINGKO DUBLIN LLC
3772	HAWAIIAN GRILL EXPRESS
3776	FRESH PIXX
6033	TOLL BROTHERS INC

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

DOOLAN RD 2010

3201	PALOMAR DIALYSIS LLC
	PENCON INC
	PREVENT
	SPECIALIZED MAINTENANCE INC
4351	OCCUPANT UNKNOWN,
4589	FLANIGAN LIVESTOCK
	FLANIGAN, DON V
	SCRIBNER LIVESTOCK
4895	TAYLOR KERRY
5033	OCCUPANT UNKNOWN,
	STEFFEN ROBERT
5111	HORIZONS EAST
	MADRIGAL, JESSY
5184	JON, KARSTENS
5200	JOHNSON, INGRID E
5210	CLP LANDSCAPING
	PAYNTER, CHRISTOPHER L
5360	OCCUPANT UNKNOWN,
5388	VALLADARES, ELIZABETH
5661	PATTERSON TREVOR J

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

FALLON RD 2010

4800	ALAMEDA COUNTY OF
	OCCUPANT UNKNOWN,
6033	TOLL BROTHERS INC

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

DOOLAN RD 2005

4300	OCCUPANT UNKNOWN,
4351	OCCUPANT UNKNOWN,
4589	FLANIGAN, DON
4895	OCCUPANT UNKNOWN,
5000	CARDOZA, TONY R
5033	OCCUPANT UNKNOWN,
5111	HORIZONS EAST
5184	OCCUPANT UNKNOWN,
5200	JOHNSON, INGRID E
5210	CLP LANDSCAPING
	PAYNTER, CHRISTOPHER L
5388	HERMOSILLO, JUAN J
	J&J CONCRETE CO

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

FALLON RD 2005

4800 ALAMEDA COUNTY OF
6033 OCCUPANT UNKNOWN,
TOLL BROTHERS INC

Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

DOOLAN RD 2001

DOOLAN RD 94550
LIVERMORE

WEALTH CODE 9.0

	4300	LABRUCHERIE Kathy	925-447-4296	
	4895	XXXX	OO	
9	5000	CARDOZA Tony	925-447-0128	2
0	5111	●DOHMAN L	925-960-1901	+0
0		●DOHMAN S	925-960-1901	+0
8	5184	●MORGAN Henry	OO	+0
0	5200	●COLE Douglas	OO	+0
0	5210	●PAYNTER C	OO	8
0	5360	●MCKINNON Thomas	OO	+0
0	5388	●PESTANA James	OO	8
0	5475	SWARTWOUDT Herbert	925-447-0420	
0	★	0 BUS 11 RES	5 NEW	
0				

Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

FALLON RD 2001

FALLON RD 94550
LIVERMORE

WEALTH CODE 8.0

4233	●JORDAN H	925-443-2883	6
5781	BANKHEAD Evelyn	925-447-6375	

* 0 BUS 2 RES 0 NEW

Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

DOOLAN RD 1994

DOOLAN RD 94550
LIVERMORE

WEALTH CODE 9

4300	LABRUCHERIE Kathy	447-4296	6
4589	PEREZ Luis	455-8269	1
4895	XXXX	00	
5000	CARDOZA Tony	447-0128	2
5111	AKINS John	449-9286	
	AKINS Sheila	449-9286	
	★APPLIED DIGITL DSGN	447-8893	+4
5184	XXXX	00	
5200	FOSCALINA Bobbie	455-0888	
	FOSCALINA Chuck S	455-0888	
5210	XXXX	00	
5360	OGELVIE Robt S	443-4069	
5475	SWARTWOUDT Herbert	447-0420	

★ 1 BUS 12 RES 1 NEW

Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

FALLON RD 1994

FALLON RD 94550
LIVERMORE

WEALTH CODE 9

5781	BANKHEAD Evelyn		447-6375	
NO #	JORDAN H		443-2883	9
*	0 BUS	3 RES	0 NEW	

Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

DOOLAN RD 1989

DOOLAN RD 94550
LIVERMORE

4300	LABRUCHERIE Kathy	447-4296	6
4895	BAILEY C A	443-2677	
5033	FUNK Bruce	447-8831	
5111	AKINS John	447-8893	
	AKINS John	449-9286	
	AKINS Sheila	447-8893	
	AKINS Sheila	449-9286	
5184	XXXX	00	
5200	FOSCALINA Chuck S	455-0888	
5210	XXXX	00	
5360	OGELVIE Robt S	443-4069	
5388	MOTTIN Ralph E	449-1038	0
5475	SWARTWOUDT Herbert	447-0420	

NOT BE KEYPUNCHED. ENTERED INTO A COMPUTER

Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

DOOLAN RD 1989

..DOOLAN RD 94550 CONT..
6090 XXXX 00
NO # CARDOZA Tony 447-0128
* 0 BUS 15 RES 0 NEW

Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

FALLON RD 1989

FALLON RD 94550
LIVERMORE

4233	JORDAN H	443-2883 +9
5100	BOWRON Frank W	373-1911 +9
5781	BANKHEAD Evelyn	447-6375

* 0 BUS 3 RES 2 NEW

Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

DOOLAN RD 1985

DOOLAN RD 94550
LIVERMORE

4300	LABRUCHERIE L JR	443-4738	+5
4895	BAILEY C A	443-2677	
5033	FUNK BRUCE	447-8831	9
	TOWER INDUSTRIES	**455-6477**	**+5**
5111	AKINS SHEILA	447-8893	2
5184	XXXX	00	
5200	FOSCALINA CHUCK S	455-0888	7
5210	KATSINIS TED	455-5744	9
5360	OGELVIE ROBT S	443-4069	
5388	MOTTIN RALPH E	449-1038	0
5475	SWARTWOUDT HERBERT	447-0420	
5658	XXXX	00	
5660	XXXX	00	
6090	CODERO RODNEY J	455-1403	3
NO #	CARDOZA TONY	447-0128	

* 1 BUS 14 RES 2 NEW

Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

FALLON RD 1985

★ 0 BUS 6 RES 2 NEW

FALLON RD 94550
LIVERMORE

5781 BANKHEAD EVELYN 447-6375
★ 0 BUS 1 RES 0 NEW

Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

DOOLAN RD 1980

DOOLAN RD 94550
LIVERMORE

4300	SHORT LILIAS A	447-0335	
4895	BAILEY C A	443-2677	
5033	FUNK BRUCE	447-8831	9
5200	FOSCALINA CHUCK S	455-0888	7
5210	KATSINIS TED	455-5744	9
5360	OGELVIE ROBT S	443-4069	5

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Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

DOOLAN RD 1980

DOOLAN RD 94550 CONT

5388	MOTTIN RALPH E	449-1038	+0
5475	SWARTWOUDT HERBERT	447-0420	
5658	XXXX	00	
5660	AXELROD TIM S	455-0434	9
6090	BECK ROBERT	447-7459	8
NO #	CARDOZA TONY	447-0128	

* 0 BUS 12 RES 1 NEW

Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

FALLON RD 1980

FALLON RD 94550
LIVERMORE

4233	JORDAN H	443-2883	7
5781	BANKHEAD EVELYN	447-6375	
★	0 BUS 2 RES	0 NEW	

Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

DOOLAN RD 1975

DOOLAN RD 94550 LIVERMORE

4300	SHORT LILIAS A	447-0335	
4895	BAILEY A E	443-2677	
5200	FOSCALINA CHAS S	455-0888	3
5210	IMPEY CHAS C JR	443-6686	3
5360	OGELVIE ROBT S	443-4069	+5
5388	WHITEAR FRANK	443-7781	3
5475	SWARTWOUDT HERBERT	447-0420	
5658	BEHRENS WAYNE	447-4719	
5660	BECK ROBT	447-7459	+5
6090	BAILEY MELVIN E	443-5129	
6500	XXXX	00	
NO #	CARDOZA TONY	447-0128	

* 0 BUS 11 RES 2 NEW

Target Street	Cross Street	Source
-	✓	Haines Criss-Cross Directory

FALLON RD 1975

FALLON RD 94550 LIVERMORE

5220	GARCIA RICHARD	455-5820+5
	STOLL CHAS	447-9431 3
5781	BANKHEAD EVELYN	447-6375

* 0 BUS 3 RES 1 NEW

Dublin Blvd Extension
Croak Road
Pleasanton, CA 94588

Inquiry Number: 5241710.1
April 04, 2018

The EDR-City Directory Image Report

Environmental Data Resources Inc

6 Armstrong Road
Shelton, CT 06484
800.352.0050
www.edrnet.com

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2005	☑	☐	EDR Digital Archive
2000	☑	☐	EDR Digital Archive
1992	☑	☐	EDR Digital Archive
1989	☐	☐	Haines Criss-Cross Directory
1985	☐	☐	Haines Criss-Cross Directory
1980	☐	☐	Haines Criss-Cross Directory
1975	☐	☐	Haines Criss-Cross Directory

FINDINGS

TARGET PROPERTY STREET

Croak Road
Pleasanton, CA 94588

Year	CD Image	Source	
CROAK RD			
2014	pg A2	EDR Digital Archive	
2010	pg A4	EDR Digital Archive	
2005	pg A5	EDR Digital Archive	
2000	pg A6	EDR Digital Archive	
1992	pg A7	EDR Digital Archive	
1989	-	Haines Criss-Cross Directory	Street not listed in Source
1985	-	Haines Criss-Cross Directory	Street not listed in Source
1980	-	Haines Criss-Cross Directory	Street not listed in Source
1975	-	Haines Criss-Cross Directory	Street not listed in Source

FINDINGS

CROSS STREETS

Year	*CD Image*	*Source*	
COLLIER CANYON RD			
2014	pg. A1	EDR Digital Archive	
2010	pg. A3	EDR Digital Archive	
2005	-	EDR Digital Archive	Street not listed in Source
2000	-	EDR Digital Archive	Street not listed in Source
1992	-	EDR Digital Archive	Street not listed in Source
1989	-	Haines Criss-Cross Directory	Street not listed in Source
1985	-	Haines Criss-Cross Directory	Street not listed in Source
1980	-	Haines Criss-Cross Directory	Street not listed in Source
1975	-	Haines Criss-Cross Directory	Street not listed in Source

City Directory Images

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

COLLIER CANYON RD 2014

1421 ANDERSEN, PETE

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

CROAK RD 2014

3457 PLEASANTON TRUCKING

Target Street	Cross Street	Source
-	✓	EDR Digital Archive

COLLIER CANYON RD 2010

1421 ANDERSEN, PEDER E

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

CROAK RD 2010

3457 PLEASANTON TRUCKING
4037 OCCUPANT UNKNOWN,

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

CROAK RD 2005

3457 JOHNSON, KIRSTEN
PLEASANTON TRUCKING

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

CROAK RD 2000

3457 PLEASANTON TRUCKING

Target Street	Cross Street	Source
✓	-	EDR Digital Archive

CROAK RD 1992

4037 A M BACKHOE

Appendix H: Hydrology and Water Quality

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Water Quality Report
Dublin Boulevard-North Canyons Parkway Extension Project
Federal Project No. RTPL 5432(019)

Prepared for

City of Dublin, County of Alameda, and City of Livermore

Located in:

Dublin, Unincorporated Alameda County, and Livermore
California

BKF Engineers
4670 Willow Road, Suite 250
Pleasanton, CA 94588

July 16, 2018

Water Quality Report

Dublin Boulevard-North Canyons Parkway Extension Project

July 16, 2018

Prepared for

City of Dublin, County of Alameda, and City of Livermore

Located in:

Dublin, Unincorporated Alameda County, and Livermore California

This Water Quality report has been prepared by BKF Engineers under the supervision of the following Registered Engineer. To the best of my knowledge and belief, the information submitted is true, accurate and complete

Ramon Alvarez-Muro Date: 11/21/18

Ramon Alvarez-Muro, P.E.
Registered Civil Engineer

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1.2 Project Description

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2.2 State Laws and Requirements
2.3 Regional and Local Requirements

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1. INTRODUCTION

1.1 Approach to Water Quality Report

The purpose of the Water Quality Report is to fulfill the requirements of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), and to provide information for National Pollutant Discharge Elimination System (NPDES) permitting. The document includes a discussion of the proposed project, the general environmental setting of the project area, and the regulatory framework with respect to water quality; it also provides data on surface water within the project area and the water quality of these waters, describes water quality impairments and beneficial uses, and identifies potential water quality impacts/benefits associated with the proposed project, and recommends avoidance and/or minimization measures for potentially adverse impacts.

1.2 Project Description

The City of Dublin (Dublin), in cooperation with the City of Livermore (Livermore), Alameda County (County), Alameda County Transportation Commission (ACTC), and the California Department of Transportation (Caltrans) as assigned by the Federal Highway Administration (FHWA), proposes to extend Dublin Boulevard approximately 1.5 miles eastward through eastern Dublin and an unincorporated portion of the County, terminating at the boundary between the County and Livermore city limits (project). The work proposed will include the construction of a new 4-6 lane roadway, including bicycle and pedestrian facilities (i.e., sidewalks and bike lanes). Additionally, the project proposes to conduct intersection improvements at the Dublin Boulevard/Fallon Road and Doolan Road/North Canyon Parkway intersections; eliminate the frontage road connection/intersection and add a new intersection at Dublin Boulevard/Croak Road intersection; and construct a new bridge over Cottonwood Creek.

The maximum anticipated excavation depth will reach about 40 feet below current ground surface for the sewer line and the potential Disturbed Soil Area (DSA) is estimated to be about 84 acres. The project will construct about 19 acres of new impervious area all of which will require post-construction stormwater treatment.

The Project Location Map is shown on Figure 1, Project Vicinity Map on Figure 2 and Surface Waters within the project vicinity on Figure 3.

Figure 1. Project Location Map

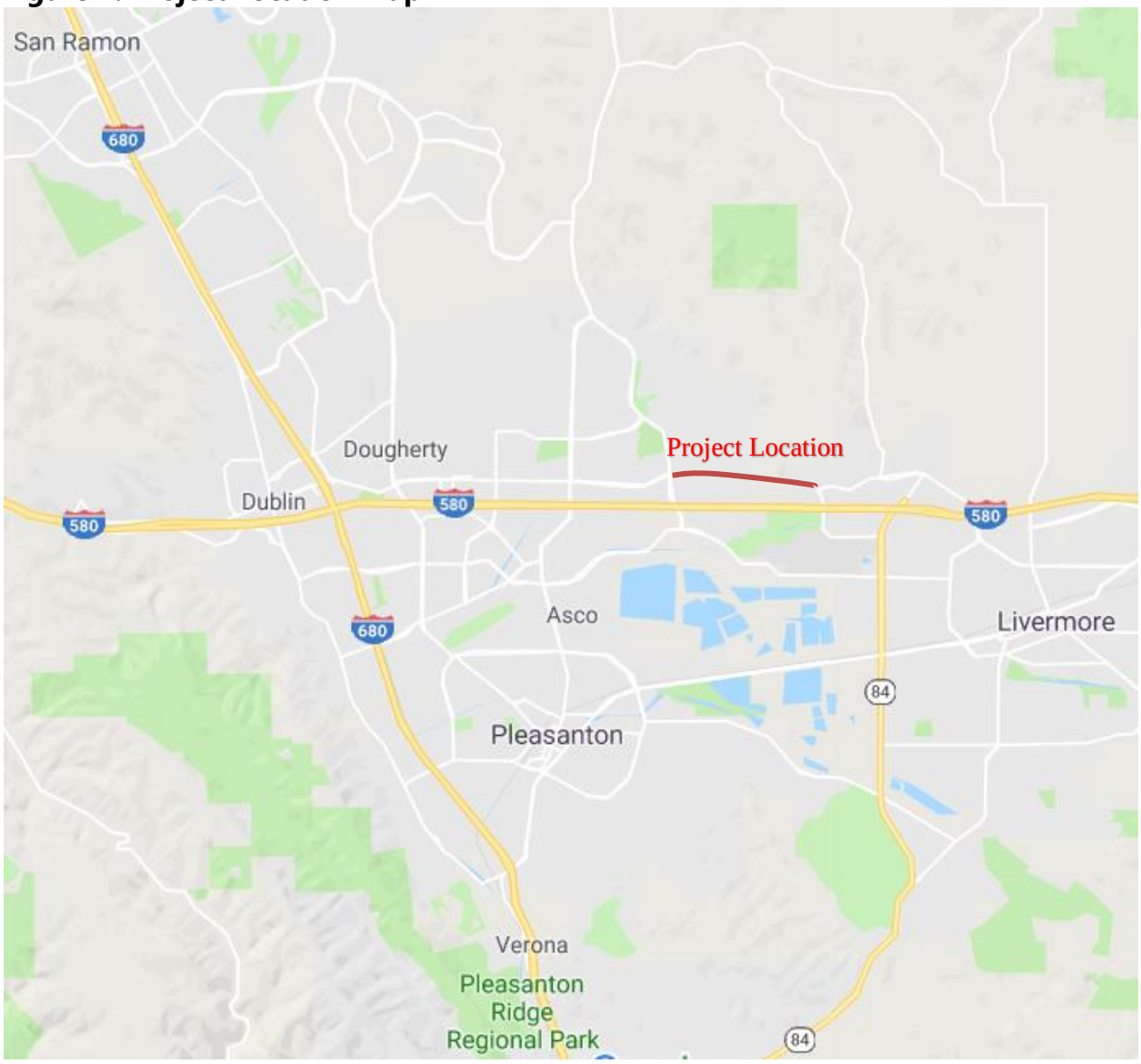
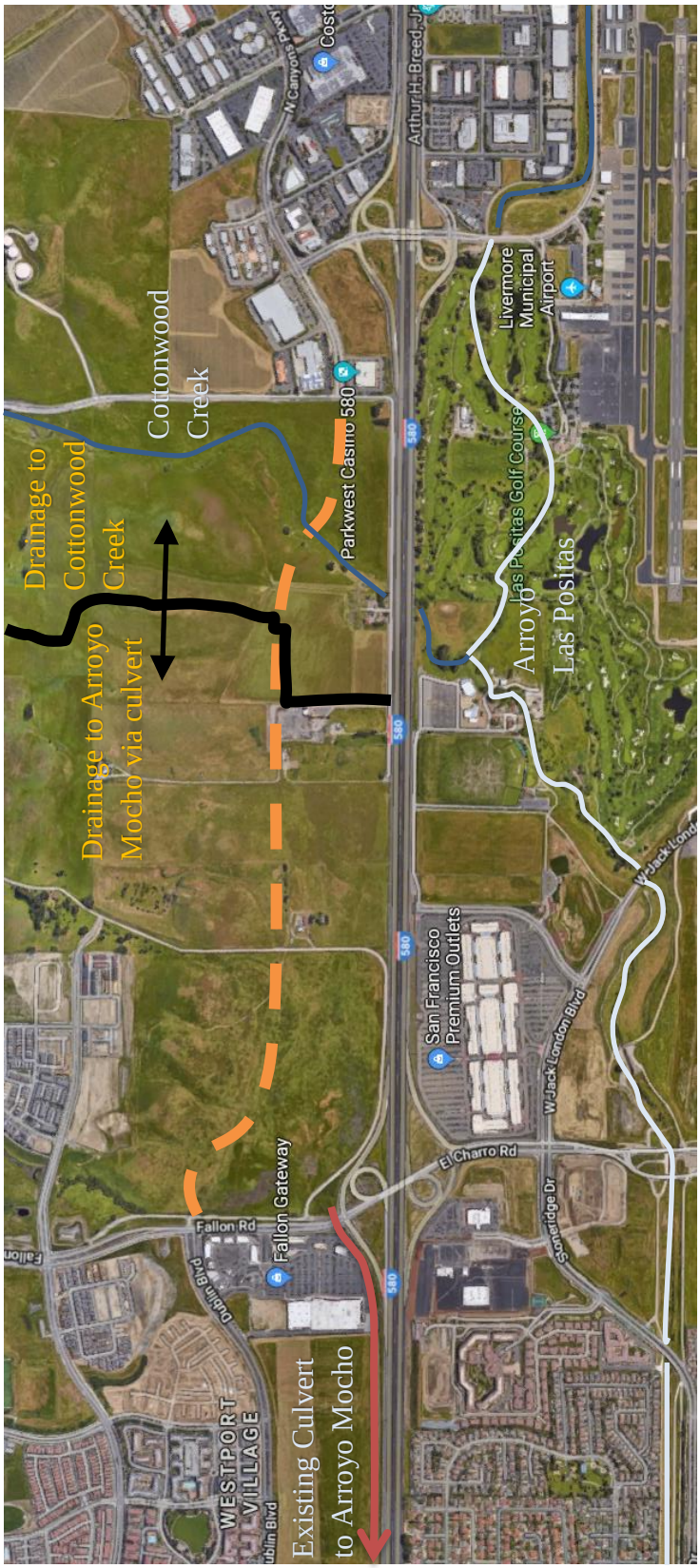


Figure 2. Project Vicinity Map

Figure 3. Surface Waters


Drainage to Cottonwood Creek
Drainage to Arroyo Mocho via culvert
Cottonwood Creek
Parkwest Casino 580
Arthur H. Breed, Jr
Livermore Municipal Airport
Las Positas Golf Course
Arroyo Las Positas
San Francisco Premium Outlets
W Jack London Blvd
El Charro Rd
Stoneridge Dr
Fallon Rd
Fallon Gateway
Dublin Blvd
WESTPORT VILLAGE
Existing Culvert to Arroyo Mocho
580

2. Regulatory Setting

This section summarizes the water quality regulations mandated at the federal, state and local jurisdictional levels.

2.1 Federal Laws and Requirements

The primary regulation at the federal level for the quality of surface and ground water is the Clean Water Act (CWA). Details are summarized in the section below.

Clean Water Act

In 1972 Congress amended the Federal Water Pollution Control Act, making the addition of pollutants to the waters of the United States (U.S.) from any point source unlawful unless the discharge is in compliance with a NPDES permit. Known today as the Clean Water Act (CWA), Congress has amended it several times. In the 1987 amendments, Congress directed dischargers of stormwater from municipal and industrial/construction point sources to comply with the NPDES permit program. Important CWA sections are:

- Sections 303 and 304 require states to promulgate water quality standards, criteria, and guidelines.

- Section 401 requires an applicant for a federal license or permit to conduct any activity, which may result in a discharge to waters of the U.S., to obtain certification from the State that the discharge will comply with other provisions of the act. (Most frequently required in tandem with a Section 404 permit request. See below).

- Section 402 establishes the NPDES, a permitting system for the discharges (except for dredge or fill material) of any pollutant into waters of the U.S. The Federal Environmental Protection Agency delegated to the California State Water Resources Control Board (SWRCB) the implementation and administration of the NPDES program in California. The SWRCB established nine Regional Water Quality Control Boards (RWQCBs). The SWRCB enacts and enforces the Federal NPDES program and all water quality programs and regulations that cross Regional boundaries. The nine RWQCBs enact, administer and enforce all programs, including NPDES permitting, within their jurisdictional boundaries. Section 402(p) requires permits for discharges of stormwater from industrial, construction, and Municipal Separate Storm Sewer Systems (MS4s).

- Section 404 establishes a permit program for the discharge of dredge or fill material into waters of the U.S, including wetlands. This permit program is administered by the U.S. Army Corps of Engineers (USACE).

The objective of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

The USACE issues two types of 404 permits: General and Individual. There are two types of General permits: Regional and Nationwide permits. Regional permits are issued for a general category of activities when they are similar in nature and cause minimal environmental effect. Nationwide permits are issued to authorize a variety of minor project activities with no more than minimal effects.

There are also two types of Individual permits: Standard Individual permit and Letter of Permission. Ordinarily, projects that do not meet the criteria for a Nationwide Permit may be permitted under one of USACE's Individual permits. For Standard Individual permit, the USACE decision to approve is based on compliance with U.S. Environmental Protection Agency's (EPA) Section 404 (b)(1) Guidelines (U.S. EPA CFR 40 Part 230), and whether permit approval is in the public interest. The 404(b)(1) Guidelines were developed by the U.S. EPA in conjunction with USACE, and allow the discharge of dredged or fill material into the aquatic system (waters of the U.S.) only if there is no practicable alternative which would have less adverse effects. The Guidelines state that USACE may not issue a permit if there is a least environmentally damaging practicable alternative (LEDPA), to the proposed discharge that would have less effects on waters of the U.S., and not have any other significant adverse environmental consequences. Per Guidelines, documentation is needed that a sequence of avoidance, minimization, and compensation measures have been followed, in that order. The Guidelines also restrict permitting activities that violate water quality or toxic effluent standards, jeopardize the continued existence of listed species, violate marine sanctuary protections, or cause "significant degradation" to waters of the U.S. In addition, every permit from the USACE, even if not subject to the 404(b)(1) Guidelines, must meet general requirements. See 33 CFR 320.4.

2.2 State Laws and Requirements

Porter-Cologne Water Quality Control Act

California's Porter-Cologne Act, enacted in 1969, provides the legal basis for water quality regulation within California. This Act requires a "Report of Waste Discharge" for any discharge of waste (liquid, solid, or gaseous) to land or surface waters that may impair beneficial uses for surface and/or groundwater of the State. It predates the

CWA and regulates discharges to waters of the State. Waters of the State include more than just waters of the U.S., like groundwater and surface waters not considered waters of the U.S. Additionally, it prohibits discharges of "waste" as defined and this definition is broader than the CWA definition of "pollutant". Discharges under the Porter-Cologne Act are permitted by Waste Discharge Requirements (WDRs) and may be required even when the discharge is already permitted or exempt under the CWA.

Water body segments that fail to meet standards for specific pollutants are included in a Statewide List in accordance with CWA Section 303(d). If a Regional Board determines that waters are impaired for one or more constituents and the standards cannot be met through point source or non-source point controls (NPDES permits or Waste Discharge Requirements), the CWA requires the establishment of Total Maximum Daily Loads (TMDLs). TMDLs specify allowable pollutant loads from all sources (point, non-point, and natural) for a given watershed.

State Water Resources Control Board and Regional Water Quality Control Boards
The SWRCB adjudicates water rights, sets water pollution control policy, and issues water board orders on matters of statewide application, and oversees water quality functions throughout the state by approving Basin Plans, TMDLs, and NPDES permits. RWCQBs are responsible for protecting beneficial uses of water resources within their regional jurisdiction using planning, permitting, and enforcement authorities to meet this responsibility.

The SWRCB and RWQCBs are responsible for establishing the water quality standards as required by the CWA, and regulating discharges to protect beneficial uses of water bodies. Details regarding water quality standards in a project area are contained in the applicable RWQCB Basin Plan. In California, Regional Boards designate beneficial uses for all water body segments in their jurisdictions, and then set standards necessary to protect these uses. Consequently, the water quality standards developed for particular water body segments are based on the designated use and vary depending on such use.

National Pollutant Discharge Elimination System (NPDES) Program

Municipal Separate Storm Sewer Systems (MS4)

Section 402(p) of the CWA requires the issuance of NPDES permits for five categories of stormwater dischargers, including MS4s. The U.S. EPA defines an MS4 as "any conveyance or system of conveyances (roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, human-made channels, and storm drains) owned or operated by a state, city, town, county, or other public body having jurisdiction over storm water, that are designed or used for

collecting or conveying stormwater." The SWRCB or the RWQCB issues NPDES permits for five years, and permit requirements remain active until a new permit has been adopted. NPDES permits are required and issued for discharges from a MS4 serving a population of 100,000 or more for Phase I, and serving a population of 10,000 or more for Phase II. Alameda County is within a Phase I area.

Construction General Permit

Construction General Permit (NPDES No. CAS000002, SWRCB Order No. 2009-0009-DWQ) was amended by Order No. 2010-0014-DWQ and Order No. 2012-0006-DWQ. The permit regulates stormwater discharges from construction sites which result in a Disturbed Soil Area (DSA) of one acre or greater, and/or are smaller sites that are part of a larger common plan of development.

For all projects subject to the construction general permit (CGP), the applicant is required to utilize a Qualified Storm Water Pollution Prevention Plan (SWPPP) Developer (QSD) to develop and implement an effective SWPPP. All Project Registration Documents, including the SWPPP, are required to be uploaded into the SWRCB's on-line Stormwater Multiple Application and Report Tracking System (SMARTS), at least 30 days prior to construction.

<u>Waivers from CGP coverage</u>.

Projects that disturb over 1.0 acre but less than 5 acres of soil, may qualify for waiver of CGP coverage. This occurs whenever the R factor of the **Watershed Erosion Estimate (=RxKxLS) in tons/acre** is less than 5. Within this CGP formula, there is a factor related to when and where the construction will take place. This factor, the 'R' factor, may be low, medium or high. When the R factor is below the numeric value of 5, projects can be waived from coverage under the CGP, and are instead covered by the Caltrans Statewide MS4.

Construction activity that results in soil disturbances of less than one acre is subject to this CGP if there is potential for significant water quality impairment resulting from the activity as determined by the RWQCB. Operators of regulated construction sites are required to develop a SWPPP, to implement soil erosion and pollution prevention control measures, and to obtain coverage under the CGP.

The CGP contains a risk-based permitting approach by establishing three levels of risk possible for a construction site. Risk levels are determined during the planning, design, and construction phases, and are based on project risk of generating sediments and receiving water risk of becoming impaired. Requirements apply according to the Risk Level determined.

Section 401 Permitting

Under Section 401 of the CWA, any project requiring a federal license or permit that may result in a discharge to a water of the United States must obtain a 401 Certification, which certifies that the project will be in compliance with State water quality standards. The most common federal permit triggering 401 Certification is a CWA Section 404 permit, issued by USACE. The 401 permit certifications are obtained from the appropriate RWQCB, dependent on the project location, and are required before USACE issues a 404 permit.

In some cases the RWQCB may have specific concerns with discharges associated with a project. As a result, the RWQCB may prescribe a set of requirements known as Waste Discharge Requirements (WDRs) under the State Water Code (Porter-Cologne Act). WDRs may specify the inclusion of additional project features, effluent limitations, monitoring, and plan submittals that are to be implemented for protecting or benefiting water quality. WDRs can be issued to address both permanent and temporary discharges of a project.

2.3 Regional and Local Requirements

The Project is located in Alameda County (within the City of Dublin and Unincorporated Alameda County, abutting City of Livermore) which lies within the limits of the San Francisco Bay RWQCB and is under a Phase I MS4. The Project area is under regional/local requirements and subject to the following permit "California Regional Water Quality Control Board San Francisco Bay Region Municipal Regional Stormwater NPDES Permit" (Order R2-2015-0049 NPDES Permit No. CAS612008). This permit is known as the MRP and presents the provisions for permanent post-construction stormwater requirements related to development, re-development and roadway projects outside of Caltrans Right-of-Way. The MRP in Alameda County is administered by the Alameda Countywide Clean Water Program (ACCWP). The ACCWP has developed a manual called "C.3 Stormwater Technical Guidance" to assist designers and reviewers in complying with post-construction stormwater treatment requirements as well as Hydromodification Management requirements. For new roadway projects the MRP requires post-construction stormwater treatment be provided for all new impervious areas.

3. AFFECTED ENVIRONMENT

3.1 General Environmental Setting

3.1.1 Topography

Perpendicular to the west-east path of the project, the existing grade generally falls north to south with many rolling hills. The elevation at the western boundary of Fallon Road is about 370 feet above sea level and meanders to match grade along the path reaching a maximum of elevation of about 420 feet at its highest point before connecting to Doolan Road at elevation 415 feet.

3.1.2 Soil and Geology

A Natural Resources Conservation Service (NRCS) Web Soil Survey was done to identify the underlying soils within the project limits. The predominant soil underlying the project are Diablo Clay and Linne Clay Loam with the soils under Cottonwood Creek as Clear Lake Clay. All three soils have a Hydraulic Soil Group (HSG) classification of C, which are soils having a slow infiltration rate (high runoff potential) when thoroughly wet. Wet Soil Survey can be found in Appendix A.

Erosion potential data was obtained via a NRCS Wed Soil Survey. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. The K factor for the soils in the Project area is primarily 0.24. These soils are considered to have low erosion potential.

3.1.3 Hydrology

3.1.3.1 Regional Hydrology

The Project is located within the South Bay Hydrologic unit, Alameda Creek hydrologic area and hydrologic sub-area 204.30

3.1.3.2 Local Hydrology

The Project is located within the Arroyo Mocho watershed and Lower Arroyo Mocho sub-watershed. Local drainage flows to Arroyo Mocho via one of two methods, in a storm drain culvert that is routed north of but next to Highway 580

westerly before crossing Highway 580 that then outfalls into Arroyo Mocho or into Cottonwood Creek which has a downstream confluence into Arroyo Las Positas south of 580 which in turn has a downstream confluence into Arroyo Mocho south of Highway 580 and west of Highway 580. Surface Waters are shown in Figure 3 on Page 4.

3.1.3.3 Precipitation and Climate

The climate in Alameda County is characterized by warm, dry summers and mild, wet winters. The City of Livermore, in the Livermore-Amador Valley, has an average annual temperature of 59 degrees Fahrenheit. The mean annual precipitation in the Dublin part of the Project area is 14.18 inches with precipitation occurring mostly in the months of October through April.

3.2 Surface Water Resources

3.2.1 Surface Waters

Within the Project area, stormwater runoff on the eastern side is discharged to Cottonwood Creek directly via storm drain line in Dublin Blvd or to Arroyo Mocho indirectly via an underground storm drain system.

3.2.2 Beneficial Uses of Receiving Water Bodies

Protection and enhancement of beneficial uses are the primary goals of water planning. The San Francisco Bay RWQCB Basin Plan identifies beneficial uses for water bodies within its jurisdiction. Table 1 below lists the identified beneficial uses for Cottonwood Creek and Arroyo Mocho, the two surface waterbodies the project area discharges to directly. Detailed descriptions of the individual beneficial uses are provided in the excerpts from Chapter 2 Beneficial Uses of the basin plan included in Appendix B of this report.

Table 1 Beneficial Uses

Water Body	Beneficial Uses								
	AGR	MUN	FRSH	GWR	IND	PROC	COMM	COLD	EST
Cottonwood Creek									
Arroyo Mocho				E				E	

Table 1 (Continued)

Water Body	Beneficial Uses (Continued)							
	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
Cottonwood Creek		E		E	E	E	E	
Arroyo Mocho	E		E	E	E	E	E	

Source: San Francisco Bay RWQCB Basin Plan (2017)

AGR	Agricultural Supply	MIGR	Fish Migration
MUN	Municipal And Domestic Supply	RARE	Preservation Of Rare And Endangered Species
FRSH	Freshwater Replenishment	SPWN	And Fish Spawning
GWR	Groundwater Recharge	WARM	Warm Freshwater Habitat
IND	Industrial Service Supply	WILD	Wildlife Habitat
PROC	Industrial Process Supply	REC1	Water Contact Recreation
COMM	Commercial And Sport Fishing	REC2	Noncontact Water Recreation
COLD	Cold Freshwater Habitat	NAV	Navigation
EST	Estuarine Habitat		
E	Existing Beneficial Use		

3.2.3 Water Quality Objectives

The San Francisco Bay RWQCB Basin Plan identifies two types of water quality objectives: narrative and numerical. Narrative objectives present general description of water quality that must be attained through pollutant control measures and watershed management. They also serve as the basis for the development of detailed numerical objectives. Numerical objectives typically describe pollutant concentrations, physical/chemical conditions of the water itself and the toxicity of the water to aquatic organisms.

The general water quality objectives established for surface waters within the San Francisco Bay region are set for bacteria, bioaccumulation, biostimulatory substances, color, dissolved oxygen, floating material, oil and grease, population and community ecology, pH, radioactivity, salinity, sediment, settleable material, suspended material, sulfide, taste and odors, temperature, toxicity, turbidity and un-

ionized ammonia. Excerpts from Chapter 3 “Water Quality Objectives” of the Basin Plan is included in Appendix C of this report.

3.2.4 Possible Water Quality Pollutants

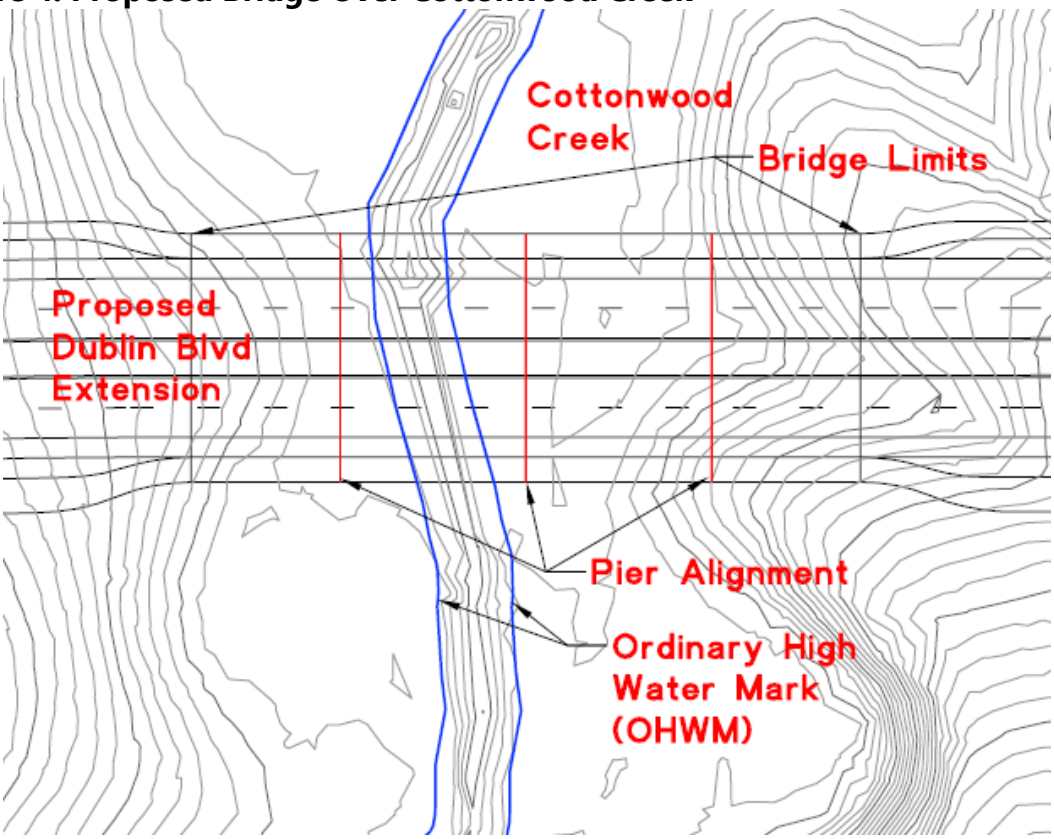
Arroyo Mocho appears on the California 2010 Integrated Report (Clean Water Act Section 303(d) list / 305 (b) Report). Listed pollutant are Diazinon and Temperature Water. Diazinon from urban storm runoff and Temperature from channelization, habitat modification and removal of Riparian Vegetation. It is listed as 303(d) Category 5 which means this is a water segment where standards are not met and a TMDL is required, but not yet completed, for at least one of the pollutants being listed for this segment. The project is not required to take any specific action to address these pollutants.

3.2.5 Floodplains

The FEMA Flood Insurance Rate Maps for the Project location identify Cottonwood Creek as a floodplain. Cottonwood Creek is identified as 0.2% Annual chance flood discharge contained in channel, which signifies the channel is sufficient to convey the 100-year and 500-year storm event.

The project will construct a new bridge across Cottonwood Creek as shown on Figure 4 below. At the proposed bridge crossing Cottonwood Creek is about 200-foot wide. Additionally there is a deep incision about the middle of the floodplain which contains the Ordinary High Water Mark (OHWM). Three lines of new piers will be built in the floodplain but clear of the OHWM. Hydraulic modeling contained in the Hydrology Report indicated the addition of piers in the floodplain will raise the water surface elevation by 0.18’ locally. However, at 50-feet upstream of the bridge the proposed water surface elevation is equivalent to the pre-project condition.

Figure 4. Proposed Bridge Over Cottonwood Creek



3.2.6 Municipal Supply

No known municipal drinking water and water recharge facilities are known to be within the project area.

3.2.7 Biological Communities

3.2.7.1 Aquatic Habitat

The potential for aquatic habitat in the project vicinity is documented in the Biological Resources Technical Memorandum by H.T. Harvey & Associates dated May 12, 2017.

3.2.7.2 Special Status Species

Special Status Species in the project vicinity are documented in the Biological Resources Technical Memorandum by H.T. Harvey & Associates dated May 12, 2017.

3.2.7.3 Stream/Riparian Habitats

Perennial Stream and Mixed Riparian Woodlands occurring within the vicinity of the project site are documented in the Biological Resources Technical Memorandum by H.T. Harvey & Associates dated May 12, 2017.

3.2.7.4 Wetlands

Seasonal Wetlands occurring within the vicinity of the project site are documented in the Biological Resources Technical Memorandum by H.T. Harvey & Associates dated May 12, 2017.

3.3 Groundwater Resources

The Project is within the San Francisco Bay Hydrologic Region. The San Francisco Bay RWQCB Basin Plan identifies the Project as being within the Livermore Valley groundwater basin (Basin ID 2-10).

According to the draft Geotechnical Feasibility Summary information from the California Geological Survey (CGS) seismic hazard zone report for the project area indicates historic high groundwater levels are on the order of 20 to 25 feet below grade along the project alignment. The same CGS source indicates historic high groundwater levels closer to 10 feet below grade in the area northwest of the existing I-580 / Fallon Road interchange. An approximately 80-foot-deep boring performed by Caltrans in 1965 for the I-580 / Cottonwood Creek crossing encountered groundwater at a depth of approximately 32 feet. A deep soil boring performed in January 1997 at the I-580 / Airport Boulevard interchange encountered groundwater at a depth of approximately 39 feet. Shallower groundwater levels may be present throughout the proposed Project alignment, particularly at the Cottonwood Creek crossing.

3.3.1 Groundwater Objectives

The San Francisco Bay RWQCB Basin Plan identifies two types of ground water quality objectives: narrative and numerical. The objectives consist primarily of narrative objectives combined with a limited number of numeric objectives. The Basin Plan states, “at a minimum, groundwater shall not contain concentrations of bacteria, chemical constituents, radioactivity, or substances producing taste and odor in excess of the objectives description.”

The Livermore Valley groundwater basin is identified as having the existing groundwater beneficial uses of municipal and domestic water supply, industrial process water supply, industrial service water supply, and agricultural water supply.

Groundwater basins with the beneficial use of municipal and domestic water supply, are subject to further narrative and numeric groundwater objectives for bacteria, organic and inorganic constituents, radioactivity, and taste and odor; these objectives are presented in Section 3.3 of the Basin Plan, which is included in Appendix C of this report.

4. STORMWATER TREATMENT

4.1 Introduction

The Project is required to implement stormwater treatment Best Management Practices (BMPs) because it surpasses the MRPs threshold of creating and/or replacing 10,000 sq-ft or more of impervious surface. As previously mentioned, the impervious area added by this project is about 827,640 sq-ft or 19 acres. Additionally if a project creates and/or replaces 1 acre or more it may be subject to Hydromodification Management (HM) requirements per the Phase I MRP which entail that peak runoff rates in the post-project condition match the pre-project condition for storm events between 10% of the 2-year storm up to the 10-year storm event. This ensures projects that drain to an erodible waterbody do not contribute to long term erosion and sedimentation of said waterbody. This Project is subject to HM requirements according to the Alameda County HMP susceptibility map shown in Appendix D.

4.2 Post Construction Treatment BMPs

The projects conceptual drainage systems will consist of superelevating or crowning Dublin Blvd pavement towards the median-island area separating eastbound and westbound traffic. The median-island will be used as a stormwater conveyance swale and also be the location for Low Impact Development (LID) stormwater treatment facilities. The exception to this strategy will be at street intersection locations with left turn pockets, where the median-island necks down to 4-feet. In those situations, the LID treatment area will be within the parkway strip areas which separate the roadway from the sidewalk and bike path/multi-use pathway (MUP areas. These other impervious areas (sidewalk and bike path/MUP) will be sloped towards the parkway strip and the LID treatment area.

The MRPs stormwater priorities are to provide LID based solutions. The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. Storing to later evaportranspirate/infiltrate is not a viable option for this project due to the limited areas available for storage of significant amounts of stormwater, particularly when considering the underlying soils are Hydraulic Soil Group C soils, having slow infiltration rates. Based on these conditions, the most feasible LID post-construction treatment BMPs for this Project are bioretention areas which will infiltrate

stormwater runoff through an 18-inch minimum biotreatment soil media layer, then enter a perforated subsurface-drain before entering an MS4 drainage system. Typical street cross sections with treatment in the median and parkway strip are shown in Figure 4 and 5 below.

Figure 5. Typical Street Section with bioretention treatment in the median

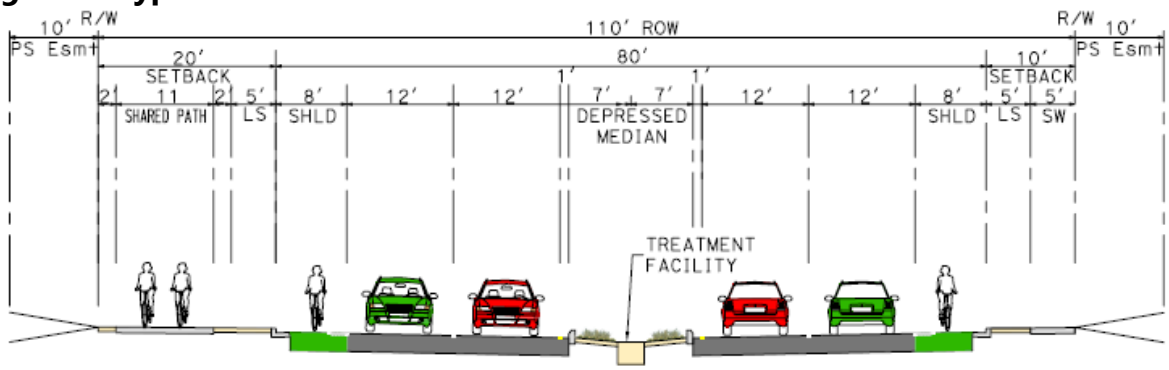
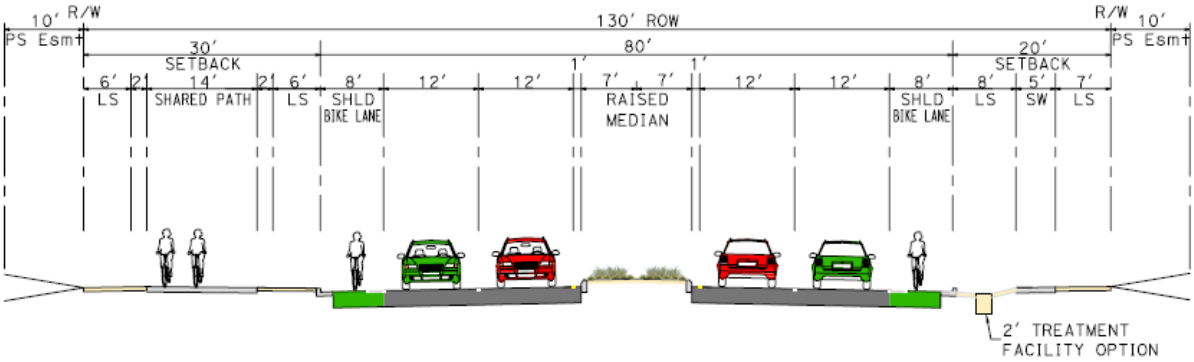


Figure 6. Typical Street Section with bioretention treatment in the parkway strip



The bioretention areas can be modified by adding orifices and deepening the ponding depth to function as a HM facility as well. Should the full HM requirement not be met by modifications to the bioretention areas along the median and shoulders, then supplemental storage can be explored on either side of the roadway, or through underground oversized storm drain lines or underground vaults; these options can be added to supplement bioretention areas as necessary until full HM compliance is achieved.

4.3 Potential Impacts to Water Quality

The Project would increase the total impervious surface area by about 19 acres and therefore, would increase the volume of stormwater runoff. As required by the Phase 1 MRP, this will be mitigated by implementing HM requirements as related to water

quality measures of peak flow rates and velocities. The runoff from the Project would also increase the amount of pollutants typically related to roadway projects however, as required in the Phase I MRP, the implementation of post-construction treatment BMPs will mitigate against the increase.

The proposed treatment BMP bioretention area removes among other containments pesticides which include Diazinon. The proposed project BMPs would help minimize this containment from entering the 303d listed waterbodies.

5. AVOIDANCE AND MINIMIZATION MEASURES

5.1 Construction General Permit

The Project will disturb well over the 1 acre of soil threshold require to be subject to California's Construction General Permit (CGP) (NPDES No. CAS000002, SWRCB Order No. 2009-0009-DWQ, adopted on November 16, 2010). As part of the CGP requirements, a Stormwater Pollution Prevention Plan (SWPPP) will be developed prior to the commencement of construction. The SWPPP will be developed by the Contractor and uploaded to the Stormwater Multiple Application and Report Tracking System (SMARTS) before earth disturbing activities are to commence. The SWPPP will document temporary construction BMPs implementation strategies and inspection procedures to be used to comply with the CGP. The CGP also requires that annual reports be prepared to document any issues encountered throughout the year.

5.2 Potential Construction BMPs

In general, as the site DSA increases, the potential for temporary water quality impacts will also increase. Construction activities contributing to this will include but not limited to the removal of existing vegetation, excavation for the removal existing slopes, and grading activities in the placement of new slopes. These potential temporary stormwater impacts can be mitigated by implementing standard BMPs recommended for a particular construction activity. For example construction scheduling should take into consideration anticipated rain events before planning land disturbance earthwork activities. Suggested temporary construction site BMPs that should be considered for the Project are listed in Table 2. Construction BMPs fall into one of six categories, 1. Erosion Control 2. Sediment Control 3. Tracking Control 4.Wind Erosion Control 5. Non-Stormwater Management Control. 6. Waste Management and Material Pollution Control. Non-Stormwater Management Control and Waste Management and Material Pollution Control BMP are not listed in Table 2 below.

Table 2 Potential Temporary Construction BMPs

Erosion Control BMPs	
EC-1 Scheduling	EC-2 Preservation of Existing Vegetation
EC-3 Hydraulic Mulch	EC-4 Hydroseeding
EC-7 Geotextiles and Mats	EC-8 Wood Mulching
EC-9 Earth Dikes and Drainage Swales	
Sediment Control BMPs	
SE-1 Silt Fence	SE-4 Check Dams
SE-5 Fiber Rolls	SE-7 Street Sweeping and Vacuuming
SE-10 Storm Drain Inlet Protection	
Wind Erosion Control Type BMPs	
WE-1 Wind Erosion Control	
Tracking Control	
TC-1 Stabilized Construction Entrance/Exit	

Additional temporary construction BMPs that should be considered for the Project are presented in the California Stormwater Quality Association (CASQA) *Construction BMP Handbook* (2015). The SWPPP prepared by the Contractor before the commencement of construction will detail actual implementation of the construction BMPs to match changes in field conditions and construction phasing of the Project.

6. REFERENCES

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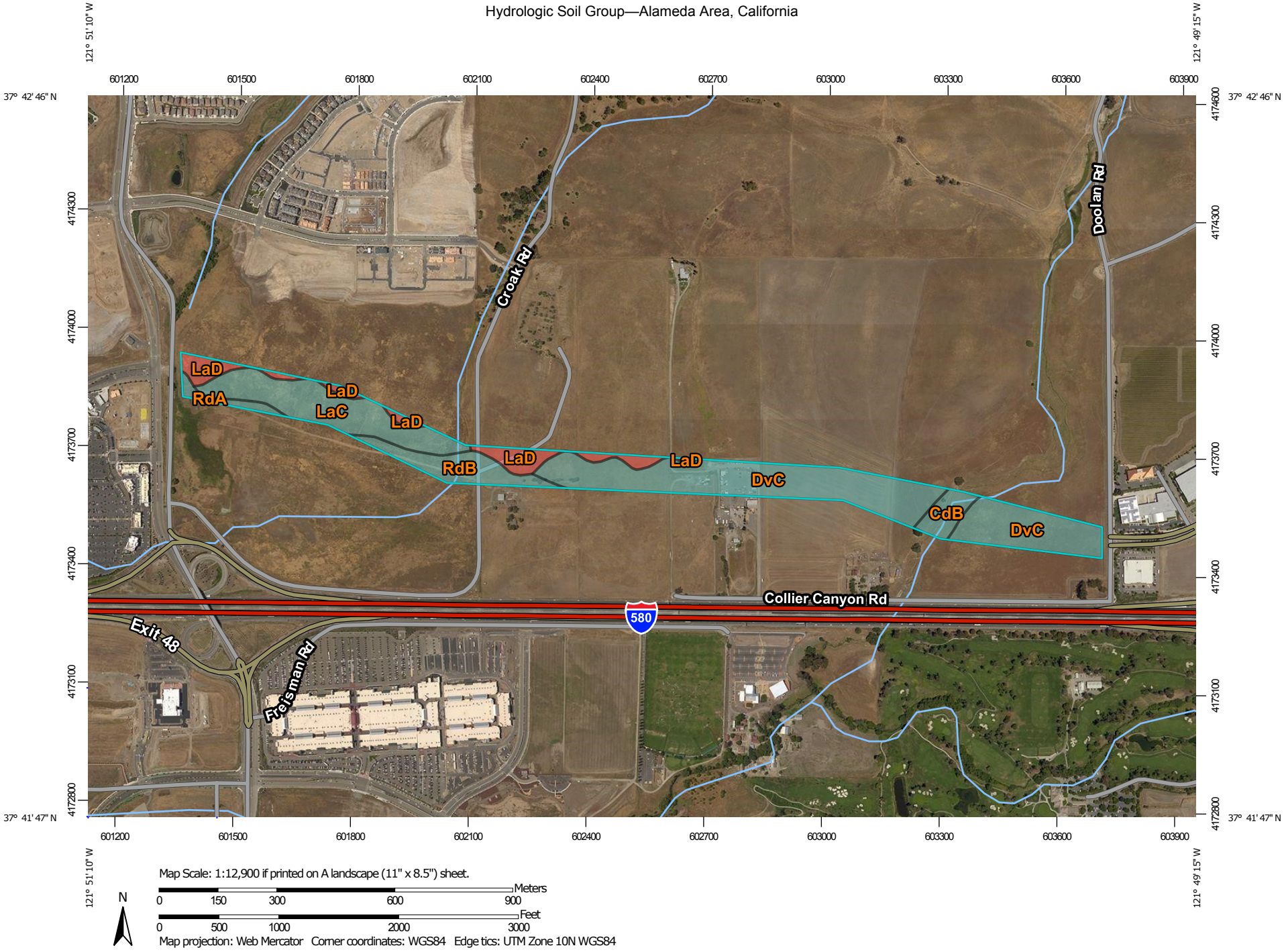
Appendix A

NCRS Web Soil Survey

- **Appendix A.1 Hydraulic Soil Group**
- **Appendix A.2 Soil Erodibility Factor (K)**

Hydrologic Soil Group—Alameda Area, California



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Alameda Area, California
Survey Area Data: Version 11, Sep 13, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 11, 2015—Jun 17, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CdB	Clear Lake clay, drained, 3 to 7 percent slopes	C	2.7	4.5%
DvC	Diablo clay, very deep, 3 to 15 percent slopes	C	30.1	51.1%
LaC	Linne clay loam, 3 to 15 percent slopes	C	12.6	21.5%
LaD	Linne clay loam, 15 to 30 percent slopes, MLRA 15	D	6.5	11.0%
RdA	Rincon clay loam, 0 to 3 percent slopes	C	1.4	2.3%
RdB	Rincon clay loam, 3 to 7 percent slopes	C	5.7	9.7%
Totals for Area of Interest			**58.9**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

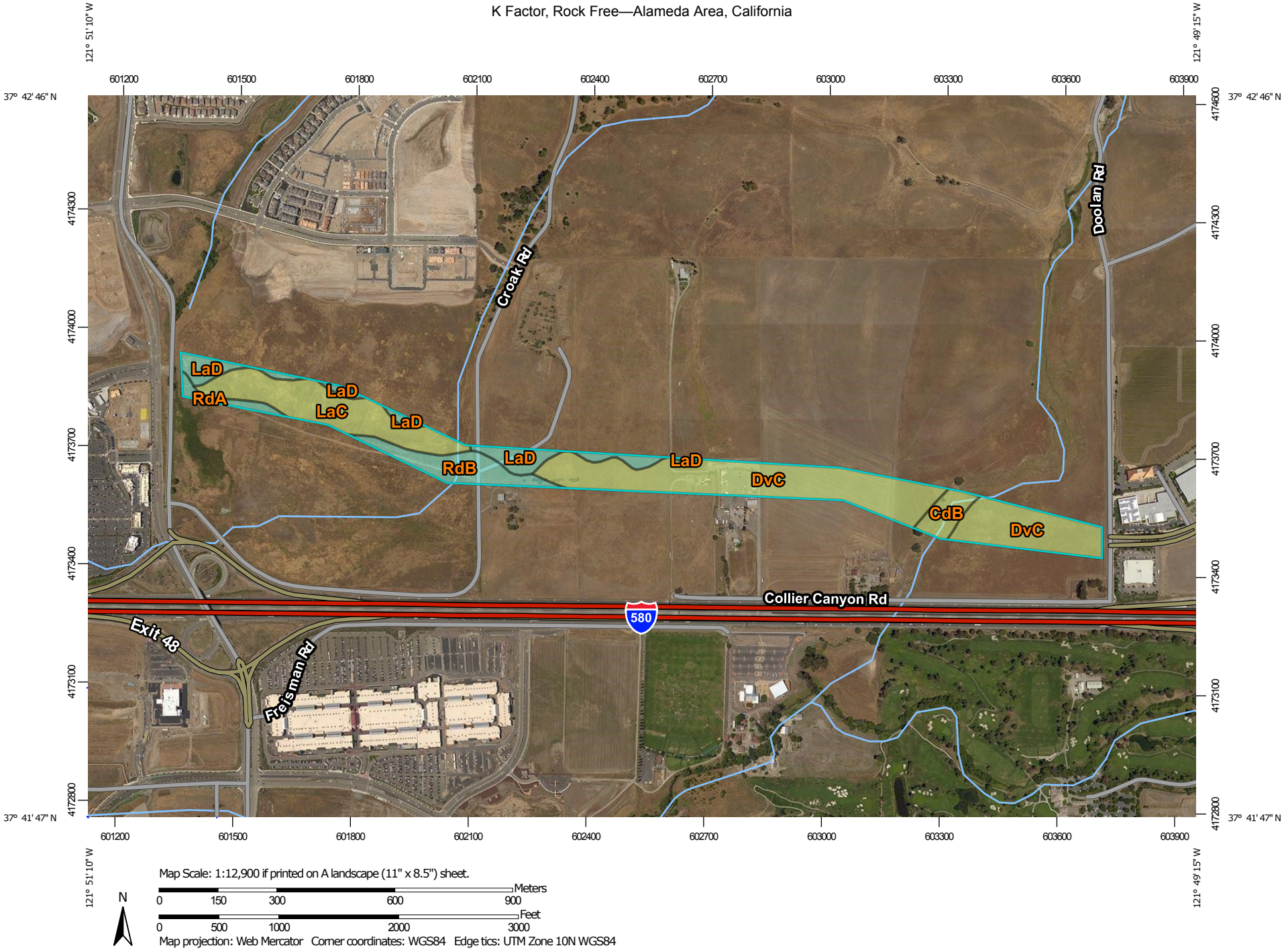
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

K Factor, Rock Free—Alameda Area, California



Map Scale: 1:12,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 150 300 600 900

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Lines

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Points

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Alameda Area, California
Survey Area Data: Version 11, Sep 13, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 11, 2015—Jun 17, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

K Factor, Rock Free

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CdB	Clear Lake clay, drained, 3 to 7 percent slopes	.24	2.7	4.5%
DvC	Diablo clay, very deep, 3 to 15 percent slopes	.24	30.1	51.1%
LaC	Linne clay loam, 3 to 15 percent slopes	.24	12.6	21.5%
LaD	Linne clay loam, 15 to 30 percent slopes, MLRA 15	.32	6.5	11.0%
RdA	Rincon clay loam, 0 to 3 percent slopes	.32	1.4	2.3%
RdB	Rincon clay loam, 3 to 7 percent slopes	.32	5.7	9.7%
Totals for Area of Interest			**58.9**	**100.0%**

Description

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kf (rock free)" indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

Appendix B

San Francisco Regional Water Board
Waterbodies Beneficial Uses Definition and Table

CHAPTER 2: BENEFICIAL USES

State policy for water quality control in California is directed toward achieving the highest water quality consistent with maximum benefit to the people of the state. Aquatic ecosystems and underground aquifers provide many different benefits to the people of the state. The beneficial uses described in detail in this chapter define the resources, services, and qualities of these aquatic systems that are the ultimate goals of protecting and achieving high water quality. The Water Board is charged with protecting all these uses from pollution and nuisance that may occur as a result of waste discharges in the region. Beneficial uses of waters of the State presented here serve as a basis for establishing water quality objectives and discharge prohibitions to attain these goals.

Beneficial use designations for any given water body do not rule out the possibility that other beneficial uses exist or have the potential to exist. Existing beneficial uses that have not been formally designated in this Basin Plan are protected whether or not they are identified. While the tables in this Chapter list a large, representative portion of the water bodies in our region, it is not practical to list each and every water body.

2.1 DEFINITIONS OF BENEFICIAL USES

The following definitions (in italic) for beneficial uses are applicable throughout the entire state. A brief description of the most important water quality requirements for each beneficial use follows each definition (in alphabetical order by abbreviation).

2.1.1 AGRICULTURAL SUPPLY (AGR)

Uses of water for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

The criteria discussed under municipal and domestic water supply (MUN) also effectively protect farmstead uses. To establish water quality criteria for livestock water supply, the Water Board must consider the relationship of water to the total diet, including water freely drunk, moisture content of feed, and interactions between irrigation water quality and feed quality. The University of California Cooperative Extension has developed threshold and limiting concentrations for livestock and irrigation water. Continued irrigation often leads to one or more of four types of hazards related to water quality and the nature of soils and crops. These hazards are (1) soluble salt accumulations, (2) chemical changes in the soil, (3) toxicity to crops, and (4) potential disease transmission to humans through reclaimed water use. Irrigation water classification systems, arable soil classification systems, and public health criteria related to reuse of wastewater have been developed with consideration given to these hazards.

2.1.2 AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS)

Areas designated by the State Water Board.

These include marine life refuges, ecological reserves, and designated areas where the preservation and enhancement of natural resources requires special protection. In these areas,

alteration of natural water quality is undesirable. The areas that have been designated as ASBS in this Region are Bird Rock, Point Reyes Headland Reserve and Extension, Double Point, Duxbury Reef Reserve and Extension, Farallon Islands, and James V. Fitzgerald Marine Reserve, depicted in Figure 2-1. The California Ocean Plan prohibits waste discharges into, and requires wastes to be discharged at a sufficient distance from, these areas to assure maintenance of natural water quality conditions. These areas have been designated as a subset of State Water Quality Protection Areas as per the Public Resources Code.

2.1.3 COLD FRESHWATER HABITAT (COLD)

Uses of water that support cold water ecosystems, including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Cold freshwater habitats generally support trout and may support anadromous salmon and steelhead fisheries as well. Cold water habitats are commonly well-oxygenated. Life within these waters is relatively intolerant to environmental stresses. Often, soft waters feed cold water habitats. These waters render fish more susceptible to toxic metals, such as copper, because of their lower buffering capacity.

2.1.4 COMMERCIAL AND SPORT FISHING (COMM)

Uses of water for commercial or recreational collection of fish, shellfish, or other organisms, including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

To maintain fishing, the aquatic life habitats where fish reproduce and seek their food must be protected. Habitat protection is under descriptions of other beneficial uses.

2.1.5 ESTUARINE HABITAT (EST)

Uses of water that support estuarine ecosystems, including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds), and the propagation, sustenance, and migration of estuarine organisms.

Estuarine habitat provides an essential and unique habitat that serves to acclimate anadromous fishes (e.g., salmon, striped bass) migrating into fresh or marine water conditions. The protection of estuarine habitat is contingent upon (1) the maintenance of adequate Delta outflow to provide mixing and salinity control; and (2) provisions to protect wildlife habitat associated with marshlands and the Bay periphery (i.e., prevention of fill activities). Estuarine habitat is generally associated with moderate seasonal fluctuations in dissolved oxygen, pH, and temperature and with a wide range in turbidity.

2.1.6 FRESHWATER REPLENISHMENT (FRESH)

Uses of water for natural or artificial maintenance of surface water quantity or quality.

Fresh water inputs are important for maintaining salinity balance, flow, and/or water quantity for such surface water bodies as marshes, wetlands, and lakes.

2.1.7 GROUNDWATER RECHARGE (GWR)

Uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting saltwater intrusion into freshwater aquifers.

The requirements for groundwater recharge operations generally reflect the future use to be made of the water stored underground. In some cases, recharge operations may be conducted to prevent seawater intrusion. In these cases, the quality of recharged waters may not directly affect quality at the wellfield being protected. Recharge operations are often limited by excessive suspended sediment or turbidity that can clog the surface of recharge pits, basins, or wells.

Under the state Antidegradation Policy, the quality of some of the waters of the state is higher than established by adopted policies. It is the intent of this policy to maintain that existing higher water quality to the maximum extent possible.

Requirements for groundwater recharge, therefore, shall impose the Best Available Technology (BAT) or Best Management Practices (BMPs) for control of the discharge as necessary to assure the highest quality consistent with maximum benefit to the people of the state. Additionally, it must be recognized that groundwater recharge occurs naturally in many areas from streams and reservoirs. This recharge may have little impact on the quality of groundwaters under normal circumstances, but it may act to transport pollutants from the recharging water body to the groundwater. Therefore, groundwater recharge must be considered when requirements are established.

2.1.8 INDUSTRIAL SERVICE SUPPLY (IND)

Uses of water for industrial activities that do not depend primarily on water quality, including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization.

Most industrial service supplies have essentially no water quality limitations except for gross constraints, such as freedom from unusual debris.

2.1.9 MARINE HABITAT (MAR)

Uses of water that support marine ecosystems, including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).

In many cases, the protection of marine habitat will be accomplished by measures that protect wildlife habitat generally, but more stringent criteria may be necessary for waterfowl marshes and other habitats, such as those for shellfish and marine fishes. Some marine habitats, such as important intertidal zones and kelp beds, may require special protection.

2.1.10 FISH MIGRATION (MIGR)

Uses of water that support habitats necessary for migration, acclimatization between fresh water and salt water, and protection of aquatic organisms that are temporary inhabitants of waters within the region.

The water quality provisions acceptable to cold water fish generally protect anadromous fish as well. However, particular attention must be paid to maintaining zones of passage. Any barrier to migration or free movement of migratory fish is harmful. Natural tidal movement in estuaries and unimpeded river flows are necessary to sustain migratory fish and their offspring. A water quality barrier, whether thermal, physical, or chemical, can destroy the integrity of the migration route and lead to the rapid decline of dependent fisheries.

Water quality may vary through a zone of passage as a result of natural or human- induced activities. Fresh water entering estuaries may float on the surface of the denser salt water or hug one shore as a result of density differences related to water temperature, salinity, or suspended matter.

2.1.11 MUNICIPAL AND DOMESTIC SUPPLY (MUN)

Uses of water for community, military, or individual water supply systems, including, but not limited to, drinking water supply.

The principal issues involving municipal water supply quality are (1) protection of public health; (2) aesthetic acceptability of the water; and (3) the economic impacts associated with treatment- or quality-related damages.

The health aspects broadly relate to: direct disease transmission, such as the possibility of contracting typhoid fever or cholera from contaminated water; toxic effects, such as links between nitrate and methemoglobinemia (blue babies); and increased susceptibility to disease, such as links between halogenated organic compounds and cancer.

Aesthetic acceptance varies widely depending on the nature of the supply source to which people have become accustomed. However, the parameters of general concern are excessive hardness, unpleasant odor or taste, turbidity, and color. In each case, treatment can improve acceptability although its cost may not be economically justified when alternative water supply sources of suitable quality are available.

Published water quality objectives give limits for known health-related constituents and most properties affecting public acceptance. These objectives for drinking water include the U.S. Environmental Protection Agency Drinking Water Standards and the California State Department of Health Services criteria.

2.1.12 NAVIGATION (NAV)

Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

Navigation is a designated use where water is used for shipping, travel, or other transportation by private, military, or commercial vessels.

2.1.13 INDUSTRIAL PROCESS SUPPLY (PROC)

Uses of water for industrial activities that depend primarily on water quality.

Water quality requirements differ widely for the many industrial processes in use today. So many specific industrial processes exist with differing water quality requirements that no meaningful criteria can be established generally for quality of raw water supplies. Fortunately, this is not a serious shortcoming, since current water treatment technology can create desired product waters tailored for specific uses.

2.1.14 PRESERVATION OF RARE AND ENDANGERED SPECIES (RARE)

Uses of waters that support habitats necessary for the survival and successful maintenance of plant or animal species established under state and/or federal law as rare, threatened, or endangered.

The water quality criteria to be achieved that would encourage development and protection of rare and endangered species should be the same as those for protection of fish and wildlife habitats generally. However, where rare or endangered species exist, special control requirements may be necessary to assure attainment and maintenance of particular quality criteria, which may vary slightly with the environmental needs of each particular species. Criteria for species using areas of special biological significance should likewise be derived from the general criteria for the habitat types involved, with special management diligence given where required.

2.1.15 WATER CONTACT RECREATION (REC1)

Uses of water for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing, and uses of natural hot springs.

Water contact implies a risk of waterborne disease transmission and involves human health; accordingly, criteria required to protect this use are more stringent than those for more casual water-oriented recreation.

Excessive algal growth has reduced the value of shoreline recreation areas in some cases, particularly for swimming. Where algal growths exist in nuisance proportions, particularly bluegreen algae, all recreational water uses, including fishing, tend to suffer.

One criterion to protect the aesthetic quality of waters used for recreation from excessive algal growth is based on chlorophyll a.

Public access to drinking water reservoirs is limited or prohibited by reservoir owner/operators for purposes of protecting drinking water quality and public health. In some cases, access to reservoir tributaries is also prohibited. For these water bodies, REC-1 is designated as E*, for the purpose of protecting water quality. No right to public access is intended by this designation.

2.1.16 NONCONTACT WATER RECREATION (REC2)

Uses of water for recreational activities involving proximity to water, but not normally involving contact with water where water ingestion is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Water quality considerations relevant to noncontact water recreation, such as hiking, camping, or boating, and those activities related to tide pool or other nature studies require protection of habitats and aesthetic features. In some cases, preservation of a natural wilderness condition is justified, particularly when nature study is a major dedicated use.

One criterion to protect the aesthetic quality of waters used for recreation from excessive algal growth is based on chlorophyll a.

2.1.17 SHELLFISH HARVESTING (SHELL)

Uses of water that support habitats suitable for the collection of crustaceans and filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sport purposes.

Shellfish harvesting areas require protection and management to preserve the resource and protect public health. The potential for disease transmission and direct poisoning of humans is of considerable concern in shellfish regulation. The bacteriological criteria for the open ocean, bays, and estuarine waters where shellfish cultivation and harvesting occur should conform with the standards described in the National Shellfish Sanitation Program, Manual of Operation.

Toxic metals can accumulate in shellfish. Mercury and cadmium are two metals known to have caused extremely disabling effects in humans who consumed shellfish that concentrated these elements from industrial waste discharges. Other elements, radioactive isotopes, and certain toxins produced by particular plankton species also concentrate in shellfish tissue. Documented cases of paralytic shellfish poisoning are not uncommon in California.

2.1.18 FISH SPAWNING (SPWN)

Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

Dissolved oxygen levels in spawning areas should ideally approach saturation levels. Free movement of water is essential to maintain well-oxygenated conditions around eggs deposited in sediments. Water temperature, size distribution and organic content of sediments, water depth, and current velocity are also important determinants of spawning area adequacy.

2.1.19 WARM FRESHWATER HABITAT (WARM)

Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

The warm freshwater habitats supporting bass, bluegill, perch, and other fish are generally lakes and reservoirs, although some minor streams will serve this purpose where stream flow is sufficient to sustain the fishery. The habitat is also important to a variety of nonfish species, such as frogs, crayfish, and insects, which provide food for fish and small mammals. This habitat is less sensitive to environmental changes, but more diverse than the cold freshwater habitat, and natural fluctuations in temperature, dissolved oxygen, pH, and turbidity are usually greater.

2.1.20 WILDLIFE HABITAT (WILD)

Uses of waters that support wildlife habitats, including, but not limited to, the preservation and enhancement of vegetation and prey species used by wildlife, such as waterfowl.

The two most important types of wildlife habitat are riparian and wetland habitats. These habitats can be threatened by development, erosion, and sedimentation, as well as by poor water quality.

The water quality requirements of wildlife pertain to the water directly ingested, the aquatic habitat itself, and the effect of water quality on the production of food materials. Waterfowl habitat is particularly sensitive to changes in water quality. Dissolved oxygen, pH, alkalinity, salinity, turbidity, settleable matter, oil, toxicants, and specific disease organisms are water quality characteristics particularly important to waterfowl habitat. Dissolved oxygen is needed in waterfowl habitats to suppress development of botulism organisms; botulism has killed millions of waterfowl. It is particularly important to maintain adequate circulation and aerobic conditions in shallow fringe areas of ponds or reservoirs where botulism has caused problems.

2.2 EXISTING AND POTENTIAL BENEFICIAL USES

2.2.1 SURFACE WATERS

Surface waters in the Region consist of non-tidal wetlands, rivers, streams, and lakes (collectively described as inland surface waters), estuarine wetlands known as baylands, estuarine waters, and coastal waters. In this Region, estuarine waters consist of the Bay system including intertidal, tidal, and subtidal habitats from the Golden Gate to the Region's boundary near Pittsburg and the lower portions of streams that are affected by tidal hydrology, such as the Napa and Petaluma rivers in the north and Coyote and San Francisquito creeks in the south.

Inland surface waters support or could support most of the beneficial uses described above. The specific beneficial uses for inland streams include municipal and domestic supply (MUN), agricultural supply (AGR), commercial and sport fishing (COMM), freshwater replenishment (FRESH), industrial process supply (PRO), groundwater recharge (GWR), preservation of rare and endangered species (RARE), water contact recreation (REC1), noncontact water recreation (REC2), wildlife habitat (WILD), cold freshwater habitat (COLD), warm freshwater habitat (WARM), fish migration (MIGR), and fish spawning (SPWN).

The San Francisco Bay Estuary supports estuarine habitat (EST), industrial service supply (IND), and navigation (NAV) in addition to COMM, RARE, REC1, REC2, WILD, MIGR, and SPWN.

Coastal waters' beneficial uses include water contact recreation (REC1); noncontact water recreation (REC2); industrial service supply (IND); navigation (NAV); marine habitat (MAR); shellfish harvesting (SHELL); commercial and sport fishing (COMM); wildlife habitat (WILD), fish migration (MIGR), fish spawning (SPWN), and preservation of rare and endangered species (RARE). In addition, the California coastline within the Region is endowed with exceptional scenic beauty.

The beneficial uses of any specifically identified water body generally apply to all its tributaries. In some cases a beneficial use may not be applicable to the entire body of water, such as navigation in Richardson Bay or shellfish harvesting in the Pacific Ocean. In these cases, the Water Board's judgment regarding water quality control measures necessary to protect beneficial uses will be applied.

Beneficial uses of streams that have intermittent flows, as is typical of many streams in the region, must be protected throughout the year and are designated as "existing."

Beneficial uses of each significant water body have been identified and are organized according to the seven major Hydrologic Planning Areas within the Region (Figure 2-2). The maps locating each water body (Figures 2-3 through 2-9b) were produced using a geographical information system (GIS) at the Water Board. The maps use the hydrologic basin information compiled by the California Interagency Watershed map, with supplemental information from the Oakland Museum of California Creek and Watershed Map series, the Contra Costa County Watershed Atlas, and the San Francisco Estuary Institute EcoAtlas. More detailed representations of each location can be created using this GIS version.

Table 2-1 contains the beneficial uses for many surface water bodies in the Region, organized geographically by the Region's seven Hydrologic Planning Areas. Within each Hydrologic Planning Area, water bodies are listed geographically, with tributaries indented below their receiving water body. In cases where a water body shares the same name with another water body (e.g., Redwood Creek), the location of the water body (county and/or other identifier) is given in parentheses. An alternative name for a water body, where known, is also shown in parentheses. In Table 2-1, beneficial uses are indicated as follows:

E – indicates the beneficial use exists in the water body.

E* – indicates public access to the water body is limited or prohibited for purposes of protecting drinking water quality and public health. REC-1 is designated as E* for the purpose of protecting water quality. No right to public access is intended by this designation.

P – indicates the water body could potentially support the beneficial use.

2.2.2 GROUNDWATER

Groundwater is defined as subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated. Where groundwater occurs in a saturated geologic unit that contains sufficient permeable thickness to yield significant quantities of water to wells and springs, it can be defined as an aquifer. A groundwater basin is defined as a hydrogeologic unit containing one large aquifer or several connected and interrelated aquifers.

Water-bearing geologic units occur within groundwater basins in the Region that do not meet the definition of an aquifer. For instance, there are shallow, low permeability zones throughout the Region that have extremely low water yields. Groundwater may also occur outside of currently identified basins. Therefore, for basin planning purposes, the term "groundwater" includes all

subsurface waters, whether or not these waters meet the classic definition of an aquifer or occur within identified groundwater basins.

The California Department of Water Resources (DWR) evaluated the characteristics of groundwater basins in the Region and throughout the state and summarized the results in California's Groundwater, Bulletin 118 (2003). Of special importance to the Region are the 28 groundwater basins and seven sub-basins classified by DWR that produce, or potentially could produce, significant amounts of groundwater (Figures 2-10 and 2-10A-D). The Water Board maintains a GIS for all water bodies in the Region and has the capacity to present information on each basin at a much higher level of resolution than is depicted in Figures 2-10A-D.

Existing and potential beneficial uses applicable to groundwater in the Region include municipal and domestic water supply (MUN), industrial water supply (IND), industrial process supply (PRO), agricultural water supply (AGR), groundwater recharge (GWR), and freshwater replenishment to surface waters (FRESH). Table 2-2 lists the 28 identified groundwater basins and seven sub-basins located in the Region and their existing and potential beneficial uses.

Unless otherwise designated by the Water Board, all groundwater is considered suitable, or potentially suitable, for municipal or domestic water supply (MUN). In making any exceptions, the Water Board will consider the criteria referenced in State Water Board Resolution No. 88-63 and Water Board Resolution No. 89-39, "Sources of Drinking Water," where:

- The total dissolved solids exceed 3,000 milligrams per liter (mg/L) (5,000 microSiemens per centimeter, μS/cm, electrical conductivity), and it is not reasonably expected by the Water Board that the groundwater could supply a public water system; or
- There is contamination, either by natural processes or by human activity (unrelated to a specific pollution incident), that cannot reasonably be treated for domestic use using either Best Management Practices (BMPs) or best economically achievable treatment practices; or
- The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day; or
- The aquifer is regulated as a geothermal energy-producing source or has been exempted administratively pursuant to 40 Code of Federal Regulations (CFR) Part 146.4 for the purpose of underground injection of fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR Part 261.3.

2.2.3 WETLANDS

Federal administrative law (e.g., 40 CFR Part 122.2, revised December 22, 1993) defines wetlands as waters of the United States. National waters include waters of the State of California, defined by the Porter-Cologne Act as "any water, surface or underground, including saline waters, within the boundaries of the State" (California Water Code §13050[e]). Wetland water quality control is therefore clearly within the jurisdiction of the State Water Board and Regional Water Boards.

Wetlands are further defined in 40 CFR 122.2 as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal

circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

The Water Board recognizes that wetlands frequently include areas commonly referred to as saltwater marshes, freshwater marshes, open or closed brackish water marshes, mudflats, sandflats, unvegetated seasonally ponded areas, vegetated shallows, sloughs, wet meadows, playa lakes, natural ponds, vernal pools, diked baylands, seasonal wetlands, floodplains, and riparian woodlands.

Mudflats make up one of the largest and most important habitat types in the Estuary. Snails, clams, worms, and other animals convert the rich organic matter in the mud bottom to food for fish, crabs, and birds.

Mudflats generally support a variety of edible shellfish, and many species of fish rely heavily on the mudflats during at least a part of their life cycle. Additionally, San Francisco Bay mudflats are one of the most important habitats on the coast of California for millions of migrating shorebirds.

Another important characteristic of the Estuary is the fresh, brackish, and salt water marshes around the Bay's margins. These highly complex communities are recognized as vital components of the Bay system's ecology. Most marshes around the Bay have been destroyed through filling and development. The protection, preservation, and restoration of the remaining marsh communities are essential for maintaining the ecological integrity of the Estuary.

Identifying wetlands may be complicated by such factors as the seasonality of rainfall in the Region. Therefore, in identifying wetlands considered waters of the United States, the Water Board will consider such indicators as hydrology, hydrophytic plants, and/or hydric soils for the purpose of mapping and inventorying wetlands. The Water Board will, in general, rely on the federal manual for wetland delineation in the Region when issuing Clean Water Act Section 401 water quality certifications (U.S. Army Corps of Engineers (Corps) Wetlands Delineation Manual, 1987). In the rare cases where the U.S. EPA and Corps guidelines disagree on the boundaries for federal jurisdictional wetlands, the Water Board will rely on the wetlands delineation made by the U.S. EPA or the California Department of Fish and Game (CDFG). For the purpose of mapping and inventorying wetlands, the Water Board will rely on the protocols and naming conventions of the National Wetlands Inventory (NWI) prepared by the U.S. Fish and Wildlife Service (USFWS).

Many individual wetlands provide multiple benefits depending on the wetland type and location. There are many potential beneficial uses of wetlands, including Wildlife Habitat (WILD); Preservation of Rare and Endangered Species (RARE); Shellfish Harvesting (SHELL); Water Contact Recreation (REC1); Noncontact Water Recreation (REC2); Commercial, and Sport Fishing (COMM); Marine Habitat (MAR); Fish Migration (MIGR); Fish Spawning (SPAWN); and Estuarine Habitat (EST). Some of these general beneficial uses can be further described in terms of their component wetland function. For example, many wetlands that provide groundwater recharge (GWR) also provide flood control, pollution control, erosion control, and stream baseflow.

Table 2-3 shows how beneficial uses are associated with different wetland types. Table 2-4 lists and specifies beneficial uses for 34 significant wetland areas within the Region; generalized locations of these wetlands are shown in Figure 2-11. It should be noted that most of the wetlands listed in Table 2-4 are saltwater marshes, and that the list is not comprehensive.

The Water Board has participated in completing the Baylands Ecosystem Habitat Goals Report (1999) and the Baylands Ecosystem Species and Community Profiles (2000), which were written by scientists and managers in the Region in order to recommend sound wetland restoration strategies. Other efforts around the Bay to locate wetland sites include San Francisco Estuary Institute's (SFEI) EcoAtlas Baylands Maps (Baylands Maps) and Bay Area Wetlands Project Tracker (Wetlands Tracker), and the Wetland Tracker managed by the San Francisco Bay Joint Venture. Because of the large number of small and non-contiguous wetlands, it is not practical to delineate and specify beneficial uses of every wetland area. Therefore, beneficial uses may be determined site specifically, as needed. Chapter 4 of this Plan contains additional information on the process used to determine beneficial uses for specific wetland sites.

FIGURES

Figure 2-1: Areas of Special Biological Significance

Figure 2-2: Hydrologic Planning Areas

Legend for Figures 2-3 through 2-9b

Figures 2-3 through 2-3b: Marin Coastal Basin

Figures 2-4 through 2-4b: San Mateo Coastal Basin

Figure 2-5: Central Basin

Figures 2-6 through 2-6b: South Bay Basin

Figures 2-7 through 2-7b: Santa Clara Basin

Figures 2-8 through 2-8b: San Pablo Basin

Figures 2-9 through 2-9b: Suisun Basin

Figure 2-10: Significant Groundwater Basins

Figure 2-10A: Groundwater Basins: Marin / Sonoma / Napa

Figure 2-10B: Groundwater Basins: Napa / Solano

Figure 2-10C: Groundwater Basins: San Francisco

Figure 2-10D: Groundwater Basins: East and South Bay

Figure 2-11: General Locations of Wetland Areas

TABLES

Table 2-1: Existing and Potential Beneficial Uses of Water Bodies in the San Francisco Bay Region

Table 2-2: Existing and Potential Beneficial Uses of Groundwater in Identified Basins

Table 2-3: Examples of Existing and Potential Beneficial Uses of Selected Wetlands

Table 2-4: Beneficial Uses of Wetland Areas

SOUTH BAY BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
ALAMEDA COUNTY, continued																			
Upper San Leandro Reservoir		E							E					E	E	E	E*	P	
Kaiser Creek			E						E					E	E	E	E	E	
Buckhorn Creek			E						E					E	E	E	E	E	
Redwood Creek (Alameda)			E						E					E	E	E	E	E	
Moraga Creek (in Contra Costa Co.)			E						E					E	E	E	E	E	
Estudillo Canal															E	E	E	E	
San Lorenzo Creek		E	E	E					E			E		E	E	E	E	E	
Don Castro Reservoir							E		E					E	E	E	E	E	
Castro Valley Creek									E				E		E	E	E	E	
Crow Creek									E			E	E	E	E	E	E	E	
Cull Creek									E				E	E	E	E	E	E	
Cull Canyon Reservoir							E		E					E	E	E	E	E	
Bolinas Creek									E						E	E	E	E	
Norris Creek									E						E	E	E	E	
Palomares Creek									E			E		E	E	E	E	E	
Eden Canyon Creek									E						E	E	E	E	
Hollis Creek									E				E		E	E	E	E	
Sulphur Creek (west Alameda)															E	E	E	E	
Mount Eden Creek										E						E	E	E	
Old Alameda Creek										E						E	E	E	
Ward Creek															E	E	E	E	
Zeile Creek															E	E	E	E	
Alameda Creek Quarry Ponds				E			E		E						E	E	E	E	
Coyote Hills Slough										E		E	E	E		E	E	E	
Alameda Creek	E			E			E		E			E	E	E	E	E	E	E	
Crandall Creek															E	E	E	E	
Dry Creek (Alameda, low in watershed)													E		E	E	E	E	
Stonybrook Creek									E			E	E	E	E	E	E	E	
Sinbad Creek									E			E	E	E	E	E	E	E	
San Antonio Creek (Alameda)			E						E				E	E	E	E	E*	E	
San Antonio Reservoir		E							E				E	E	E	E	E*	E	

E: Existing beneficial use E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health P: Potential beneficial use

SOUTH BAY BASIN

COUNTY Waterbody	AGR	MUN	FRSH	GWR	IND	PROC	COMM	SHELL	COLD	EST	MAR	MIGR	RARE	SPWN	WARM	WILD	REC-1	REC-2	NAV
ALAMEDA COUNTY, continued																			
Indian Creek (central Alameda)			E						E				E	E	E	E	E*	E	
La Costa Creek			E						E				E	E	E	E	E	E	
Arroyo de la Laguna				E					E			E		E	E	E	E	E	
Vallecitos Creek															E	E	E	E	
Happy Valley Creek															E	E	E	E	
Sycamore Creek															E	E	E	E	
Arroyo del Valle		E		E					E			P	E	E	E	E	E	E	
Shadow Cliffs Reservoir				E			E		E					E	E	E	E	E	
Del Valle Reservoir		E					E		E					E	E	E	E	E	
Arroyo Mocho				E					E			E		E	E	E	E	E	
Tassajara Creek				E					P			E	E	E	E	E	E	E	
Arroyo las Positas				E					E			E	E	E	E	E	E	E	
Cottonwood Creek													E		E	E	E	E	
Collier Canyon Creek													E		E	E	E	E	
Cayetano Creek													E		E	E	E	E	
Arroyo Seco (Alameda)				E					E			E	E	E	E	E	E	E	
Altamont Creek				E					E				E		E	E	E	E	
Alamo Canal				E					P			E		E	E	E	E	E	
Alamo Creek				E					P			E	E	E	E	E	E	E	
Dublin Creek															E	E	E	E	
Martin Canyon Creek															E	E	E	E	
South San Ramon Creek															E	E	E	E	
SANTA CLARA COUNTY																			
Tributary to Alameda Creek:																			
Calaveras Creek			E						E				E	E	E	E	E	E	
Calaveras Reservoir		E							E				E	E	E	E	E*	E	
Arroyo Hondo		E	E						E				E	E	E	E	E	E	
Isabel Creek		E	E						E					E	E	E	E	E	
Smith Creek		E	E						E					E	E	E	E	E	
Sulphur Creek (Santa Clara)		E	E						E					E	E	E	E	E	
Colorado Creek *Trib. to Arroyo del Val*			E						E						E	E	E	E	

E: Existing beneficial use E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health P: Potential beneficial use

Appendix C

San Francisco Regional Water Board
Water Quality Objectives
Surface Waters & Groundwater

CHAPTER 3: WATER QUALITY OBJECTIVES

The overall goals of water quality regulation are to protect and maintain thriving aquatic ecosystems and the resources those systems provide to society and to accomplish these in an economically and socially sound manner. California's regulatory framework uses water quality objectives both to define appropriate levels of environmental quality and to control activities that can adversely affect aquatic systems.

3.1 WATER QUALITY OBJECTIVES

There are two types of objectives: narrative and numerical. Narrative objectives present general descriptions of water quality that must be attained through pollutant control measures and watershed management. They also serve as the basis for the development of detailed numerical objectives.

Historically, numerical objectives were developed primarily to limit the adverse effect of pollutants in the water column. Two decades of regulatory experience and extensive research in environmental science have demonstrated that beneficial uses are not fully protected unless pollutant levels in all parts of the aquatic system are also monitored and controlled. The Regional Board is actively working towards an integrated set of objectives, including numerical sediment objectives, that will ensure the protection of all current and potential beneficial uses.

Numerical objectives typically describe pollutant concentrations, physical/chemical conditions of the water itself, and the toxicity of the water to aquatic organisms. These objectives are designed to represent the maximum amount of pollutants that can remain in the water column without causing any adverse effect on organisms using the aquatic system as habitat, on people consuming those organisms or water, and on other current or potential beneficial uses (as described in Chapter 2).

The technical bases of the region's water quality objectives include extensive biological, chemical, and physical partitioning information reported in the scientific literature, national water quality criteria, studies conducted by other agencies, and information gained from local environmental and discharge monitoring (as described in Chapter 6). The Regional Board recognizes that limited information exists in some cases, making it difficult to establish definitive numerical objectives, but the Regional Board believes its conservative approach to setting objectives has been proper. In addition to the technical review, the overall feasibility of reaching objectives in terms of technological, institutional, economic, and administrative factors is considered at many different stages of objective derivation and implementation of the water quality control plan.

Together, the narrative and numerical objectives define the level of water quality that shall be maintained within the region. In instances where water quality is better than that prescribed by the objectives, the state Antidegradation Policy applies (State Board Resolution 68-16: Statement of Policy With Respect to Maintaining High Quality of Waters in California). This policy is aimed at protecting relatively uncontaminated aquatic systems where they exist and preventing further degradation. The state's Antidegradation Policy is consistent with the federal Antidegradation Policy, as interpreted by the State Water Resources Control Board in State Board Order No. 86-17.

When uncontrollable water quality factors result in the degradation of water quality beyond the levels or limits established herein as water quality objectives, the Regional Board will conduct a case-by-case analysis of the benefits and costs of preventing further degradation. In cases where this analysis indicates that beneficial uses will be adversely impacted by allowing further degradation, then the Regional Board will not allow controllable water quality factors to cause any further degradation of water quality. Controllable water quality factors are those actions, conditions, or circumstances resulting from human activities that may influence the quality of the waters of the state and that may be reasonably controlled.

The Regional Board establishes and enforces waste discharge requirements for point and nonpoint source of pollutants at levels necessary to meet numerical and narrative water quality objectives. In setting waste discharge requirements, the Regional Board will consider, among other things, the potential impact on beneficial uses within the area of influence of the discharge, the existing quality of receiving waters, and the appropriate water quality objectives.

In general, the objectives are intended to govern the concentration of pollutant constituents in the main water mass. The same objectives cannot be applied at or immediately adjacent to submerged effluent discharge structures. Zones of initial dilution within which higher concentrations can be tolerated will be allowed for such discharges.

For a submerged buoyant discharge, characteristic of most municipal and industrial wastes that are released from submerged outfalls, the momentum of the discharge and its initial buoyancy act together to produce turbulent mixing. Initial dilution in this case is completed when the diluting wastewater ceases to rise in the water column and first begins to spread horizontally.

For shallow water submerged discharges, surface discharges, and nonbuoyant discharges, characteristic of cooling water wastes and some individual discharges, turbulent mixing results primarily from the momentum of discharge. Initial dilution, in these cases, is considered to be completed when the momentum-induced velocity of the discharge ceases to produce significant mixing of the waste, or the diluting plume reaches a fixed distance from the discharge to be specified by the Regional Board, whichever results in the lower estimate for initial dilution.

Compliance with water quality objectives may be prohibitively expensive or technically impossible in some cases. The Regional Board will consider modification of specific water quality objectives as long as the discharger can demonstrate that the alternate objective will protect existing beneficial uses, is scientifically defensible, and is consistent with the state Antidegradation Policy. This exception clause properly indicates that the Regional Board will conservatively compare benefits and costs in these cases because of the difficulty in quantifying beneficial uses.

These water quality objectives are considered necessary to protect the present and potential beneficial uses described in Chapter 2 of this Plan and to protect existing high quality waters of the state. These objectives will be achieved primarily through establishing and enforcing waste discharge requirements and by implementing this water quality control plan.

3.2 OBJECTIVES FOR OCEAN WATERS

The provisions of the State Board's "Water Quality Control Plan for Ocean Waters of California" (Ocean Plan) and "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" (Thermal Plan) and any revision to them will apply to ocean waters. These plans describe objectives and effluent limitations for ocean waters.

3.3 OBJECTIVES FOR SURFACE WATERS

The following objectives apply to all surface waters within the region, except the Pacific Ocean.

3.3.1 BACTERIA

Table 3-1 provides a summary of the bacterial water quality objectives and identifies the sources of those objectives. Table 3-2 summarizes U.S. EPA's water quality criteria for water contact recreation based on the frequency of use a particular area receives. These criteria will be used to differentiate between pollution sources or to supplement objectives for water contact recreation.

3.3.3.1 Implementation Provisions for Water Contact Recreation Bacteria Objectives

Water quality objectives for bacteria in Table 3-1 shall be strictly applied except when otherwise provided for in a TMDL. In the context of a TMDL, the Water Board may implement the objectives in fresh and marine waters by using a “reference system and antidegradation approach” as discussed below. Implementation of water quality objectives for bacteria using a “reference system and antidegradation approach” requires control of bacteria from all anthropogenic sources so that bacteriological water quality is consistent with that of a reference system. A reference system is defined as an area (e.g., a subwatershed or catchment) and associated monitoring point(s) that is minimally impacted by human activities that potentially affect bacteria densities in the reference receiving water body.

This approach recognizes that there are natural sources of bacteria (defined as non-anthropogenic sources) that may cause or contribute to exceedances of the objectives for indicator bacteria. It also avoids requiring treatment or diversion of water bodies or treatment of natural sources of bacteria from undeveloped areas. Such requirements, if imposed by the Water Board, could have the potential to adversely affect valuable aquatic life and wildlife beneficial uses supported by water bodies in the region.

Under the reference system approach, a certain frequency of exceedance of the single-sample objectives shall be permitted. The permitted number of exceedances shall be based on the observed exceedance frequency in a selected reference system(s) or the targeted water body, whichever is less. The “reference system and antidegradation approach” ensures that bacteriological water quality is at least as good as that of a reference system and that no degradation of existing bacteriological water quality is permitted where existing bacteriological water quality is better than that of the selected reference system(s).

The appropriateness of this approach, the specific exceedance frequencies to be permitted under it, and the permittees to whom it would apply will be evaluated within the context of TMDL development for a specific water body, and decided by the Water Board when considering

adoption of a TMDL. These implementation provisions may only be used within the context of a TMDL addressing municipal stormwater (including discharges regulated under statewide municipal NPDES waste discharge requirements), discharges from confined animal facilities, and discharges from nonpoint sources.

3.3.2 BIOACCUMULATION

Many pollutants can accumulate on particles, in sediment, or bioaccumulate in fish and other aquatic organisms. Controllable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered.

3.3.3 BIOSTIMULATORY SUBSTANCES

Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses. Changes in chlorophyll a and associated phytoplankton communities follow complex dynamics that are sometimes associated with a discharge of biostimulatory substances. Irregular and extreme levels of chlorophyll a or phytoplankton blooms may indicate exceedance of this objective and require investigation.

3.3.4 COLOR

Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.

3.3.5 DISSOLVED OXYGEN

For all tidal waters, the following objectives shall apply:

In the Bay:

Downstream of Carquinez Bridge	5.0 mg/l minimum
Upstream of Carquinez Bridge	7.0 mg/l minimum

For nontidal waters, the following objectives shall apply:

Waters designated as:

Cold water habitat	7.0 mg/l minimum
Warm water habitat	5.0 mg/l minimum

The median dissolved oxygen concentration for any three consecutive months shall not be less than 80 percent of the dissolved oxygen content at saturation.

Dissolved oxygen is a general index of the state of the health of receiving waters. Although minimum concentrations of 5 mg/l and 7 mg/l are frequently used as objectives to protect fish life,

higher concentrations are generally desirable to protect sensitive aquatic forms. In areas unaffected by waste discharges, a level of about 85 percent of oxygen saturation exists. A three-month median objective of 80 percent of oxygen saturation allows for some degradation from this level, but still requires a consistently high oxygen content in the receiving water.

3.3.6 FLOATING MATERIAL

Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.

3.3.7 OIL AND GREASE

Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.

3.3.8 POPULATION AND COMMUNITY ECOLOGY

All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce significant alterations in population or community ecology or receiving water biota. In addition, the health and life history characteristics of aquatic organisms in waters affected by controllable water quality factors shall not differ significantly from those for the same waters in areas unaffected by controllable water quality factors.

3.3.9 pH

The pH shall not be depressed below 6.5 nor raised above 8.5. This encompasses the pH range usually found in waters within the basin. Controllable water quality factors shall not cause changes greater than 0.5 units in normal ambient pH levels.

3.3.10 RADIOACTIVITY

Radionuclides shall not be present in concentrations that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life. Waters designated for use as domestic or municipal supply shall not contain concentrations of radionuclides in excess of the limits specified in Table 4 of Section 64443 (Radioactivity) of Title 22 of the California Code of Regulations (CCR), which is incorporated by reference into this Plan. This incorporation is prospective, including future changes to the incorporated provisions as the changes take effect (see Table 3-5).

3.3.11 SALINITY

Controllable water quality factors shall not increase the total dissolved solids or salinity of waters of the state so as to adversely affect beneficial uses, particularly fish migration and estuarine habitat.

3.3.12 SEDIMENT

The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

Controllable water quality factors shall not cause a detrimental increase in the concentrations of toxic pollutants in sediments or aquatic life.

3.3.13 SETTLEABLE MATERIAL

Waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses.

3.3.14 SUSPENDED MATERIAL

Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.

3.3.15 SULFIDE

All water shall be free from dissolved sulfide concentrations above natural background levels. Sulfide occurs in Bay muds as a result of bacterial action on organic matter in an anaerobic environment.

Concentrations of only a few hundredths of a milligram per liter can cause a noticeable odor or be toxic to aquatic life. Violation of the sulfide objective will reflect violation of dissolved oxygen objectives as sulfides cannot exist to a significant degree in an oxygenated environment.

3.3.16 TASTES AND ODORS

Waters shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, that cause nuisance, or that adversely affect beneficial uses.

3.3.17 TEMPERATURE

Temperature objectives for enclosed bays and estuaries are as specified in the "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays of California," including any revisions to the plan.

In addition, the following temperature objectives apply to surface waters:

- The natural receiving water temperature of inland surface waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses.
- The temperature of any cold or warm freshwater habitat shall not be increased by more than 5°F (2.8°C) above natural receiving water temperature

3.3.18 TOXICITY

All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms. Detrimental responses include, but are not limited to, decreased growth rate and decreased reproductive success of resident or indicator species. There shall be no acute toxicity in ambient waters. Acute toxicity is defined as a median of less than 90 percent survival, or less than 70 percent survival, 10 percent of the time, of test organisms in a 96-hour static or continuous flow test.

There shall be no chronic toxicity in ambient waters. Chronic toxicity is a detrimental biological effect on growth rate, reproduction, fertilization success, larval development, population abundance, community composition, or any other relevant measure of the health of an organism, population, or community.

Attainment of this objective will be determined by analyses of indicator organisms, species diversity, population density, growth anomalies, or toxicity tests (including those described in Chapter 4), or other methods selected by the Water Board. The Water Board will also consider other relevant information and numeric criteria and guidelines for toxic substances developed by other agencies as appropriate.

The health and life history characteristics of aquatic organisms in waters affected by controllable water quality factors shall not differ significantly from those for the same waters in areas unaffected by controllable water quality factors.

3.3.19 TURBIDITY

Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases from normal background light penetration or turbidity relatable to waste discharge shall not be greater than 10 percent in areas where natural turbidity is greater than 50 NTU.

3.3.20 UN-IONIZED AMMONIA

The discharge of wastes shall not cause receiving waters to contain concentrations of un-ionized ammonia in excess of the following limits (in mg/l as N):

Annual Median	0.025
Maximum, Central Bay (as depicted in Figure 2-5) and upstream	0.16
Maximum, Lower Bay (as depicted in Figures 2-6 and 2-7):	0.4

The intent of this objective is to protect against the chronic toxic effects of ammonia in the receiving waters. An ammonia objective is needed for the following reasons:

- Ammonia (specifically un-ionized ammonia) is a demonstrated toxicant. Ammonia is generally accepted as one of the principle toxicants in municipal waste discharges. Some industries also discharge significant quantities of ammonia.

- Exceptions to the effluent toxicity limitations in Chapter 4 of the Plan allow for the discharge of ammonia in toxic amounts. In most instances, ammonia will be diluted or degraded to a nontoxic state fairly rapidly. However, this does not occur in all cases, the South Bay being a notable example. The ammonia limit is recommended in order to preclude any build up of ammonia in the receiving water.
- A more stringent maximum objective is desirable for the northern reach of the Bay for the protection of the migratory corridor running through Central Bay, San Pablo Bay, and upstream reaches.

3.3.21 OBJECTIVES FOR SPECIFIC CHEMICAL CONSTITUENTS

Surface waters shall not contain concentrations of chemical constituents in amounts that adversely affect any designated beneficial use. Water quality objectives for selected toxic pollutants for surface waters are given in Tables 3-3, 3-3A, 3-3B, 3-3C, 3-4 and 3-4A.

The Water Board intends to work towards the derivation of site-specific objectives for the Bay-Delta estuarine system. Site-specific objectives to be considered by the Water Board shall be developed in accordance with the provisions of the federal Clean Water Act, the State Water Code, State Board water quality control plans, and this Plan. These site-specific objectives will take into consideration factors such as all available scientific information and monitoring data and the latest U.S. EPA guidance, and local environmental conditions and impacts caused by bioaccumulation. The objectives in Tables 3-3 and 3-4 apply throughout the region except as otherwise indicated in the tables or when site-specific objectives for the pollutant parameter have been adopted. Site-specific objectives have been adopted for copper in segments of San Francisco Bay (see Figure 7.2-1-01), for nickel in South San Francisco Bay (Table 3-3A), and for cyanide in all San Francisco Bay segments (Table 3-3C). Objectives for mercury that apply to San Francisco Bay are listed in Table 3-3B. Objectives for mercury that apply to Walker Creek, Soulajule Reservoir, and their tributaries, and to waters of the Guadalupe River watershed are listed in Table 3-4A.

South San Francisco Bay south of the Dumbarton Bridge is a unique, water-quality-limited, hydrodynamic and biological environment that merits continued special attention by the Water Board. Controlling urban and upland runoff sources is critical to the success of maintaining water quality in this portion of the Bay. Site-specific water quality objectives have been adopted for dissolved copper and nickel in this Bay segment. Site-specific objectives may be appropriate for other pollutants of concern, but this determination will be made on a case-by-case basis, and after it has been demonstrated that all other reasonable treatment, source control and pollution prevention measures have been exhausted. The Water Board will determine whether revised water quality objectives and/or effluent limitations are appropriate based on sound technical information and scientific studies, stakeholder input, and the need for flexibility to address priority problems in the watershed.

3.3.22 CONSTITUENTS OF CONCERN FOR MUNICIPAL AND AGRICULTURAL WATER SUPPLIES

At a minimum, surface waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of constituents in excess of the maximum (MCLs) or secondary maximum contaminant levels (SMCLs) specified in the following provisions of Title 22, which are incorporated by reference into this plan: Table 64431-A (Inorganic Chemicals) of Section 64431,

and Table 64433.2-A (Fluoride) of Section 64433.2, Table 64444-A (Organic Chemicals) of Section 64444, and Table 64449-A (SMCLs-Consumer Acceptance Limits) and 64449-B (SMCLs-Ranges) of Section 64449. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. Table 3-5 contains water quality objectives for municipal supply, including the MCLs contained in various sections of Title 22 as of the adoption of this plan.

At a minimum, surface waters designated for use as agricultural supply (AGR) shall not contain concentrations of constituents in excess of the levels specified in Table 3-6.

3.4 OBJECTIVES FOR GROUNDWATER

Groundwater objectives consist primarily of narrative objectives combined with a limited number of numerical objectives. Additionally, the Water Board will establish basin- and/or site-specific numerical groundwater objectives as necessary. For example, the Water Board has groundwater basin-specific objectives for the Alameda Creek watershed above Niles to include the Livermore-Amador Valley as shown in Table 3-7.

The maintenance of existing high quality of groundwater (i.e., "background") is the primary groundwater objective.

In addition, at a minimum, groundwater shall not contain concentrations of bacteria, chemical constituents, radioactivity, or substances producing taste and odor in excess of the objectives described below unless naturally occurring background concentrations are greater. Under existing law, the Water Board regulates waste discharges to land that could affect water quality, including both groundwater and surface water quality. Waste discharges that reach groundwater are regulated to protect both groundwater and any surface water in continuity with groundwater. Waste discharges that affect groundwater that is in continuity with surface water cannot cause violations of any applicable surface water standards.

3.4.1 BACTERIA

In groundwater with a beneficial use of municipal and domestic supply, the median of the most probable number of coliform organisms over any seven-day period shall be less than 1.1 most probable number per 100 milliliters (MPN/100 mL) (based on multiple tube fermentation technique; equivalent test results based on other analytical techniques as specified in the National Primary Drinking Water Regulation, 40 CFR, Part 141.21 (f), revised June 10, 1992, are acceptable).

3.4.2 ORGANIC AND INORGANIC CHEMICAL CONSTITUENTS

All groundwater shall be maintained free of organic and inorganic chemical constituents in concentrations that adversely affect beneficial uses. To evaluate compliance with water quality objectives, the Water Board will consider all relevant and scientifically valid evidence, including relevant and scientifically valid numerical criteria and guidelines developed and/or published by other agencies and organizations (e.g., U.S. Environmental Protection Agency (U.S. EPA), the State Water Board, California Department of Health Services (DHS), U.S. Food and Drug

Administration, National Academy of Sciences, California Environmental Protection Agency's (Cal/EPA) Office of Environmental Health Hazard Assessment (OEHHA), U.S. Agency for Toxic Substances and Disease Registry, Cal/EPA Department of Toxic Substances Control (DTSC), and other appropriate organizations.)

At a minimum, groundwater designated for use as domestic or municipal supply (MUN) shall not contain concentrations of constituents in excess of the maximum (MCLs) or secondary maximum contaminant levels (SMCLs) specified in the following provisions of Title 22, which are incorporated by reference into this plan: Tables 64431-A (Inorganic Chemicals) of Section 64431, Table 64433.2-A (Fluoride) of Section 64433.2, and Table 64444-A (Organic Chemicals) of Section 64444. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. (See Table 3-5.)

Groundwater with a beneficial use of agricultural supply shall not contain concentrations of chemical constituents in amounts that adversely affect such beneficial use. In determining compliance with this objective, the Water Board will consider as evidence relevant and scientifically valid water quality goals from sources such as the Food and Agricultural Organizations of the United Nations; University of California Cooperative Extension, Committee of Experts; and McKee and Wolf's "Water Quality Criteria," as well as other relevant and scientifically valid evidence. At a minimum, groundwater designated for use as agricultural supply (AGR) shall not contain concentrations of constituents in excess of the levels specified in Table 3-6.

Groundwater with a beneficial use of freshwater replenishment shall not contain concentrations of chemicals in amounts that will adversely affect the beneficial use of the receiving surface water.

Groundwater with a beneficial use of industrial service supply or industrial process supply shall not contain pollutant levels that impair current or potential industrial uses.

3.4.3 RADIOACTIVITY

At a minimum, groundwater designated for use as domestic or municipal supply (MUN) shall not contain concentrations of radionuclides in excess of the MCLs specified in Table 4 (Radioactivity) of Section 64443 of Title 22, which is incorporated by reference into this plan. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. (See Table 3-5.)

3.4.4 TASTE AND ODOR

Groundwater designated for use as domestic or municipal supply (MUN) shall not contain taste- or odor-producing substances in concentrations that cause a nuisance or adversely affect beneficial uses. At a minimum, groundwater designated for use as domestic or municipal supply shall not contain concentrations in excess of the SMCLs specified in Tables 64449-A (Secondary MCLs-Consumer Acceptance Limits) and 64449-B (Secondary MCLs-Ranges) of Section 64449 of Title 22, which is incorporated by reference into this plan. This incorporation-by-reference is

prospective, including future changes to the incorporated provisions as the changes take effect. (See Table 3-5.)

3.5 OBJECTIVES FOR THE DELTA

The objectives contained in the State Water Board's 1995 "Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary" and any revisions thereto shall apply to the waters of the Sacramento-San Joaquin Delta and adjacent waters as specified in that plan.

3.6 OBJECTIVES FOR ALAMEDA CREEK WATERSHED

The water quality objectives contained in Table 3-7 apply to the surface and groundwaters of the Alameda Creek watershed above Niles.

Wastewater discharges that cause the surface water limits in Table 3-7 to be exceeded may be allowed if they are part of an overall wastewater resource operational program developed by those agencies affected and approved by the Water Board.

TABLES

Table 3-1: Water Quality Objectives for Bacteria

Table 3-2: U.S. EPA Bacteriological Criteria for Water Contact Recreation

Table 3-3: Marine Water Quality Objectives for Toxic Pollutants for Surface Waters

Table 3-3A: Water Quality Objectives for Copper and Nickel in San Francisco Bay Segments

Table 3-3B: Marine Water Quality Objectives for Mercury in San Francisco Bay

Table 3-3C: Marine Water Quality Objectives for Cyanide in San Francisco Bay

Table 3-4: Freshwater Water Quality Objectives for Toxic Pollutants for Surface Waters

Table 3-4A: Freshwater Water Quality Objectives for Mercury in Walker Creek, Soulajule Reservoir, and All Tributary Waters

Table 3-5: Water Quality Objectives for Municipal Supply

Table 3-6: Water Quality Objectives for Agricultural Supply

Table 3-7: Water Quality Objectives for the Alameda Creek Watershed above Niles

Table 3-1: Water Quality Objectives for Bacteria[a]

Beneficial Use	Fecal Coliform (MPN/100ml)	Total Coliform (MPN/100ml)	Enterococcus (MPN/100ml)[g]
Water Contact Recreation	geometric mean < 200 90th percentile < 400	median < 240 no sample > 10,000	geometric mean < 35 no sample > 104
Shellfish Harvesting[b]	median < 14 90th percentile < 43	median < 70 90th percentile < 230[c]	
Non-contact Water Recreation[d]	mean < 2000 90th percentile < 4000		
Municipal Supply: - Surface Water[e] - Groundwater	geometric mean < 20	geometric mean < 100 < 1.1[f]	

Notes:

a. Based on a minimum of five consecutive samples equally spaced over a 30-day period.

b. Source: National Shellfish Sanitation Program.

c. Based on a five-tube decimal dilution test or 300 MPN/100 ml when a three-tube decimal dilution test is used.

d. Source: Report of the Committee on Water Quality Criteria, National Technical Advisory Committee, 1968.

e. Source: California Department of Public Health recommendation.

f. Based on multiple tube fermentation technique; equivalent test results based on other analytical techniques, as specified in the National Primary Drinking Water Regulation, 40 CFR, Part 141.21(f), revised June 10, 1992, are acceptable.

g. Applicable to marine and estuarine waters only. Numeric values are based on Section 7958 of Title 17 of the California Code of Regulations, 69FR 67217 et seq., and 40 CFR Part 131.41 (effective date December 16, 2004).

Table 3-2: U.S. EPA Bacteriological Criteria for Water Contact Recreation[1,2]
(in colonies per 100 ML)

	Fresh Water		Salt Water
	Enterococci	**E. Coli**	**Enterococci**
Steady State (all areas)	33	126	35
Maximum at:			
- designated beach	61	235	104
- moderately used area	89	298	124
- lightly used area	108	406	276
- infrequently used area	151	576	500

NOTES:

1. The criteria were published in the Federal Register, Vol. 51, No. 45 / Friday, March 7, 1986 / 8012-8016. The Criteria are based on:
(a) Cabelli, V.J. 1983. Health Effects Criteria for Marine Recreational Waters. U.S. EPA, EPA 600/1-80-031, Cincinnati, Ohio, and
(b) Dufour, A.P. 1984. Health Effects Criteria for Fresh Recreational Waters. U.S. EPA, EPA 600/1-84-004, Cincinnati Ohio.

2. The U.S. EPA criteria apply to water contact recreation only. The criteria provide for a level of production based on the frequency of usage of a given water contact recreation area. The criteria may be employed in special studies within this region to differentiate between pollution sources or to supplement the current coliform objectives for water contact recreation.

Table 3-3: Marine[a] Water Quality Objectives for Toxic Pollutants for Surface Waters (all values in ug/l)

Compound	4-day Average	1-hr Average	24-hr Average
Arsenic[b, c, d]	36	69	
Cadmium[b, c, d]	9.3	42	
Chromium VI[b, c, d, e]	50	1100	
Copper[c, d, f]			
Cyanide[g]			
Lead[b, c, d]	8.1	210	
Mercury[h]	0.025	2.1	
Nickel[b, c, d]	8.2	74	
Selenium[i]			
Silver[b, c, d]		1.9	
Tributyltin[j]			
Zinc[b, c, d]	81	90	
PAHs[k]			15

NOTES:

a. Marine waters are those in which the salinity is equal to or greater than 10 parts per thousand 95% of the time, as set forth in Chapter 4 of the Basin Plan. Unless a site-specific objective has been adopted, these objectives shall apply to all marine waters except for the South Bay south of Dumbarton Bridge (where the California Toxics Rule (CTR) applies) or as specified in note h (below). For waters in which the salinity is between 1 and 10 parts per thousand, the applicable objectives are the more stringent of the freshwater (Table 3-4) or marine objectives.

b. Source: 40 CFR Part 131.38 (California Toxics Rule or CTR), May 18, 2000.

c. These objectives for metals are expressed in terms of the dissolved fraction of the metal in the water column.

d. According to the CTR, these objectives are expressed as a function of the water-effect ratio (WER), which is a measure of the toxicity of a pollutant in site water divided by the same measure of the toxicity of the same pollutant in laboratory dilution water. The 1-hr. and 4-day objectives = table value X WER. The table values assume a WER equal to one.

e. This objective may be met as total chromium.

f. Water quality objectives for copper were promulgated by the CTR and may be updated by U.S. EPA without amending the Basin Plan. Note: at the time of writing, the values are 3.1 ug/l (4-day average) and 4.8 ug/l (1-hr. average). The most recent version of the CTR should be consulted before applying these values.

g. Cyanide criteria were promulgated in the National Toxics Rule (NTR) (Note: at the time of writing, the values are 1.0 µg/l (4-day average) and 1.0 µg/l (1-hr. average)) and apply, except that site-specific

marine water quality objectives for cyanide have been adopted for San Francisco Bay as set forth in Table 3-3C.

h. Source: U.S. EPA Ambient Water Quality Criteria for Mercury (1984). The 4-day average value for mercury does not apply to San Francisco Bay; instead, the water quality objectives specified in Table 3-3B apply. The 1-hour average value continues to apply to San Francisco Bay.

i. Selenium criteria were promulgated for all San Francisco Bay/Delta waters in the National Toxics Rule (NTR). The NTR criteria specifically apply to San Francisco Bay upstream to and including Suisun Bay and Sacramento-San Joaquin Delta. Note: at the time of writing, the values are 5.0 ug/l (4-day average) and 20 ug/l (1-hr. average).

j. Tributyltin is a compound used as an antifouling ingredient in marine paints and toxic to aquatic life in low concentrations. U.S. EPA has published draft criteria for protection of aquatic life (Federal Register: December 27, 2002, Vol. 67, No. 249, Page 79090-79091). These criteria are cited for advisory purposes. The draft criteria may be revised.

k. The 24-hour average aquatic life protection objective for total PAHs is retained from the 1995 Basin Plan. Source: U.S. EPA 1980.

Table 3-3A: Water Quality Objectives for Copper and Nickel in San Francisco Bay Segments (ug/L)

Compound	4-day Average (CCC)[1]	1-hr Average (CMC)[2]	Extent of Applicability
Copper	6.9	10.8	The portion of Lower San Francisco Bay south of the line representing the Hayward Shoals shown on Figure 7.1. and South San Francisco Bay
Copper	6.0	9.4	The portion of the delta located in the San Francisco Bay Region, Suisun Bay, Carquinez Strait, San Pablo Bay, Central San Francisco Bay, and the portion of Lower San Francisco Bay north of the line representing the Hayward Shoals on Figure 7.1.
Nickel	11.9	62.4*	South San Francisco Bay

[1]Criteria Continuous Concentration

[2]Criteria Maximum Concentration

*Handbook of Water Quality Standards, 2nd ed. 1994 in Section 3.7.6 states that the CMC = Final AcuteValue/2; 62.4 is the Final Acute Value (resident species database)/2; so the site-specific CMC is lower than the California Toxics Rule value because we are using the resident species database instead of the National Species Database.

Table 3-3B: Marine[a] Water Quality Objectives for Mercury in San Francisco Bay[b]		
Protection of Human Health	0.2 mg mercury per kg fish tissue	Average wet weight concentration measured in the edible portion of trophic level 3 and trophic level 4 fish[c]
Protection of Aquatic Organisms and Wildlife	0.03 mg mercury per kg fish	Average wet weight concentration measured in whole fish 3–5 cm in length

Notes:

a. Marine waters are those in which the salinity is equal to or greater than 10 parts per thousand 95% of the time, as set forth in Chapter 4 of the Basin Plan. For waters in which the salinity is between 1 and 10 parts per thousand, the applicable objectives are the more stringent of the freshwater or marine objectives.

b. Objectives apply to all segments of San Francisco Bay, including Sacramento/San Joaquin River Delta (within San Francisco Bay region), Suisun Bay, Carquinez Strait, San Pablo Bay, Richardson Bay, Central San Francisco Bay, Lower San Francisco Bay, and South San Francisco Bay (including the Lower South Bay)~~.~~

c. Compliance shall be determined by analysis of fish tissue as described in Chapter 6, Surveillance and Monitoring.

Table 3-3C: Marine [a] Water Quality Objectives for Cyanide in San Francisco Bay [b] (values in ug/l)		
Cyanide	Chronic Objective (4-day Average)	2.9
Cyanide	Acute Objective (1-hour Average)	9.4

Notes:

a. Marine waters are those in which the salinity is equal to or greater than 10 parts per thousand 95% of the time, as set forth in Chapter 4 of the Basin Plan. For waters in which the salinity is between 1 and 10 parts per thousand, the applicable objectives are the more stringent of the freshwater or marine objectives.

b. Objectives apply to all segments of San Francisco Bay, including Sacramento/San Joaquin River Delta (within San Francisco Bay region), Suisun Bay, Carquinez Strait, San Pablo Bay, Central San Francisco Bay, Lower San Francisco Bay, and South San Francisco Bay.

Table 3–4: Freshwater[a] Water Quality Objectives for Toxic Pollutants for Surface Waters (all values in ug/l)

Compound	4-day Average	1-hr Average
Arsenic[b, c, d]	150	340
Cadmium[b, d]	e	e
Chromium III[f]		
Chromium VI[b, c, d, g]	11	16
Copper[b, c, d]	9.0[h]	13[h]
Cyanide[i]		
Lead[b, c, d]	2.5[j]	65[j]
Mercury[k]	0.025	2.4
Nickel[b, c, d]	52[l]	470[l]
Selenium[m]		
Silver[b, c, d]		3.4[n]
Tributyltin[o]		
Zinc[b, c, d]	120[p]	120[p]

Notes:

a. Freshwaters are those in which the salinity is equal to or less than 1 part per thousand 95% of the time, as set forth in Chapter 4 of the Basin Plan. Unless a site-specific objective has been adopted, these objectives shall apply to all freshwaters except for the South Bay south of Dumbarton Bridge, where the California Toxics Rule (CTR) applies. For waters in which the salinity is between 1 and 10 parts per thousand, the applicable objectives are the more stringent of the marine (Table 3-3) and freshwater objectives.

b. Source: 40 CFR Part 131.38 (California Toxics Rule or CTR), May 18, 2000.

c. These objectives for metals are expressed in terms of the dissolved fraction of the metal in the water column.

d. These objectives are expressed as a function of the water-effect ratio (WER), which is a measure of the toxicity of a pollutant in site water divided by the same measure of the toxicity of the same pollutant in laboratory dilution water. The 1-hr. and 4-day objectives = table value X WER. The table values assume a WER equal to one.

e. The objectives for cadmium and other noted metals are expressed by formulas where H = ln (hardness) as $CaCO_3$ in mg/l: The four-day average objective for cadmium is $e^{(0.7852\ H\ -\ 3.490)}$. This is 1.1 µg/l at a hardness of 100 mg/l as $CaCO_3$. The one-hour average objective for cadmium is $e^{(1.128\ H\ -\ 3.828)}$. This is 3.9 µg/l at a hardness of 100 mg/l as $CaCO_3$.

f. Chromium III criteria were promulgated in the National Toxics Rule (NTR). The NTR criteria specifically apply to San Francisco Bay upstream to and including Suisun Bay and Sacramento-San Joaquin Delta. Note: at the time of writing, the values are 180 ug/l (4-day average) and 550 ug/l (1-hr. average). The objectives for chromium III are based on hardness. The values in this footnote assume a hardness of 100 mg/l $CaCO_3$. At other hardnesses, the objectives must be calculated using the following formulas where H = ln (hardness): The 4-day average objective for chromium III is $e^{(0.8190H+1.561)}$. The 1-hour average for chromium III is $e^{(0.8190\ H+3.688)}$.

g. This objective may be met as total chromium.

h. The objectives for copper are based on hardness. The table values assume a hardness of 100 mg/l $CaCO_3$. At other hardnesses, the objectives must be calculated using the following formulas where H = ln (hardness): The 4-day average objective for copper is $e^{(0.8545H-1.702)}$. The 1-hour average for copper is $e^{(0.9422H-1.700)}$.

i. Cyanide criteria were promulgated in the National Toxics Rule (NTR). The NTR criteria specifically apply to San Francisco Bay upstream to and including Suisun Bay and Sacramento-San Joaquin Delta. Note: at the time of writing, the values are 5.2 ug/l (4-day average) and 22 ug/l (1-hr. average).

j. The objectives for lead are based on hardness. The table values assume a hardness of 100 mg/l $CaCO_3$. At other hardnesses, the objectives must be calculated using the following formulas where H = ln (hardness): The 4-day average objective is $e^{(1.273H - 4.705)}$. The 1-hour average for lead is $e^{(1.273H-1.460)}$.

k. Source: U.S. EPA Quality Criteria for Water 1986 (EPA 440/5-86-001), which established a mercury criterion of 0.012 ug/l. The Basin Plan set the objective at 0.025 based on considerations of the level of detection attainable at that time. The 4-day average value for mercury does not apply to Walker Creek and Soulajule Reservoir and their tributaries nor to waters of the Guadalupe River watershed; instead, the water quality objectives specified in Table 3-4A apply. The 1-hour average value continues to apply to waters specified in Table 3-4A.

l. The objectives for nickel are based on hardness. The table values assume a hardness of 100 mg/l $CaCO_3$. At other hardnesses, the objectives must be calculated using the following formulas where H = ln (hardness): The 4-day average objective is $e^{(0.8460H + 0.0584)}$. The 1-hour average objective is $e^{(0.8460H + 2.255)}$.

m. Selenium criteria were promulgated for all San Francisco Bay/Delta waters in the National Toxics Rule (NTR). The NTR criteria specifically apply to San Francisco Bay upstream to and including Suisun Bay and Sacramento-San Joaquin Delta. Note: at the time of writing, the values are 5.0 ug/l (4-day average) and 20 ug/l (1-hr. average).

n. The objective for silver is based on hardness. The table value assumes a hardness of 100 mg/l $CaCO_3$. At other hardnesses, the objective must be calculated using the following formula where H = ln (hardness): The 1-hour average objective for silver is $e^{(1.72H - 6.52)}$. U.S. EPA has not developed a 4-day criterion.

o. Tributyltin is a compound used as an antifouling ingredient in marine paints and toxic to aquatic life in low concentrations. U.S. EPA has published draft criteria for protection of aquatic life (Federal Register: December 27, 2002, Vol. 67, No. 249, Page 79090-79091). These criteria are cited for advisory purposes. The draft criteria may be revised.

p. The objectives for zinc are based on hardness. The table values assume a hardness of 100 mg/l $CaCO_3$. At other hardnesses, the objectives must be calculated using the following formulas where H = ln (hardness): The 4-day average objective for zinc is $e^{(0.8473 H+0.884)}$. The 1-hour average for zinc is $e^{(0.8473 H+ 0.884)}$.

Table 3-4A: Freshwater Water Quality Objectives for Mercury in Walker Creek, Soulajule Reservoir, and Their Tributaries; and in Waters of the Guadalupe River Watershed, Except Los Gatos Creek and its Tributaries Upstream of Vasona Dam, Lake Elsman, Lexington Reservoir, and Vasona Lake

Protection of Aquatic Organisms and Wildlife[a]	0.05 mg methylmercury per kg fish	Average wet weight concentration measured in whole trophic level 3 fish 5–15 cm in length
	0.1 mg methylmercury per kg fish	Average wet weight concentration measured in whole trophic level 3 fish 15 – 35 cm in length

a. The freshwater water quality objectives for the protection of aquatic organisms and wildlife also protect humans who consume fish from the Walker Creek and Guadalupe River watersheds.

Table 3-5: Water Quality Objectives for Municipal Supply

Parameter	Objective (in MG/L)
Physical:	
Color (units)[a]	15.0
Odor (number)[a]	3.0
Turbidity (NTU)[a]	5.0
pH[b]	6.0 - 8.5
TDS[c]	500.0
EC (mmhos/cm)[c]	900
Corrosivity	non-corrosive
Inorganic Parameters:	
Aluminum[d]	1.0[d] / 0.2[a]
Antimony[d]	0.006
Arsenic[d]	0.05
Asbestos[d]	7 MFL[e]
Barium[d]	1.0
Beryllium[d]	0.004
Chloride[c]	250.0
Cadmium[d]	0.005
Chromium[d]	0.05
Copper[a]	1.0
Cyanide[d]	0.15
Fluoride[f]	0.6 - 1.7[g]
Iron[a]	0.3
Lead[b]	0.05
Manganese[a]	0.05
Mercury[d]	0.002
Nickel[d]	0.1
Nitrate (as NO_3)[d]	45.0
Nitrate + Nitrite (as N)[d]	10.0
Nitrite (as N)[d]	1.0
Selenium[d]	0.05
Silver[b]	0.1
Sulfate[c]	250.0
Thallium[d]	0.002
Zinc[a]	5.0
Organic Parameters:	
MBAS (Foaming agents)[a]	0.5
Oil and grease[b]	none
Phenols[b]	0.001
Trihalomethanes[b]	0.1
Chlorinated Hydrocarbons:	
Endrin[h]	0.002
Lindane[h]	0.0002
Methoxychlor[h]	0.03
Toxaphene[h]	0.003
2,3,7,8-TCDD (Dioxin)[h]	3×10^{-8}
2,4-D[h]	0.07
2,4,4-TP Silvex[h]	0.05
Synthetic Organic Chemicals:	
Alachor[h]	0.002
Atrazine[h]	0.001
Bentazon[h]	0.018
Benzo(a)pyrene[h]	0.0002
Dalapon[h]	0.2
Dinoseb[h]	0.007
Diquat[h]	0.02
Endothall[h]	0.1
Ethylene dibromide[h]	0.00005
Glyphosate[h]	0.7
Heptachlor[h]	0.00001
Heptachlor epoxide[h]	0.00001
Hexachlorecyclopentadiene[h]	0.001
Molinate[h]	0.02
Oxarnyl[h]	0.05
Pentachlorophenol[h]	0.001
Picloram[h]	0.5
Polychlorinated Biphenyls[h]	0.0005
Simazine[h]	0.004
Thiobencarb[h]	0.07 / 0.001
Volatile Organic Chemicals:	
Benzene[h]	0.001
Carbon Tetrachloride[h]	0.005
1,2-Dibromo-3-chloropropane[h]	0.0002
1,2-Dichlorobenzene[h]	0.6
1,4-Dichlorobenzene[h]	0.005
1,1-Dichloroethane[h]	0.005
1,2-Dichloroethane[h]	0.0005
cis-1,2-Dichloroethlyene[h]	0.006
trans-1,2-Dichloroethylene[h]	0.01
1,1-Dichloroethylene[h]	0.006
Dichloromethane[h]	0.005
1,2-Dichloropropane[h]	0.005
1,3-Dichloropropene[h]	0.0005
Ethylbenzene[h]	0.7
Methyl-tert-butyl ether[h]	0.013 / 0.005
Monochlorobenzene[h]	0.07
Styrene[h]	0.1
1,1,2,2-Tetrachloroethane[h]	0.001
Tetrachloroethylene[h]	0.005
1,2,4-Trichlorobenzene[h]	0.005
1,1,1-Trichloroethane	0.200
1,1,2-Trichloroethane[h]	0.005
Trichloroethylene[h]	0.005
Trichlorofluoromethane	0.15
Volatile Organic Chemicals (cont'd):	
1,1,2-Trichloro-1,2,2 trifluoromethane[h]	1.2
Toluene[h]	0.15
Vinyl Chloride[h]	0.0005
Xylenes (single or sum of isomers)[h]	1.750
Radioactivity:	
Combined Radium-226 and Radium-228[i]	5
Gross Alpha Particle Activity[i]	15
Tritium[i]	20,000
Strontium-90[i]	8
Gross Beta Particle Activity[i]	50
Uranium[i]	20

NOTES:

a. Secondary Maximum Contaminant Levels as specified in Table 64449- A of Section 64449, Title 22 of the California Code of Regulations, as June 3, 2005.

b. Table III-2, 1986 Basin Plan

c. Secondary Maximum Contaminant Levels as specified in Table 64449-B of Section 64449, Title 22 of the California Code of Regulations, as of June 3, 2005. (Levels indicated are "recommended" levels. Table 64449-B contains a complete list of upper and short-term ranges.)

d. Maximum Contaminant Levels as specified in Table 64431-A (Inorganic Chemicals) of Section 64431, Title 22 of the California Code of Regulations, as of June 3, 2005.

e. MFL = million fibers per liter; MCL for fibers exceeding 10 um in length.

f. Flouride objectives depend on temperature.

g. A complete list of optimum and limiting concentrations is specified in Table 64433.2-A of Section 64433.2, Title 22 of the California Code of Regulations, as of June 3, 2005.

h. Maximum Contaminant Levels as specified in Table 64444-A (Organic Chemicals) of Section 64444, Title 22 of the California Code of Regulations, as of June 3, 2005.

i. Maximum Contaminant Levels as specified in Table 4 (Radioactivity) of Section 64443, Title 22 of the California Code of Regulations, as of June 3, 2005.

j. Included Radium-226 but excludes Radon and Uranium.

MG/L Milligrams per liter
pCi/L pico Curries per liter

Table 3-6: Water Quality Objectives for Agricultural Supply[a] (in mg/l)

Parameter	Threshold	Limit	Limit for Livestock Watering
Physical:			
pH	5.5-8.3	4.5-9.0	
TDS			10,000.0
EC (mmhos / cm)		0.2-3.0	
Inorganic Parameters:			
Aluminum	5.0	20.0	5.0
Arsenic	0.1	2.0	0.2
Beryllium	0.1	0.5	
Boron	0.5	2.0	5.0
Chloride	142.0	355.0	
Cadmium	0.01	0.5	0.05
Chromium	0.1	1.0	1.0
Cobalt	0.05	5.0	1.0
Copper	0.2	5.0	0.5
Flouride	1.0	15.0	2.0
Iron	5.0	20.0	
Lead	5.0	10.0	0.1
Lithium		2.5[b]	
Manganese	0.2	10.0	
Molybdenum	0.01	0.05	0.5
Nickel	0.2	2.0	
$NO_3 + NO_2$ (as N)	5.0	30[c]	100.0
Selenium		0.02	0.05
Sodium adsorption ratio (adjusted)[d]	3.0	9.0	
Vanadium	0.1	1.0	0.1
Zinc	2.0	10.0	25

NOTES:

a. For an extensive discussion of water quality for agricultural purposes, see "A Compilation of Water Quality Goals," Central Valley Regional Water Quality Control Board, May 1993.

b. For citrus irrigation, maximum 0.075 mg/l.

c. For sensitive crops. Values are actually for NO_3-N + NH_4-N.

d. Adjusted SAR = $\{ Na /[(Ca + Mg)+2]^{0.5} \}\{1 + [8.4 – pHc]\}$, where pHc is a calculated value based on total cations, Ca + Mg, and CO_3 + HCO_3, in me/l. Exact calculations of pHc can be found in "Guidelines for Interpretation of Water Quality for Agriculture" prepared by the Univ. of California Cooperative Extension.

Table 3-7: Water Quality Objectives for the Alameda Creek Watershed Above Niles

SURFACE WATER QUALITY OBJECTIVES (ALAMEDA CREEK AND TRIBUTARIES)

TDS:	250 mg/l (90 day-arithmetic mean)
	360 mg/l (90 day-90th percentile)
	500 mg/l (daily maximum)
Chlorides:	60 mg/l (90 day-arithmetic mean)
	100 mg/l (90 day-90th percentile)
	250 mg/l (daily maximum)

GROUNDWATER QUALITY OBJECTIVES

(Concentration not to be exceeded more than 10 percent of the time during one year.)

Central Basin

TDS:	Ambient or 500 mg/l, whichever is lower
Nitrate (NO_3):	45 mg/l

Fringe Subbasins

TDS:	Ambient or 1000 mg/l, whichever is lower
Nitrate (NO_3):	45 mg/l

Upland and Highland Areas

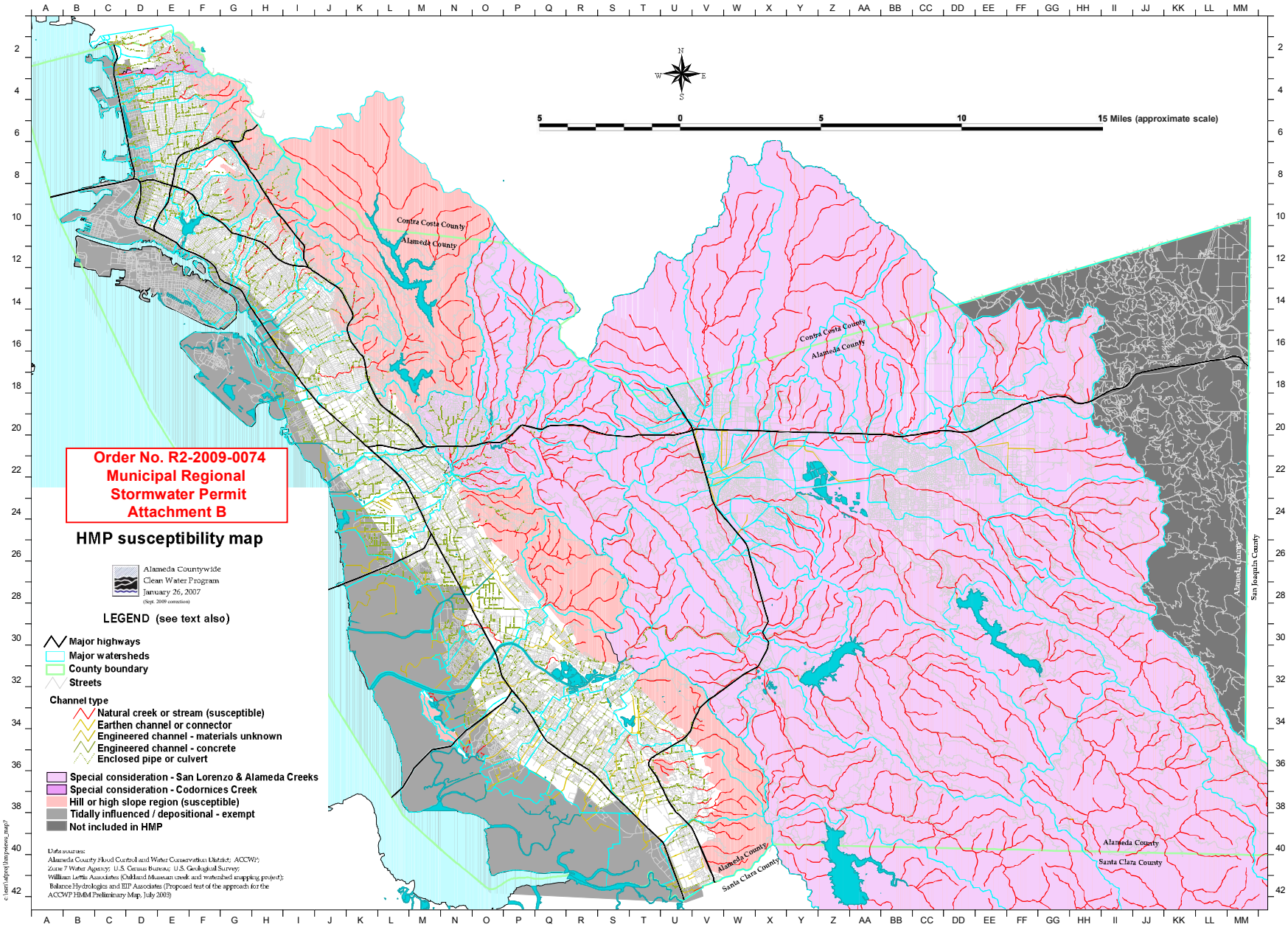
California domestic water quality standards set forth in California Code of Regulations, Title 22 and current county standards.

Ambient water quality conditions at a proposed project area will be determined by Zone 7 of the Alameda County Flood Control and Water Conservation District at the time the project is proposed, with the cost borne by the project proponents. Ambient conditions apply to the water-bearing zone with the highest quality water.

Waters designated for use as domestic or municipal water supply shall not contain concentrations of chemicals in excess of natural concentrations or the limits specified in California Code of Regulations, Title 22, Chapter 15, particularly Tables 64431-A and 64431-B of Section 64431, Table 64444-A of Section 64444, and Table 4 of Section 64443.

Appendix D

Alameda Countywide Clean Water Program
HMP Susceptibility Map


Order No. R2-2009-0074
Municipal Regional
Stormwater Permit
Attachment B
HMP susceptibility map
Alameda Countywide
Clean Water Program
January 26, 2007
(Sept. 2009 correction)
LEGEND (see text also)
Major highways
Major watersheds
County boundary
Streets
Channel type
Natural creek or stream (susceptible)
Earthen channel or connector
Engineered channel - materials unknown
Engineered channel - concrete
Enclosed pipe or culvert
Special consideration - San Lorenzo & Alameda Creeks
Special consideration - Codornices Creek
Hill or high slope region (susceptible)
Tidally influenced / depositional - exempt
Not included in HMP
Data sources:
Alameda County Flood Control and Water Conservation District; ACCWP;
Zone 7 Water Agency; U.S. Census Bureau; U.S. Geological Survey;
William Lettis Associates (Oakland Museum creek and watershed mapping project);
Balance Hydrologics and EIP Associates (Proposed test of the approach for the
ACCWP HMM Preliminary Map, July 2003)
N
S
E
W
5
0
5
10
15 Miles (approximate scale)
Contra Costa County
Alameda County
Santa Clara County
San Joaquin County

Hydrology Report

Dublin Boulevard-North Canyons Parkway Extension Project

Federal Project No. RTPL 5432(019)

Prepared for

City of Dublin, County of Alameda, and City of Livermore

Located in:

Dublin, Unincorporated Alameda County, and Livermore
California

BKF Engineers
4670 Willow Road, Suite 250
Pleasanton, CA 94588

July 16, 2018

Hydrology Report

Dublin Boulevard-North Canyons Parkway Extension Project

July 16, 2018

Prepared for

City of Dublin, County of Alameda, and City of Livermore

Located in:

Dublin, Unincorporated Alameda County, and Livermore California

This Hydrology report has been prepared by BKF Engineers under the supervision of the following Registered Engineer. To the best of my knowledge and belief, the information submitted is true, accurate and complete

Date: 11/21/18

Ramon Alvarez-Muro, P.E.
Registered Civil Engineer

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1. Introduction

1.1 Approach to Hydrology Report

The purpose of the Hydrology Report is to document storm flows and any drainage improvement necessary to address the drainage needs of the Dublin Boulevard-North Canyons Parkway Extension known from hereon as the "Project". This hydrology report is built upon previous efforts by MacKay and Somps in the "Dublin Ranch Master Drainage Study" and by Engeo in the "Jordan Ranch Stormwater and Hydromodification Management Plan". These documents, along with other works, create a backdrop upon which this Hydrology Report is built upon.

1.2 Project Description

The City of Dublin (City), in coordination with the City of Livermore, Alameda County, and the California Department of Transportation (Caltrans), District 4, propose to improve east-west local roadway connectivity by extending Dublin Boulevard from Fallon Road to Doolan Road/North Canyon Parkway in the Cities of Dublin and Livermore in Alameda County. The work proposed will include the construction of a new 4-6 lane roadway, sidewalk, path, and bicycle facilities. Additionally, the City proposes to conduct intersection improvements at the Dublin Boulevard/Fallon Road and Doolan Road/North Canyon Parkway intersections. A new intersection is proposed at Dublin Boulevard/Croak Road, eliminating the frontage road connection of Croak Road/Fallon Road. A new bridge is proposed over Cottonwood Creek.

Drainage improvements will include storm drainage inlets and manholes, storm drain laterals, a longitudinal storm drain main located under Dublin Boulevard, post construction stormwater treatment and hydromodification facilities, and cross culverts beneath the Dublin Boulevard extension.

The Project Location Map is shown on Figure 1 and Project Vicinity Map on Figure 2.

Figure 1. Project Location Map

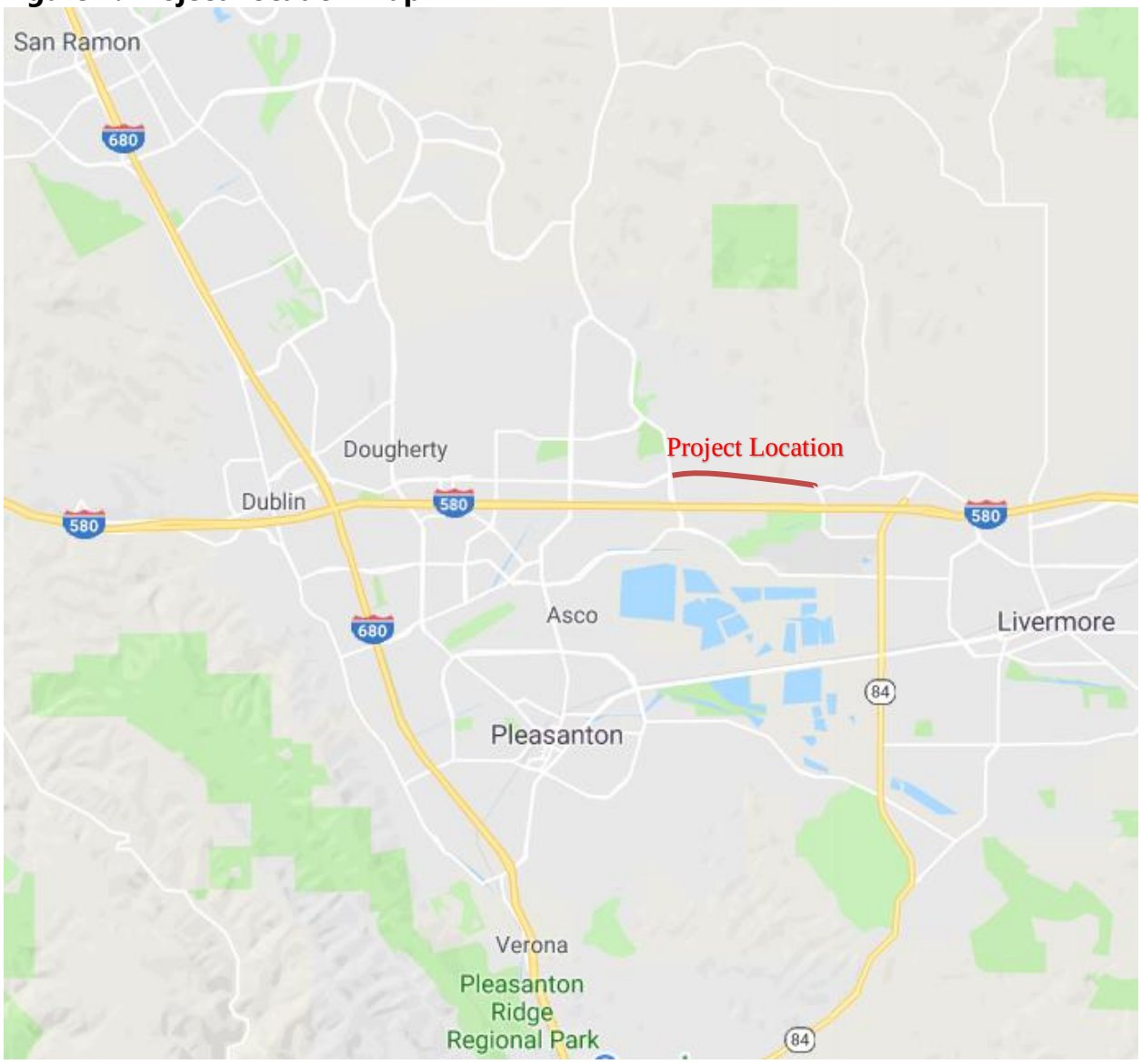


Figure 2. Project Vicinity Map

2. Drainage Background

2.1 Previous Study

In 2004, with subsequent updates in 2006, MacKay and Somps prepared the "Dublin Ranch Drainage Master Plan". This document establishes the watershed limits in the Alameda County and City of Livermore portions of the project. In 2011, Engeo Inc. prepared a "Stormwater and Hydromodification Management Plan" for Jordan Ranch. This document establishes watershed limits in the City of Dublin portion of the project.

2.2 Criteria and Methodology

Alameda County Flood Control and Water Conservation District's (District) Hydrology and Hydraulics criteria form the basis of this hydrology report's calculations. Other criteria include matching the design storm capacities of other storm drain lines built in Fallon Road. The proposed longitudinal storm drain main built along the Dublin Boulevard extension flowing west toward Fallon Road and south down Fallon Road will be capable of conveying a 100-year peak storm event. It should be noted that the proposed system along Fallon Road has been previously environmentally cleared by others, but is assumed to be constructed separately (future existing) for connection, or as part of the Dublin Blvd Extension project improvements to convey storm drainage.

The District's Rational Formula was used to determine peak runoff rates. All factors in the rational formula such as runoff coefficient, time of concentration, and rainfall intensity come from the District's Hydrology and Hydraulics manual. Watershed delineation was primarily based on the Project's aerial planimetric (contour) topographic base mapping provided by the City, but subsequently checked against other drainage studies and their mapping. This crosscheck was required for the planned northern watershed limits, which may or may not have been developed/constructed to date, but alter the undeveloped historical watershed limits derived from the aerial topography.

The Project's drainage facilities west of the crest curve located at approximately Station 157+00 (herein referred to as the "high point") will be designed as a Primary Facility, as defined by the District's Hydrology and Hydraulics manual. Primary Facilities have watershed areas between 50 acres and 25 square miles, and are designed to a higher design storm event than secondary facilities. The rest of the drainage facilities

are fed by minor watersheds, less than 50 acres and will be designated as a Secondary Facility.

2.3 Regional and Local Requirements

The Project is located in Alameda County which resides within the limits of the San Francisco Bay Regional Water Quality Control Board (RWQCB). As a result, the Project is subject to the "California Regional Water Quality Control Board San Francisco Bay Region Municipal Regional Stormwater NPDES Permit" (Order R2-2015-0049 NPDES Permit No. CAS612008). This permit is informally known as the "MRP," and presents the provisions for permanent post-construction stormwater treatment requirements related to development, re-development and roadway projects outside of Caltrans Right-of-Way. The MRP in Alameda County is administered by the Alameda Countywide Clean Water Program (ACCWP). The ACCWP has developed a manual called "C.3 Stormwater Technical Guidance" to assist designers and reviewers in complying with post-construction stormwater treatment requirements, as well as Hydromodification Management (HM) requirements. This project is required to meet post-construction stormwater treatment and HM. HM will require post-construction peak flow rates to match pre-construction flow rate for the flow ranges of 10% of a 2-year storm, up to the 10-year storm event.

3. EXISTING HYDROLOGY

3.1 Existing Topography and Soils

Grades across the Project generally fall north to south, with the area north of the project defined by rolling hills on gentle 10-20% slopes, while the area south consists of flat grasslands with slopes generally less than 5%. The elevation at Fallon Road is about 370 feet, meandering easterly to match grade along the existing contours reaching a maximum elevation of about 420 feet at the high point, and descends to a sag (low point) at Cotton Wood Creek near elevation 390 feet, and ascends to connect to Doolan Road/North Canyon Boulevard, at approximately elevation 415 feet. Soils in the area have a Hydraulic Soil Group classification of C, which mean the native material has a slow infiltration rate and high runoff potential.

3.2 Existing Hydrology

Regionally, all stormwater within the project watershed enters Alameda Creek downstream of the Project. The Project area itself drains either to an existing drainage system that crosses Fallon Road to the west, Cottonwood Creek to the south, a Caltrans drainage system under I-580 to the south, or a City of Livermore existing drainage system to the east; ultimately – drainages cross I-580 and enteri Arroyo Mocho on the way to Alameda Creek. The mean annual precipitation for the area is 16 inches. No man-made drainage improvements exist within the project area, though the following systems exist (or are planned) on either end of the Project, located at the intersection termini:

- 48" CMP Bypass/Outfall – NE corner of Fallon Road, Dublin Boulevard, and Croak Road
- 84" RCP – Fallon Road
- 96" RCP – Fallon Road (Future)
- 30" RCP – Doolan Road

Within the project area, runoff is routed north to south as sheet flow and concentrated shallow flow run along tributary areas, following the natural topography before entering one of the three drainage systems that cross I-580:

- 8'x9' RCB in CT R/W running east-west converging with 84" RCP to feed the "G3" system west of Fallon Road before running south under I-580.
- 30" Cross Culvert CMP – Collier Canyon Road running south under I-580
- Double 8'x10' RCBs - Cottonwood Creek running south under I-580

The aforementioned (existing) 48″ CMP bypass/outfall conveys existing creek corridor drainage from upstream areas, and feeds a perennial marsh and seasonal wetland area that runs along the easterly edge of Croak Road, ultimately crossing via a culvert and RCB beneath Croak Road, feeding the large 8′x9′ RCB in Caltrans R/W under Fallon Road; the existing 84″ RCP located between Fallon and Croak Road crosses Fallon Road and converges with the 8′x9′ RCB, creating the easterly G3 system heading westerly before crossing I-580 towards Arroyo Mocho.

Based on as-builts for the construction of the 84″ RCP main along Fallon, a 59-foot (48″ diameter) storm drain connection was proposed (and constructed) between the existing SDMH (for the existing creek corridor drainage) and the 84″ SD main at SDMH #5; note in the as-built indicate that the 59-foot bypass/connection should remain plugged at the existing SDMH until which time the existing bypass to the perennial marsh and seasonal wetland areas are no longer needed (future-by others). Therefore, the 48″ CMP bypass/outfall to the open drainage/culvert is an existing hydrology component.

3.3 Existing Floodplains

The FEMA Flood Insurance Rate Maps for the Project location identify Cottonwood Creek as a floodplain. Cottonwood Creek is identified as 0.2% Annual chance flood discharge, but this discharge is contained in the channel. This means the channel is large enough to contain the 100-year event; the creek contains a 500-year storm event as well. The project will include a new bridge spanning Cottonwood Creek. No other floodplain is identified within the project limits.

4. Proposed Hydrology

4.1 Potential Interim Hydrology and Storm Drainage Improvements

As part of the proposed improvements along Dublin Boulevard and prior to the completion of development surrounding the Project, the hydrology patterns will preserve the existing overland drainage pattern from north to south. As the constructed Dublin Boulevard will cut off these existing drainage patterns, the project proposes storm drain cross-culverts to preserve and convey the drainage under Dublin Boulevard when possible and feasible. As an option, the City could opt to connect the upstream cross culverts with the proposed longitudinal drainage system located the new roadway discussed in Section 4.2, however, the ability to maintain and convey overland drainage from north to south in the interim conditions (prior to development) will be preserved to minimize biological and permitting impacts and mitigation.

Watershed areas for these cross-culverts are shown in Figure 3 and in Table 1. Swales will be built along the north side of the Project to convey and direct runoff to one of five proposed cross-culvert systems or Cottonwood Creek. The aforementioned existing 48" CMP bypass/outfall will be extended under the Dublin Boulevard/Fallon Road intersection as part of a "sixth" proposed cross culvert system; this system conveys drainage from 237 acres upland, mostly undeveloped and is summarized in Figure 3 and Table 1.

These culverts are sized for existing conditions where no development upstream of the Project has yet occurred. The culverts can be discharged in one of two ways:

1. Discharge at grade on the south side of the project and continue its existing routing downstream towards I-580.
2. Connect into the newly constructed longitudinal drainage system (main) proposed within Dublin Boulevard.

These culverts can be abandoned in place or removed in the build-out conditions should future development deem them unnecessary, however, those property owners will be responsible for their direct and downstream environmental/biological impacts, which feed the downstream jurisdictional waters and wetlands.

The new drainage system running along Dublin Boulevard will be sized for a 100-year flow of the ultimate build-out condition, based on zoning and development in the City's General Plan and East Dublin Specific Plan, and has adequate capacity to

handle the undeveloped watershed peak flows should the cross-culverts be rerouted to the storm drain main. Hydrology calculations for each of the cross culverts can be found in Table 1 below.

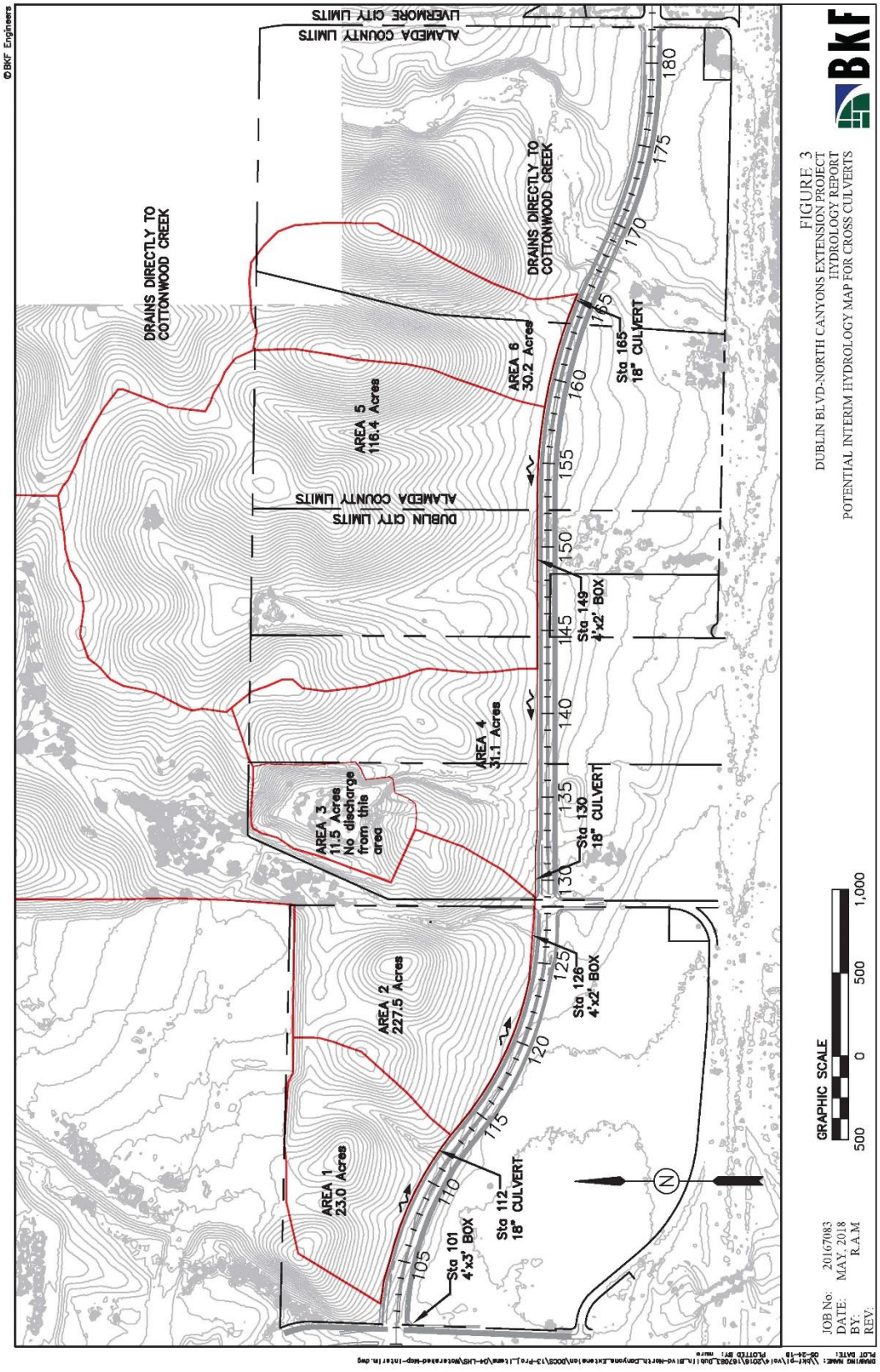

©BKF Engineers
LIVERMORE CITY LIMITS
ALAMEDA COUNTY LIMITS
DRAINS DIRECTLY TO COTTONWOOD CREEK
DRAINS DIRECTLY TO COTTONWOOD CREEK
AREA 6 30.2 Acres
AREA 5 118.4 Acres
DUBLIN CITY LIMITS
ALAMEDA COUNTY LIMITS
AREA 4 31.1 Acres
AREA 3 11.5 Acres No discharge from this area
AREA 2 227.5 Acres
AREA 1 23.0 Acres
Sta 165 18" CULVERT
Sta 149 4'x2' BOX
Sta 130 18" CULVERT
Sta 126 4'x2' BOX
Sta 112 18" CULVERT
Sta 101 4'x3' BOX
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
N
GRAPHIC SCALE
500
0
500
1,000
JOB No: 20167083
DATE: MAY, 2018
BY: RAM
REV:
FIGURE 3
DUBLIN BLVD-NORTH CANYONS EXTENSION PROJECT
HYDROLOGY REPORT
POTENTIAL INTERIM HYDROLOGY MAP FOR CROSS CULVERTS
BKF

Table 1: Hydrology for 15-Year Peak Flow for Cross Culverts

Watershed Area No.	Runoff Coefficient	Overland Flow Length	Time of Concentration	Intensity	Area	15-Year Peak Flow	Station	Cross Culvert Size/Type
		(ft)	(minutes)	(in/hr)	(acres)	(cfs)		
N/A							101	4'x3' Box Culvert (existing 48")
1	0.25	1,320	11	1.98	23.0	11.4	112	18" Culvert
2	0.25	7,070	59	0.77	227.5	43.8	126	4'x2' Box Culvert
3	-	-	-	-	11.5	-		N/A
4	0.25	1,950	16	1.60	31.1	12.4	130	18" Culvert
5	0.25	3,430	29	1.14	116.4	33.2	149	4'x2' Box Culvert
6	0.25	2,225	19	1.46	30.2	11.0	165	18" Culvert

The existing 48" culvert located at Station 101 could be extended with a 48" (round) culvert under Dublin Boulevard, essentially preserving the bypass to the wetlands indefinitely or until it is no longer needed, however, due to the existing invert and limited cover at the intersection, has been shown as a 4'x2' box structure instead.

The watersheds No. 2 and 5 are larger and will require a 4' wide by 2' high box culvert, while the other smaller watersheds No. 1, 4 and 6 require an 18" culvert.

Watershed No. 3 is in a bowl configuration and does not produce runoff down to the Project area.

It should be noted that preserving native beds intact on cross culverts is desirable from a resource (permitting) agency standpoint, specifically for the cross-culverts located at Station 101, Station 165, and Cottonwood Creek due to connectivity to the downstream resources. Provided hydraulic demand for the 100-year flow event is met, native bed culvert alternatives (to those types/sizes shown in Table 1) will be pursued when possible and feasible during the design phase of the project.

4.2 Final Build-Out Hydrology and Storm Drainage Improvements

Project drainage improvements will consist of:

- drainage inlets as needed to meet City and County gutter spread requirements,
- storm drain laterals connecting the inlets to a storm drain main,
- storm drain manholes spaced as needed for maintenance, and
- the possibility of laterals or secondary mains for future connections stubbed-out to the Right-of-Way in pre-determined locations.

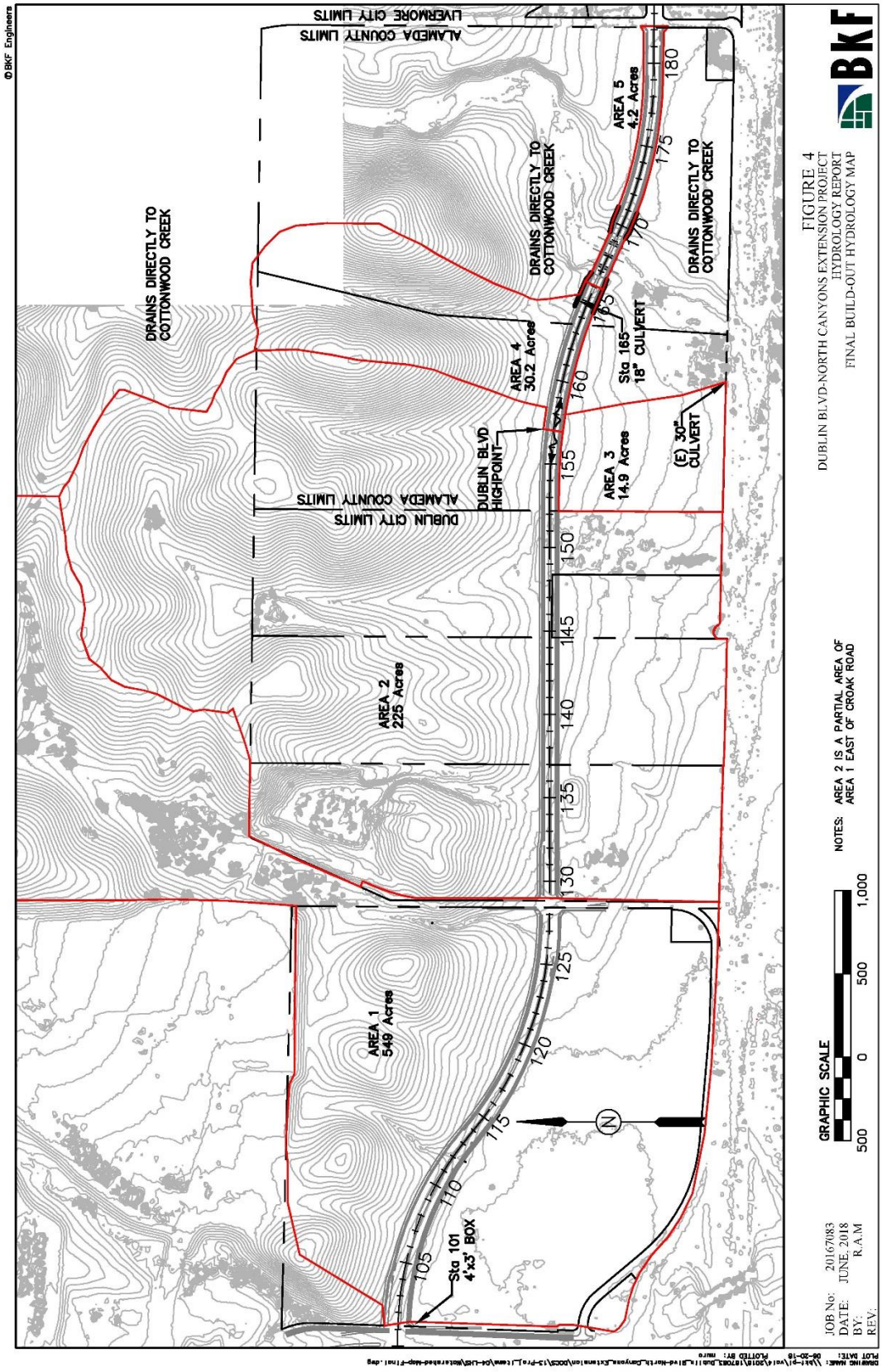
The purpose of integrating laterals or secondary mains is to limit, if not eliminate future connections and disturbing the newly built roadway.

A Final Build-Out Hydrology map is shown in Figure 4, and assumes future development in Dublin City limits located on either side of Dublin Boulevard, flowing towards the new roadway; it is assumed planned development will meet ACCWP post-construction stormwater treatment and HM requirements on site, before releasing/connecting to the new drainage main along Dublin Boulevard. An overview of the 5 watersheds from east to west:

- Watershed 5 is located at the easterly limits of the project area in unincorporated Alameda County, and includes the western limits of the Cottonwood Creek Bridge and the new street terminus at Doolan Road to the east. Drainage will be conveyed along the north side of the Project to direct runoff towards Cottonwood Creek. To the south – existing topography and overland drainage will continue to drain southerly towards Cottonwood Creek and Collier Canyon Road (which outfalls to Cottonwood Creek under I-580). Drainage within the roadway will be conveyed along Dublin Boulevard via an 18" longitudinal storm drain line, which will discharge to Cottonwood Creek.
- Watershed No 4 is essentially the same watershed as Area 6 from Section 4.1 (Figure 3), but includes roadway drainage, and will continue to be conveyed from north to south via the 18" cross-culvert (shown in Table 1) outfalling to Cottonwood Creek. The roadway will be drained via an 18" longitudinal drainage system built along Dublin Boulevard, collecting roadway drainage between the high point to the west and the Cottonwood Creek to the east. It is proposed to tie the roadway culvert directly to the 18" cross-culvert, outfalling to Cottonwood Creek.
- Watershed No 3 is a small undeveloped area south of the Project (east of Dublin City Limits) that will continue to drain southerly to an existing 30" cross-culvert underneath Collier Canyon Road and I-580.

- Watershed No 2 is a partial watershed beginning at the high point in the east, spanning to Croak Road in the west. This roadway area will drain to a 60" longitudinal storm drainage system running along Dublin Boulevard that ultimately makes its way to Fallon Road.
- Watershed No 1 is the final watershed on the west side of the project, located from Croak Road in the east to Fallon Road on the west. This watershed will encompass all the areas of Watershed No 1 and Watershed No 2 (conveyed in a 60" stormdrain line) into a 72" longitudinal storm drainage system running along Dublin Boulevard connecting at Fallon Road.
- Under the build-out conditions, the 4'x3' box culvert extension of the 48" CMP located at Station 101 conveying the existing (upstream) creek corridor/watershed along Fallon Road discussed in the previous section of the report would be addressed as part of any future development proposed on the property located at the corner of Fallon Road and the Dublin Boulevard Extension. Options could include leaving the 4'x3' box culvert system in place indefinitely or unplugging the bypass upstream which would redirect the creek corridor to the 84" RCP running along Fallon Road (as designed).

It is assumed that the 72" culvert supporting the extension of Dublin Boulevard will tie directly into a 96" RCP studied and sized in the Dublin Ranch Drainage Master Plan (MacKay & Somps, 2006). Based on this report and related information available, the culvert will be constructed along the east side of Dublin (just east of the existing 84" RCP) within City R/W identified in the ultimate build-out conditions of the Fallon Plan Line. The 96" RCP is proposed to originate at the new intersection of Dublin Boulevard/Fallon Road (supporting the drainage of the Dublin Blvd Extension) and tie directly to the existing 8'x9' RCB in Caltrans R/W. The 96" RCP (via the 8'x9' RCB) converges with the aforementioned 84" RCP, before heading easterly towards the G3 System.


©BKF Engineers
LIVERMORE CITY LIMITS
ALAMEDA COUNTY LIMITS
DRAINS DIRECTLY TO COTTONWOOD CREEK
DRAINS DIRECTLY TO COTTONWOOD CREEK
DRAINS DIRECTLY TO COTTONWOOD CREEK
AREA 5 4.2 Acres
AREA 4 30.2 Acres
Sta 165 18" CULVERT
(E) 30" CULVERT
DUBLIN BLVD HIGHPOINT
AREA 3 14.9 Acres
DUBLIN CITY LIMITS
ALAMEDA COUNTY LIMITS
AREA 2 225 Acres
AREA 1 549 Acres
Sta 101 4'x3' BOX
105
110
115
120
125
130
135
140
145
150
155
160
165
170
175
180
N
GRAPHIC SCALE
500
0
500
1,000
NOTES: AREA 2 IS A PARTIAL AREA OF AREA 1 EAST OF CROAK ROAD
JOB No: 20167083
DATE: JUNE, 2018
BY: R.A.M
REV:
FIGURE 4
DUBLIN BLVD-NORTH CANYONS EXTENSION PROJECT
HYDROLOGY REPORT
FINAL BUILD-OUT HYDROLOGY MAP
BKF

15-Year storm hydrology calculations for each watershed and sub-watershed requiring storm drainage facilities can be found in Table 2 below.

Table 2: Final Build-Out Hydrology 15-Year Peak Flow

Watershed Area No.	Runoff Coefficient	Overland Flow Length	Time of Concentration	Intensity	Area	15-Year Peak Flow
		(ft)	(minutes)	(in/hr)	(acres)	(cfs)
Full Watershed 1	0.25	7,070	59	0.77	549	105.7
Sub Watershed 2	0.25	3,430	29	1.14	225	64.1
4	0.25	2,225	19	2.38	14.9	8.9
5	0.25	-	5	3.10	4.2	3.3

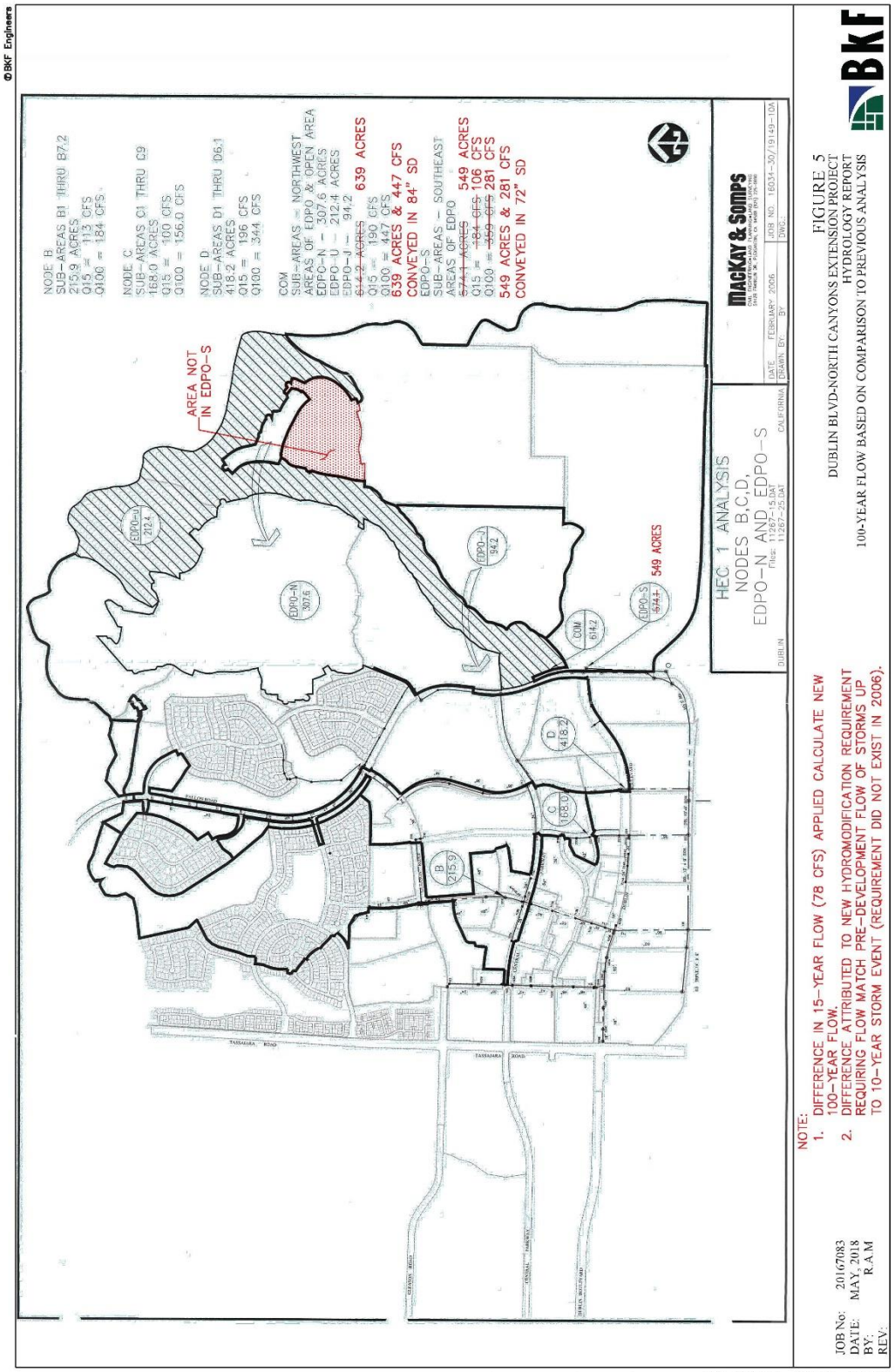
The calculations above use the same runoff coefficient associated with undeveloped land for the future development because future developments will also be subject to HM. Post-development peak flow rates will be required to match pre-development peak flow rates for storm events up to a 10-year event. For the watersheds No 4 an 18" storm drain is still sufficient as a cross culverts. Watersheds No 4 and 5 longitudinal storm drain mains will also be 18" which, coincidently 18" is the District minimum pipe sized allowed.

The storm drain main in Dublin Boulevard from the high point and continuing to the west connecting at Fallon Road will be sized to convey the 100-year storm event. A rational method calculation, like the one above for the 15-year storm will not work for the 100-year storm event because it will either be conservative if parcel post development runoff coefficients are used and the mitigation HM provides on peak flows is ignored, or be unconservative if the undeveloped land runoff coefficients are used to compute the 100-year event peak flow.

For these reasons, an approach of using previously published values (while updating, per new current watersheds and detention requirement) was used. Figure 5 contains the 100-year flows estimated for the Project area in the 2006 Dublin Ranch Drainage Master Plan. The project area labeled Watershed 1 on Figure 4 is comparable to "EDPO-S" in Figure 5.
The first adjustment removes a 25-acre area at the northern most limit of Watershed 1/EDPO-S, which has been developed and is routed westerly to the aforementioned

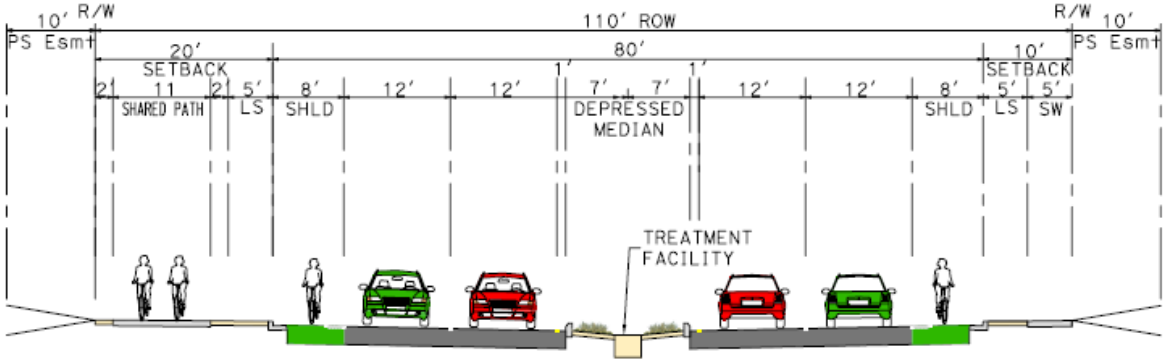
48" culvert crossing Dublin Boulevard at Station 101, and therefore is no longer a tributary to Watershed 1/EDPO-S. With the mitigation required per HM, the calculated 15-Year peak flow for Watershed 1/EDPO-S will be 106 cfs and not 184 cfs previously calculated in the 2006 Dublin Ranch Drainage Master Plan. Applying this HM mitigation and reduction of 78 cfs to the previously calculated 100-year peak flow will drop the peak flow from 359 cfs to 281 cfs. The existing (as-built) 84-inch storm drain main in Fallon Road collects 639 acres that produce a 447 cfs flow rate. Watershed 1/EDPO-S is recalculated to 549 acres, and would therefore produce a 281 cfs flow rate, that can be conveyed by a 72-inch culvert along Dublin Boulevard, and connecting to Fallon Road.

Adjustments and final culvert sizing will be addressed during the design phase of the Project, and will involve incremental sizing upstream (resulting in a slight reduction in required culvert size) of the drainage systems along Dublin Boulevard and Fallon Road.


©BKF Engineers
NODE B
SUB-AREAS B1 THRU B7.2
215.9 ACRES
Q15 = 113 CFS
Q100 = 184 CFS
NODE C
SUB-AREAS C1 THRU C9
168.0 ACRES
Q15 = 100 CFS
Q100 = 156.0 CFS
NODE D
SUB-AREAS D1 THRU D6.1
418.2 ACRES
Q15 = 196 CFS
Q100 = 344 CFS
COM
SUB-AREAS – NORTHWEST
AREAS OF EDPO & OPEN AREA
EDPO-N – 307.6 ACRES
EDPO-U – 212.4 ACRES
EDPO-J – 94.2
~~614.2 ACRES~~
639 ACRES
Q15 = 190 CFS
Q100 = 447 CFS
639 ACRES & 447 CFS
CONVEYED IN 84" SD
EDPO-S
SUB-AREAS – SOUTHEAST
AREAS OF EDPO
~~674.1 ACRES~~
549 ACRES
Q15 = ~~184 CFS~~ 106 CFS
Q100 = ~~359 CFS~~ 281 CFS
549 ACRES & 281 CFS
CONVEYED IN 72" SD
AREA NOT IN EDPO-S
EDPO-U 212.4
EDPO-N 307.6
EDPO-J 94.2
COM 614.2
EDPO-S 674.1
549 ACRES
D 418.2
C 168.0
B 215.9
TASSAJARA ROAD
HEC 1 ANALYSIS
NODES B,C,D,
EDPO-N AND EDPO-S
DUBLIN
CALIFORNIA
MacKay & Somps
DATE FEBRUARY 2006
DRAWN BY: BF
JOB NO. 16034-30/19149-10A
DWG.
BKF
NOTE:
1. DIFFERENCE IN 15-YEAR FLOW (78 CFS) APPLIED CALCULATE NEW 100-YEAR FLOW.
2. DIFFERENCE ATTRIBUTED TO NEW HYDROMODIFICATION REQUIREMENT REQUIRING FLOW MATCH PRE-DEVELOPMENT FLOW OF STORMS UP TO 10-YEAR STORM EVENT (REQUIREMENT DID NOT EXIST IN 2006).
JOB No: 20167083
DATE: MAY, 2018
BY: RAM
REV:
FIGURE 5
DUBLIN BLVD-NORTH CANYONS EXTENSION PROJECT
HYDROLOGY REPORT
100-YEAR FLOW BASED ON COMPARISON TO PREVIOUS ANALYSIS

Although the main will be sized to convey the 100-year storm event, adjacent local developments on either side of Dublin Boulevard will be required to size their systems for the 10-year storm event if the development is less than 50 acres. During larger storm events, this will lead to substantial surface runoff conveyed to the 60”/72” longitudinal storm drain main running along Dublin Boulevard. Based on the typical cross section proposed, which will utilize the depressed median and parkway strips for C.3 treatment and HM, additional inlets located at sag locations of the roadway profile will be necessary (and included in this project) to provide additional capacity to collect the 10-year/100-year into the underground storm drain system. The need for additional capacity will be evaluated at a later date during the detailed design phase of the project.

Figure 6. Typical Street Section with bioretention treatment in the median



4.3 Location Hydraulics Study

As part of the Project improvements, a new bridge measuring approximately 270’ in length and 168’ in width will be built over Cottonwood Creek. This bridge will have four spans (two abutments and three bents/piers) spaced 60 and 75-feet on center in the floodplain, but will stay outside the Ordinary High Water Mark (OHWM). A location hydraulic study with HEC-RAS modeling of the Cottonwood Creek pre and post-construction conditions is included in Appendix B.

The lowest bridge profile grade is approximately 402.70’ with the bottom of the bridge elevation of about 399.70’. Hydraulic modeling results show the 100-Year water surface elevation (WSE) of 393.86’ post-bridge. This represents a freeboard of approximately 5.8 feet between the 100-Year WSE and the bottom of bridge elevation. Per the Districts requirements, 1-foot of freeboard is required between these two elevations. The same station 2+62 in HEC-RAS has a pre-bridge (WSE) of

393.68 which indicates a local rise in WSE of 0.18′. However, this elevation jump does not track farther upstream as stations 10′, 50′ and 100′ north of the bridge have the same WSE pre and post-bridge. At the perpendicular bridge/creek crossing, the top width is 168-feet. The three sets of piers remove approximately 6 feet of flow area which is equivalent to about 3.5% of the flow area.

5. References

California Regional Water Quality Control Board San Francisco Bay Region. (November 19, 2015). *California Regional Water Quality Control Board San Francisco Bay Region Municipal Regional Stormwater NPDES Permit*. Order R2-2015-0049, NPDES Permit No. CAS612008.

Federal Emergency Management Agency. *Flood Insurance Rate Map-Alameda County, California and Incorporated Areas, Panel 329 of 725.* Map No. 06001C0329G.

Alameda County Clean Water Program (October 31, 2017). *C.3 Stormwater Technical Guidance-A handbook for developers, builders and project applicants, Version 6*.

State Water Resources Control Board, Division of Water Quality (July 17, 2012). *National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities.* Order No. 2009-0009-DWQ (As amended by 2010-0014-DWQ and 2012-0006-DWQ), NPDES No. CAS000002.

Alameda County Flood Control & Water Conservation District (2018) *Alameda County Hydrology & Hydraulics Manual*

MacKay & Somps (April 2004, March 2006) *Dublin Ranch Drainage Master Plan*

Engeo (March 23, 2011) *Stormwater and Hydromodification Management Plan for Jordan Ranch, Dublin, California*

Appendix A

FEMA FIRMettes

FEMA FIS - Cottonwood Creek Flood Profile

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National Flood Hazard Layer FIRMette

FEMA

37°42'37.43"N

121°51'3.55"W

121°50'26.09"W

37°42'8.96"N

Feet 1:6,000

0 250 500 1,000 1,500 2,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth
- Regulatory Floodway *Zone AE, AO, AH, VE, AR*

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS

- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES

- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS

- Digital Data Available
- No Digital Data Available
- Unmapped

N

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The base map shown complies with FEMA's base map accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/19/2018 at 2:12:14 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: base map imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette

FEMA

37°42'23.70"N

121°50'42.77"W

121°50'5.32"W

37°41'55.23"N

Feet

0 250 500 1,000 1,500 2,000

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth
- Regulatory Floodway *Zone AE, AO, AH, VE, AR*

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS

- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES

- B 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS

- Digital Data Available
- No Digital Data Available
- Unmapped

N

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The base map shown complies with FEMA's base map accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/19/2018 at 2:11:21 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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National Flood Hazard Layer FIRMette

FEMA

37°42'20.84"N

121°50'0.79"W

121°49'23.33"W

37°41'52.37"N

Feet 1:6,000

0 250 500 1,000 1,500 2,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth
- Regulatory Floodway *Zone AE, AO, AH, VE, AR*

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS

- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES

- B 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS

- Digital Data Available
- No Digital Data Available
- Unmapped

N

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The base map shown complies with FEMA's base map accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/19/2018 at 2:10:25 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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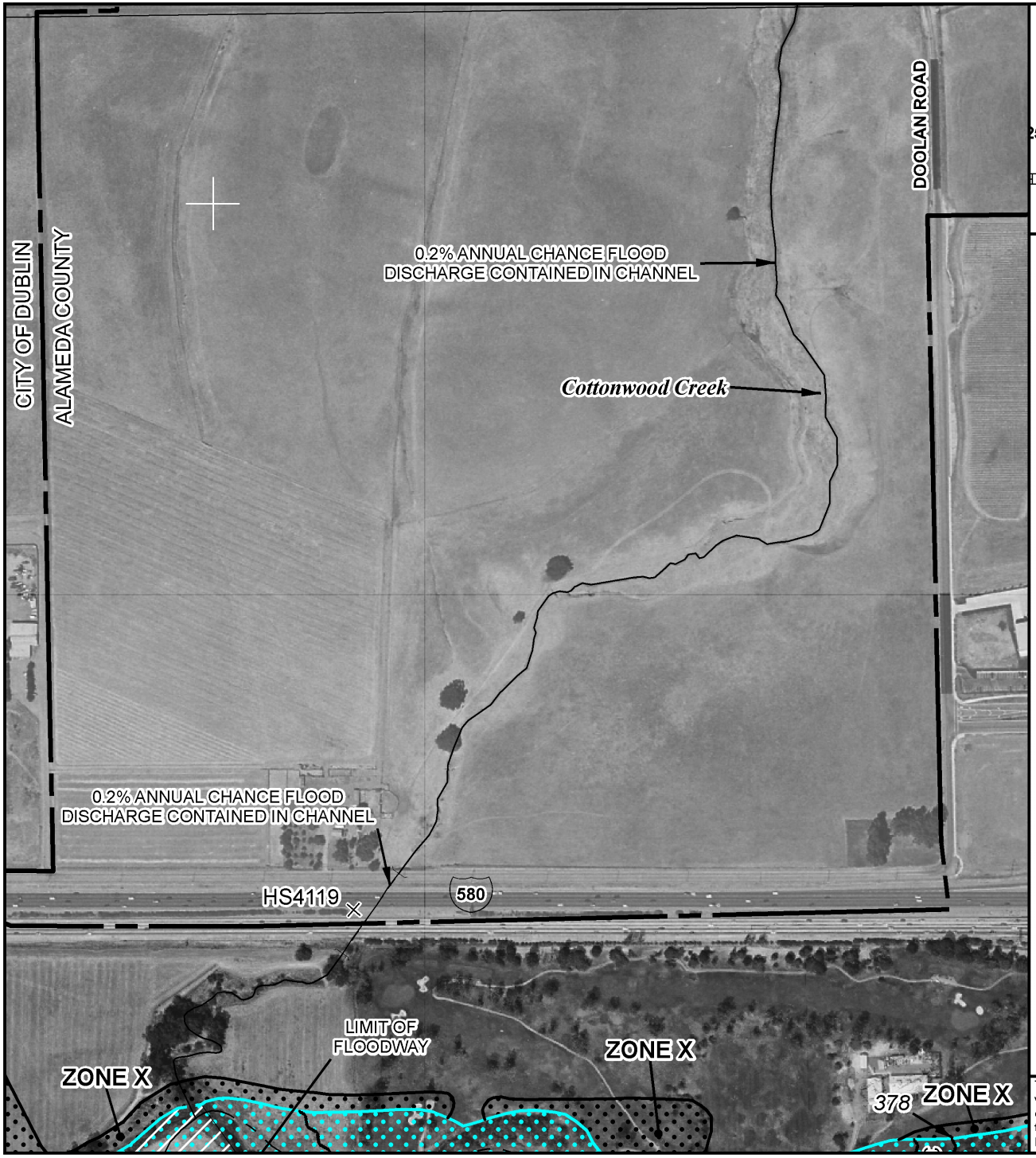


MAP SCALE 1" = 500'

250 0 500 1000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0329G

FIRM

FLOOD INSURANCE RATE MAP

ALAMEDA COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 329 OF 725

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ALAMEDA COUNTY	060001	0329	G
DUBLIN, CITY OF	060705	0329	G
LIVERMORE, CITY OF	060008	0329	G

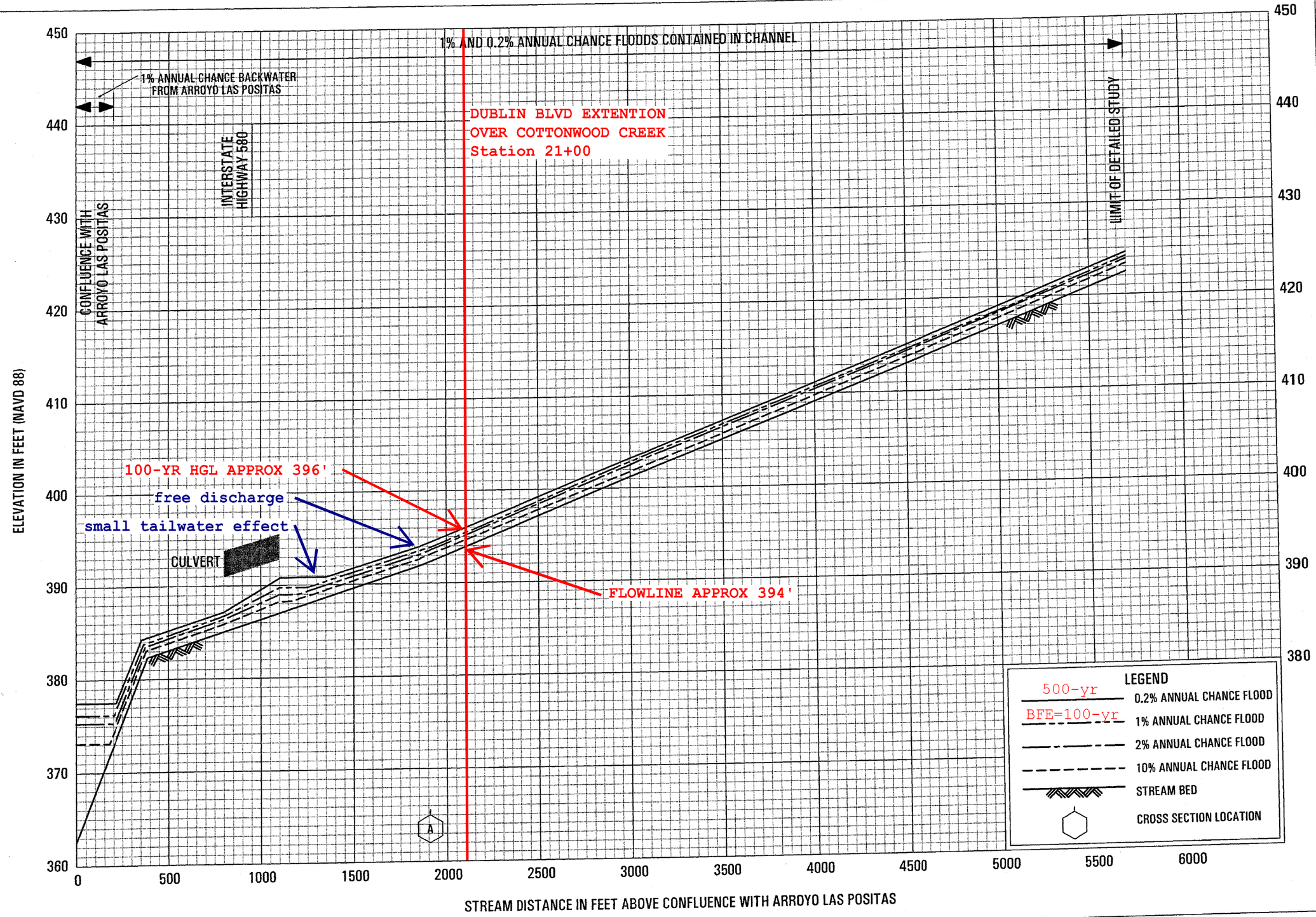
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06001C0329G

EFFECTIVE DATE
AUGUST 3, 2009

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



FLOOD PROFILES

COTTONWOOD CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ALAMEDA COUNTY, CA

AND INCORPORATED AREAS

Appendix B

Location Hydraulic Study
For Proposed Bridge over Cottonwood Creek

LOCATION HYDRAULIC STUDY FORM

Dist. _____Co.___Alameda_____Rte.___Dublin Avenue_____P.M._____
EA _____ Bridge No._____
Floodplain Description:

There is one existing floodplain within the Dublin Avenue Extension Project, Cottonwood Creek. Cottonwood Creek sufficient capacity to contain the 0.2% Annual Chance Flood Discharge (500-Year storm event) within the channel.

1. Description of Proposal (include any physical barriers i.e. concrete barriers, soundwalls, etc. and design elements to minimize floodplain impacts)

As part of the Dublin Avenue Extension project a new bridge is proposed over Cottonwood Creek. The bridge crosses Cottonwood Creek near perpendicular to the flowline. At this crossing the Top Width during the Base Flood is about 167-feet. Three rows of 2-foot diameter piers will be installed in the floodway 75-feet apart on center to support the bridge. The Piers will be outside of the Ordinary High Water Mark and will remove 6-feet of flow area from the 167-foot wide floodway.

2. ADT: Current_____ Projected_____

3. Hydraulic Data: Base Flood Q_{100}=____940___CFS
WSE_{100}= _____394-feet, NAVD_____
The flood of record, if greater than Q_{100}:
Q=____-_____CFS WSE= _____-_____
Overtopping flood Q= _____-_____CFS WSE= _____-_____
Are NFIP maps and studies available? YES___X_____ NO_____

4. Is the Project location alternative within a regulatory floodway?
YES_____ NO___X_____

5. Attach map with flood limits outlined showing all buildings or other improvements within the base floodplain.

Potential Q_{100} backwater damages:

A. Residences? NO___X_____YES_____
B. Other Buildings? NO___X_____YES_____

C. Crops? NO___X_____YES_____

D. Natural and beneficial floodplain values?
NO___X_____YES_____

6. Type of Traffic:

A. Emergency supply or evacuation route? NO_____YES_____
B. Emergency vehicle access? NO_____YES_____
C. Practicable detour available? NO_____YES_____
D. School bus or mail route? NO_____YES _____

7. Estimated duration of traffic interruption for 100-year event hours:_____0_____

8. Estimated value of Q_{100} flood damages (if any) – moderate risk level.

A. Roadway $_____0_____
B Property $_____0_____
Total $_____0_____

9. Assessment of Level of Risk Low___X_____
Moderate____
High_____

For High Risk projects, during design phase, additional Design Study Risk Analysis May be necessary to determine design alternative.

Is there any longitudinal encroachment, significant encroachment, or any support of incompatible?

Floodplain development? NO___X_____YES_____

If yes, provide evaluation and discussion of practicability of alternatives in accordance with 23 CFR 650.113

Information developed to comply with the Federal requirement for the Location Hydraulic Study shall be retained in the project files.

SUMMARY FLOODPLAIN ENCROACHMENT REPORT

Dist. _____Co. __Alameda_____ Rte.__Dublin Avenue___ P.M. _____
Project No.: _____ Bridge No. _____
Limits:

Project limits are from the existing terminus of Dublin Avenue at Fallon Road to the west and the intersection of North Canyons Parkway and Doolan Road to the east. Along the way a 270' long proposed bridge will cross over Cottonwood Creek.

Floodplain Description:

There is one existing floodplain within the Dublin Avenue Extension Project, Cottonwood Creek. Cottonwood Creek sufficient capacity to contain the 0.2% Annual Chance Flood Discharge (500-Year storm event) within the channel.

		No	Yes
1.	Is the proposed action a longitudinal encroachment of the base floodplain?	X	___
2.	Are the risks associated with the implementation of the proposed action significant?	X	___
3.	Will the proposed action support probable incompatible floodplain development?	X	___
4.	Are there any significant impacts on natural and beneficial floodplain values?	X	___
5.	Routine construction procedures are required to minimize impacts on the floodplain. Are there any special mitigation measures necessary to minimize impacts or restore and preserve natural and beneficial floodplain values? If yes, explain.	X	___
6.	Does the proposed action constitute a significant floodplain encroachment as defined in 23 CFR, Section 650.105(q).	X	___
7.	Are Location Hydraulic Studies that document the above answers on file? If not explain.	___	X

Table 1

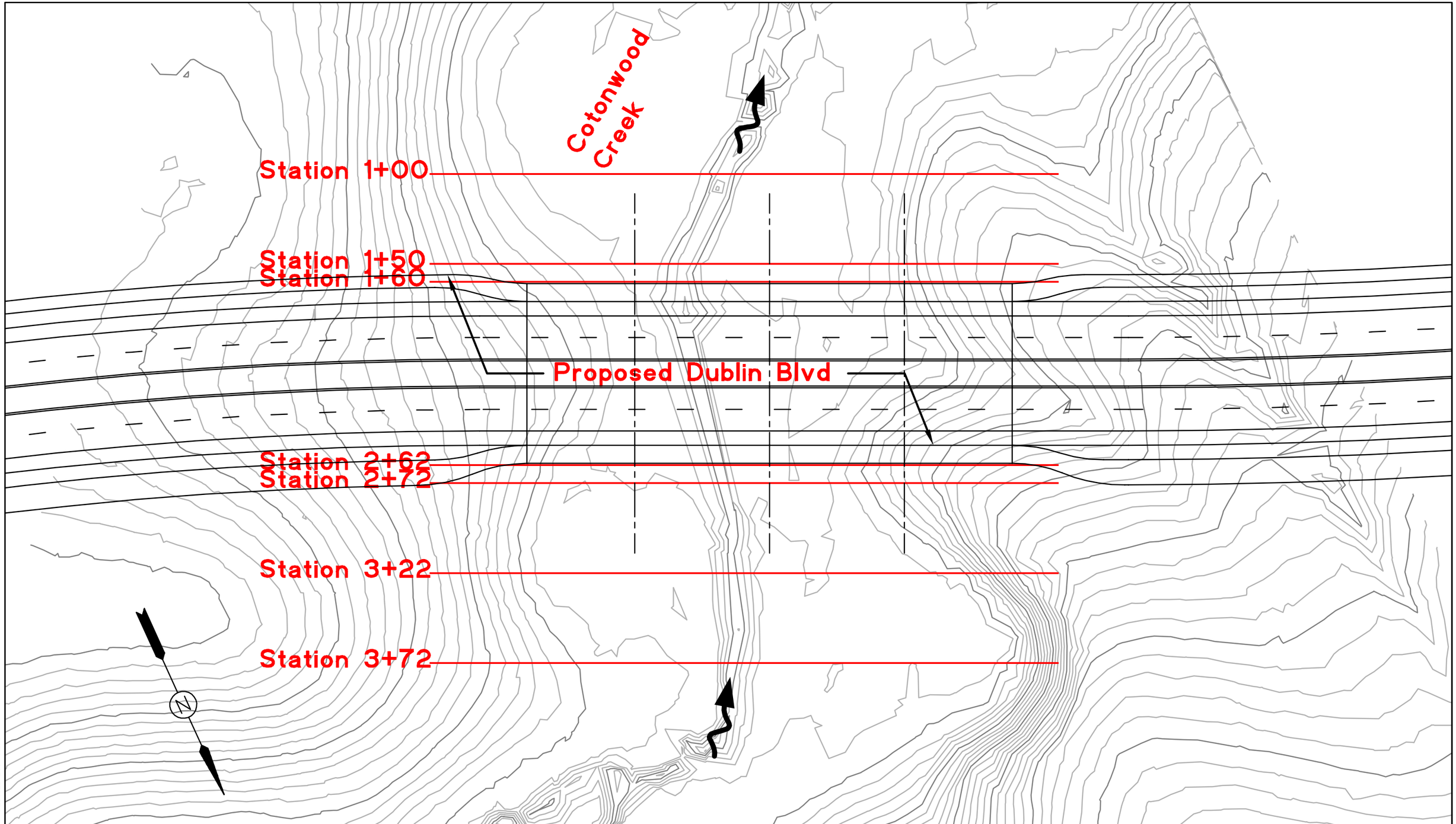
Hydraulic Condition Pre and Post-Project Cottonwood Creek (100-Year Storm)

River River Station	100-Year Flow (cfs)	Minimum Channel Elev (ft)	Water Surface Elevation (ft)	Flow Depth (ft)	Crit W.S. (ft)	Energy Grade Elevation (ft)	Energy Grade Slope (ft/ft)	Velocity Channel (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Channel
Existing Cottonwood Creek											
372	940	390	394.74	4.74		395.06	0.0048	5.86	291.0	223.4	0.55
322	940	390	394.53	4.53		394.8	0.0048	5.64	305.1	230.0	0.54
272	940	390	393.85	3.85	393.85	394.43	0.0101	7.84	207.0	164.7	0.78
262	940	390	393.68	3.68	393.68	394.26	0.0110	7.87	202.2	154.3	0.81
160	940	389	392.71	3.71		393.15	0.0080	6.82	229.4	167.9	0.69
150	940	389	392.81	3.81	392.22	393.03	0.0042	5.07	298.8	179.4	0.51
100	940	389	392.22	3.22	392.22	392.68	0.0112	7.27	227.7	210.0	0.8
Proposed Condition - Bridge over Cottonwood Creek											
372	940	390	394.74	4.74		395.06	0.0049	5.86	290.7	223.3	0.55
322	940	390	394.53	4.53		394.8	0.0049	5.65	304.6	229.9	0.54
272	940	390	393.85	3.85	393.85	394.43	0.0101	7.84	207.0	164.7	0.78
262	940	390	393.86	3.86	393.68	394.29	0.0077	6.88	231.4	159.9	0.68
210	Bridge										
160	940	389	392.71	3.71		393.15	0.0080	6.82	229.4	167.9	0.69
150	940	389	392.81	3.81	392.22	393.03	0.0042	5.07	298.8	179.4	0.51
100	940	389	392.22	3.22	392.22	392.68	0.0112	7.27	227.7	210.0	0.8

Notes:

1. Downstream boundary condition set to critial depth
2. 100-Year flow Q=940 from Hydrologic Procedures and Design Discharges, Schaaf & Wheeler date Dec 3, 1997

©BKF Engineers



JOB No: 20167083
DATE: APRIL, 2018
BY: R.A.M
REV:

GRAPHIC SCALE
50 0 50 100

FIGURE 1
DUBLIN BLVD-NORTH CANYONS EXTENSION PROJECT
LOCATION HYDRAULIC STUDY
COTTONWOOD CREEK HEC-RAS STATIONS

BKF

DRAWING NAME: \\bkf-pl\vol4\2016\167083_Dublin_Blvd-North_Canyons_Extension\DOCS\13-Proj_Items\04-LHS\HEC_RAS_Model\Exhibit.dwg
PLOT DATE: 04-24-18 PLOTTED BY: muro

Appendix C

Zone 7 Design Discharges
By Schaaf & Wheeler

HYDROLOGIC PROCEDURES

AND

DESIGN DISCHARGES

DRAFT

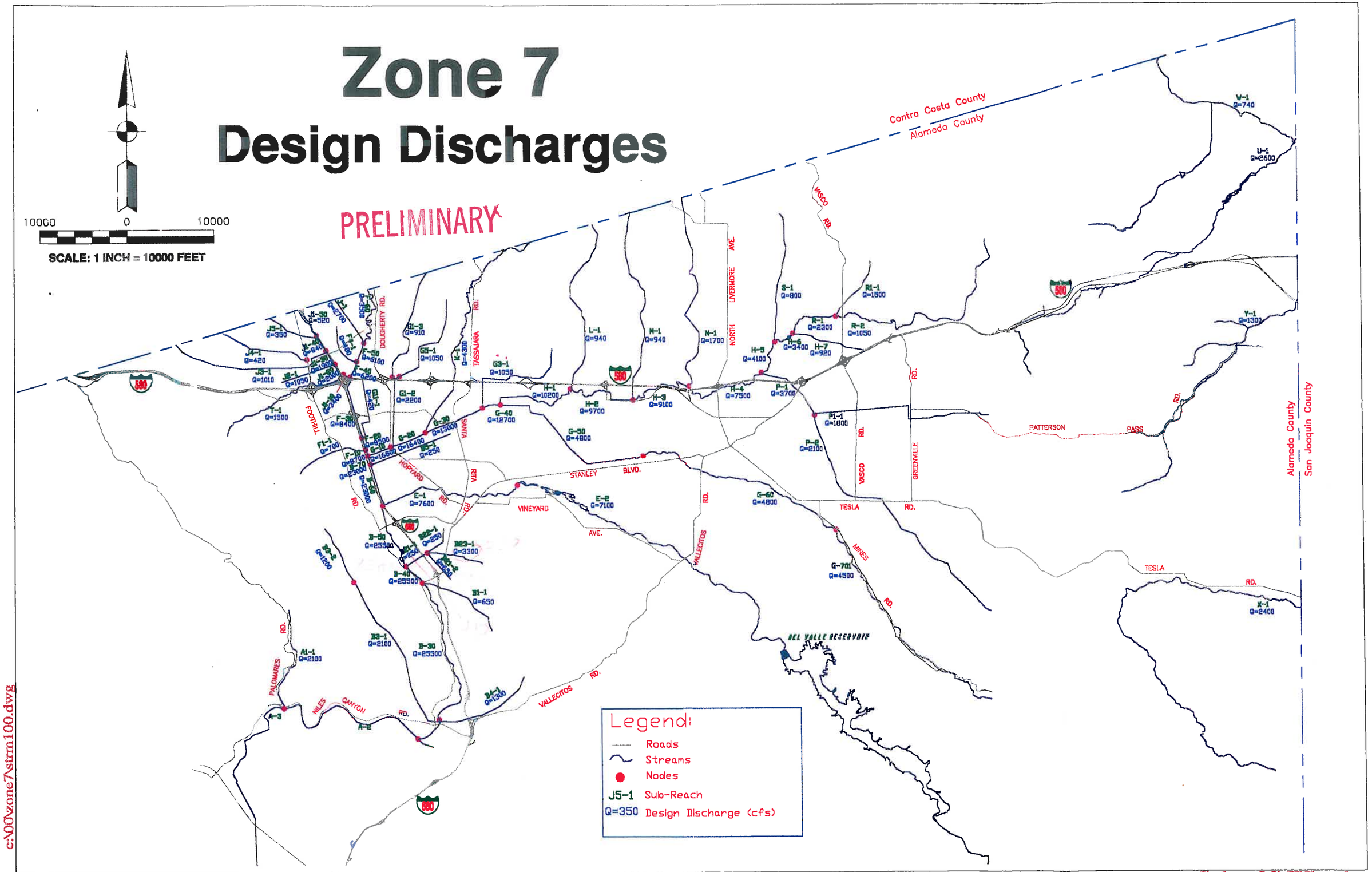
Prepared for:

Zone 7, Alameda County Flood Control
and
Water Conservation District

December 3, 1997

Schaaf & Wheeler, Consulting Civil Engineers
100 N. Winchester Blvd., Suite 200
Santa Clara, CA 95050
408-246-4848
FAX:408-246-5624

FIGURE 5

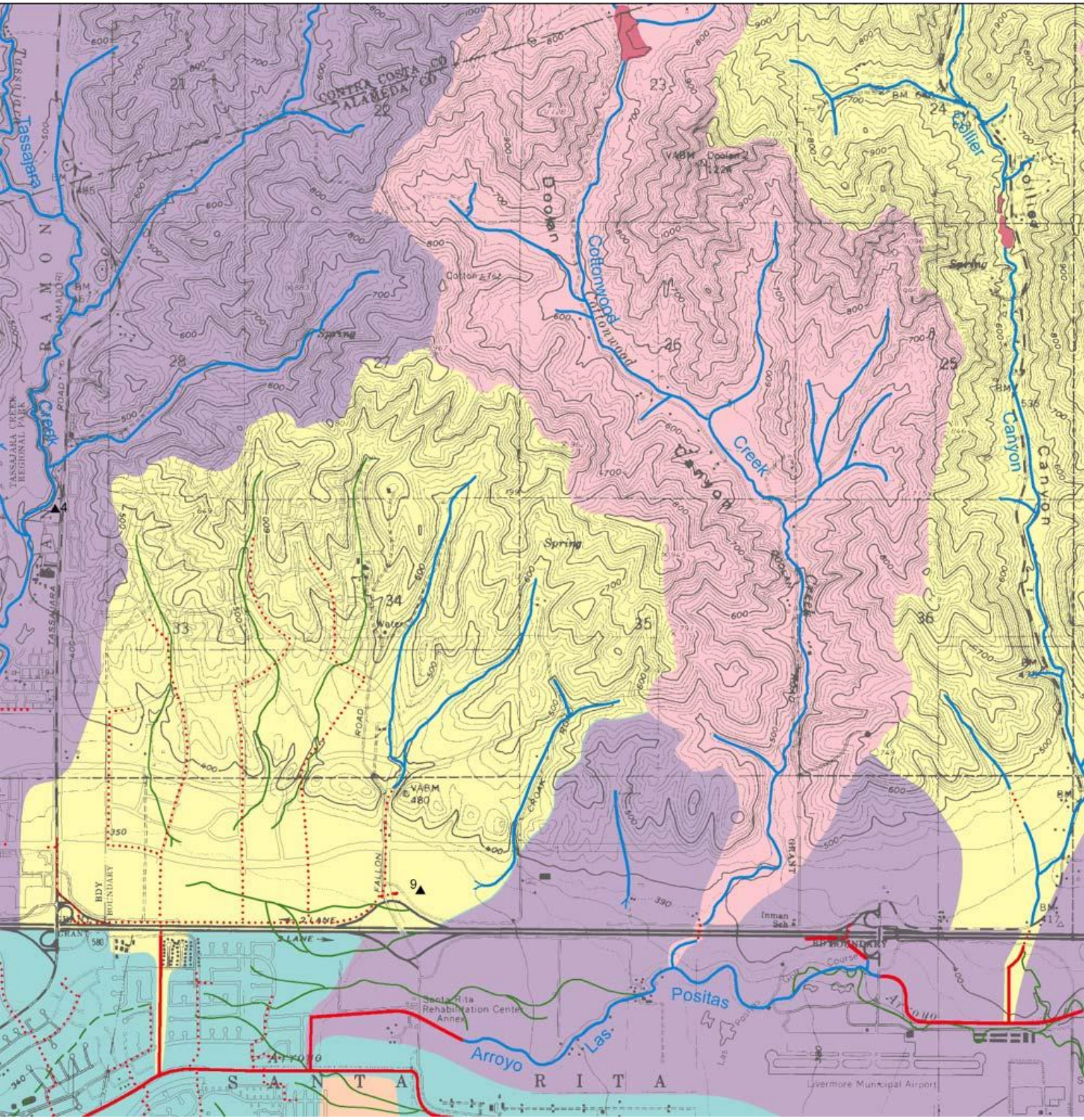


c:\00zone7\strm100.dwg

Schaaf & Wheeler

Appendix D

Historic Watershed Map


Tassajara
Creek
Cottonwood
Canyon
Creek
Canyon
Collier
Canyon
Arroyo
Las
Positas
Arroyo
S A N T A
R I T A
CONTRA COSTA CO
ALAMEDA CO
TASSAJARA CREEK REGIONAL PARK
Spring
Water
Inman Sch
Santa Rita Rehabilitation Center Annex
Livermore Municipal Airport
Golf Course

Creeks, watershed area ≥ 0.2 km^2

Underground storm drains ≥ 24"

Engineered channels

Bay, ocean or natural lakes

Artificial bodies of water

Bay fill

Present watersheds

Modern tidal marsh formed after ~1850

Historical tidal marsh, circa 1850, still present

Historical Features, circa 1850

Creeks, buried or drained, dashed where location uncertain

Shoreline or marsh boundary

Ephemeral creek

Lakes

Water spreads over the ground

Willow grove

Tidal marsh and sloughs

Now filled land

Appendix I: Noise and Vibration Assessment

DUBLIN BOULEVARD-NORTH CANYONS PARKWAY EXTENSION PROJECT

ENVIRONMENTAL NOISE AND VIBRATION ASSESSMENT

Dublin, California

November 28, 2018

Prepared for:

Brianna Ceglia Bohonok
Circlepoint
200 Webster Street, Suite 200
Oakland, CA 94607

Prepared by:

Dana M. Lodico, PE, INCE Bd. Cert.

ILLINGWORTH & RODKIN, INC.
Acoustics • Air Quality
429 E. Cotati Ave.
Cotati, CA 94931
(707) 794-0400

Project: 17-027

INTRODUCTION

This report evaluates the potential for Dublin Boulevard-North Canyons Parkway Extension Project to result in significant impacts with respect to applicable California Environmental Quality Act (CEQA) guidelines. The report is divided into two sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise, summarizes applicable regulatory criteria, and discusses the results of the ambient noise monitoring survey completed to document existing noise condition and 2) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts and provides a discussion of each project impact.

PROJECT DESCRIPTION

The Dublin Boulevard-North Canyons Parkway Extension Project would include the extension of Dublin Boulevard 1.5 miles eastward through eastern Dublin and an unincorporated portion of the County. The roadway extension would start from the current terminus of Dublin Boulevard at the Dublin Boulevard/Fallon Road intersection in Dublin and would end at the Doolan Road/North Canyons Parkway intersection along the boundary of the County and Livermore. This roadway extension would provide four to six travel lanes and bicycle and pedestrian facilities (i.e., sidewalks and bike lanes). Beginning at Fallon Road, the roadway extension would have six travel lanes (three in each direction). Continuing eastward, the roadway extension would transition to four travel lanes (two in each direction) before or at the intersection with Croak Road. From Croak Road to Doolan Road, the roadway extension would remain in the four lane configuration. The permanent area needed for the project, including the roadway, sidewalks, intersections, and land acquired for right-of-way is estimated at 29 acres.

SETTING

Fundamentals of Environmental Noise

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its *pitch* or its *loudness*. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. A *decibel (dB)* is a unit of measurement which indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its

intensity. Each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1.

There are several methods of characterizing sound. The most common in California is the *A-weighted sound level (dBA).* This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This *energy-equivalent sound/noise descriptor* is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The *Community Noise Equivalent Level* (*CNEL*) is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 pm - 10:00 pm) and a 10 dB addition to nocturnal (10:00 pm - 7:00 am) noise levels. The *Day/Night Average Sound Level* (*DNL* or L_{dn}) is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

Effects of Noise

Sleep and Speech Interference

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noises of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA CNEL. Typically, the highest steady traffic noise level during the daytime is about equal to the CNEL and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12-17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when exterior noise levels are about 57-62 dBA CNEL with open windows and 65-70 dBA CNEL if the windows are closed. Levels of 55-60 dBA are common along collector streets and secondary arterials, while 65-70 dBA is a typical value for a primary/major arterial. Levels of 75-80 dBA are normal noise levels at the

first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed, and those facing major roadways and freeways typically need special glass windows.

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn} as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. When measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 50 dBA L_{dn}. At an L_{dn} of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the L_{dn} increases to 70 dBA, the percentage of the population highly annoyed increases to about 25-30 percent of the population. There is, therefore, an increase of about 2 percent per dBA between an L_{dn} of 60-70 dBA. Between an L_{dn} of 70-80 dBA, each decibel increase increases by about 3 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the CNEL is 60 dBA, approximately 30-35 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 3 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 4 percent increase in the percentage of the population highly annoyed.

Fundamentals of Groundborne Vibration

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One method is the Peak Particle Velocity (PPV). The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. In this report, a PPV descriptor with units of mm/sec or in/sec is used to evaluate construction generated vibration for building damage and human complaints. Table 3 displays the reactions of people and the effects on buildings that continuous or frequent intermittent vibration levels produce. The guidelines in Table 3 represent syntheses of vibration criteria for human response and potential damage to buildings resulting from construction vibration.

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related groundborne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess groundborne vibration and almost exclusively to assess the potential of vibration to cause damage and the degree of annoyance for humans.

The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Human perception to vibration varies with the individual and is a function of physical

setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level.

Structural damage can be classified as cosmetic only, such as paint flaking or minimal extension of cracks in building surfaces; minor, including limited surface cracking; or major, that may threaten the structural integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher. The damage criteria presented in Table 3 include several categories for ancient, fragile, and historic structures, the types of structures most at risk to damage. Most buildings are included within the categories ranging from “Historic and some old buildings” to “Modern industrial/commercial buildings”. Construction-induced vibration that can be detrimental to the building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity occurs immediately adjacent to the structure.

The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage.

Railroad and light-rail operations are potential sources of substantial ground vibration depending on distance, the type and the speed of trains, and the type of railroad track. People’s response to ground vibration from rail vehicles has been correlated best with the average, root mean square (RMS) velocity of the ground. The velocity of the ground is expressed on the decibel scale. The reference velocity is 1 x 10-6 in/sec RMS, which equals 0 VdB, and 1 in/sec equals 120 VdB. Although not a universally accepted notation, the abbreviation “VdB” is used in this document for vibration decibels to reduce the potential for confusion with sound decibels.

Typical background vibration levels in residential areas are usually 50 VdB or lower, well below the threshold of perception for most humans. Perceptible vibration levels inside residences are attributed to the operation of heating and air conditioning systems, door slams and foot traffic. Construction activities, train operations, and street traffic are some of the most common external sources of vibration that can be perceptible inside residences. Table 4 illustrates some common sources of vibration and the association to human perception or the potential for structural damage.

TABLE 1 Definition of Acoustical Terms Used in this Report

Term	Definition
Decibel, dB	A unit describing, the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micro Pascals.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e. g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels measured in the night between 10:00 pm and 7:00 am.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: Handbook of Acoustical Measurements and Noise Control, Harris, 1998.

TABLE 2 Typical Noise Levels in the Environment

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110 dBA	Rock band
Jet fly-over at 1,000 feet		
	100 dBA	
Gas lawn mower at 3 feet		
	90 dBA	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80 dBA	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	70 dBA	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60 dBA	
		Large business office
Quiet urban daytime	50 dBA	Dishwasher in next room
Quiet urban nighttime	40 dBA	Theater, large conference room
Quiet suburban nighttime		
	30 dBA	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20 dBA	
		Broadcast/recording studio
	10 dBA	
	0 dBA	

Source: Technical Noise Supplement (TeNS), California Department of Transportation, September 2013.

TABLE 3 Reaction of People and Damage to Buildings from Continuous or Frequent Intermittent Vibration Levels

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.01	Barely perceptible	No effect
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.1	Strongly perceptible	Threshold at which there is a risk of damage to fragile buildings with no risk of damage to most buildings
0.25	Strongly perceptible to severe	Threshold at which there is a risk of damage to historic and some old buildings.
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential structures
0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to new residential and modern commercial/industrial structures

Source: Transportation and Construction Vibration Guidance Manual, California Department of Transportation, September 2013.

Regulatory Background – Noise

The State of California, the Cities of Dublin and Livermore, and Alameda County have established regulatory criteria that are applicable in this assessment. The State CEQA Guidelines, Appendix G, are used to assess the potential significance of impacts pursuant to local General Plan policies, Municipal Code standards, or the applicable standards of other agencies. A summary of the applicable regulatory criteria is provided below.

State CEQA Guidelines. The California Environmental Quality Act (CEQA) contains guidelines to evaluate the significance of environmental noise impacts attributable to a proposed project. Applicable CEQA checklist questions ask whether the project would result in:

a) Exposure of persons to or generation of noise levels in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies?

b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

f) For a project located in the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

The project is proposed within the 55 CNEL noise contour for the Livermore Municipal Airport. However, the project does not propose noise sensitive land uses and aircraft noise levels would be well below the noise produced by the construction equipment necessary to complete the project when construction workers would be working at the site; therefore, checklist items e) and f) are not applicable to the project.

City of Dublin General Plan. The City of Dublin's Noise Element of the General Plan aims to mitigate traffic noise to appropriate levels considered compatible for community noise environments. The City's normally acceptable exterior noise exposure standard is 60 dBA CNEL or less for residential and hotels and 70 dBA CNEL or less for offices and retail commercial.

City of Dublin Municipal Code. The City of Dublin's Municipal Code includes standards pertaining to noise control within the City. Municipal Code Section 5.28.020 prohibits any person within the City to make any loud, or disturbing, or unnecessary, or unusual or habitual noise or any noise which annoys or disturbs or injures or endangers the health, repose, peace or safety of any reasonable person of normal sensitivity present in the area.

City of Livermore General Plan. The City of Livermore's normally acceptable exterior noise exposure standard is 60 dBA CNEL or less for single-family residential, 65 dBA CNEL or less for multi-family and hotels, and 70 dBA CNEL or less for office buildings, commercial, and retail. The following policies are applicable to the proposed project:

Objective N-1.2: Adopt design standards and identify effective noise attenuation programs to prevent noise or reduce noise to acceptable levels.

- Policy 1. When crafting mitigation programs for adverse noise exposure from new development, the City shall encourage the use of noise attenuation programs that avoid constructing sound walls.

- Policy 5. During all phases of construction, the City shall take measures to minimize the exposure of neighboring properties to excessive noise levels from construction related activity.

- Policy 8. It shall be the responsibility of new development or new land uses to be consistent with noise standards appropriate and sensitive to adjacent land uses

Objective N-1.4: Reduce noise levels from traffic, which is the single largest continual source of unacceptable noise in the City.

- Policy 2. The City shall minimize potential transportation noise through proper design of street circulation, coordination of routing, and other traffic control measures.

- Policy 4. The City shall require exterior noise in backyards to be Normally Acceptable at a maximum of 60 dBA CNEL for single-family development and a maximum of 65 dBA CNEL for multi-family development.

- Policy 5. The City will consider sound walls as a means of noise mitigation along proposed and existing roadway segments and railroad right-of-ways only after other noise attenuation programs such as building construction, larger landscaped berms, and distances have been considered to reduce noise to appropriate levels in residential areas.

City of Livermore Municipal Code. The City of Livermore prohibits the operation, between the hours of 6:00 p.m. Saturday to 7:00 a.m. Monday; 8:00 p.m. to 7:00 a.m. on Monday, Tuesday, Wednesday and Thursdays; 8:00 p.m. Friday to 9:00 a.m. on Saturday or at all on city-observed holidays, of any pile driver, pneumatic tools, derrick, electric hoist, sandblaster or other equipment used in construction, demolition or other repair work, the use of which is attended by loud or unusual noise.

Additionally, the city engineer and/or building official shall have the authority to authorize construction activities during the hours specified above for the following reasons:

1. A public agency, other than the city, requires as a condition of a permit that the construction be done during the restricted hours.

2. Public health, safety or welfare requires the work to be done during the restricted hours.

3. Specific construction activities (such as large concrete foundation pours) can be identified and approved to occur as an exemption to this ordinance in the conditions of approval for a project at the time of the public hearing.

If the city engineer and/or building official approves the exception or it is an exception allowed by the conditions of approval for the project, the following shall be done:

1. Notify the Livermore police department, watch commander, at least 24 hours in advance.

2. Notify residents and business owners that are adjacent to the work area at least 24 hours in advance. The limits of this notification shall be determined by the city engineer and/or building official.

Alameda County Municipal Code. Construction is exempt from the noise limits specified in Alameda County's Municipal Code, provided that construction activities are limited to the hours between 7:00 am to 7:00 pm, Mondays through Fridays, and 8:00 am to 5:00 pm on Saturdays and Sundays.

Existing Noise Environment

A noise monitoring survey was conducted from December 12th to 14th, 2017, to identify land uses that could be subject to traffic and construction noise impacts from the proposed project and to measure ambient noise levels at these locations. The monitoring survey included two long-term (L1 and L2) noise measurements and six short-term (S1 through S6) noise measurements. The primary existing noise source in the area is vehicles traveling on I-580 and local roads. Local non-traffic related noise sources include aircraft, sounds of nature, and agricultural operations. Measurement locations are shown in Figure 1. The daily trends in noise levels for the long-term measurements are shown in Figures 2 and 3. Table 4 summarizes the results of the short-term measurements. Two consecutive short-term noise measurements were made at each location, as indicated in Table 4.

TABLE 4 Summary of Short-Term Noise Measurement Data

Site	Location	Start Time	Measured Noise Levels, dBA				Primary Noise Source
			L_{10}	L_{50}	L_{90}	L_{eq}	
S1	2601 Alliston Loop, Dublin	11:30 a.m.	63	60	56	60	Traffic on Fallon Road
		11:40 a.m.	63	60	56	60	
S2	3899 Camino Loop, Dublin	11:20 a.m.	49	45	43	52	Distant traffic (I-580), intermittent aircraft, occasional local traffic
		11:30 a.m.	47	45	43	46	
S3	Croak Road, north of Central Parkway, Dublin	10:50 a.m.	45	39	35	45	Distant traffic (I-580), intermittent aircraft, occasional local traffic
		11:00 a.m.	48	42	38	45	
S4[1]	Croak Road, 730 feet north of I-580, Dublin	10:10 a.m.	61	58	53	58	Traffic on I-580, police sirens
		10:20 a.m.	58	56	54	57	
S5	500 feet north of I-580, Dublin	10:00 a.m.	60	59	57	59	Traffic on I-580
		10:10 a.m.	62	59	58	61	
S6	901 Doolan Road, Livermore	10:30 a.m.	61	52	50	59	Traffic on I-580 and Doolan Road
		10:40 a.m.	61	51	49	60	

[1] Measurement location S4 was selected to be representative of the adjacent residence, but was not located at the noise sensitive land use due to access restrictions. Measurement results were used to determine the Existing loudest hour at the adjacent sensitive land use represented by R4 (see Figure 1).

FIGURE 1 Noise Measurement and Modeling Positions

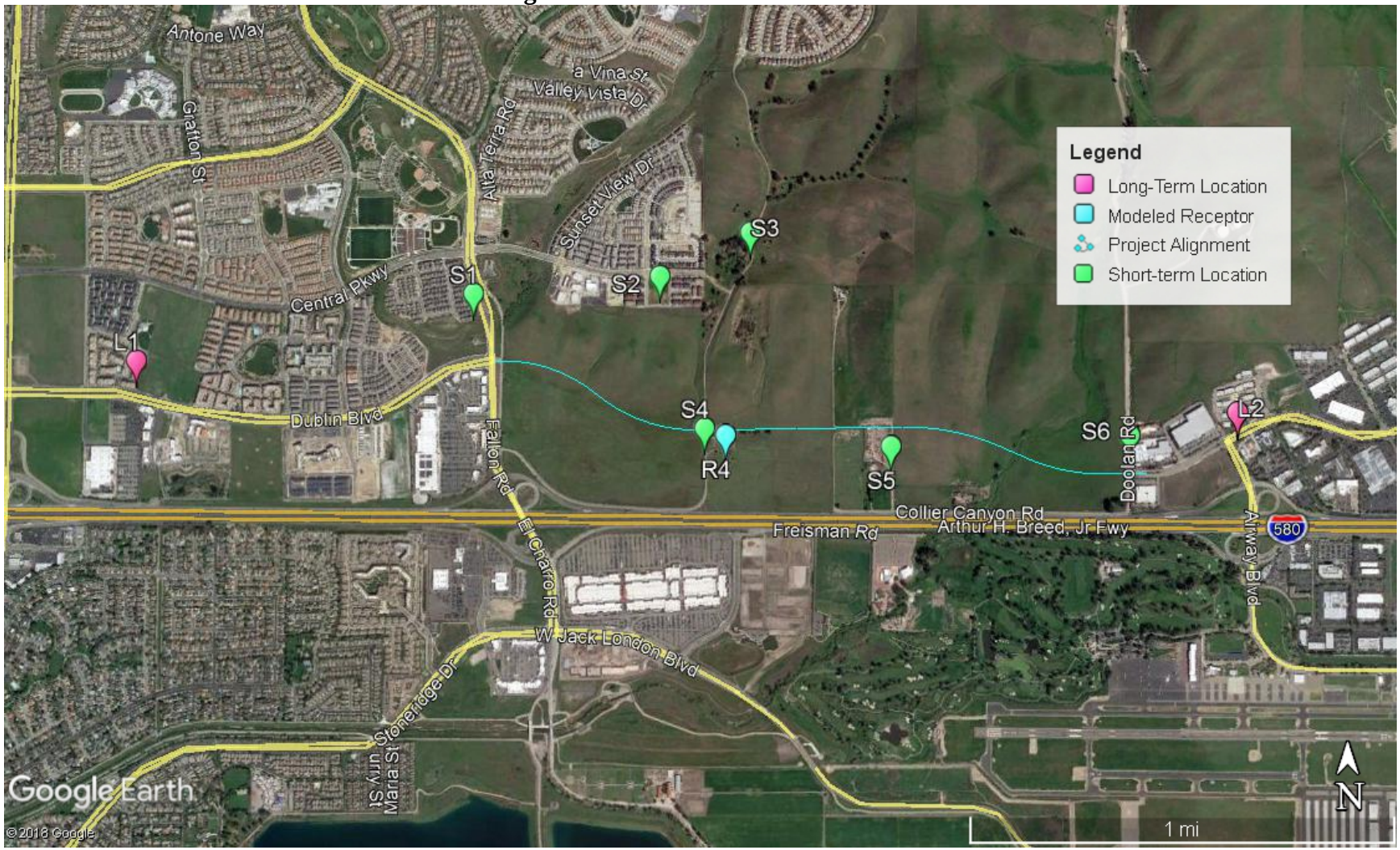


FIGURE 2 Daily Noise Trends at L1, 1051 Airway Boulevard, Livermore, Wednesday, December 13th, 2017

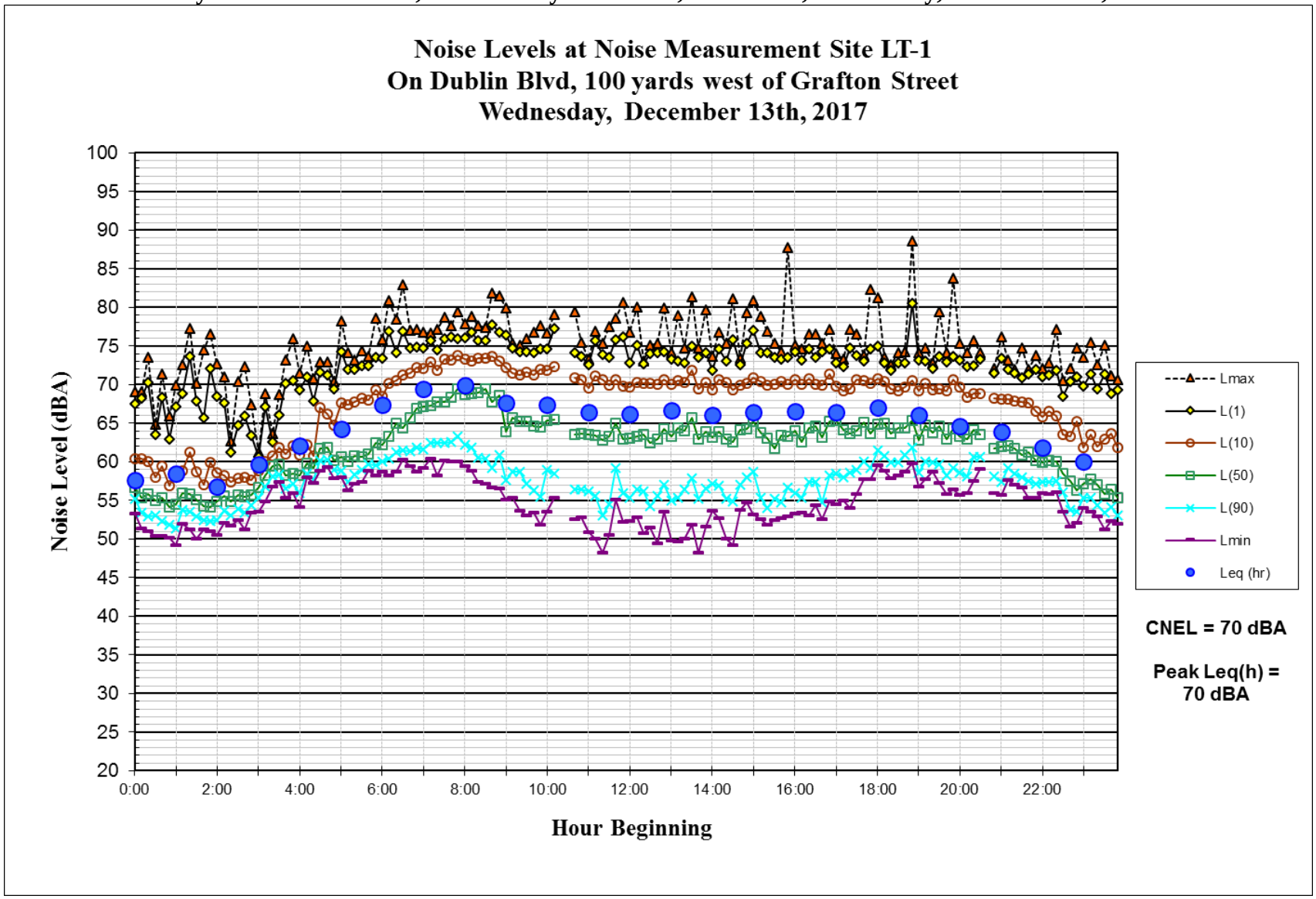
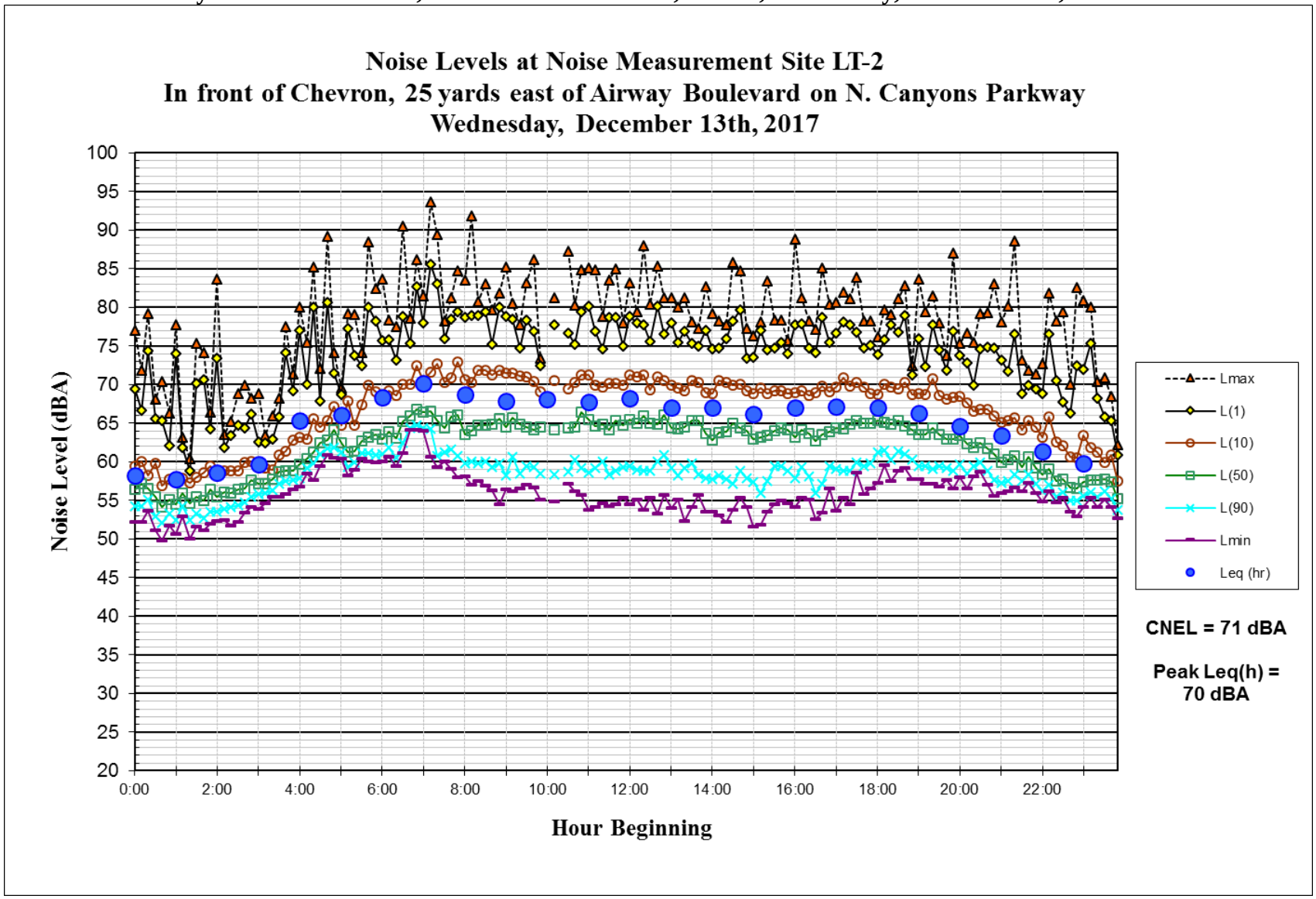


FIGURE 3 Daily Noise Trends at L2, 3637 Dublin Boulevard, Dublin, Wednesday, December 13th, 2017



NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

The following criteria were used to evaluate the significance of environmental noise resulting from the project:

- **Noise Levels in Excess of Standards:** A significant noise impact would be identified if the project would expose persons to or generate noise levels that would exceed applicable noise standards presented in the Dublin, Livermore, or Alameda County. Where noise standards conflict, the more conservative standard is applied.

- **Groundborne Vibration from Construction:** Neither the Cities of Dublin or Livermore, nor Alameda County define excessive groundborne vibration levels. To avoid structural damage, the California Department of Transportation recommends a vibration limit of 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards, which typically consist of buildings constructed since the 1990s. A conservative vibration limit of 0.3 in/sec PPV has been used for buildings that are found to be structurally sound but where structural damage is a major concern (see Table 3).

- **Permanent Noise Increases:** Neither the Cities of Dublin or Livermore, nor Alameda County define the permanent noise level increase that is considered substantial. Typically, a permanent increase in the day-night average noise level of 3 dBA CNEL or greater at noise-sensitive receptors would be considered significant when projected noise levels would exceed those considered satisfactory for the affected land use. An increase of 5 dBA CNEL or greater would be considered significant when projected noise levels would continue to meet those considered satisfactory for the affected land use.

- **Construction Noise:** Neither the Cities of Dublin or Livermore, Alameda County, nor the State of California define the temporary noise level increase that is considered substantial. Based on the thresholds for speech interferences (see Setting Section), a significant temporary noise increase would be identified if hourly average construction noise levels exceed 60 dBA L_{eq} and the ambient by at least 5 dBA L_{eq} at residential land uses for a period of more than one year.

Impact 1: **Conflict with Established Standards.** The project would not conflict with local noise standards. **This is a less-than-significant impact.**

Applicable standards, goals, and policies contained in the City of Dublin's, the City of Livermore's, and Alameda County's General Plans and Municipal Codes are summarized in the Setting section of this report. These document do not contain noise standards applicable to project construction. The City of Livermore limits the operation of any pile driver, pneumatic tools, derrick, electric hoist, sandblaster or other equipment used in construction, demolition or other repair work, the use of which is attended by loud or unusual noise, to between the hours of 7:00 a.m. and 8:00 p.m. on weekdays and 9:00 a.m. and 6:00 p.m. on Saturdays, with these operations prohibited on Sundays and Holidays. Alameda County limits construction activities to the hours

between 7:00 am to 7:00 pm, Mondays through Fridays, and 8:00 am to 5:00 pm on Saturdays and Sundays.

The project would be constructed through largely undeveloped areas. Construction activities would include but are not limited to demolition, earthwork, paving, pile driving, concrete/rebar/formwork, utility trenching, and roadway striping. Pile driving is a possible construction method needed to construct the bridge over Cottonwood Creek. Construction staging would be located at the eastern end of the project site, south of the roadway extension and north of Collier Canyon Road. Project construction would occur in a single construction phase.

Construction noise would primarily result from the operation of heavy construction equipment and arrival and departure of heavy-duty trucks. The highest maximum instantaneous noise levels would result from special impact tools such as impact pile drivers. FHWA's Roadway Construction Noise Model (RCNM) was used to calculate the maximum and average noise levels anticipated during each phase of construction. This construction noise model includes representative sound levels for the most common types of construction equipment and the approximate usage factors of such equipment that were developed based on an extensive database of information gathered during the construction of the Central Artery/Tunnel Project in Boston, Massachusetts (CA/T Project or "Big Dig"). The usage factors represent the percentage of time that the equipment would be operating at full power. Vehicles and equipment anticipated during each phase of construction were input into RCNM to calculate noise levels at a distance of 100 feet. Table 5 presents the construction noise levels calculated for each major phase of the project. In some instances, maximum instantaneous noise levels are calculated to be slightly lower than hourly average noise levels. This occurs because the model reports the maximum instantaneous noise level generated by the loudest single piece of construction equipment, while alternatively, the model reports the hourly average noise levels resulting from the additive effect of multiple pieces of construction equipment operating simultaneously. Noise generated by construction equipment drops off at a rate of 6 dB per doubling of distance.

TABLE 5 Noise Levels by Construction Phase at 100 feet

Construction Phase	Maximum Noise Level (L_{max}, dBA)	Hourly Average Noise Level (L_{eq}, dBA)
Site Preparation	84	85
Grading and Excavation	79	82
Sewer Trenching and Installation	75	79
Utility Trenching and Installation	75	79
Bridge Foundations	75	77
Impact Pile Driving	95	88
Bridge Abutment and Piers	75	76
Bridge Superstructure/ Barriers	75	76
Landscaping, Irrigation, and Lighting	75	76
Paving	77	80

Although the overall construction schedule is anticipated to occur over a period exceeding 12 months, roadway construction activities typically occur for relatively short periods of time in any specific location as construction proceeds along the project's alignment. Much of construction would be located more than 500 feet from any noise sensitive receptors, resulting in noise levels that are 14 dBA or more below the levels indicated in Table 5. Residences are located 4,000 feet or greater from pile driving activities. At a distance of 4,000 feet, pile driving activities would generate hourly average noise levels of about 56 dBA L_{eq} and maximum instantaneous noise levels of about 63 dBA L_{max}.

To reduce the potential for noise impacts resulting from project construction, the following measures should be implemented during project construction.

Mitigation Measure 1:

- The project shall submit a Construction Noise Management Program that identifies measures proposed to minimize construction noise impacts on existing residents.

- Construction shall be limited to comply with local ordinances. If work is necessary outside of these hours, the contractor shall acquire appropriate permits from the local jurisdiction and implement a construction noise monitoring program, providing additional mitigation where practical and feasible.

- Pile driving activities should be limited to daytime hours only, when feasible. If pile driving outside of typical construction hours specified in this measure is required, the contractor shall acquire appropriate permits from the local jurisdiction and implement a construction noise monitoring program, providing additional mitigation where practical and feasible.

- Equip all internal combustion engine driven equipment with manufacturer recommended intake and exhaust mufflers that are in good condition and appropriate for the equipment.

- Locate stationary noise generating equipment as far as possible from sensitive receptors when sensitive receptors adjoin or are near a construction project area.

- Utilize "quiet" air compressors and other "quiet" equipment where such technology exists.

- Prohibit unnecessary idling of internal combustion engines within 100 feet of residences.

- Avoid staging of construction equipment within 200 feet of sensitive uses.

- The construction contractor shall designate a noise disturbance coordinator who would be responsible for responding to any local complaints about construction noise. When a complaint is received, the disturbance coordinator shall notify the City within 24 hours of the complaint and determine the cause of the noise complaints (starting too early, bad muffler, etc.) and institute reasonable measures warranted to correct the problem, as deemed acceptable by the City of Dublin Community Development Department. The construction contractor shall conspicuously post the contact name and telephone number for the noise disturbance coordinator at the construction site.

This impact is **less-than-significant**.

Impact 2: **Groundborne Vibration.** The proposed project will not result in excessive groundborne vibration at structures in the vicinity. **This is a less-than-significant impact.**

A significant impact would be identified if project construction activity or project-related vehicle traffic would result in vibration levels of 0.3 in/sec PPV or greater at nearby structures. Project-related vehicle traffic is not anticipated to generate perceptible levels of groundborne vibration at nearby structures (vibration levels are anticipated to be below 0.01 in/sec PPV). Project construction equipment to be used on the project is anticipated to include concrete saws, excavators, graders, dozers, backhoes, forklifts, cement mixers, bore/drill rigs, aerial lifts, cranes, welders, generators, pavers, paving equipment, rollers, and pick-up trucks. Pile driving is anticipated as part of the construction of the project bridge over Cottonwood Creek. Construction activities with the greatest potential of generating perceptible vibration levels would include pile driving, the removal of pavement and soil, the movement of heavy tracked equipment, and vibratory compacting of roadway base materials by use of a roller. Table 6 summarizes typical vibration levels associated with varying pieces of construction equipment at a distance of 25 feet.

TABLE 6 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)
Pile Driver (Impact)	upper range	1.158
	typical	0.644
Pile Driver (Sonic)	upper range	0.734
	typical	0.170
Clam shovel drop		0.202
Hydromill (slurry wall)	in soil	0.008
	in rock	0.017
Vibratory Roller		0.210
Hoe Ram		0.089
Large bulldozer		0.089
Caisson drilling		0.089
Loaded trucks		0.076
Jackhammer		0.035
Small bulldozer		0.003

Source: Transit Noise and Vibration Impact Assessment, United States Department of Transportation, Office of Planning and Environment, Federal Transit Administration, September 2018.

A review of the anticipated construction equipment and the vibration level data provided in Table 6 indicates that vibration levels generated by proposed activities and equipment other than pile driving would be below the 0.3 in/sec PPV criteria when construction occurs at distances of 20 feet or greater from structures. Pile driving activities would be below the 0.3 in/sec PPV criteria when construction occurs at distances of 100 feet or greater from structures. There are no existing structures located within 100 feet of the project alignment and architectural or structural damage to normal structures would not be anticipated. This is a **less-than-significant** impact.

Mitigation Measure 2: None Required.

Impact 3: Permanent Traffic Noise Increases. Project generated traffic and changes to the roadway alignment would not substantially increase traffic noise levels at noise sensitive land uses in the vicinity of the project. **This is a less-than-significant impact.**

A permanent increase in the day-night average noise level of 3 dBA CNEL or greater at noise-sensitive receptors would be considered significant when projected noise levels would exceed those considered satisfactory for the affected land use. An increase of 5 dBA CNEL or greater would be considered significant when projected noise levels would continue to meet those considered satisfactory for the affected land use. Both the Cities of Dublin and Livermore define a noise level of 60 dBA CNEL or less to be normally acceptable for residential land uses and 70 dBA CNEL or less to be normally acceptable for commercial land uses.

Traffic noise modeling was conducted using the Federal Highway Administration's Traffic Noise Model (TNM v 2.5). Roadway/site geometries were entered into the model based on digital project plans, GIS coordinates, observations documented in the field, and a review of available mapping software such as Google Earth, etc. Traffic volumes were provided by Kittelson & Associates, Inc. The primary existing noise source at receptors located along the proposed alignment of the Dublin Boulevard – North Canyons Parkway Extension is vehicles traveling on I-580, which is located 500 feet to 2,500 feet from these receptors. Local non-traffic related noise sources include aircraft, sounds of nature, and agricultural operations. TNM has been validated by FHWA within 500 feet of a highway or roadway noise source; therefore, Existing noise levels were established based on the results of noise monitoring and modeling results.

Traffic noise modeling results and predicted traffic noise impacts for existing and design year conditions are shown in Table 7. Receptor locations are indicated in Figure 1. Based on a review of measured and modeled data, the CNEL at each location was calculated to be equal to the peak-hour traffic noise level.

TABLE 7 Modeled Traffic Noise Levels

Receiver	Land Use	Calculated CNEL, dBA			Noise Increase Over Existing, dBA		2040 Build Noise Increase Over No Build, dBA
		Existing	2040 No Build	2040 Build	2040 No Build	2040 Build	
S1	Residential	63	64	65	1	2	1
S2	Residential	50	50	51	0	1	1
S3	Residential	48	48	48	0	0	0
R4	Residential	63	63	64	0	1	1
S5	Agricultural	67	67	67	0	0	0
S6	Office	63	63	65	0	2	2

As shown in Table 7, traffic noise increases at existing land uses along the proposed project alignment are calculated to increase by 0 to 2 dBA CNEL. Existing noise levels at residential

receptors R4 and S1 currently exceed the Cities' noise and land use compatibility thresholds for residential land use and would continue to do so with the development of the project. The primary noise source at these locations is traffic on I-580 (R4) or traffic on local roadways (S1). The project's contribution to traffic noise levels at these locations would be 1 dBA or less, which would not be considered significant because the increase is below the applicable significance threshold of an increase of 3 dBA CNEL. All other existing land uses would be considered compatible with the noise environment and would experience project generated noise increases of less than the applicable significance threshold of an increase in 5 dBA CNEL.

Traffic data provided by Kittelson & Associates, Inc. was also reviewed to calculate potential traffic noise level increases attributable to the Dublin Boulevard – North Canyons Parkway Extension expected along roadways serving the site. Roadways evaluated in the analysis included Dublin Boulevard, North Canyons Parkway, Hacienda Drive, Tassajara Road, Fallon Road, the I-580 ramps, El Charro Road, Airway Boulevard, Doolan Road, Isabel Avenue, Portola Avenue, and Murrieta Boulevard. Traffic volumes under the 2025 + Project scenario were compared to the 2025 No Build scenario and traffic volumes under the 2040 + Project scenario were compared to 2040 No Build conditions to calculate the noise increase attributable to the project. The data indicate that traffic volumes in the site vicinity will increase as a result of the proposed project. Traffic noise levels due to the proposed project are calculated to increase by 0 to 1 dBA CNEL along all existing roadways in the network. These noise increases would not be considered significant because the noise increases would be less than the lowest applicable significance threshold of 3 dBA CNEL. This is a **less-than-significant** impact.

Mitigation Measure 3: None Required.

Impact 4: **Temporary Construction Noise Increases.** The project will not expose off-site noise-sensitive land uses to a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. **This is a less-than-significant impact.**

Neither the Cities of Dublin and Livermore, Alameda County, nor the State of California specify quantitative thresholds for the impact of temporary increases in noise due to construction. The threshold for speech interference indoors is 45 dBA. Assuming a 15 dB exterior-to-interior reduction for standard residential construction with windows open and a 25 dB exterior-to-interior reduction for standard commercial construction, assuming windows closed, this would correlate to an exterior threshold of 60 dBA L_{eq} at residential land uses. Therefore, the project would be considered to generate a significant temporary construction noise impact if project construction activities exceeded 60 dBA L_{eq} at nearby residences and exceeded the ambient noise environment by 5 dBA L_{eq} or more for a period longer than one year.

As described in Impact 1, noise impacts resulting from construction depend upon the noise generated by various pieces of construction equipment, the timing and duration of noise-generating activities, and the distance between construction noise sources and noise-sensitive areas. Construction activities would include demolition, earthwork, paving, pile driving, concrete/rebar/formwork, utility trenching, and roadway striping. Anticipated construction activities and resulting noise levels are described in Impact 1. As described in Impact 1, unshielded

noise levels at 100 feet from the center of construction activities would generally range from 76 to 85 dBA L_{eq} during peak periods without pile driving and would be about 88 dBA L_{eq} during periods with pile driving, with the highest maximum instantaneous noise levels typically ranging from 75 to 84 dBA L_{max} without pile driving and about 95 dBA L_{max} during pile driving. Noise produced by construction equipment typically attenuates over distance at a rate of about 6 dB per doubling of distance.

Existing peak-hour noise levels are in the range of 48 to 63 dBA L_{eq} at adjacent residences. Construction noise levels at these residences, which are located 300 to more than 2,000 feet from project construction, would range from 66 to 75 dBA L_{eq} at R4, 60 to 69 dBA L_{eq} at S1, 52 to 61 dBA L_{eq} at S2, and 50 to 59 dBA L_{eq} at S3, not taking additional noise reduction from shielding into account, during periods without pile driving when construction is located closest to residences. Residences are located 4,000 feet or greater from pile driving activities proposed to construct the bridge over Cottonwood Creek. At a distance of 4,000 feet, pile driving activities would generate hourly average noise levels of about 56 dBA L_{eq} and maximum instantaneous noise levels of about 63 dBA L_{max}.

Average noise levels could exceed ambient daytime noise levels at adjacent residential land uses by 0 to 6 dBA L_{eq} during most construction phases when construction is located closest to residences and by 6 to 15 dBA L_{eq} during site preparation. Pile driving activities would generally be below 60 dBA L_{eq} at residences due to the large distance from Cottonwood Creek bridge construction.

Hourly average construction noise levels would exceed 60 dBA L_{eq} and ambient noise levels by as much as 15 dBA L_{eq} during short periods of site preparation work located closest to residences, but would be 5 dBA L_{eq} or less above ambient levels during most phases of construction. Additionally, although construction is anticipated to occur over a total period of greater than 1-year, the duration of noise generating activities at individual locations along the project alignment would be significantly shorter as construction moves along the alignment and progress occurs. Construction noise levels at residences would not be anticipated to exceed 60 dBA L_{eq} and the ambient noise environment by 5 dBA L_{eq} or more for a period longer than one year. As discussed in Impact 1, construction would be conducted in compliance with the appropriate local regulatory criteria and would include standard noise suppression devices and techniques, as described in Mitigation Measure 1.

Mitigation Measure 4: No Additional Mitigation Required. This is a **less-than-significant** impact with implementation of Mitigation Measure 1.

Appendix J: Energy Report

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DUBLIN BOULEVARD NORTH CANYONS PARKWAY EXTENSION ENERGY REPORT

Dublin, California

November 28, 2018

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Regulatory Background

This energy analysis has been prepared pursuant to the California Environmental Quality Act (CEQA). CEQA Appendix F requires that EIRs include a discussion of the potential energy impacts of proposed projects, with particular emphasis on avoiding or reducing inefficient, wasteful and unnecessary consumption of energy. The purpose of this analysis is to compare the energy consumption impacts associated with the new proposed roadway extension. Relative energy consumption impacts are evaluated in terms of direct energy consumption, indirect energy consumption, and total energy consumption.

Affected Environment

In 2016, total energy use per person in the State of California was 199 million British thermal units (MBTU)[1], according to the 2016 census there are approximately 59,830 residents in the City of Dublin and 89,115 residents in the city of Livermore. This would equate to approximately 29,640 billion BTU's of energy consumption per year in the Dublin/Livermore area. According to the California Energy Commission, nearly half of the energy consumed in the state is used in transportation[2]. This project should decrease the amount of energy consumed by improving traffic flow. It is expected that the amount of energy consumed by the construction of this project will be a small percentage of the total energy consumed in the Dublin/Livermore area.

Project Description

The Build Alternative would include the extension of Dublin Boulevard approximately 1.5 miles eastward through eastern Dublin and an unincorporated portion of the County. The roadway extension would start from the current terminus of Dublin Boulevard at the Dublin Boulevard/Fallon Road intersection in Dublin and would end at the Doolan Road/North Canyons Parkway intersection along the boundary of the County and Livermore. This roadway extension would provide four to six travel lanes and bicycle and pedestrian facilities (i.e., sidewalks and bike lanes). Beginning at Fallon Road, the roadway extension would have six travel lanes (three in each direction). Continuing eastward, the roadway extension would narrow to four travel lanes (two in each direction) before intersecting with Croak Road. From Croak Road to Doolan Road, the roadway extension would remain in the four lane configuration. The permanent area needed for the project, including the roadway, sidewalks, intersections, and land acquired for right-of-way is estimated at 29 acres.

Project design features and components include (from west to east):

[1] http://www.eia.gov/state/rankings/?sid=CA#series/12
[2] http://www.consumerenergycenter.org/transportation/index.html

- Intersection improvements at Fallon Road and the elimination of the existing intersection of Croak Road and Fallon Road
- Grading and earthwork northeast of the Dublin Boulevard/Fallon Road intersection, including grading at the base of the Livermore Hills, to allow for the roadway extension, and more minor grading throughout the road alignment to meet engineering and safety requirements
- Abandonment of a north-south (frontage road) portion of Croak Road parallel to Fallon Road
- The addition of a ”T” shaped hammerhead turnaround at the new terminus of Croak Road adjacent to Fallon Road
- Removal of overhead utility lines between Fallon Road and Croak Road
- Creation of a new signalized intersection between the Dublin Boulevard extension and Croak Road
- Construction of a new bridge over Cottonwood Creek
- Construction staging and laydown between the extension and Collier Canyon Road, along Doolan Road
- Intersection improvements at Doolan Road
- The extension of underground utility lines into the project site, within the paved areas of the proposed roadway extension
- Construction of the new roadway, which would include a median, inside shoulder, vehicle travel lanes, street bicycle facilities, a parkway strip and separated sidewalk or a separated Class I bike path/MUP, lighting, and cut/fill embankments
- Retaining walls may be use in addition to, or as an alternative to, cut/fill embankments associated with roadway and hillside grading. If used, retaining walls would be placed outside of the sidewalk and path areas on either side of the roadway cross section, within the construction footprint and within the permanent right-of-way. Retaining walls would measure 3 feet to 10 feet in height and would generally require a smaller area of grading or ground disturbance in comparison to cut/fill slopes.

Methodology

Traffic information used in the energy analysis was provided by a traffic report prepared for by Kittelson and Associates, Inc. Peak and off-peak traffic data was reported for existing (2013) and future (2040) traffic volumes. Energy consumption for the different roadway alternatives was calculated using fuel consumption factors provided by the computer program EMFAC2017 and guidelines set by Caltrans[3]. Consumption factors used for this analysis are listed in Appendix A. This report compares the existing energy consumption with the future energy consumption with project implementation.

[3] Energy and Transportation Systems, Caltrans Transportation Laboratory, Sacramento, CA, July 1983

Direct Energy

Direct energy is the amount of fuel consumed by vehicles over a given period of time. Factors that influence fuel consumption include: speed, grade, intersection delay time, traffic density (free flowing or congested) and changing fuel economy due to newer more fuel efficient vehicles on the road. The traffic report did not differentiate between truck and auto traffic, for the purpose of this report the same energy consumption factors were applied to all vehicles for all of the alternatives.

Indirect Energy

Indirect energy is the remaining energy consumed to construct, operate and maintain the proposed project alternative. Indirect energy also includes the manufacture and maintenance of vehicles using the roadway. Indirect energy consumption for construction was determined using the input-output method. This method uses construction cost to estimate energy consumption by multiplying the cost of the project by a MBTU/1977 ratio provided by Caltrans[3]. This ratio was based on the cost of construction in 1977. In order to apply this ratio, the Caltrans construction cost index[4] was used to relate current construction cost to 1977 construction cost. Other sources of indirect energy consumption were determined by multiplying the roadway length by a MBTU/mile ratio which was provided by Caltrans.

Energy Impacts

Direct Energy Consumption

Direct energy consumption is based on travel forecasts. These projections show that for the region, there would be an increase in VMT between existing and future conditions without the project. Regional VMT under the proposed project would be similar to no-build conditions. Projected direct energy consumption is reported in Table 1, direct energy expenditures range from 7,403,643 billion BTU under existing conditions to 5,575,127 billion for project conditions in 2040. When focusing on the project area, the travel forecasts show a decrease in VMT with the project in 2040. This equates to a decrease of approximately 1.2 billion BTUs per day and 436 billion BTUs annually (see Table 2).

[4] http://www.dot.ca.gov/hq/esc/oe/cost_index/historical_reports/CCI_1QTR_2014.pdf

Table 1: Annual Projected Direct Energy Consumption - Regional

	Annual VMT				
	Existing 2013	**2025**	**2040**	**2025 Build**	**2040 Build**
	1,197,741,358	1,349,057,818	1,528,944,016	1,348,999,732	1,529,387,024
	Percentage of Travel				
Gas Travel	94%	90%	90%	90%	90%
Diesel Travel	6%	7%	7%	7%	7%
Electric Travel	0%	3%	3%	3%	3%
	Fuel Efficiency (gal/mi, kW/mi)				
Gas Travel	21.5	29.1	36.6	29.1	36.6
Diesel Travel	7.8	10.6	13.1	10.6	13.1
Electric Travel	3.3	3.3	3.3	3.3	3.3
	Energy Usage (mmBtu)				
Gas Travel	6,270,877,784	5,038,561,125	4,528,133,577	5,038,344,182	4,529,445,594
Diesel Travel	1,132,765,714	1,089,512,157	1,001,364,985	1,089,465,247	1,001,655,129
Electric Travel		38,835,098	44,013,451	38,833,426	44,026,204
Total	**7,403,643,498**	**6,166,908,379**	**5,573,512,014**	**6,166,642,855**	**5,575,126,927**
Total over 2013		(1,236,735,119)	(1,830,131,485)	(1,237,000,644)	(1,828,516,571)
Percentage Change		-16.70%	-24.72%	-16.71%	-24.70%
Project vs No Project				(265,525)	1,614,914
Percentage Change				-0.0048%	0.029%
	Fuel efficiency and travel fraction based on EMFAC2017 for Bay Area				
	1 gallon of gasoline = 120,476 Btu				
	1 gallon of diesel fuel = 137,452 Btu				
	Source:	U.S. Energy Information Administration			
		https://www.eia.gov/Energyexplained/?page=about_energy_units			
	30 kW·h/100 mi = 3.3 mi/kW				
	1 kW = 3,412 Btu				
	Source:	Wikipedia from US EPA:			
		https://en.wikipedia.org/wiki/Miles_per_gallon_gasoline_equivalent			

Table 2 Projected Direct Energy Consumption – Focused Area

	Focused Daily VMT				
	Existing 2013	**2025**	**2040**	**2025 Build**	**2040 Build**
	Percentage of Travel				
Gas Travel	94%	90%	90%	90%	90%
Diesel Travel	6%	7%	7%	7%	7%
Electric Travel	0%	3%	3%	3%	3%
	Fuel Efficiency (gal/mi, kW/mi)				
Gas Travel	21.5	29.1	36.6	29.1	36.6
Diesel Travel	7.8	10.6	13.1	10.6	13.1
Electric Travel	3.3	3.3	3.3	3.3	3.3
	Energy Usage (mmBtu)				
Gas Travel	-	-	-	-	(971)
Diesel Travel	-	-	-	-	(215)
Electric Travel		-	-	-	(9)
Daily Total Annual Total	-	-	-	-	(1,196) (436,419)
	Fuel efficiency and travel fraction based on EMFAC2017 for Bay Area 1 gallon of gasoline = 120,476 Btu 1 gallon of diesel fuel = 137,452 Btu Source: U.S. Energy Information Administration *https://www.eia.gov/Energyexplained/?page=about_energy_units*				
	30 kW·h/100 mi = 3.3 mi/kW 1 kW = 3,412 Btu Source: Wikipedia from US EPA: *https://en.wikipedia.org/wiki/Miles_per_gallon_gasoline_equivalent*				

Indirect Energy Consumption

Projected indirect energy consumption is reported in Table 3. To capture the net increase in energy consumption attributable to the project, existing conditions are compared with projected energy consumption in 2040 without the project (no build) and against 2040 energy consumption with project implementation (build). Indirect energy consumption for the 2040 no build alternative compared to existing conditions will be 68 MBTUs of energy. Implementation of the project would result in consumption of an additional 308 MBTUs of energy over the 2040 no build scenario. The indirect energy consumed in road construction and vehicle manufacturing is a one-time non-recoverable consumption of energy, the other sources are reported as a per year expenditure.

Table 3: Projected Indirect Energy Consumption (in Billion BTU)

Description	Existing	2040 No Build	2040 Build
Vehicles Maintenance	1,977	2,141	2,141
Road Maintenance	40	40	40
Road Construction	--	--	308
Vehicle Manufacturing	1,676	2,139	2,139
Total Indirect Energy	3,393	4,320	4,628

Table 4 shows the annual energy consumption in the Dublin/Livermore area compared to the indirect energy consumed by one-time non-recoverable energy expenditures. The energy consumed in the construction of the project would make up 1% of the typical the energy consumed by the Cities of Dublin and Livermore; therefore, the energy impacts associated with the construction of the project will have minimal impact on the surrounding area.

Table 4: Annual Energy Consumption Dublin/Livermore area Compared to the Indirect Non-Recoverable Energy Consumption Associated with the Proposed Alternatives.

Description	BTUs
Annual Energy Consumed in the Dublin/Livermore area (2017)	29,640,055,000,000
Indirect Energy Consumed by the Construction of the Alternative	307,694,691,935
%Of the Cities Energy Demands Used in Construction	1%

Conservation Measures

Energy consumption for the build alternatives will have a minimal impact on the surrounding area, but implementing the following conservation measures would help further reduce impacts to the area.

- Use energy efficient lighting at the new intersections; for example, install light emitting diode traffic signals.
- Use of energy efficient construction equipment.
- Limit idle time for construction equipment.
- Promote carpooling for construction crews.
- Recycle construction waste when feasible and select disposal sites in the vicinity of the project area.

Summary and Conclusion

When comparing the no build to the build alternative, the build alternative will consume less than 0.03% more direct energy than the no build alternative. As stated above, the difference between the build and no build alternatives is due to increased VMT in the region, while VMT in the local area decreases. In terms of indirect energy consumption the build alternative would use more energy than the no build alternative due to the amount of energy needed for construction. But when considering the annual energy consumption by the Cities Dublin and Livermore, the energy used in construction of the project is quite small.

Appendix A

Indirect Energy Consumption Factors

Road Maintenance	80.3 MBTU/lane-mile
Vehicle Maintenance	0.0014 MBTU/VMT
Road Construction	0.0246 MBTU/1977$
Vehicle Manufacturing	0.001399 MBTU/mile

Note: Energy and Transportation Systems, Caltrans Transportation Laboratory, Sacramento, CA, July 1983