AGENDA

REGULAR JOINT MEETING OF THE OAKLEY CITY COUNCIL/OAKLEY CITY COUNCIL ACTING AS THE SUCCESSOR AGENCY TO THE OAKLEY REDEVELOPMENT AGENCY/OAKLEY PUBLIC FINANCING AUTHORITY

Tuesday, March 12, 2024
6:30 PM

Oakley City Council Chambers located at 3231 Main Street, Oakley, California 94561

Unless stated otherwise on the agenda, every item on the agenda is exempt from CEQA Guidelines Sections 15060(c), 15061(b)(3), 15273, 15378, 15301, 15323 and/or Public Resources Code Section 21065.

MISSION STATEMENT: The City of Oakley will create a resilient future that fosters and attracts a vibrant and evolving community that welcomes and values all people.

VISION STATEMENT: The City of Oakley celebrates our unique Delta lifestyle and small-town feel where we ***Live*** in a safe, dynamic community, ***Work*** together to build the future, and ***Play*** in our own backyard.

Agendas are posted in Oakley at Oakley City Hall-3231 Main Street, outside the gym at Delta Vista Middle School-4901 Frank Hengel Way and outside the Library at Freedom High School-1050 Neroly Road. Agendas are also posted on the City's Internet Website www.ci.oakley.ca.us.

A complete packet of information containing staff reports and exhibits related to each item is available for public review prior to an Oakley City Council and/or City Council Acting as the Successor Agency to the Oakley Redevelopment Agency/Oakley Public Financing Authority meeting at Oakley City Hall, 3231 Main Street, Oakley, CA 94561. Any writings or documents provided to a majority of the Oakley City Council, Oakley City Council Acting as the Successor Agency to the Oakley Redevelopment Agency or Oakley Public Financing Authority regarding any item on this agenda will be made available for public inspection, during regular business hours, at the front counter in the Main Lobby of the Oakley City Hall located at 3231 Main Street, Oakley, CA 94561. Agendas may be picked up at the Oakley City Hall located at 3231 Main Street, Oakley, CA 94561 for no charge. To request information regarding placement on the City's agenda e-mail distribution list, please contact us at (925) 625-7000.

The City of Oakley provides social media options to stay connected to City Hall through Facebook, Twitter, Next Door and Instagram. Other opportunities to connect with City Hall include Engage In Oakley, Oakley OnDemand on the City's website, and by emailing info@ci.oakley.ca.us.

If you have a physically challenging condition and require special accommodations, please call the City Clerk's office at (925) 625-7000.

Please keep cell phones/electronic devices turned off during the meeting. Please be advised that City Council meetings are video recorded and attendees may appear on video.

Information Regarding Public Comment

Members of the public may address the Council on items of interest that are within the City's jurisdiction. In compliance with State law, the council may not take actionor have discussion on any item that is not specifically listed on the agenda. Public comment on items not listed on the agenda will be heard under the Public Comments section of the agenda. Public comments on items listed on the agenda will be heard as the Mayor calls the items. In compliance with State law, the Council may not take action on an item that is not specifically listed on the agenda. If you would like to speak on any agenda item, please fill out a public speaker card available in the lobby and submit it to the City Clerk seated in the Council Chamber **prior to the agenda item being called.** The Mayor will call you by name to the podium to hear your comment. PUBLIC COMMENTS ARE LIMITED TO THREE (3) MINUTES. Online public comments are accepted until 5 p.m. the day of the meeting and can be submitted at https://www.ci.oakley.ca.us/online-public-comment-card/.

1.OPENING MATTERS

Oakley City Council/Oakley City Council Acting as the Successor Agency to the Oakley Redevelopment Agency/Oakley Public Financing Authority

1.1 Call to Order and Roll Call of the Oakley City Council/Oakley City Council Acting as the Successor Agency to the Oakley Redevelopment Agency/Oakley Public Financing Authority

1.2 Pledge of Allegiance to the Flag (Ariana Mesa and Briana Hernandez, Oakley Elementary School Students)

1.3 Recognition of Hector Espinoza, Senior at Freedom High School and finalist in the Contra Costa Shark Tank (Mayor Williams)

1.4 Proclamation Proclaiming March as Red Cross Month (Stephen Griswold, Deputy Chief of Staff, Office of Supervisor Diane Burgis, and Contra Costa Red Cross Leadership Council)

Proclamation

2.PUBLIC COMMENTS

At this time, the public is permitted to address the Oakley City Council/Oakley City Council Acting as the Successor Agency to the Oakley Redevelopment Agency/Oakley Public Financing Authority on non-agendized items.

3.COUNCILMEMBER COMMENTS

4.CONSENT CALENDAR

Consent Calendar items are typically non-controversial in nature and are considered for approval by the Oakley City Council/ Oakley City Council Acting as the Successor Agency to the Oakley Redevelopment Agency/Oakley Public Financing Authority with one single action. Members of the audience, Staff or the Oakley City Council/ Oakley City Council Acting as the Successor Agency to the Oakley Redevelopment Agency/Oakley Public Financing Authority who would like an item removed from the Consent Calendar for purposes of public input may request the Mayor remove the item. The public may request to remove an item(s) to provide input by completing a public speaker card and submitting it to the City Clerk prior to the item(s) being called by the Mayor.

4.1 Approve Minutes of the Regular Joint City Council/City Council Acting as the Successor Agency to the Redevelopment Agency and Special Public Financing Authority Meeting held February 27, 2024 (Libby Vreonis, City Clerk)

Minutes 02-27-24

4.2 Waive the Second Reading and Adopt an Ordinance Regarding Administrative Fines for Unlicensed Commercial Cannabis Activity Including Cultivation, Manufacturing, Processing, Distribution or Retail Sale of Cannabis and Declaring Such Activity a Public Nuisance (Libby Vreonis, City Clerk/Paralegal)

Ordinance

4.3 Adopt a Resolution Approving the City of Oakley Local Roadway Safety Plan (LRSP) (Kevin Rohani, P.E., Public Works Director/City Engineer)

Staff Report
1. Resolution
2. Local Roadway Safety Plan

4.4 Adopt a Resolution Accepting as Complete Capital Improvement Project Number 286 – City Hall Rooftop Solar Power Project as Constructed by Sun Light & Power (Kevin Rohani, P.E., Public Works Director/City Engineer)

Staff Report
1. Resolution
2. Notice of Completion

4.5 Adopt a Resolution Accepting as Complete Capital Improvement Project Number 187 – Main Street Bridge Rehabilitation Project at Contra Costa Canal

Project as constructed by TNB Construction (Kevin Rohani, P.E., Public Works Director/City Engineer)

Staff Report
1. Resolution
2. Notice of Completion

4.6 Adopt a Resolution Accepting the subdivision improvements associated with the Pheasant Meadows Subdivision 8736 and Vintner View Subdivision 8836 located along the east side of O'Hara Avenue south of Grapevine Lane and west of the Cinnamon Ridge Subdivision (Kevin Rohani, P.E., Public Works Director/City Engineer)

Staff Report
1. Vicinity Map - Pheasant Meadows & Vintner View.pdf
2. Resolution

4.7 Adopt a Resolution Appointing Kai-Christian Torf to the Contra Costa Transportation Authority Citizens Advisory Committee for the Remainder of the Current Four-Year Term Expiring August 11, 2025 (Libby Vreonis, City Clerk)
Staff Report
1. Application
2. Proposed Resolution

4.8 Adopt a Resolution Approving Contract Amendment Number 1 with HMH Engineers, Inc. for On-Call Consulting Services Related to Development Engineering Support Services for Fiscal Year (FY) 2023/24 and Award of Contract for Professional Services Agreement for On-Call Development Engineering Support Services with HMH Engineers, Inc for Fiscal Years 2024/25 and 2025/26 (Kevin Rohani, P.E., Public Works Director/City Engineer)
Staff Report
1. Resolution
2. HMH Engineers Inc. On-Call FY 23-24 Amendment 1 Agreement-revised.docx
3. HMH Proposal

4.9 Adopt a Resolution Approving Contract Amendment Number 1 with Park Engineering, Inc. for On-Call Consulting Services Related to Inspection Support Services for Fiscal Year (FY) 2023/24 and Award of Contract for Professional Services Agreement for On-Call Inspection Support Services with Park Engineering, Inc for Fiscal Years 2024/25 and 2025/26 (Kevin Rohani, P.E., Public Works Director/City Engineer)
Staff Report
1. Resolution
2. Amendment Agreement No. 1 for FY 2023/24

3. Park Engineering, Inc. Proposal for Contract FY 2024/25 and 2025/26

4.10 Adopt a Resolution Awarding a Construction Contract to R&R Pacific Construction Inc. for the construction of Fiscal Year 2023/24 Curb, Gutter & Sidewalk Repair and Replacement Project, Capital Improvement Project Number 295 (Kevin Rohani, P.E., Public Works Director/City Engineer)

Staff Report
1. Resolution
2. Bid Summary

4.11 Approval of the Special Event Beverage Concessions Non-Profit Selection and Vendor Selection Criteria (Jeri Tejeda, Administrative Services Director, Troy Faulk, Recreation Manager)

Staff Report
1. Events Beverage Concession Request for Proposal
2. Adventure Therapy Foundation Proposal
3. Be Exceptional Proposal
4. East County All Star Fundraising Proposal
5. Pillars of Hope Proposal
6. Rotary Club of Oakley Proposal
7. Internal Selection Criteria - Vendors

5.PUBLIC HEARINGS

5.1 Adopt a Mitigated Negative Declaration and Approve the Project titled The Village at 2092 Oakley Road Subdivision 9634 (GPA 01-22, RZ 03-22, FDP 01-22, TM 04-22, DR 07-22) – Request for approval of a General Plan Amendment, Rezone, Final Development Plan, Tentative Map, and Design Review for a 9.99 acre, 83 unit single family residential subdivision project. APN 037-110-031. (Ken Strelo, Planning Manager)
California Environmental Quality Act determination: Recommend that the City Council adopt a Negative Declaration finding the proposed project will not have a significant adverse impact on the environment.

Suggested Action: Staff Recommendation: 1) Receive the Staff Report, 2) Receive Questions from the City Council, 3) Open the Public Hearing, 4) Receive Comments from the Applicant, 5) Receive Public Testimony, 6) Close the Public Hearing, 7) Deliberate, 8) Summarize the Deliberation 9) Introduce the Ordinance 10)Adopt the Resolutions

Staff Report
1. Vicinity Map
2. Notice of Public Hearing
3. Applicant's Plans
4. City Council Minutes from March 22, 2022 - Excerpt of Project's Preliminary General Plan Amendment Work Session (Item 7.2)

5. Planning Commission Staff Report from February 6, 2024
6. Planning Commission Minutes from February 6, 2024
7. Planning Commission Resolution No. 2-24
8. Notice of Intent to Adopt a Mitigated Negative Declaration
9. Initial Study/Mitigated Negative Declaration
10. Proposed Ordinance (Rezone)
11. Proposed Resolution (General Plan Amendment)
12. Proposed Resolution (Final Development Plan, Tentative Map, Design Review)
12.a. Exhibit "A" Mitigation Monitoring Program

6.REGULAR CALENDAR

7.REPORTS

7.1 CITY MANAGER
(a) City Manager
(b) Business License Update
(c) Commercial and Industrial Development Project Update

(b) February 2024 New Business Licenses

7.2 OAKLEY CITY COUNCIL/OAKLEY CITY COUNCIL ACTING AS THE SUCCESSOR AGENCY TO THE OAKLEY REDEVELOPMENT AGENCY

(a) Reports from Council Liaisons to Regional Committees, Commissions and Boards AND Oakley City Council/Oakley City Council Acting as the Successor Agency to the Oakley Redevelopment Agency

(b) Requests for Future Agendas

8.WORK SESSIONS

9.CLOSED SESSION

10.ADJOURN

OAKLEY
CALIFORNIA

PROCLAMATION
AMERICAN RED CROSS MONTH, 2024

WHEREAS, March is American Red Cross month, when we recognize the compassion of people in Contra Costa County and reaffirm our commitment to care for one another in times of crisis; and

WHEREAS, this generous spirit is woven into the fabric of our community and advances the humanitarian legacy of American Red Cross founder Clara Barton — one of the most honored women in our country's history — who nobly dedicated herself to alleviating suffering; and

WHEREAS, people have counted on the American Red Cross for the information and skills they need to be safe at home, at work, at school, and at play, training people in lifesaving skills in CPR, first aid, fire prevention and water safety; and

WHEREAS, with 1,032 volunteers in Contra Costa County, the American Red Cross assisted or responded to 115 disasters; and through our Sound the Alarm program, the American Red Cross installed 583 smoke alarms, making 205 homes safer, and trained 577 individuals and families about fire prevention; and trained 617 youth through the Pillowcase Project and Prepare with Pedro; and

WHEREAS, Contra Costa County residents donated nearly 16,736 units of lifesaving blood; hosted 538 blood drives; and trained 6,522 citizens in first aid, CPR and AED; and 3,803 in Water Safety; and 756 military members and their families received support and services; and humanitarian aid was provided internationally; and

WHEREAS, we hereby recognize this month of March in honor of all those who lead with their hearts to serve people in need, and we ask everyone to join in this commitment to strengthen our community.

NOW, THEREFORE, BE IT RESOLVED THAT I, Anissa Williams, Mayor of the City of Oakley, on behalf of the City Council, do hereby proclaim March 2024 as Red Cross Month.

March 12, 2024

_____
Anissa Williams, Mayor

Minutes of the Regular Joint Meeting of the Oakley City Council/Oakley City Council Acting as the Successor Agency to the Oakley Redevelopment Agency and Special Meeting of the Oakley Public Financing Authority held February 27, 2024

1) OPENING MATTERS

1.1 Call to Order and Roll Call of the Oakley City Council/Oakley City Council Acting as the Successor Agency to the Oakley Redevelopment Agency/Oakley Public Financing Authority

Mayor Anissa Williams called the meeting to order at 6:31 p.m. in the Oakley City Council Chambers located at 3231 Main Street, Oakley, California. Vice Mayor Shannon Shaw and Councilmembers Hugh Henderson and Aaron Meadows were also present. Mayor Williams announced that Councilmember Dr. George Fuller is joining by teleconference and provided his location, the DoubleTree by Hilton, Pakalana Room, 1956 Ala Moana Bl, Honolulu, HI 96815-1897.

1.2 Pledge of Allegiance to the Flag (Heritage High School JROTC)

The Heritage High School JROTC led the Pledge of Allegiance to the Flag.

1.3 Proclamation Recognizing February as Prescription Drug Abuse Awareness Month (Danielle Aubin, BAART Programs)

Mayor Williams presented the proclamation to Danielle Aubin with BAART Programs.

Ms. Aubin thanked the Council.

2) PUBLIC COMMENTS

Online public comments were submitted by Katie Patterson, Angela Lanuza, Michele Duran, Michele D, Jennifer Barajas, Jennifer Carper, Michelle Meade, Erin Mass, Sean Mass, Sandy Whiting, Jennifer Greene, Jennifer Emmons, and Justin Ashford to request that the Council consider the City providing financial support toward the Freedom High School Grad Night.

3) COUNCILMEMBER COMMENTS

Dr. Fuller thanked the City Clerk and City Manager for their efforts in regard to the minutes, item 4.1.

Mayor Williams commented that the Freedom Parents Club is trying to pull off Grad Night and she has contact information if anyone can help.

4) CONSENT CALENDAR

4.1 Approve Minutes from the Regular Joint City Council/City Council Acting as the Successor Agency to the Redevelopment Agency/Public Financing Authority Meeting Held February 13, 2024 (Libby Vreonis, City Clerk)

4.2 Accept Report Out of Closed Session Memo (Derek Cole, City Attorney)

4.3 Award of Construction Contract to sofSURFACES for the Daffodil Park Playground Surfacing Project - Capital Improvement Program (CIP) No. 307 (Kevin Rohani, P.E., Public Works Director/City Engineer)

4.4 Approval of Subdivision Improvement Agreement and Final Map for Summer Lake North Subdivision 9307 (Located at the northeast corner of East Cypress Road and Bethel Island Road) (Kevin Rohani, P.E., Public Works Director/City Engineer)

4.5 Approval of the Final Agreement for the Purchase of Portions of Contra Costa Assessor Parcel No. 034-090-022 from the Del Barba family for the Laurel Road Widening (Cloverbrook Avenue to O'Hara Avenue) Project-Capital Improvement Project (CIP) Number 280 (Derek Cole, City Attorney and Kevin Rohani, P.E., Public Works Director/City Engineer)

Vice Mayor Shaw pulled item 4.4.

Mayor Williams pulled item 4.5.

It was moved by Councilmember Meadows and seconded by Councilmember Henderson to approve the remainder of the Consent Calendar. A roll call vote was conducted by the City Clerk. Motion was unanimous and so ordered. (5-0)

Item 4.4

Vice Mayor Shaw shared that she pulled the item for staff to highlight the history and what the agreement and final map do for the process.

Public Works Director/City Engineer Kevin Rohani shared that the Summer Lake development began before the City of Oakley incorporated and at that time, the developer was Shea Homes, and in the early 2000s, it completed Summer Lake South and owned the Summer Lake North property of which a tentative vesting map was

approved by the Council in 2011, creating one of the largest subdivisions. He mentioned Civic Summer Lake North LLC purchased the property in July 2021, actively began working on it, and since then levee work was completed on the property and they are now ready to begin infrastructure. He explained this agreement and map are a formality of that process. He mentioned the development could take 10 years before all homes are built and the E. Cypress Road project will be completed over the next 3 years, extending to the frontage of this subdivision, so the road will be completed before the homes are built.

Vice Mayor Shaw mentioned that she wanted to highlight it to make sure people are aware that the road will be complete before the homes are built, and that this is a formality for the homes that will be built, but that the E. Cypress Road expansion is in the forefront.

Mr. Rohani explained that the road improvements are forefront and happening and these will be separate but parallel projects.

It was moved by Vice Mayor Shaw and seconded by Councilmember Henderson. A roll call vote was conducted by the City Clerk. Motion was unanimous and so ordered. (5-0)

Item 4.5

Mayor Williams shared that she pulled the item for staff to highlight the history and next steps.

Public Works Director/City Engineer Kevin Rohani shared that staff has been working on this portion of Laurel Road for many years, other parts of Laurel Road have been expanded, and this portion was left out because the City did not have the right of way to execute the project. He mentioned staff has been in contact with the property owners over a number of years and in December 2022, they came to an informal agreement. He shared that once the right of way is acquired, an item will come before the Council in April to consider granting an easement to WAPA to move the poles on the property, to allow the City to proceed with the road expansion. He thanked the City Attorney for his work to help get to this point of the final agreement. He mentioned the road design should be completed by summer and the award of a construction contract should come before the Council in July, with construction beginning late August, and completion of the project occurring in mid-2025. He thanked all the parties involved for their work to make this happen.

Vice Mayor Shaw mentioned the City is spending money on this. She inquired if in the event the rest of the property sells, if the City can recuperate some cost for improvements it is making.

Mr. Rohani explained that is correct; the vineyard may eventually be sold and once a developer acquires it, as part of the developer’s conditions of approval, the frontage improvements will have been completed by then so the City will know its cost and keep that on file, and when the developer comes in, the developer will have to pay the City for the cost of the frontage improvements.

Councilmember Meadows referred to section 5.1 in the Agreement and mentioned the days appear to need correction. He requested clarification on the timing of the due diligence period (60 days) and closing of escrow (30 days).

City Attorney Derek Cole mentioned it is the intent to have a 30-day escrow and staff can make the appropriate changes to section 5.1 to clarify the language.

Mr. Rohani explained there has been a lot of last-minute back and forth between the parties to wrap this up and staff will ensure that Councilmember Meadows' comments are incorporated.

Dr. Fuller thanked staff and the Del Barba family. He commented that it has been many years and he is glad it is wrapping up as he believes the road will improve safety, convenience, and happiness for the community.

It was moved by Councilmember Meadows and seconded by Vice Mayor Shaw to approve the Purchase and Sale Agreement with a 30-day close of escrow and clean up revisions to section 5.1 to reflect a 30-day close of escrow. A roll call vote was conducted by the City Clerk. Motion was unanimous and so ordered. (5-0)

5) PUBLIC HEARINGS

5.1 Consideration of a Resolution Establishing a Master Fee Schedule and Updating Certain City Fees (Jeri Tejeda, Administrative Services Director)

Administrative Services Director Jeri Tejeda presented the staff report and provided a handout for a change to the last page of the fee schedule. She requested the fee schedule be considered with the following amendment to correct clerical errors: Account Reinstatement Fee $35.00 (not $75.00), Go Back Service Fee $35.00 (not $75.00), and the Cart Service Per Cart Charge $75.00 (not $40.00). She mentioned that all noticing requirements were met for this public hearing and if approved, the fee schedule will be effective April 28, 2024.

Mayor Williams called for questions of the Council, including Dr. Fuller joining remotely. The Council had no questions.

Mayor Williams opened the public hearing and called for public comments; there being none, she closed the public hearing.

Dr. Fuller commented that staff did fantastic work on the master fee schedule. He mentioned there are a couple of items he disagrees with, one being the increase of the after-school fee from $4 to $10 which provides a 150% increase. He explained that he doesn't want to request each item to be considered separately so he will vote 'no' for the entire item.

It was moved by Councilmember Henderson and seconded by Vice Mayor Shaw to adopt the resolution with the amendments. A roll call vote was conducted by the City Clerk. AYES: Henderson, Meadows, Shaw, Williams. NOES: Fuller. (4-1)

6) REGULAR CALENDAR

6.1 Waive the First Reading and Introduce an Ordinance Regarding Administrative Fines for Unlicensed Commercial Cannabis Activity Including Cultivation, Manufacturing, Processing, Distribution or Retail Sale of Cannabis and Declaring Such Activity a Public Nuisance (Libby Vreonis, City Clerk/Paralegal)

City Clerk/Paralegal Libby Vreonis presented the staff report. She recommended clerical revisions to the ordinance to reflect that Chapter 41 of Title 4 is being added, that there are amendments to Oakley Municipal Code Sections 1.5.022 and 1.5.207, and that the definition of "Distribution" in Oakley Municipal Code Section 4.41.104(d) read as follows: "refers to the procurement, sale, and transport of cannabis and cannabis related products between persons or entities."

Vice Mayor Shaw inquired if there is a cap with the $100, $200, $500 escalating fees.

Mr. McMurray explained that there is not; it is per violation, per day.

Dr. Fuller expressed his strong opposition to cannabis operations within the city as it doesn't fit our lifestyle, safety plans, or needs, he is glad the City is taking measures to ensure there are no rogue marijuana operations, and that it is being handled in a professional manner.

No public comments were submitted.

It was moved by Vice Mayor Shaw and seconded by Councilmember Meadows to waive the first reading and introduce the ordinance with the stated amendments. A roll call vote was conducted by the City Clerk. Motion was unanimous and so ordered. (5-0)

6.2 Adopt a Resolution to Establish a Library and Community Center Project Specific Sub-Committee (Joshua McMurray, City Manager)

City Manager Joshua McMurray presented the staff report. He recommended that two sub-committee members be nominated, and that the sub-committee terminate at the end of 2024.

Councilmember Meadows commented that he also likes the end of this year to terminate and nominated Mayor Williams and Vice Mayor Shaw to serve.

Vice Mayor Shaw and Mayor Williams both confirmed they would like to be on the committee.

Mayor Williams called for comments from Dr. Fuller. He had none.

Mayor Williams called for public comments. There were none.

It was moved by Councilmember Meadows and seconded by Councilmember Henderson to appoint Vice Mayor Shaw and Mayor Williams to the sub-committee and for the subcommittee to terminate 12/31/24. A roll call vote was conducted by the City Clerk. Motion was unanimous and so ordered. (5-0)

6.3 Resolution of the City Council of Oakley Declaring the Existence of a Local Emergency Due to the City's Sustaining of a Cyberattack on February 22, 2024 (Derek Cole, City Attorney)

City Attorney Derek Cole presented the staff report. He explained that the City is requesting the declaration of emergency to ensure the Emergency Operations Center (EOC) is activated. He explained that it is out of an abundance of caution, and it is not a traditional emergency such as during COVID or a natural disaster. He explained that legally, the City is not likely to get reimbursement from the state for declaring the emergency such as during the COVID era, but the City wants to make sure emergency operations are in place and purchasing powers are available.

City Manager Joshua McMurray added that they need to declare a local state of emergency as it is necessary to activate the EOC and for staff to have the ability to purchase. He mentioned knowing that the City Council meeting was just days away and is within the 7 days that the Oakley Municipal Code requires to ratify the declaration felt appropriate, he plans to keep the EOC open through the length of the investigation, and as the City is under an active investigation, he is not at liberty to disclose publicly where they are at with the investigation, but the City is actively working through it and trying to restore all of its systems so it is fully operational, and he would expect that the EOC will be operational for at least 1 more week, possibly 2 weeks.

Dr. Fuller commented that he appreciates staff’s response and professionalism and he supports it so they can conclude the investigation.

Vice Mayor Shaw thanked staff for working on this all weekend while also attending the governance meeting.

Councilmember Meadows echoed her comments.

Mayor Williams commented that they all appreciate the work of staff, being kept up to date, and believes it is in good hands.

Mayor Williams called for public comments. There were none.

It was moved by Councilmember Meadows and seconded by Councilmember Henderson to adopt the resolution. A roll call vote was conducted by the City Clerk. Motion was unanimous and so ordered. (5-0)

7) REPORTS

7.1 CITY MANAGER
(a) City Manager
(b) New Rail Platform Safety Plan Memo
(c) Police Department Annual Update
(d) Fireworks Update
(e) School Resource Officer Update

(a) City Manager Joshua McMurray reported Friday Night Bites will be held March 1st in Civic Center Plaza and Oakley's Got Talent will be held at the Recreation Center March 9th, 1 p.m.-4 p.m.

(b) Mr. McMurray mentioned this item was requested as a future agenda item and he has provided a memo.

Mayor Williams mentioned there was a public comment submitted a few Council meetings ago and it might be something to look into--a quiet zone similar to that in Downtown Martinez near homes for the area in proximity to the platform.

Mr. McMurray suggested a future agenda item request can be made to direct staff to research.

Dr. Fuller commented that he has researched trains blowing horns and discussed the matter with federal and railroad officials; it is his understanding that the train engineer must blow the train horn as loudly as possible approaching intersections pursuant to federal regulations.

(c)-(e) Chief of Police Paul Beard presented a PowerPoint presentation. Lt. Robert Roberts and Lt. Logan Cartwright were also present for any questions.

(c) Police Department Annual Update

Vice Mayor Shaw inquired if the staffing numbers reflect that the K-9 officer is assigned to something else but also has K-9 duties.

Chief Beard mentioned the K-9 officer is currently in the patrol unit but once there are enough bodies in that unit, he will transfer out.

Dr. Fuller inquired if we pursue retail theft as a burglary.

Chief Beard requested clarification if "we" refers to Police or the retail establishment.

Dr. Fuller clarified that he was referring to the City/Police when he said "we".

Chief Beard explained that Police responds to every call they are called to and takes appropriate law enforcement action; he is aware some retail establishments in some extreme circumstances have policies where employees will not confront thieves, and

some retail stores have stopped calling when theft occurs, but Police will respond and take action when called.

Dr. Fuller mentioned that he understands the policies, He used an example when $1,500 of property is taken. He inquired if there is any reason Police cannot arrest in these situations for burglary.

Chief Beard mentioned if they have identification of the person committing theft by the retailer, it can be turned over to Police to pursue.

Dr. Fuller inquired if Police can pursue it as burglary.

Chief Beard explained that they can pursue it as burglary if they have enough evidence and information, and they do follow up on leads to try and bring it to successful prosecution.

Dr. Fuller mentioned he see the citation level increase is working and he is glad to see it; he sees it as an enhancement of driving behavior and he is seeing enforcement. Regarding the school resource officer, he mentioned the state wants to take over and have it in every school but have the cities provide it; he hopes that the City can continue making the decision. He expressed his preference is for the high school and middle schools to budget and handle situations themselves and for the City to assist them to maintain campus decorum. He thanked Chief Beard for his presentation and efforts.

Mayor Williams inquired if Chief Beard could provide context how the 84 training courses over the previous year relates to other agencies.

Chief Beard mentioned he did not have that information available.

Mayor Williams called for public comment.

An unidentified member of the public inquired if particular cars are being stolen; i.e., KIA and Hyundai. She mentioned it is a problem is several cities and inquired if there is any way for reimbursement from manufacturers for patrol, etc. She also mentioned considering the growth in the area, they may wish to apply growth per citizen/per capita because they may find that the numbers are down in some areas.

Chief Beard mentioned no movement has been made at this time regarding manufacturer reimbursement for Police response services for what some may think is a faulty starting system or something similar.

(d) Fireworks

Chief Beard mentioned fireworks is an issue statewide and within our County. He shared that he plans to meet with Fire Chief Broussard ahead of 4th of July to discuss a joint effort and he would like the plan to include education, enforcement efforts, pre-event planning, intelligence gathering, post-event debriefing, and evidence disposal after the fact which Lt. Roberts will oversee developing and deploying. He mentioned

the fireworks suppression period will begin several days early in July and with July 4th falling on Thursday, they will be anticipating when the heaviest days will be and discussing it with their Fire partners. He mentioned overtime will be paid to officers during the suppression period to patrol streets, identify violators and issue administrative citations.

Councilmember Meadows commented Police had a good year last year and thanked him.

Vice Mayor Shaw commented she likes the idea of having a bigger plan, that they are considering the potential timing of the suppression period, and she looks forward to seeing the collaboration with Fire.

Mayor Williams inquired if Dr. Fuller has anything to add. He had no comments.

Mayor Williams mentioned the City has an incredible PIO. She suggested more social media outreach to address for example, fireworks purchased in a county where it is legal but used here, to get the word out. She mentioned Oakley did better last year than places that held firework shows. She mentioned the extra communication could provide the education Chief Beard mentioned.

Chief Beard mentioned they have used social media in past years and can tap into it and magnify/spotlight it even more.

Vice Mayor Shaw mentioned County dispatch is servicing so many cities at the same time and she mentioned before and would like to bring it back now for staff to look into a local number for reporting, if possible. She mentioned she feels like a lot of residents don't call because when they have they have experienced being placed on hold for a long time.

Chief Beard mentioned County dispatch has been overwhelmed on July 4th for a long time. He mentioned he will look into an internal number; but the reason they use County dispatch is because he has to have a record of the call. He mentioned he would have to look into if they could take 50 calls (random number) and later create a record. He mentioned he would also be looking at skills set and whether an officer would have ability to intake information and dispatch it out and keep track of where all the other cars are. He mentioned this might be a good topic to bring up with Chief Broussard if he can meet with him.

(e) School Resource Officer

Chief Beard mentioned the City has had a longstanding relationship with the high school for a school resource officer (SRO) and in 2023, he was approached by the middle schools to have 1 SRO for both middle schools. He mentioned the conversations are exploratory and when there is more firm information and the district demonstrates it is truly engaged, they will discuss further and bring it to Council, but they cannot staff now for an SRO at the middle schools. He explained that they are short 4 officers due to injury, 2 have pending retirements, and has 1 potential injury. He mentioned it is an

endeavor he would like to explore as an SRO at the middle schools is the right service to provide in this day and age, and whether it is this year or next, he believes they will get there, and everyone will be better served.

Vice Mayor Shaw inquired if this would include an additional officer hired.

Chief Beard mentioned if he had all the bodies allotted now and they were healthy, he could fill this position without hire.

Dr. Fuller commented that an SRO can be of value to the educational system, but he would like the schools to budget money for it and the City can assist them with maintaining safety and also ensure they have a close working relationship to share information on cost and expenses incurred.

Vice Mayor Shaw commented that there were incidents at the middle schools over the past year and the kids are growing up so much faster than they used to, so she sees the benefit of it but when it comes down to talking about schools handling things themselves, there certain trainings that come along with policing and they don't expect Police to be teachers so she does not expect teachers to do some of the things that only officers have training to do. She mentioned she looks forward to seeing this and believes many communities will move toward it.

Chief Beard commented that each school has a school safety plan which is reviewed by Police on an annual basis which he believes is normal in most jurisdictions. He mentioned the school safety plan places expectations on school staff for what to do in 'X' situation and Police attend lock down drills to see how the schools handle certain emergencies, one of which they will attend tomorrow. He added that he feels like the schools are taking steps in the direction of being self-reliant and handling certain tasks on their own and it will be always will be a conversation between Police and school staff who is expected to handle what and under what circumstance, so the key is to keep open dialogue between the entities.

Dr. Fuller agreed with Chief Beard. He mentioned saying teachers can't handle anything and only using Police would be a costly use of City personnel. He mentioned if the school wants it secure, they need to train teachers and hire enough security staff to handle situations in the schools to ensure halls are properly monitored and that administrators are handling situations appropriately. He suggested the City augment school safety, but that the schools take responsibility to maintain a safe environment, hiring of personnel, and provide enough training from their budget, not necessarily ours.

7.2 OAKLEY CITY COUNCIL/OAKLEY CITY COUNCIL ACTING AS THE SUCCESSOR AGENCY TO THE OAKLEY REDEVELOPMENT AGENCY

(a) Reports from Council Liaisons to Regional Committees, Commissions and Boards AND Oakley City Council/Oakley City Council Acting as the Successor Agency to the Oakley Redevelopment Agency

(b) Requests for Future Agendas

Vice Mayor Shaw reported they all attended the governance meeting and she attended the Affordable Housing Ad-Hoc Advisory Committee meeting. She thanked the Council for extending the Committee and shared that during the last meeting, there were some hard truths for the management and owners, and that an owner showed up and told her she was blunt. She shared that the meeting had a bigger crowd, expectations are on management and the owners, and the management and owners have goals that residents can hold them accountable to which should allow the city to step back with reporting guidelines.

Councilmember Meadows concurred. He mentioned she may have said they are blunt, but he doesn't think the things they mentioned were things that she didn't already know.

Vice Mayor Shaw agreed.

Councilmember Henderson reported he had initiated and attended the governance meeting. He thanked staff and the facilitator and expressed that he hopes it makes them all work better together in the future.

Councilmember Meadows reported that since the last meetings, he attended the CCTA meeting, he was placed on the power purchase agreements committee at the MCE meeting he attended, and he will attend the Mokelumne Trail grand opening on March 20 at 10:00 a.m.

Dr. Fuller reported he also attended the MCE meeting where he was sworn in as an alternate and he attended the Diablo Water District meeting which due to length, he will report on next time when he is back in the Council Chambers.

Mayor Williams reported she attended the governance meeting, a meeting today with staff from Lori Wilson's office regarding small business support for Oakley, a 25th City Anniversary planning meeting, and she will attend a Tri-Delta meeting tomorrow.

Mayor Williams asked the Council, including Dr. Fuller joining remotely, if anyone had any future agenda items and they did not.

8) WORK SESSION

None.

9) CLOSED SESSIONS

None.

10) ADJOURN

There being no further business, the meeting was adjourned at 8:17 p.m.

Respectively Submitted,

Libby Vreonis
City Clerk

ORDINANCE NO. 5-24

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF OAKLEY ADDING CHAPTER 41 TO TITLE 4 OF THE OAKLEY MUNICIPAL CODE REGARDING ADMINISTRATIVE FINES FOR UNLICENSED COMMERCIAL CANNABIS ACTIVITY AND DECLARING IT A PUBLIC NUISANCE, AND AMENDING OAKLEY MUNICIPAL CODE SECTIONS 1.5.002 AND 1.5.207 TO REFERENCE SAID FINES

WHEREAS, AB 1684 was approved and codified as Government Code §53069.4 on October 8, 2023, and

WHEREAS, effective January 1, 2024, the statute allows for immediate imposition of administrative fines or penalties for all unlicensed commercial cannabis activity, including cultivation, manufacturing, processing, distribution, or retail sale of cannabis through adoption of an ordinance and authorizes the ordinance to declare unlicensed commercial cannabis activity a public nuisance, and

WHEREAS, the statute allows for administrative fines for unlicensed commercial cannabis activity not to exceed $1,000 per violation or $10,000 per day, and

WHEREAS, the administrative fine may be imposed on the property owner and each owner of the occupant business entity engaging in unlicensed commercial cannabis activity and hold them jointly and severally liable, and

WHEREAS, agencies that have adopted an ordinance with these provisions can refer matters involving unlicensed commercial cannabis activity to the Attorney General.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF OAKLEY DOES ORDAIN AS FOLLOWS:

SECTION 1. AMENDMENT OF OAKLEY MUNICIPAL CODE.

Oakley Municipal Code Section 1.5.002 is amended as follows:

1.5.002 Violations as Misdemeanors or Infractions; Public Nuisances.

a. It shall be unlawful for any person to violate any provision or to fail to comply with any of the requirements of this Code or any other ordinance of the City, or any rule, regulation or order promulgated or issued pursuant to any City ordinance or the provisions of any Code adopted by reference by any City ordinance, or any condition of an approval, permit or license granted pursuant to any City ordinance. Any person violating any of such provisions or failing to comply with any of such requirements shall be guilty of a misdemeanor or an infraction if so specified. Each such person shall be guilty of a separate offense for each and every day during any portion of which any violation is committed, continued, or permitted by such person, and shall be punishable accordingly.

b. Notwithstanding subsection (a) of this section or any other provision of any City ordinance, any violation constituting a misdemeanor may, in the discretion of the enforcing authority, be charged and prosecuted as an infraction.

c. Where no specific penalty is provided therefore, any person convicted of a misdemeanor under the provisions of a City ordinance shall be punishable by a fine of not more than $1,000, or by imprisonment in the County Jail for a period not exceeding six months, or by both such fine and imprisonment.

d. Any person convicted of an infraction under the provisions of a City ordinance shall be punishable for a first conviction by a fine of not more than $100, for a second conviction within a period of one year by a fine of not more than $200, and for a third or any subsequent conviction within a period of one year by a fine of not more than $500.

e. Notwithstanding § 1.5.002(d), any person convicted of an infraction under the provisions of an ordinance of this city for unlicensed commercial cannabis activity shall be punishable by fine not to exceed $1,000 per violation and shall not exceed $10,000 per day. This section does not limit immediate imposition of larger fines otherwise authorized by law and does not limit administrative fines or penalties imposed after notice and a reasonable time to correct when the violation pertains to building, plumbing, electrical, or other similar structural or zoning issues that do not create an immediate danger to health or safety.

~~e.~~ f. In addition to the penalties by this section any condition caused or permitted to exist in violation of any of the provisions of this Code, or any other ordinance of the City, or any rule, regulation or order promulgated or issued pursuant to any City ordinance, or the provisions of any Code adopted by reference by any City ordinance, or in violation of any condition of an approval, permit or license granted pursuant to a City ordinance, shall be deemed a public nuisance and may be abated by the City in a summary action pursuant to this Title, or any civil action, and each day such condition continues shall be a new and separate offense.

SECTION 2. AMENDMENT OF OAKLEY MUNICIPAL CODE.

Oakley Municipal Code section 1.5.207 is amended as follows:

1.5.207 Amount of Civil Fines.

a. The amount of the fines for violating particular provisions of this code shall be set in a schedule of fines adopted by resolution by the City Council and shall be consistent with the fine amounts authorized by Government Code Section 36900 or successor legislation. The schedule may include escalating fine amounts for repeat code violations occurring within specified periods of time.

b. Notwithstanding §1.5.207(a), fines for violating provisions of this code relating to unlicensed commercial cannabis activity may be assessed as authorized by Government Code Section 53069.4 or successor legislation.

~~b~~c. The schedule of fines may also specify the amount of interest and late payment penalty owed for any fine not paid when due. A late payment penalty and interest shall be owed for fines not paid within 30 days of their due date.

~~c~~d. Fines are due on the day the citation is issued, except that fines for building violations shall be due on the day the Notice of Non-Correction is issued.

SECTION 3. ADDITION OF CHAPTER 41 TO TITLE 4 OF THE OAKLEY MUNICIPAL CODE.

Chapter 41 to Title 4 of the Oakley Municipal Code is added as follows:

CHAPTER 41
UNLICENSED COMMERCIAL CANNABIS ACTIVITY

4.41.102 Purpose.

The intent of this chapter is to allow imposition of fines related to unlicensed commercial cannabis activity as authorized by Government Code Section 53069.4, notwithstanding Government Code Section 36900, and any other fines allowed by law. It is also the intent of this chapter to declare such activity a public nuisance. This chapter is not intended to and does not authorize any commercial cannabis activity, whether by license or otherwise.

4.41.104 Definitions.

For purposes of this chapter:

a. "Cannabis" refers to any type of Cannabis plant, including Cannabis sativa Linnaeus, Cannabis indica, Cannabis ruderalis, and any hybrids of different types of Cannabis plants. Hemp plants and cannabidiol (commonly referred to as "CBD") products, are not included in this definition and are subject to Oakley Municipal Code §4.12.110.

b. "Commercial cannabis activity" includes the cultivation, possession, manufacture, distribution, processing, storing, laboratory testing, packaging, labeling, transportation, delivery, or sale of cannabis.

c. "Cultivation" refers to any activity involving the planting, growing, harvesting, drying, curing, grading, or trimming of cannabis.

d. "Distribution" refers to the procurement, sale, and transport of cannabis and cannabis products between persons or entities.

e. "Manufacturing" refers to creating cannabis products through cannabis that has undergone a process whereby the plant material has been transformed into a concentrate, including, but not limited to, concentrated cannabis, or an edible or

topical product containing cannabis or concentrated cannabis and other ingredients.

f. "Processing" refers to trimming, drying, curing, grading, packaging, and labeling of cannabis products.

g. "Retail sale" refers to any transaction whereby, for any consideration, cannabis or cannabis products is transferred from one person or entity to another.

4.41.106 Unlicensed Commercial Cannabis Activity.
Unlicensed commercial cannabis activity is unlawful and a public nuisance.

4.41.108 Violation for Unlicensed Commercial Cannabis Activity.
a. Administrative fines or penalties for persons or entities engaging in all unlicensed commercial cannabis activity, including cultivation, manufacturing, processing, distribution, or retail sale of cannabis may be immediately imposed.

b. Notwithstanding Government Code Section 36900, or any other provision of law, administrative fines for unlicensed commercial cannabis activity shall not exceed $1,000 per violation or $10,000 per day.

c. An administrative fine under this chapter may be imposed on the property owner and each owner of the occupant business entity engaging in unlicensed commercial cannabis activity and hold them jointly and severally liable.

4.41.110 Referral of Matters to Attorney General.
Matters involving unlicensed commercial cannabis activity may be referred to the Attorney General.

SECTION 4. CEQA FINDING.
The City Council determines that the provisions of this ordinance are exempt from the California Environmental Quality Act ("CEQA") because the instant ordinance involves continuing administrative activities and thus is not a project, as CEQA defines, pursuant to Section 15378(b)(2) of the CEQA Guidelines. To the extent the adoption of this Ordinance constitutes a project, the City Council finds pursuant to CEQA Guideline Section 15061(b)(3) that the project is exempt from environmental review because it can be seen with certainty that the adoption of the ordinance would not have any significant impact on the environment.

SECTION 5. SEVERABILITY.

If any section, subsection, sentence, clause or phrase of this ordinance is for any reason held to be invalid or unconstitutional by the decision of a court of competent jurisdiction, the holding shall not affect the validity or enforceability of the remaining provisions, and the City Council declares that it would have adopted each provision of this ordinance irrespective of the validity of any other provision.

SECTION 6. EFFECTIVE DATE.
This Ordinance shall become effective thirty (30) days after adoption.

SECTION 7. PUBLICATION.
The City Clerk shall certify to the passage of this Ordinance and shall cause this Ordinance or a summary thereof to be printed once within fifteen (15) days after its adoption in a newspaper of general circulation, published and circulated in the City of Oakley.

PASSED AND ADOPTED this 12th day of March, 2024 by the following vote:

AYES:
NOES:
ABSTENTIONS:
ABSENT:

APPROVED:

_____
Anissa Williams, Mayor

ATTEST:

_____ _____
Libby Vreonis, City Clerk Date

DATE: March 12, 2024

Approved and Forwarded to the City Council

TO: Joshua McMurray, City Manager

FROM: Kevin Rohani, P.E., Public Works Director/City Engineer

SUBJECT: Adopt a Resolution Approving the City of Oakley Local Roadway Safety Plan (LRSP)

Background and Analysis

The City of Oakley is a recipient of Highway Safety Improvement Program (HSIP) grant funding and the One Bay Area Grant (OBAG), both of which require the City of Oakley to complete a Local Roadway Safety Plan (LRSP).

The preparation of the City of Oakley Local Roadway Safety Plan is funded from Measure J funds. The goal of LRSP is to reduce collisions and enhance the safety of City of Oakley streets. The LRSP is a comprehensive plan that creates a framework to systematically identify and analyze traffic safety issues at high-risk locations and recommend safety enhancements.

Adoption of the City of Oakley LRSP will allow staff to seek future funding opportunities for the recommended safety improvements.

The preparation of the City of Oakley LRSP began in July 2022 with the project team made up of staff from the Police and Public Works Departments, as well as consultants who collected historical collision data, conducted extensive community outreach, held several virtual meetings with stakeholders, identified, analyzed, and prioritized roadway and intersection safety improvement elements that are suitable for future Highway Safety Improvement Programs and other safety-related grant opportunities.

The above work included review of the City of Oakley General Plan, Contra Costa County Transportation Authority Comprehensive Transportation Plan, East Cypress Road Specific Plan, City of Oakley Capital Improvement Program, Contra Costa Countywide Bike and Pedestrian Plan, and Contra Costa Countywide Transportation Safety Policy and Implementation Guide. The analysis included pre-pandemic historical collision data to have a full understanding of travel and accident patterns on Oakley roads.

A total of five (5) types of safety projects, as listed below, were developed for high-risk intersections and corridors. Safety improvement measures and project locations for

each safety project were identified based on data analysis, staff, stakeholder and community input as follows:

Project 1: Signalized Intersections: Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number, improve signal timing (coordination, phases, red, yellow, or operation), Install raised pavement markers and striping through intersection.

Project 2: Unsignalized Intersections: Install signals (subject to Signal Warrant Study), Upgrade intersection pavement markings, Install raised median on approaches.

Project 3: Unsignalized Intersections: Add intersection lighting, Install flashing beacons at stop-controlled intersections, Improve sight distance to intersection (Clear Sight Triangles).

Project 4: Roadway Segments: Install/Upgrade signs with new fluorescent sheeting (regulatory or warning), Install delineators, reflectors and/or object markers, Remove or relocate fixed objects outside of Clear Recovery Zone.

Project 5: Roadway Segments: Install edge-lines and centerlines, Install centerline rumble strips/stripes, Install edge-line rumble strips/roadway stripes.

Consistency with the Oakley Strategic Plan 27+

This item is consistent with the Strategic Plan 27+ Community Health and Safety goals.

Fiscal Impact

The preparation of the City of Oakley LRSP was funded from Measure J funds and the proposed safety improvements in the City of Oakley LRSP will be implemented as part of the City's Capital Improvement Program.

Staff Recommendation

Staff recommends that the City Council adopt the resolution approving the City of Oakley Local Roadway Safety Plan.

Attachments

1. Resolution
2. Local Roadway Safety Plan

RESOLUTION NO. XX-24

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF OAKLEY ADOPTING THE CITY OF OAKLEY LOCAL ROADWAY SAFETY PLAN (LRSP)

WHEREAS, the City of Oakley is a recipient of the Highway Safety Improvement Program and One Bay Area Grant, both of which require the City of Oakley to complete a Local Roadway Safety Plan (LRSP); and

WHEREAS, the City Council awarded a contract to TJKM Transportation Consultants in July 2022 to prepare the City of Oakley Local Roadway Safety Plan; and

WHEREAS, Staff from Oakley Police, Public Works Department and Contra Costa County Transportation Authority; along with other stakeholders, worked on the preparation of the LRSP over the past year, and the document was successfully completed; and

NOW, THEREFORE, BE IT RESOLVED, the City Council of City of Oakley approves the adoption of the Local Roadway Safety Plan.

PASSED AND ADOPTED by the City Council of the City of Oakley this 12th day of March 2024 by the following vote:

AYES:
NOES:
ABSENT:
ABSTENTIONS:

APPROVED:

_____
Anissa Williams, Mayor

ATTEST:

_____ _____
Libby Vreonis, City Clerk Date

OAKLEY LOCAL ROAD SAFETY PLAN

February 2024

Prepared for:
City of Oakley

OAKLEY CALIFORNIA

TJKM

Table of Contents

EXECUTIVE SUMMARY v
Acknowledgements ix
Glossary x
1. Project Background 11
What is an LRSP? 11
Process 11
Goals and Objectives 12
Study Area 15
2. Safety Partners 18
3. Existing Planning Efforts 20
4. Collision Data and Analysis 24
Data Collection 24
Collision Classification 26
Killed and Severe Injury (KSI) Collisions 34
Geographic Collision Analysis 39
Collision Severity Weight 46
High Injury Network 48
Intersection Ranking 50
Corridor Ranking 51
5. Emphasis Areas 52
The FIVE E's of Traffic Safety 53
Existing Traffic Safety Efforts in the City of Oakley 54
Factors Considered in the Determination of Emphasis Areas 55
Emphasis Area 1 – Improve Intersection Safety 56
Emphasis Area 2 – Address Rear end Collisions 57
Emphasis Area 3 – Reduce Unsafe Speed Violations 58
Emphasis Area 4 – Address Broadside Collisions 59
Emphasis Area 5 – Improve Nighttime Collisions 60

Emphasis Area 6 – Address Head-On Collisions 61
Equity 62
6. Countermeasure Selection 68
Identification of Countermeasures 68
Countermeasure Toolbox 69
What You'll see In this toolbox 69
A. Countermeasures for Signalized Intersections 70
B. Countermeasures for non- Signalized Intersections 71
C. Countermeasures for Roadways 72
7. Viable Safety Projects 73
8. Implementation and Evaluation 77
Implementation 77
Monitoring and Evaluation 80
LRSP Update 80

Figures

Figure 1 Study Area: City of Oakley 16
Figure 2 Zoom Meeting from Stakeholder Meeting #1 18
Figure 3 Oakley Local Roadway Safety Plan: Project Website 19
Figure 4 Injury Collisions in the City of Oakley (2017-2021) 25
Figure 5 Collisions by Severity (2017 -2021) 26
Figure 6 Five Year Collision Trend 27
Figure 7 Intersection vs Roadway Collisions - Total Collisions and KSI 28
Figure 8 Collision Type 29
Figure 9 Primary Violation Categories 30
Figure 10 Motor Vehicle Involved with 31
Figure 11 Transportation Modes 31
Figure 12 Lighting Conditions 32
Figure 13 Weather Conditions 32
Figure 14 Time of Day 33
Figure 15 Intersection vs. Roadway Segment Collisions – KSI Collisions 34
Figure 16 Citywide Fatal and Severe Injury Collisions 35
Figure 17 KSI Collisions: Collision Type 36
Figure 18 KSI Collisions: Violation Category Type 36
Figure 19 KSI Collisions: Motor Vehicle Involved With 37
Figure 20 KSI Collisions: Lighting 37
Figure 21 KSI Collisions: Time of Day 38
Figure 22 KSI Collisions by Gender and Age 38
Figure 23 Citywide Rear End Collisions 41
Figure 24 Citywide Broadside Collisions 42
Figure 25 Citywide Unsafe Speed Violations 43
Figure 26 Citywide Nighttime Collisions 44
Figure 27 Citywide Head-On Collisions 45
Figure 28 Citywide Equivalent Property Damage Only 47
Figure 29 Citywide High Injury Network (HIN) 49
Figure 30 Equity Priority Communities and High Injury Network 64
Figure 31 Equity Priority Communities and KSI Collisions 65

Tables

Table 1 Oakley Commute to Work Data 17
Table 2 Collisions by Severity and Facility Type 27
Table 3 EPDO Score used in HSIP Cycle 11 46
Table 4 High Collision Intersections 50
Table 5 High Injury Corridors 51
Table 6 Existing Programs Summary 54
Table 7 Emphasis Area 1 Strategies 56
Table 8 Emphasis Area 2 Strategies 57
Table 9 Emphasis Area 3 Strategies 58
Table 10 Emphasis Area 4 Strategies 59
Table 11 Emphasis Area 5 Strategies 60
Table 12 Emphasis Area 6 Strategies 61
Table 13 Breakdown of crash types occurring at high injury locations in the EPC using TIMS data 66
Table 14 Recommended Safety Project Cost Estimates with Equity Analysis 66
Table 15 List of Viable Safety Projects for Signalized Intersections 75
Table 16 List of Countermeasures used in the Safety Projects 76
Table 17 List of Potential Funding Sources 78

Appendix

Appendix A: Summary of Planning Documents
Appendix B: Consolidated High Injury Collision Database
Appendix C: Local Roadway Safety Manual (LRSM) Excerpt
Appendix D: Countermeasure Toolbox
Appendix E: Highway Safety Improvement Program (HSIP) Analyzer (B/C Ratio Calculations)
Appendix F: Ongoing/Proposed Roadway Safety-related Improvements in the City of Oakley

EXECUTIVE SUMMARY

The City of Oakley's Local Road Safety Plan (LRSP) is a comprehensive plan that creates a framework to systematically identify and address safety issues prevalent to the City of Oakley. The analysis of crash history through the City's transportation network allows for opportunities to improve safety and develop safety measures aligning with the five E's of safety.

The LRSP takes a proactive approach to learn and reduce traffic accident fatalities (killed) and severe injury (KSI) on public roads. It will be a living document, one that is routinely reviewed and updated by City staff and their safety partners to reflect evolving collision trends and community needs and priorities. With the LRSP as a guide, the City will be able to apply for grant funds, such as the Federal Highway Safety Improvement Program (HSIP). The process and analysis performed in development of the City's LRSP, including an analysis of collisions that occurred in Oakley, high-injury locations, and recommended countermeasures at each of these high-risk locations, are summarized in this LRSP.

GOALS OF THE LRSP

- Systematically identify and analyze active transportation problems and recommend improvements.
- Improve the safety of all road users by using proven effective countermeasures.
- Coordinate with key stakeholders to implement roadway safety improvements and response within Oakley.
- Continually leverage existing resources to secure additional funding for safety improvements. Seek consistent funding until the vision is fulfilled.
- Assist in prioritizing investments in traffic safety for all Oakley residents.

PROCESS

The guidelines on the LRSP process is provided at both FHWA (Federal Highway Administration) and Caltrans (California Department of Transportation) level. The systemic approach in preparing the LRSP involves the following steps:

- Develop plan goals and objectives
- Analyze collision data
- Meet with stakeholders/safety partners
- Determine focus areas and identify crash reduction strategies
- Prioritize countermeasures/projects
- Prepare the LRSP

COLLISION DATA

Collision data for a five year period spanning from January 1, 2017 through December 31, 2021 was collected from the University of California at Berkeley SafeTREC's Transportation Injury Mapping Service (TIMS) and the California Highway Patrol's Statewide Integrated Traffic Records System (SWITRS). For the purpose of this report the data was analyzed to identify top collision trends such as location type (Intersection vs Roadway Segment), injury severity, collision type, traffic violations, mode of transportation, lighting and weather conditions etc.

COLLISION TREND

Below is the summarization of key findings on collision patterns and trends. The detailed information is provided in the Chapter 4.

- A total of 217 injury collisions occurred between 2017 and 2021.
- Of those collisions, 24 resulted in a killed or severe injury, 57 resulted in a visible injury, 136 resulted in a complaint of pain injury, and 787 resulted in PDO.
- The year 2017 had the highest number of total collisions with 288 collisions, and 2020 had the lowest number of total collisions with 132 collisions.
- The highest number of KSI collisions occurred within 250 feet of an intersection (83%).
- Rear-end and broadside collisions for 32% and 20% of total collisions, respectively. 38% of broadside collisions were KSI collisions, the highest among any type of KSI collisions.
- Unsafe speed accounted for 28% of total collisions, followed by improper turning (13%) and the wrong side of the road (11%).
- Most of the KSI collisions occurred between 3:00 p.m. to 4:00 p.m., and 7:00 p.m. to 8:00 p.m.

- 58% of total collisions were motor vehicles involved with other motor vehicles followed by motor vehicles involved with fixed objects (21%) and parked motor vehicles (10%)
- There were a total of 44 bicycle and pedestrian collisions during the study period, of which 21 were bicycle and 23 pedestrian collisions.

HIGH RISK LOCATIONS

The collision analysis was performed on all city streets. The corridors were ranked to show the top 12 high-collision intersections and top 9 high-collision roadway segments.

Key findings of identifying high-risk intersections are as follows:

- There were a total of 40 injury collisions that occurred at the intersections
- 14 collisions led to KSI
- The intersection of O'Hara Avenue and Laurel Road had the highest number of injury collisions overall (6)

Key findings of identifying high-risk roadway segments are as follows:

- There were a total of 61 injury collisions that occurred on the roadway segments
- 9 collisions led to KSI collisions
- Main Street within the City Limits had the highest number of injury collisions with 21, followed by E Cypress Road from Main Street to the East City Limit with 12 injury collisions

EMPHASIS AREAS

Emphasis areas are focus areas for the LRSP that are identified through the comprehensive collision analysis of the identified high injury locations within the City of Oakley. The six emphasis area identified for the City of Oakley are:

- Improve Intersection safety
- Address Rear-end collisions
- Address Broadside collisions
- Reduce Unsafe speed violations
- Address Nighttime collisions
- Address Head-on collisions

VIABLE SAFETY PROJECTS

A set of five safety projects were created for the high-risk intersections and roadway segments. These safety projects are:

- Project 1: Signalized Intersections: Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number, improve signal timing (coordination, phases, red, yellow, or operation), Install Raised Pavement Markers and Stripping Through Intersection
- Project 2: Unsignalized Intersections: Install Signals (subject to Signal Warrant Study), Upgrade intersection pavement markings (NS.I.), Install raised median on approaches (NS.I.)
- Project 3: Unsignalized Intersections: Add intersection lighting, Install Flashing Beacons at Stop- Controlled Intersections, Improve sight distance to intersection (Clear Sight Triangles)
- Project 4: Roadway Segments: Install/Upgrade signs with new fluorescent sheeting (regulatory or warning), Install delineators, reflectors and/or object markers, Remove or relocate fixed objects outside of Clear Recovery Zone
- Project 5: Roadway Segments: Install edge-lines and centerlines, Install centerline rumble strips/stripes, Install edgeline rumble strips/stripes

IMPLEMENTATION AND EVALUATION

The LRSP is a guidance document that is recommended to be updated every two to five years in coordination with the safety partners. The LRSP document provides the 5 E's of safety; Engineering, Education, Enforcement, Equity and Emergency Medical Services (EMS) countermeasures that can be implemented throughout the City to reduce KSI collisions. It is recommended that the City of Oakley implement the selected projects in high-collision locations in coordination with other projects proposed for the City's infrastructure development in their future Capital Improvement Plans. After implementing countermeasures, the performance measures for each emphasis area should be evaluated annually. The most important measure of success of the LRSP should be reducing KSI collisions throughout the City. If the number of KSI collisions does not decrease over time, then the emphasis areas and countermeasures should be re-evaluated.

ACKNOWLEDGEMENTS

The City of Oakley (City) developed a plan to evaluate transportation safety for motorists, bicyclists, and pedestrians within the city. Input was sought from several groups consisting of Oakley City Staff, Oakley Police Department, Contra Costa Fire Protection District, Oakley Union Elementary School District, Contra Costa Transportation Authority (CCTA), and Oakley residents. Community engagement and stakeholder outreach were held with opportunities to provide online feedback to solicit feedback from the community at large. A consulting team led by TJKM Transportation Consultants assisted City staff in preparing the plan.

Note: Throughout this plan, reference to the "City" refers to Oakley government.

City of Oakley Staff

Kevin Rohani
(Public Works Director/City Engineer)

Jason Kabalin
(Capital Projects Engineer)

Consultant Team

Ruta Jariwala
(Principal / Project Manager)

Utsav Domadia
(Transportation Engineer)

GLOSSARY

5 E's – Abbreviation for Education, Enforcement, Engineering, Equity and Emergency Medical Services (EMS): A traffic engineering approach for improving safety on the roadways.

ACS – Abbreviation for American Community Survey: A U.S. Census survey that helps local officials, community leaders, and businesses understand the changes taking place in their communities.

ADT – Abbreviation for average daily traffic: Refers to vehicle traffic volumes.

BCR – Abbreviation for benefit-cost ratio: Indicator used to quantify project benefits in relation to project costs.

LRSP – Abbreviation for Local Road Safety Plan. A document that provides a framework for identifying, analyzing, and prioritizing roadway safety improvements on local roads.

CRF – Abbreviation for crash reduction factor: The percentage of expected effect of a countermeasure or safety project to decrease collisions.

Collision Severity – Defined as the intensity of collisions typically in the following categories: killed and severe injury (KSI), other visible injury and complaint of pain (other), and property damage only (PDO).

EMS – Abbreviation emergency medical services.

EPC - Equity Priority Communities

EPDO – Abbreviation for equivalent property damage only.

FHWA – Abbreviation for Federal Highway Administration: The federal agency responsible managing the nation's highway system, including bridges and tunnels.

HSIP – Abbreviation for Highway Safety Improvement Program: A roadway safety funding program managed by Caltrans, California State Department of Transportation.

KSI – Abbreviation for killed and severe injury collisions.

LRSM – Abbreviation for Local Roadway Safety Manual: A Manual for California's Local Road Owners.

MTC - Metropolitan Transportation Commission: MTC is the transportation planning, financing and coordinating agency for the nine-county San Francisco Bay Area.

Primary Violation Factor/Primary Collision Factor – Defined as contributing causes of collisions.

SWITRS - Abbreviation for Statewide Integrated Traffic Records System: A database managed by California Highway Patrol that collects and processes data gathered from collision scenes.

TIMS - Abbreviation for Transportation Injury Mapping System: A collision database managed by UC Berkeley SafeTREC system

1 PROJECT BACKGROUND

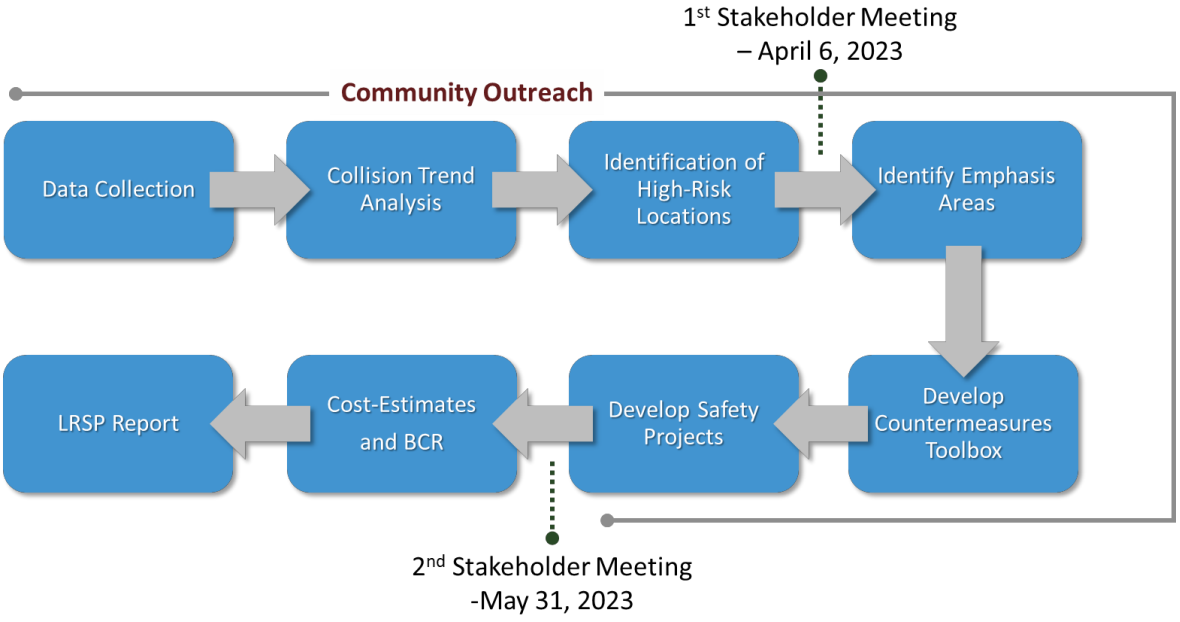
WHAT IS AN LRSP?

The LRSP is a localized data-driven traffic safety plan that provides opportunities to address unique roadway safety needs and reduce the number of KSI collisions. The LRSP creates a framework to systematically identify and analyze traffic safety-related issues, and recommend safety projects and countermeasures. It facilitates the development of local agency partnerships and collaboration, resulting in the development of a prioritized list of improvements that can qualify for HSIP funding. The LRSP is a proactive approach to addressing safety needs and is viewed as a living document that can be constantly reviewed and revised to reflect evolving trends, and community needs and priorities.

PROCESS

The systemic approach in preparing the LRSP involves the following steps:

- Develop plan goals and objectives
- Analyze collision data
- Meet with stakeholders/safety partners
- Determine focus areas and identify crash reduction strategies
- Prioritize countermeasures/projects
- Prepare the LRSP



GOALS AND OBJECTIVES

GOAL 1: SYSTEMATICALLY IDENTIFY AND ANALYZE ACTIVE TRANSPORTATION PROBLEMS AND RECOMMEND IMPROVEMENTS

Objective 1: Use the Systemic Safety Analysis data-driven process to identify traffic collisions in Oakley, (with an emphasis on KSI collisions); where, when, and how they are occurring, and implement appropriate and proven countermeasures.

Objective 2: Improve roadway planning, design, operations, and connectivity to enhance safety and mobility for all modes, and for users of all ages and abilities.

Objective 3: Implement traffic calming strategies to discourage speeding and other unsafe driving behaviors on residential streets.

Objective 4: Ensure that all recommended improvements are consistent with City of Oakley goals, as well as State and Federal plans and goals (such as, but not limited to: California Strategic Highway Safety Plan, and the FHWA Local and Rural Road Safety Program).

Objective 5: Review existing City policies and recommend improvements to ensure that they meet current best practices in the realm of traffic safety.

GOAL 2: IMPROVE THE SAFETY OF ALL ROAD USERS BY USING PROVEN EFFECTIVE COUNTERMEASURES

Objective 1: Identify safety issues and locations/hot spots where bicycle and pedestrian collisions occur in Oakley, and treat with appropriate and effective engineering countermeasures.

Objective 2: Provide educational programs for bicyclists, pedestrians, and motorists to inform on how to be safe in the public right-of-way; either through after-school programs, law enforcement programs, or other public/private sponsored programs.

Objective 3: Improve sidewalks, walkways, and crossings to be free of hazards and to minimize conflicts with vehicular traffic.

Objective 4: Prioritize improvements that promote Safe Routes to School efforts or are located near schools.

GOAL 3: COORDINATE WITH KEY STAKEHOLDERS TO IMPLEMENT ROADWAY SAFETY IMPROVEMENTS AND RESPONSE WITHIN OAKLEY

Objective 1: Coordinate between City Departments, Police Department, Fire Protection District, School Districts and EMS agencies to ensure a coordinated response to traffic safety, including:

- Implementation of safety improvements
- Public education on safely traveling in the public right-of-way, regardless of mode
- Enforcement of traffic safety laws in the public right-of-way
- Minimizing impacts to emergency response times.

Objective 2: Coordinate with local, regional, and state partners (such as CCTA, Tri-Delta, BART etc.), to identify and address traffic safety issues and ensure a coordinated response.

GOAL 4: CONTINUALLY LEVERAGE EXISTING RESOURCES TO SECURE ADDITIONAL FUNDING FOR SAFETY IMPROVEMENTS

Objective 1: Ensure the LRSP meets HSIP guidelines in order to apply for funding for identified countermeasures.

Objective 2: Provide a list of prioritized locations and improvements that guide City investments and grant funding applications.

Objective 3: Identify and prioritize specific types of countermeasures to address identified safety issues, for systemic implementation citywide

Objective 4: Continually seek funding sources to implement engineering, education, enforcement, equity, and emergency response solutions to roadway safety issues in Oakley.

GOAL 5: ASSIST IN PRIORITIZING INVESTMENTS IN TRAFFIC SAFETY FOR ALL OAKLEY RESIDENTS

Objective 1: Utilize public input to identify traffic issues and locations and inform prioritization based on community desires and needs.

Objective 2: Provide a forum for residents to submit traffic safety related concerns; and for City staff and officials to respond to such concerns.

Objective 3: Where feasible, implement community outreach to inform the public about upcoming safety improvements and seek input regarding viability and impacts while building trust and confidence to actively participate in such decisions.

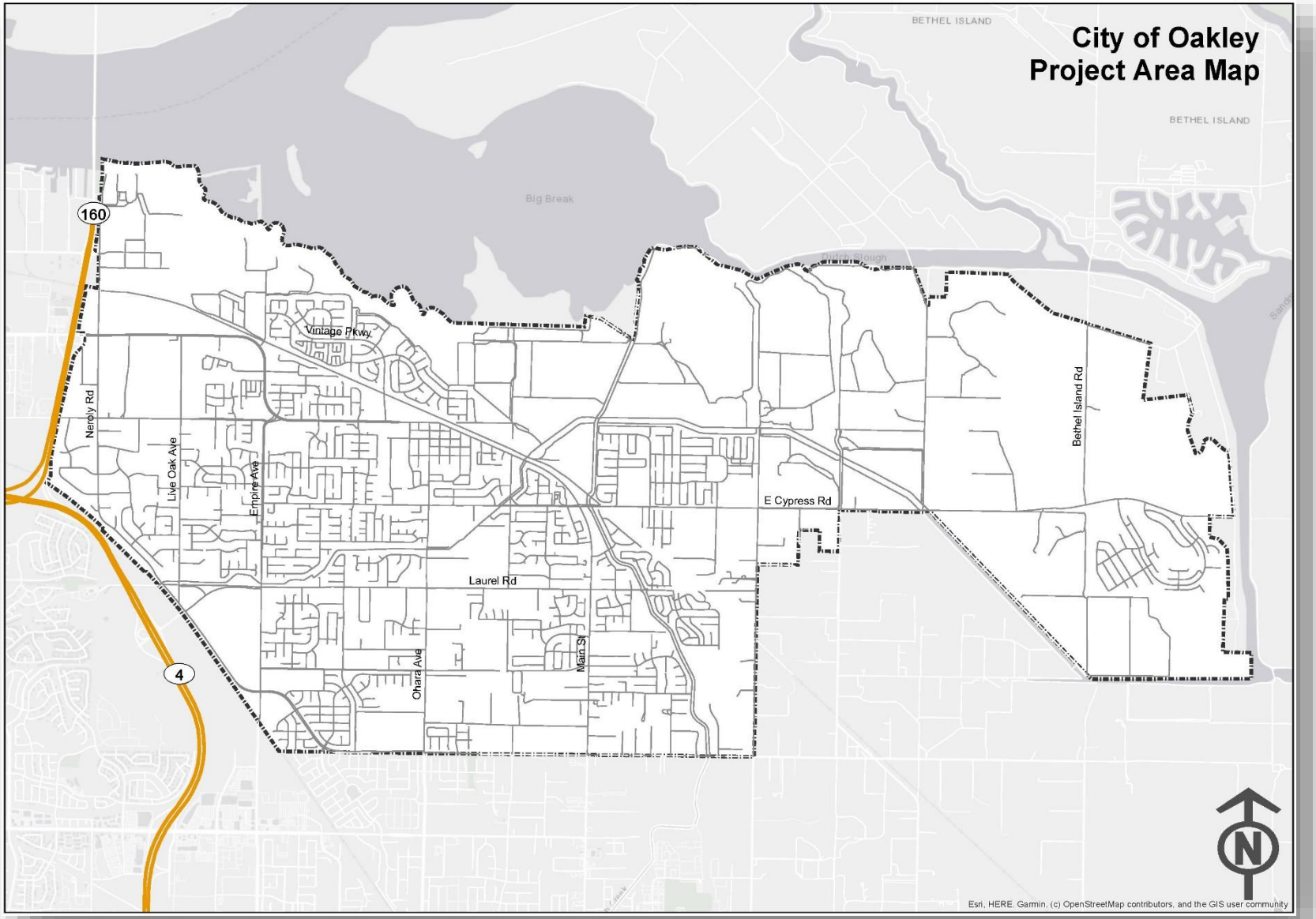
Objective 4: Ensure the consideration of equity when selecting where to make traffic safety improvements and establish metrics by which to make equitable decisions.

Objective 5: Identify groups with a special interest in roadway safety and help build their capacity to support the city in outreach efforts, including Safe Routes to School and Safe Routes for Seniors Programs.

STUDY AREA

The City of Oakley, located in Contra Costa County, California, covers a total area of 16.2 square miles. Located in the East Bay region of the San Francisco Bay Area, the City's estimated population is 43,357 (US Census 2020). Main Street, Oakley Road, Empire Avenue, O'Hara Avenue, and Cypress Road are main thoroughfares that connect Oakley with nearby cities, State Route 4 (SR 4) and SR 160. The study area is mapped in **Figure 1** below.

Figure 1 Study Area: City of Oakley



According to the five-year estimates from the American Community Survey (ACS) 2021[1] from the U.S. Census, 75% of Oakley commuters get to work by driving alone, more than both the Contra Costa County and State percentages of driving commuters. The second most common method of commuting to work in the City is carpooling at 10%. The different modes of transportation used by Oakley residents to commute to work are shown in **Table 1** below.

Table 1 Oakley Commute to Work Data

Commute to Work	Oakley	Contra Costa County	California
Drive Alone	75%	57%	64%
Carpool	10%	9%	8%
Public Transportation	4%	3%	2%
Walked	0%	2%	2%
Work from Home	10%	28%	21%
Other	1%	2%	2%

Source: Data from the Census Bureau ACS 5-year Estimate 2021

[1] https://data.census.gov/table?q=Oakley+city,+California&t=Transportation&tid=ACSDT5Y2021.B08141

2 SAFETY PARTNERS

Safety partners are vital to the development and implementation of an LRSP. For the City of Oakley, these included: City Staff, City Police Department, Contra Costa Fire Protection District, Oakley Union Elementary School District, CCTA (Contra Costa Transportation Authority), and Oakley residents. These stakeholders attended two virtual stakeholder meetings, held on April 6, 2023, and May 31, 2023, to review project goals, findings, and solicit feedback and comments. **Figure 2** illustrates the power point presentation for the virtual Stakeholder Meeting held on May 31, 2023.

Figure 2 Zoom Meeting from Stakeholder Meeting #1

This stakeholder outreach was supplemented by a project website with an interactive platform. The interactive map was used to solicit input from City of Oakley residents and stakeholders outside the confines of traditional meetings. **Figure 3** illustrates the landing page of the Oakley LSRP Project Website.

Figure 3 Oakley Local Roadway Safety Plan: Project Website

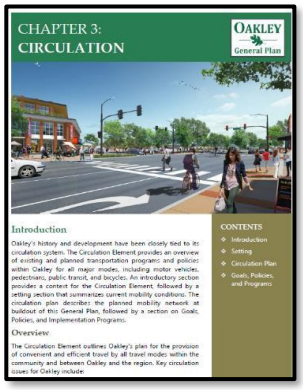
3 EXISTING PLANNING EFFORTS

This chapter summarizes the planning documents, projects underway, and studies reviewed for the City of Oakley LRSP. The purpose of this chapter is to ensure the LRSP vision, goals, and the 5 E's strategies (**E**ducation, **E**nforcement, **E**ngineering, **E**quity and **E**mergency Medical Services (EMS)) are aligned with prior planning efforts, planned transportation projects, and non-infrastructure programs for the City. The documents reviewed are listed below:

- Oakley General Plan (2022)
- Oakley Downtown Specific Plan (2010)
- East Cypress Corridor Specific Plan (2006)
- Oakley Neighborhood Traffic Management Program Policy (2014)
- City of Oakley Capital Improvement Program (2021-22)
- Contra Costa Countywide Bike and Pedestrian Plan (2018)
- CCTA Transportation Expenditure Plan (2020)
- Contra Costa Countywide Transportation Safety Policy and Implementation Guide (2021)
- CCTA Countywide Comprehensive Transportation Plan (2017)
- Contra Costa County Transportation Analysis Guidelines (2020)

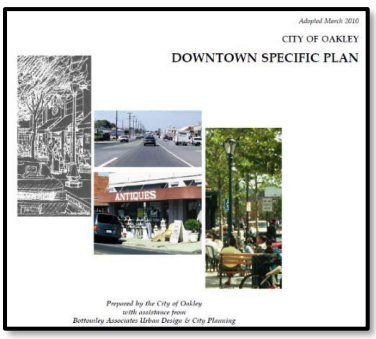
The following sections include brief descriptions of these documents and how they inform the development of the LRSP. A detailed list of relevant policies and projects is listed in **Appendix A**.

CITY OF OAKLEY GENERAL PLAN (2022)



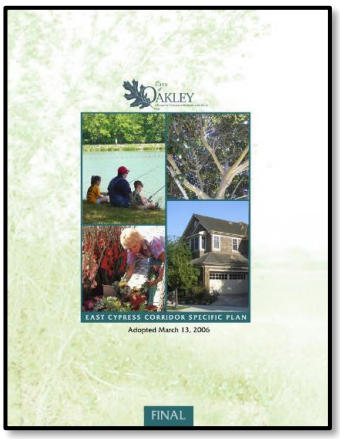
The General Plan circulation element identifies seven mobility goals including policies and implementation programs for each goal. These mobility goals focus on all major modes of transportation within Oakley. The goal of traffic safety informs City's Local Roadway Safety Plan to monitor, improve, and enhance traffic safety to eliminate traffic fatalities and reduce the rate of injury collisions in Oakley.

OAKLEY DOWNTOWN SPECIFIC PLAN (2010)



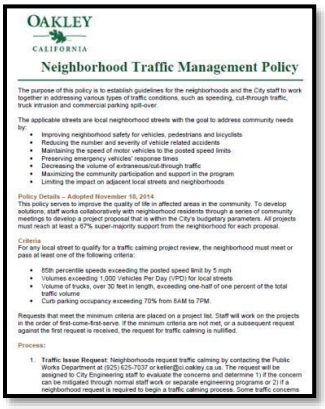
Oakley Downtown Specific Plan compiles Revitalization Strategy recommendations, clarifies revitalization objectives, and defines the programs and capital improvements the City and Redevelopment Agency will pursue to realize the community's vision for Downtown. Projects and improvements identified in this plan for the downtown area will inform pedestrian safety improvements and strategies to be recommended in the City's Local Road Safety Plan.

EAST CYPRESS CORRIDOR SPECIFIC PLAN (2006)



The purpose of the Specific Plan is to provide the City of Oakley with a comprehensive plan that controls development within the East Cypress Corridor Area, ensuring the creation of a livable community designed as a group of compatible neighborhoods with connectivity to parks, open space, schools, and commercial services. The plan reinforces the concept of traditional neighborhood design to provide not only safe and efficient movement of vehicular traffic through the project, but also provide a safe environment for pedestrian movement and bicycle traffic, reducing the reliance on the automobile as a means of travel. The improvements identified in this plan will inform the safety strategies to be recommended in the City's Local Road Safety Plan.

OAKLEY NEIGHBORHOOD TRAFFIC MANAGEMENT PROGRAM POLICY (2014)


OAKLEY
CALIFORNIA

Neighborhood Traffic Management Policy

The purpose of this policy is to establish guidelines for the neighborhoods and the City staff to work together in addressing various types of traffic conditions, such as speeding, cut-through traffic, truck intrusion and commercial parking spill-over.

The applicable streets are local neighborhood streets with the goal to address community needs by:

- Improving neighborhood safety for vehicles, pedestrians and bicyclists
- Reducing the number and severity of vehicle related accidents
- Maintaining the speed of motor vehicles to the posted speed limits
- Preserving emergency vehicles' response times
- Decreasing the volume of extraneous/cut-through traffic
- Maximizing the community participation and support in the program
- Limiting the impact on adjacent local streets and neighborhoods

Policy Details – Adopted November 18, 2014

This policy serves to improve the quality of life in affected areas in the community. To develop solutions, staff works collaboratively with neighborhood residents through a series of community meetings to develop a project proposal that is within the City's budgetary parameters. All projects must reach at least a 67% super-majority support from the neighborhood for each proposal.

Criteria

For any local street to qualify for a traffic calming project review, the neighborhood must meet or pass at least one of the following criteria:

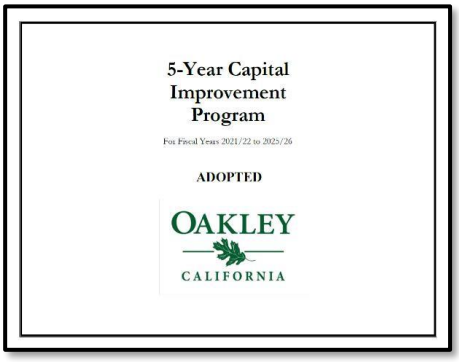
- 85th percentile speeds exceeding the posted speed limit by 5 mph
- Volumes exceeding 1,000 Vehicles Per Day (VPD) for local streets
- Volume of trucks, over 30 feet in length, exceeding one-half of one percent of the total traffic volume
- Curb parking occupancy exceeding 70% from 8AM to 7PM.

Requests that meet the minimum criteria are placed on a project list. Staff will work on the projects in the order of first-come-first-serve. If the minimum criteria are not met, or a subsequent request against the first request is received, the request for traffic calming is nullified.

Process:

1. Traffic Issue Request: Neighborhoods request traffic calming by contacting the Public Works Department at (925) 625-7037 or keller@ci.oakley.ca.us. The request will be assigned to City Engineering staff to evaluate the concerns and determine 1) if the concern can be mitigated through normal staff work or separate engineering programs or 2) if a neighborhood request is required to begin a traffic calming process. Some traffic concerns

CITY OF OAKLEY CAPITAL IMPROVEMENT PROGRAM (2021-22)


5-Year Capital Improvement Program

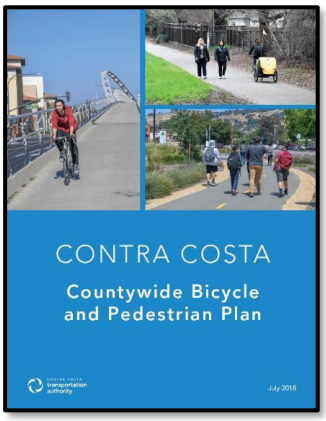
For Fiscal Years 2021/22 to 2025/26

ADOPTED

OAKLEY
CALIFORNIA

The City of Oakley's 5-Year Capital Improvement Program (CIP) is a multi-year planning instrument for constructing new facilities and infrastructure and for expanding, rehabilitating, or replacing existing City- owned assets. The 5-Year CIP is developed by City Staff and adopted by City Council as a guide for prioritization of various projects to accomplish community goals. The CIP is updated regularly to reflect changing priorities and funding availability, and to remove projects that have been completed. These improvements influence Oakley's built and natural environment and help guide the trajectory of future growth or change. The improvements identified in this plan will inform the safety improvements to be recommended in the City's Local Road Safety Plan.

CONTRA COSTA COUNTYWIDE BIKE AND PEDESTRIAN PLAN (2018)

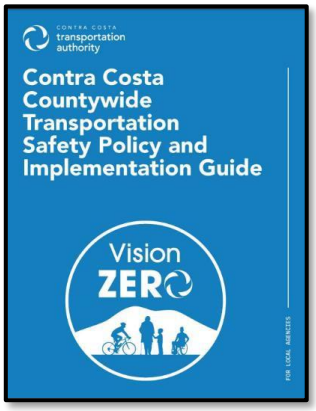


Revised in 2018, the Contra Costa Countywide Bike and Pedestrian Plan entails new policies, best practices, and standards developed over the last decade as well as newly-adopted local active transportation plans. This plan highlights the need of increased interest and support for walking and bicycling. The plan also includes the pedestrian and bicycle collision density, design for pedestrian facilities, pedestrian priority area, level of traffic stress for bicycle users, and existing and proposed bicycle facilities. The improvements identified in this plan will inform the safety improvements and strategies to be recommended in the City's Local Road Safety Plan.

CCTA TRANSPORTATION EXPENDITURE PLAN (TEP) (2020)

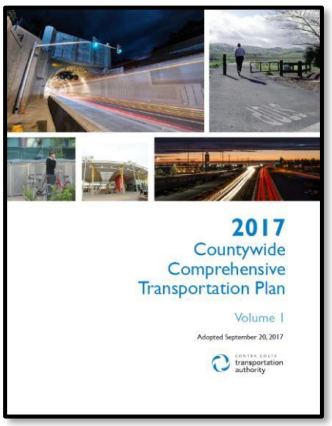
The 2020 Transportation Expenditure Plan (TEP) is a carefully curated set of solutions designed to bring Contra Costa's transportation system into the future by moving more people efficiently, encouraging mode shift, and promoting shared mobility options for all. The TEP is intentionally designed to be equitable across the entire County based on population. This plan reflects the current progress of transportation projects in Contra Costa County and the commitment to pursuing transportation policies, planning, and investments.

CONTRA COSTA COUNTYWIDE TRANSPORTATION SAFETY POLICY AND IMPLEMENTATION GUIDE (2021)



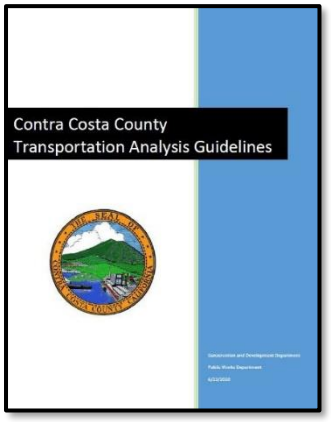
This report outlines a framework for Safety Policy and implantation in Contra Costa County. The Safe System Approach integrating multimodal equity supports the Vision Zero goal of eliminating severe injuries and fatalities. This approach is especially critical for people using non-vehicular transportation modes who lack the physical protection provided to people traveling in multi-ton vehicles, which require compliance with carefully designed and regulated manufacturing requirements. CCTA launched its Vision Zero Framework & Systemic Safety Approach effort to serve as the basis for transportation planning, policy, design, construction, and funding throughout Contra Costa County.

CCTA COUNTYWIDE COMPREHENSIVE TRANSPORTATION PLAN (2017)



The 2017 Countywide Comprehensive Transportation Plan (CTP) provides the policy framework and steps necessary for the CCTA to achieve its vision. It includes an analysis of challenges and opportunities; a definition of the vision, goals, and strategies; and defines how the CTP will be carried out through a Long-Range Transportation Investment Program and an Implementation Program, with defined responsibilities and a schedule of activities. The CTP outlines the various strategies for addressing transportation and growth management issues within Contra Costa County.

CONTRA COSTA COUNTY TRANSPORTATION ANALYSIS GUIDELINES (2020)



The Contra Costa County Transportation Analysis Guidelines (TAG) are provided to aid in the preparation of traffic analysis for project applicants and staff. The purpose of this document is to establish a uniform approach, methodology, and toolset to evaluate the impacts of land-use decisions and related transportation projects on the County's transportation system. This is a living document and is updated periodically to reflect newly acquired data and relevant policies. Capital Road Improvement and Complete Streets policies mentioned in this document will serve as a reference while developing a City's Local Road Safety Plan.

4 COLLISION DATA AND ANALYSIS

A primary component of the LRSP is the identification of locations with elevated risk of collisions either through their collision histories or their similarities to other locations that have more active collision patterns. A summary of the collision data utilized and key findings is included in this chapter.

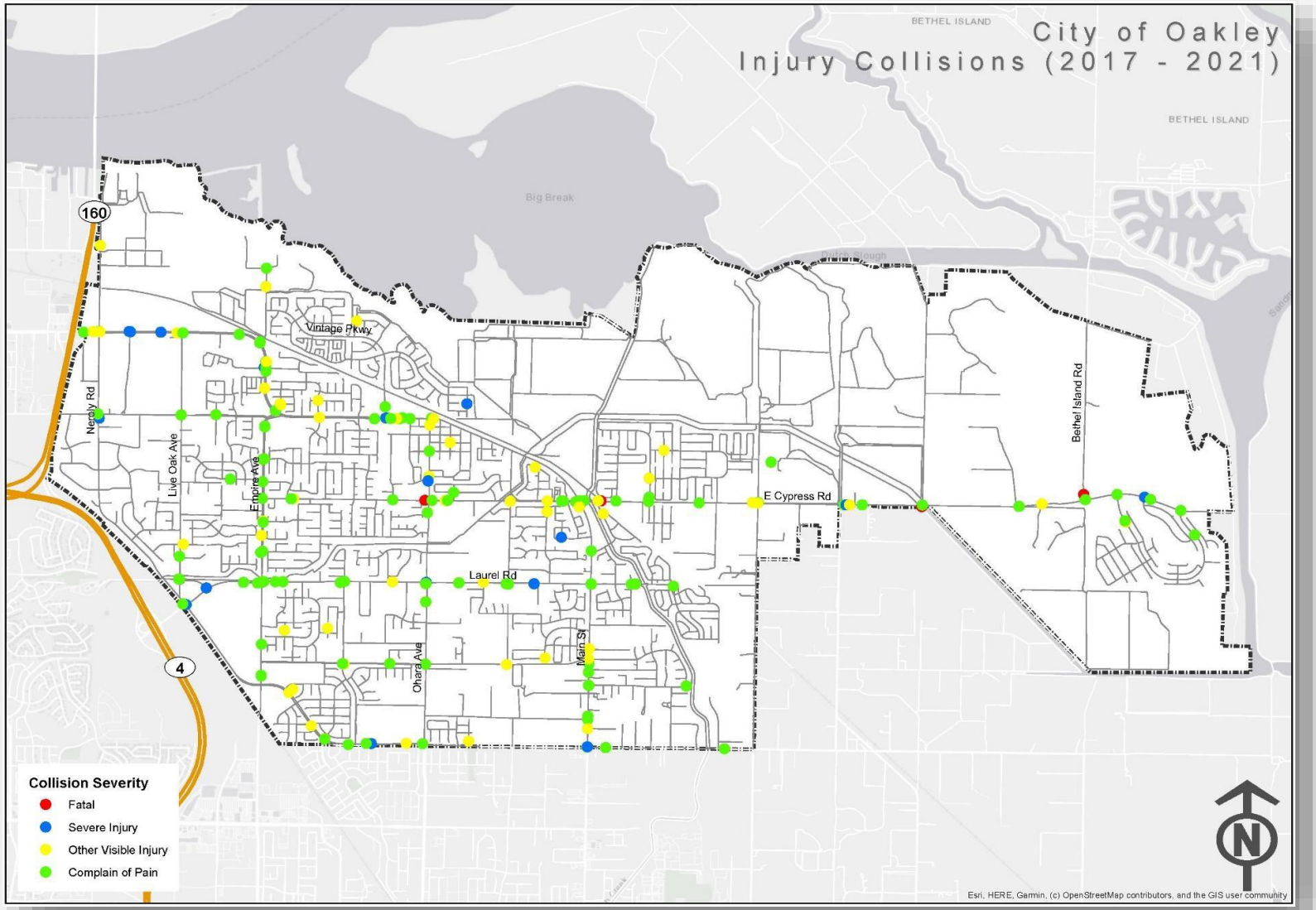
The LRSP focuses on systemically identifying and analyzing traffic safety issues and recommends appropriate safety improvements. The chapter starts with a comprehensive analysis of collisions of all severity types in Oakley and compares this with the KSI collisions. Collision trends such as collision severity, type of collision, primary collision factor, lighting, weather, and time were analyzed. Following this, a more detailed analysis was conducted for KSI collisions that have occurred on the city's roadways, including analyzing intersection and roadway segment collisions separately.

DATA COLLECTION

Collision data helps to understand different factors that might be leading to collisions and influencing collision patterns in a given area. For the purpose of this analysis, five-years of jurisdiction-wide collision data (January 1st, 2017 to December 31st, 2021) was retrieved from Transportation Injury Mapping System (TIMS) and Statewide Integrated Traffic Records System (SWITRS). The collision data were analyzed and plotted in ArcMap GIS software to identify high-risk intersections and roadway segments.

Figure 4 illustrates all the injury collisions that have occurred in the City of Oakley from January 1st, 2017 to December 31st, 2021.

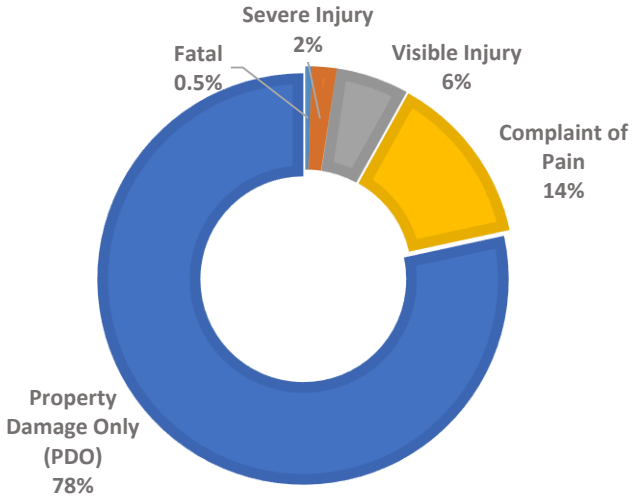
Figure 4 Injury Collisions in the City of Oakley (2017-2021)



COLLISION CLASSIFICATION

There were a total of 1,004 collisions reported on the City of Oakley roads from 2017 to 2021. Out of these, 787 were property damage only collisions (78%). 136 collisions led to a complaint of pain injury (14%), and 57 collisions (6%) led to a visible injury. There were 24 KSI collisions, of which 19 collisions (2%) led to a severe injury and five collisions (less than 0.5%) led to fatalities. **Figure 5** illustrates the classification of all collisions based on severity.

Figure 5 Collisions by Severity (2017 -2021)



The analysis first includes a comparative evaluation between all injury collisions and KSI collisions, based on various factors including (but not limited to): collision trend, primary collision factor, collision type, facility type, motor vehicle involved with, weather, lighting, and time of the day. Following this, a comprehensive analysis is conducted for only KSI collisions. KSI collisions cause the most damage to those affected and to infrastructure. Aside from the human toll exacted against the crash victims, emotional impacts are endured by family and friends, by witnesses, and by first responders. There are also financial burdens endured by victims and their families as well as by the community and society as a whole. The LRSP process thus focuses on these collision locations to proactively identify counter safety issues leading to these KSI collisions.

The collision data was separated by facility type, i.e., based on collisions occurring on intersections and roadway segments. For the purposes of the analysis and in accordance with Highway Safety Improvement Program (HSIP) guidelines, a collision was designated to have occurred at an intersection if it occurred within 250 feet of it. The reported collisions categorized by facility type and collision severity are presented in **Table 2**.

Table 2 Collisions by Severity and Facility Type

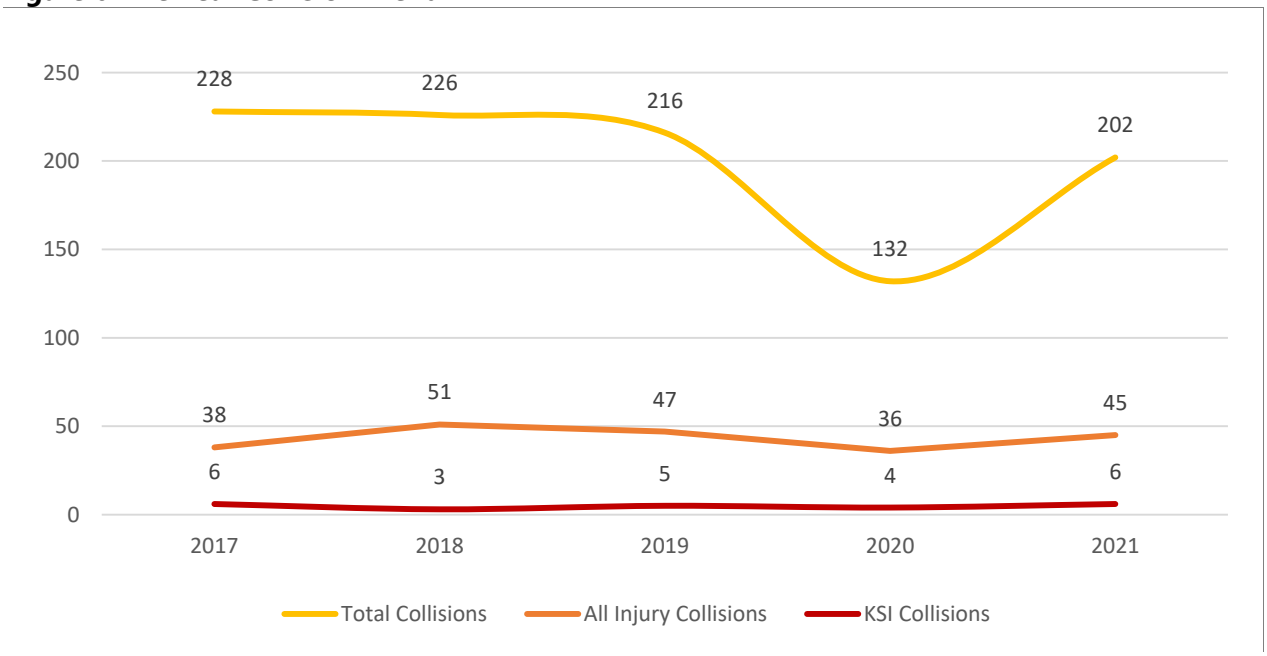
Collision Severity	Roadway Segment	Intersection	Total
Fatal	1	4	5
Severe Injury	3	16	19
Visible Injury	7	50	57
Complaint of Pain	18	118	136
Property Damage Only	105	682	787
Total	**134**	**870**	**1004**

YEARLY TREND

The number of reported total collisions decreased overall between 2017 and 2020, with a sharp increase in 2021 compared to the previous year. The year with the highest number of collisions was 2017 (228 collisions), while the year with the lowest number of collisions was 2020 (132 collisions). It was observed that the collisions percentage dropped significantly during the pandemic year of 2020 due to the lesser number of vehicles within the city roads system. The least number of KSI collisions occurred in 2018 (3 collisions), while the most occurred in 2017 and 2021 (6 collisions).

Figure 6 illustrates the five-year collision trend for total collisions (including Property Damage Only collisions - PDO), all injury collisions, and KSI collisions.

Figure 6 Five Year Collision Trend

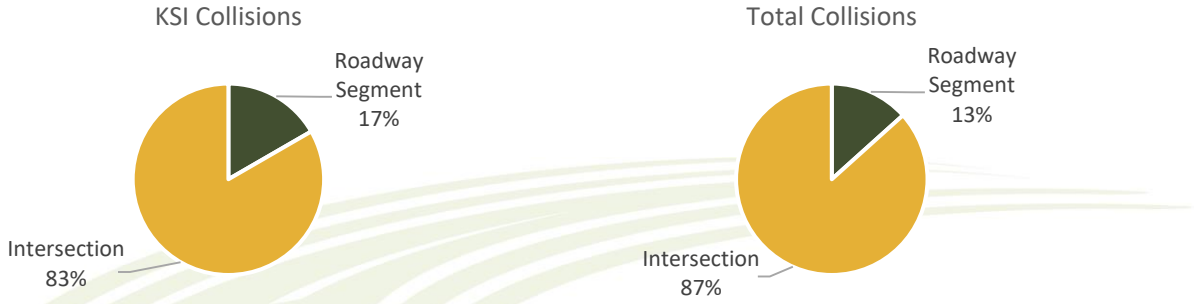


Collision types describe how a crash is reported by law enforcement based upon the parties who were involved and generally describes the manner in which contact was made between the involved parties.

ROADWAY SEGMENT VS. INTERSECTION

When evaluating the locations of collisions, most collisions occurred at intersections and not along roadway segments. In the City of Oakley, 87% of total collisions (870 collisions) occurred at intersections, whereas 13% (134 collisions) occurred on roadway segments. The proportion of roadway segment collisions is slightly higher (17%) when looking only at KSI collisions. This classification by facility type is illustrated in **Figure 7**.

Figure 7 Intersection vs Roadway Collisions - Total Collisions and KSI



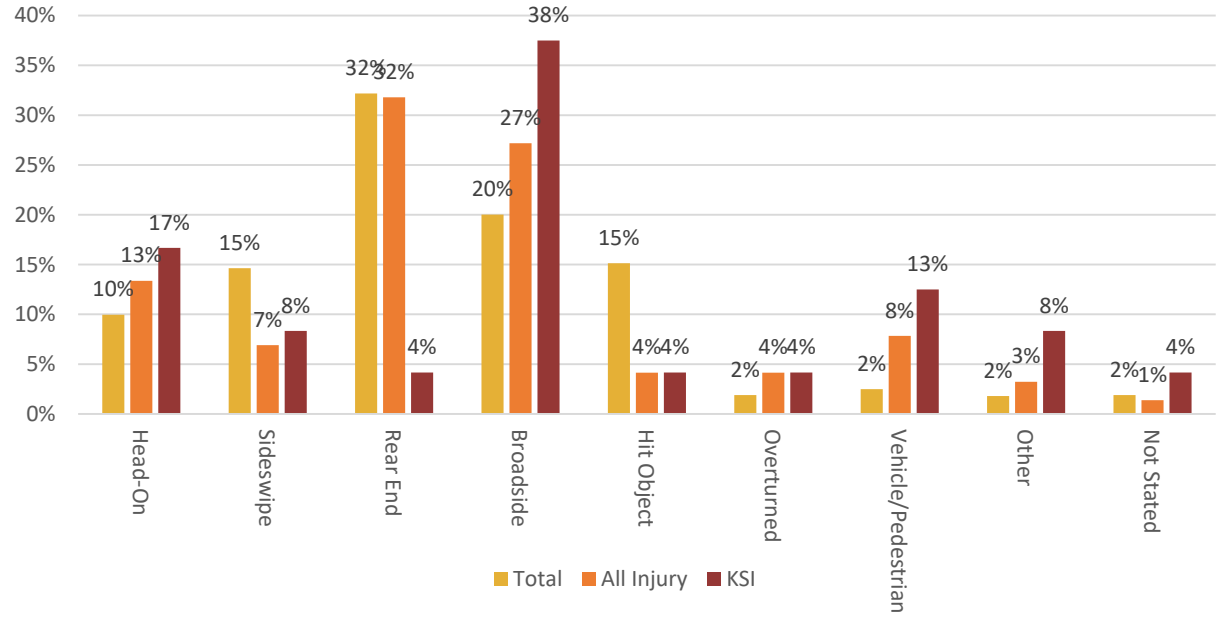
COLLISION TYPE

Collision types describe how a crash is reported by law enforcement based upon the parties who were involved and generally describes the manner in which contact was made between the involved parties.

For total collisions, the most commonly occurring collision types were rear-end collisions (32%) and broadside collisions (20%). The collision type trend for all injury collisions remains the same for the top two categories. However, the collision types for KSI collisions follow a different pattern, where the most commonly occurring collision type was broadside collisions (38%), head-on collisions (17%), and vehicle/pedestrian (13%). **Figure 8** illustrates the collision type for total collisions, injury collisions as well as KSI collisions.

KSI

Figure 8 Collision Type



Sideswipe collisions are between vehicles, typically traveling the same direction, where the primary point of contact was the side of the vehicles.

A **Rear-end** collision is between two vehicles traveling in the same direction where the front of one vehicle contacts the rear of another.

Broadside collisions are between vehicles on conflicting paths where the front of one vehicle contacts the side of another.

Unknown/Other/Not Stated collisions describe any reported collision that was not consistent with one of the primary collision types above or where collision type was not coded into the collision database.

Vehicle-Pedestrian collisions are any crash involving both a motor vehicle and a pedestrian.

An **Overturned** collision is any type of crash that results in at least one vehicle rotating 90 degrees or more side to-side or end-to-end.

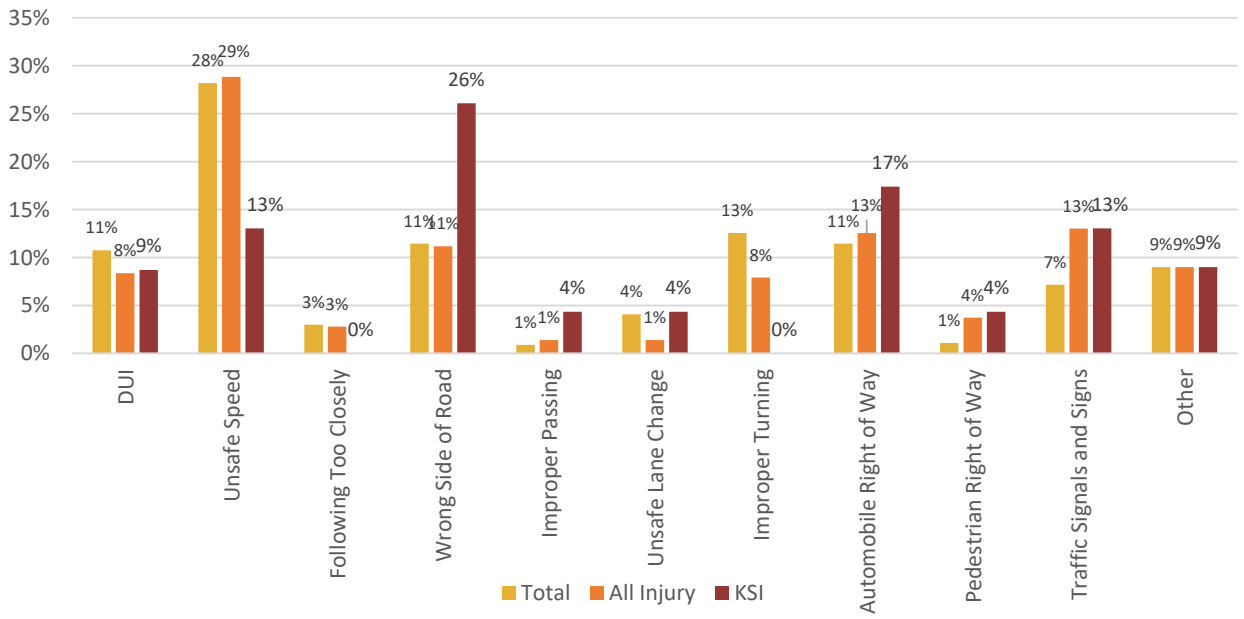
A **Head-on collision** is between two vehicles where the primary point of contact was the front of both vehicles.

Hit Object collisions are between a vehicle and non-vehicular object in or near the roadway

PRIMARY COLLISION FACTOR

For total collisions, the top two primary violation categories were observed to be unsafe speed (28%), and improper turning (13%). For all injury collisions, the top two primary violation categories were unsafe speed (29%) and traffic signal and sign violations (13%) while for KSI collisions, the top categories were driving the wrong side of the road (25%), and automobile right of way (17%). **Figure 9** illustrates the violation category for total collisions, all injury collisions, and KSI collisions.

Figure 9 Primary Violation Categories



Auto Right-of-Way (R/W) Violation refers to a driver infringing upon the right-of-way of another party in violation.

Improper Turning identifies a collision where a party made a left or right turn in violation.

Unsafe Speed refers to a collision where a party is identified to be traveling at a speed exceeding that deemed reasonable or prudent for conditions.

Traffic Signals and Signs describes a party disobeying a traffic control device such as a traffic signal or roadside sign.

Driving under Influence (DUI) identifies a collision where a driver is found to have been operating a vehicle while impaired by a substance – typically alcohol.

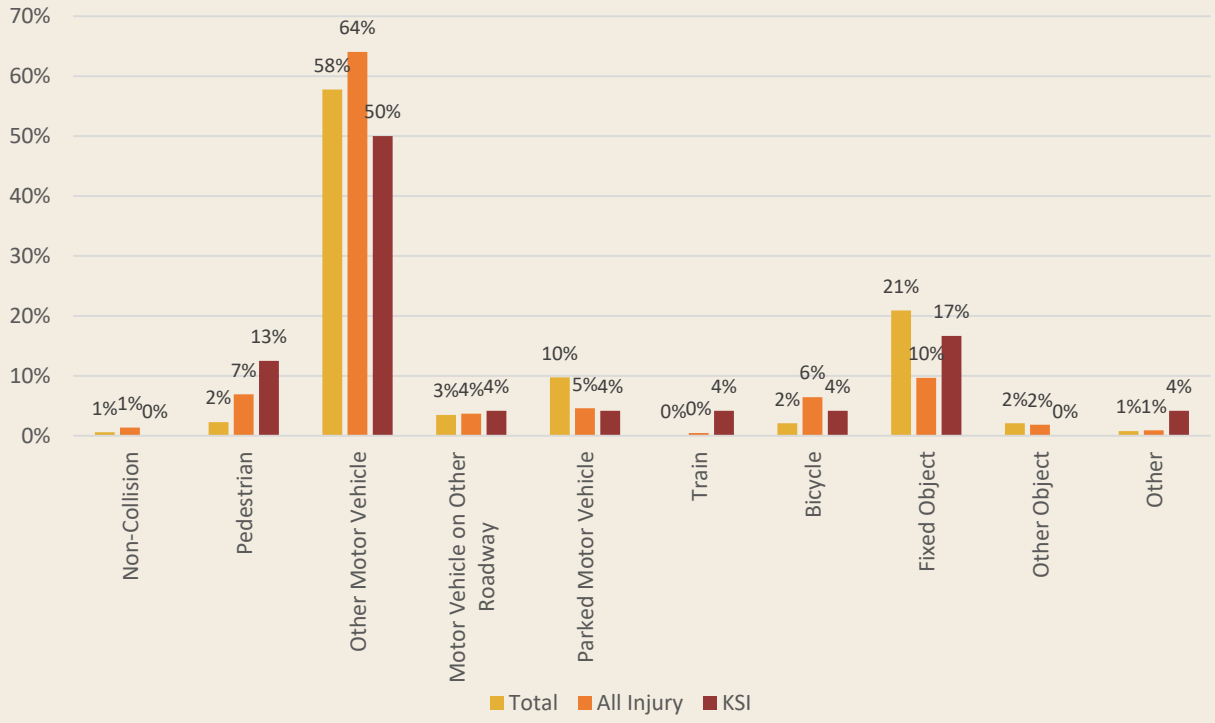
Unsafe Lane Change describes a collision where a party moves between two lanes or deviates course in a hazardous manner and/or without signaling appropriately.

Following Too Closely refers to a driver of a motor vehicle driving behind another vehicle at distance that is too short to be reasonable or prudent for conditions.

Pedestrian Right-of-Way Violation refers to a collision when a driver fails to yield the right-of-way to a pedestrian in a crosswalk.

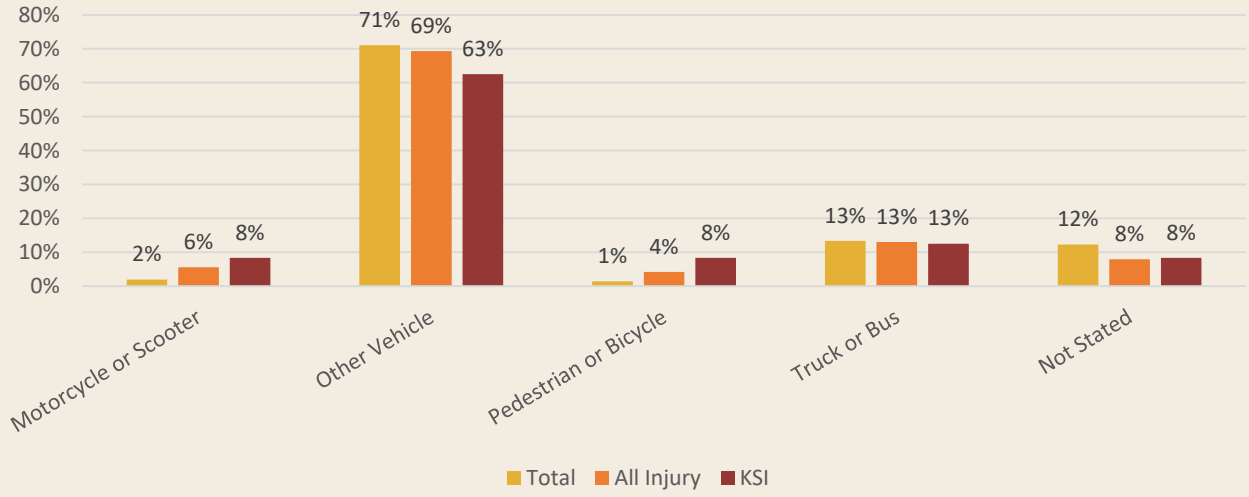
MOTOR VEHICLE INVOLVED WITH

Figure 10 Motor Vehicle Involved with



MODES

Figure 11 Transportation Modes

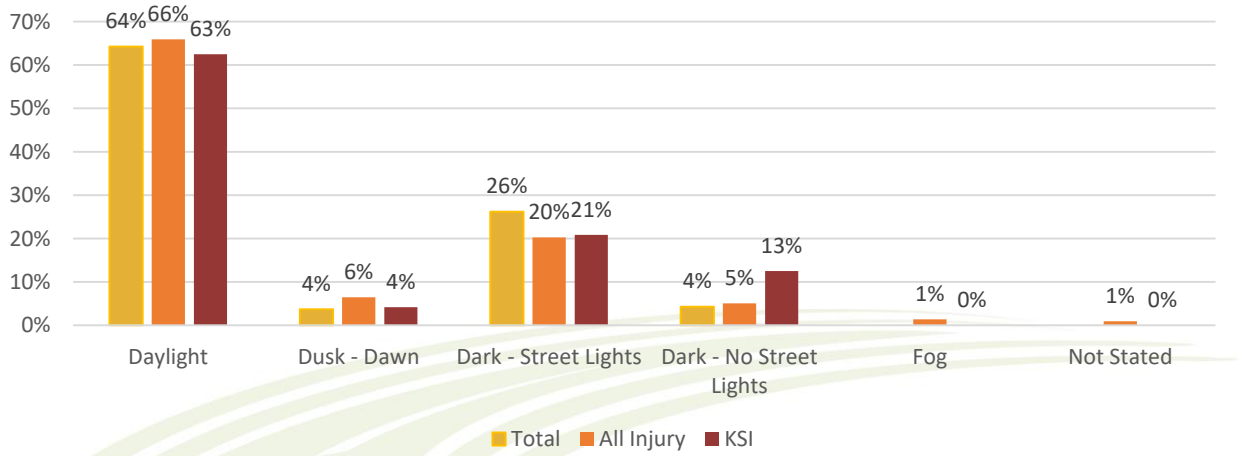


KSI

LIGHTING

For total collisions, 64% of collisions occurred in daylight, while 26% of collisions occurred in the dark on streets with streetlights. A nearly similar trend was observed for all injury and KSI collisions. However, 13% of KSI collisions occurred in dark conditions on streets without streetlights.
Figure 12 illustrates the lighting condition for total collisions, all injury collisions, and KSI collisions.

Figure 12 Lighting Conditions

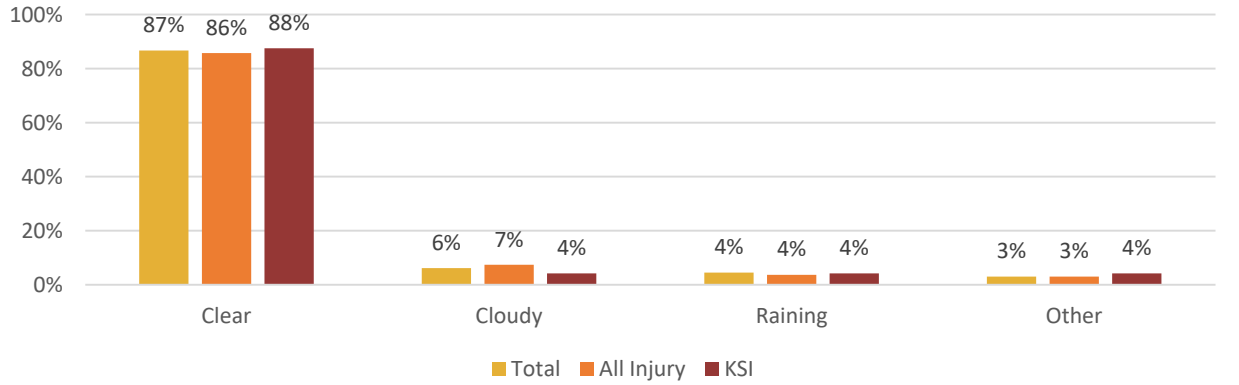


Factors that may contribute to the quality of streetlights include lights being insufficiently bright, placed too widely apart, or poor quality of lighting for people walking on the sidewalk, as streetlights are often designed primarily for vehicles in travel lanes.

WEATHER

For total collisions, the vast majority occurred during clear weather conditions (87%). For all injury and KSI collisions, similar trends have been observed, with 86% and 88% of the collisions have occurred during clear weather conditions respectively. **Figure 13** illustrates the percent distribution of weather conditions during the occurrence of collisions.

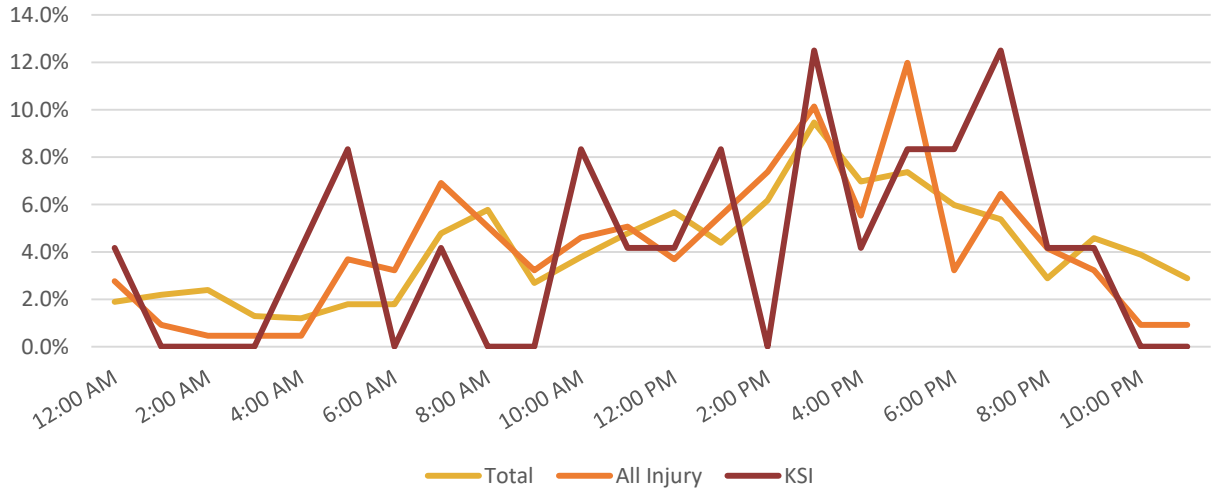
Figure 13 Weather Conditions



TIME OF THE DAY

For total collisions, the time period with the most number of collisions was between 3:00 p.m. to 4:00 p.m. (9.5%), while the time period with the fewest number of collisions was between 4:00 a.m. to 5:00 a.m. (1%). For all injury collisions, most collisions have occurred between 5:00 p.m. to 6:00 p.m. (12%). For all KSI collisions, the maximum number of collisions occurred between 3:00 p.m. to 4:00 p.m., and 7:00 p.m. to 8:00 p.m., while the time period with the fewest number of collisions was between 1:00 a.m. to 4:00 a.m. **Figure 14** illustrates the percentage of collisions occurring during each hour of the day for total collisions, all injury collisions, and KSI collisions.

Figure 14 Time of Day



KILLED AND SEVERE INJURY (KSI) COLLISIONS

This section describes a detailed collision analysis performed for KSI collisions occurring at roadway segments and intersections in the City of Oakley. Of the total 24 KSI collisions that occurred during the study period, 20 collisions (83%) occurred at intersections and 4 collisions (17%) occurred on roadway segments. This distribution is illustrated in **Figure 15**.

Figure 15 Intersection vs. Roadway Segment Collisions – KSI Collisions

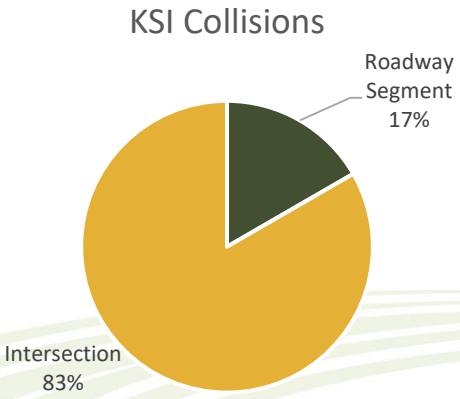
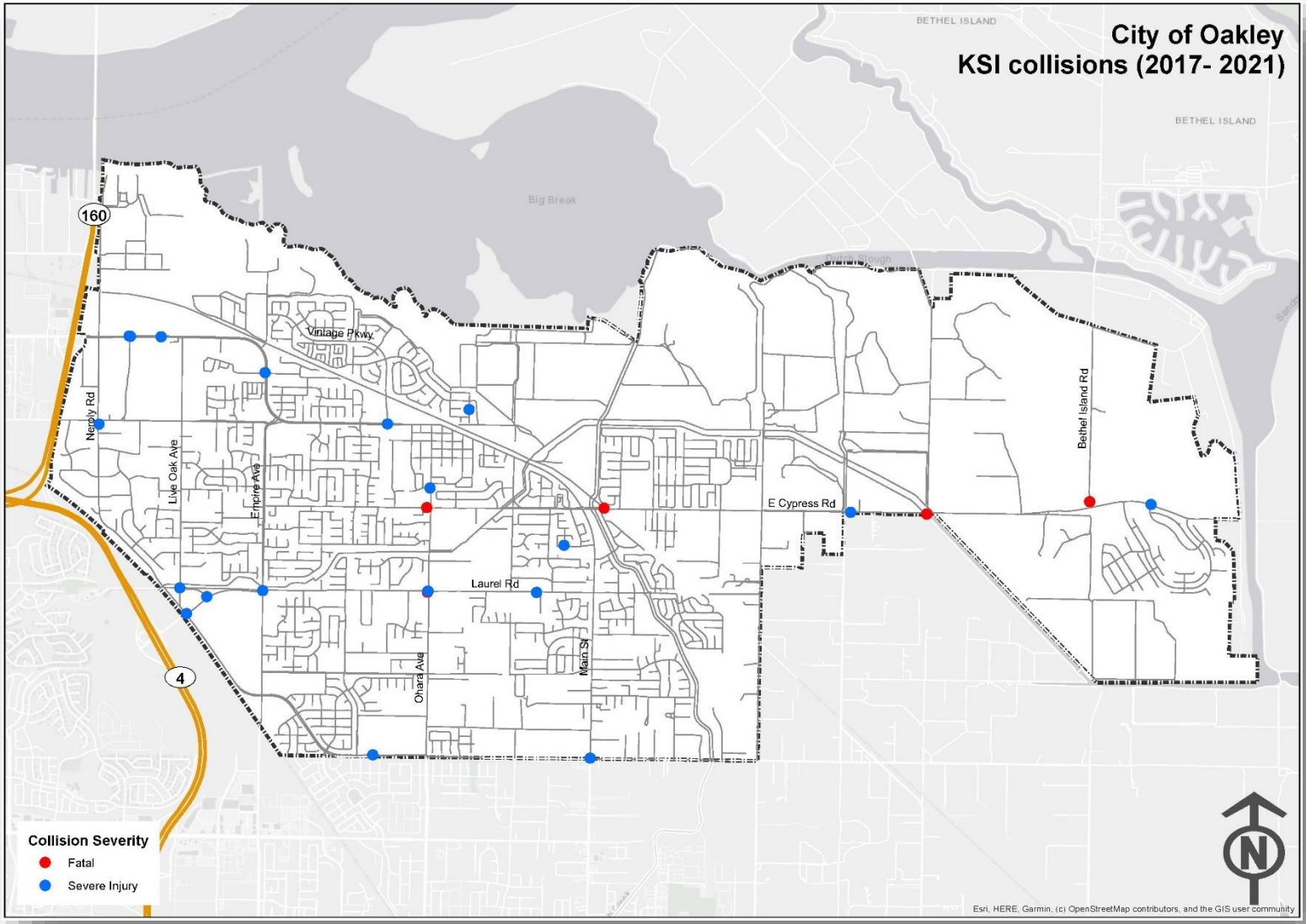


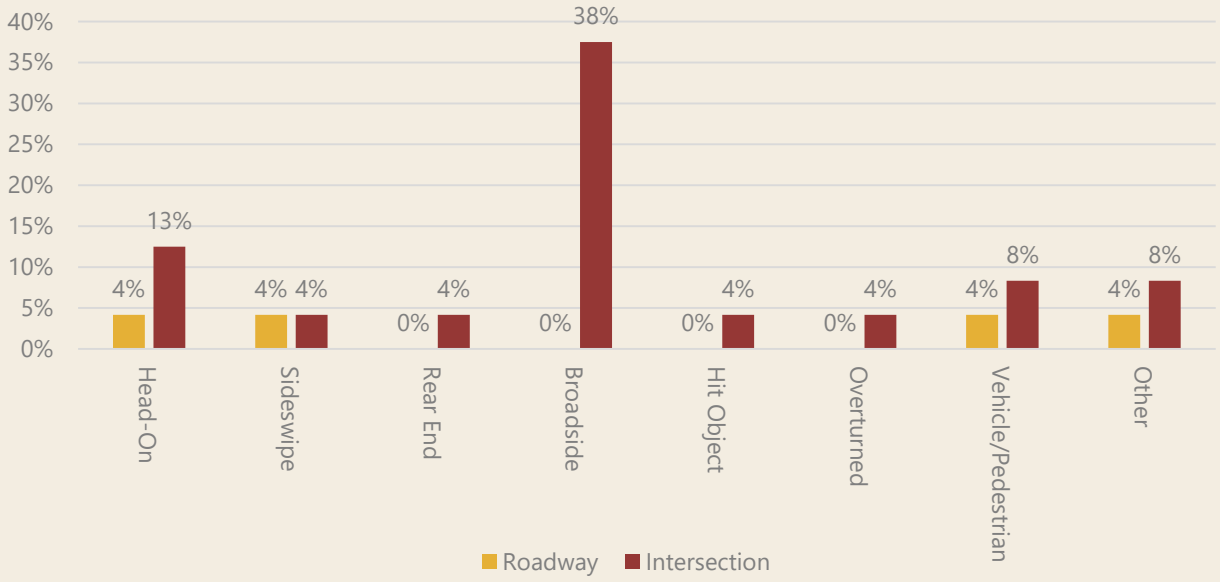
Figure 16 maps the KSI collisions that occurred in the City of Oakley during the study period.

Figure 16 Citywide Fatal and Severe Injury Collisions



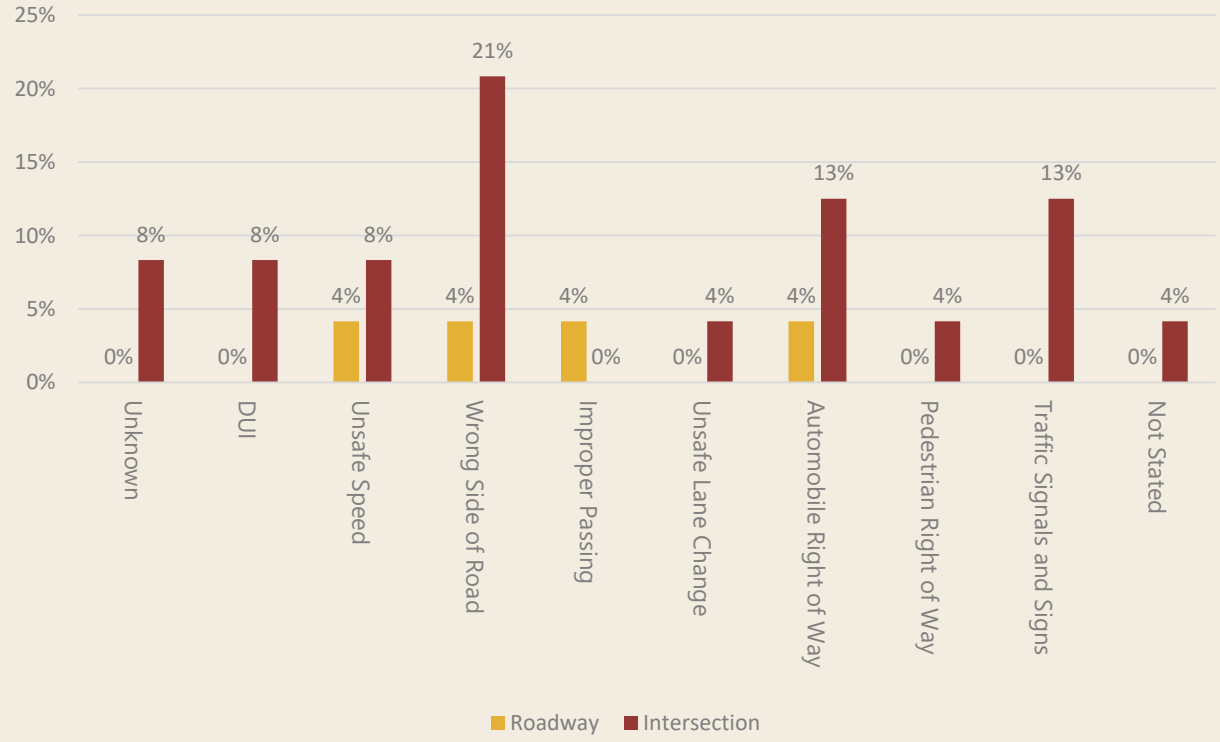
COLLISION TYPE AND LOCATION TYPE

Figure 17 KSI Collisions: Collision Type



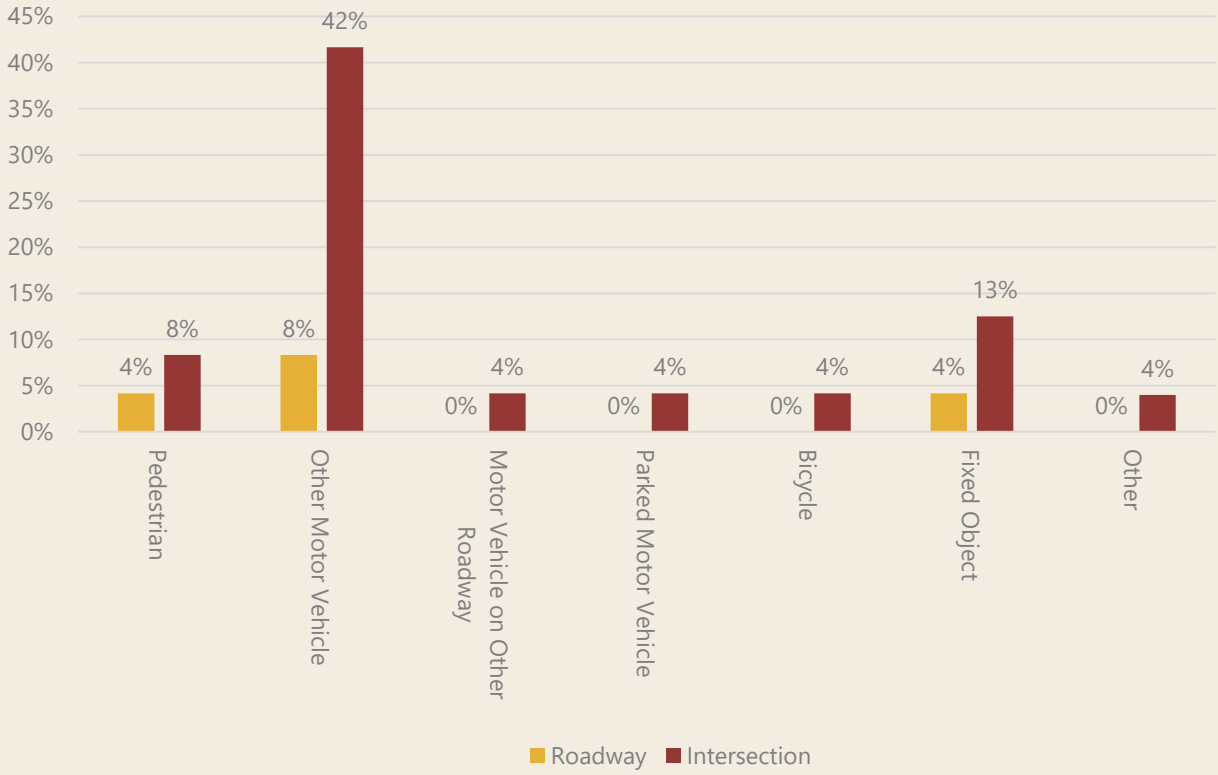
VIOLATION CATEGORY AND LOCATION TYPE

Figure 18 KSI Collisions: Violation Category Type



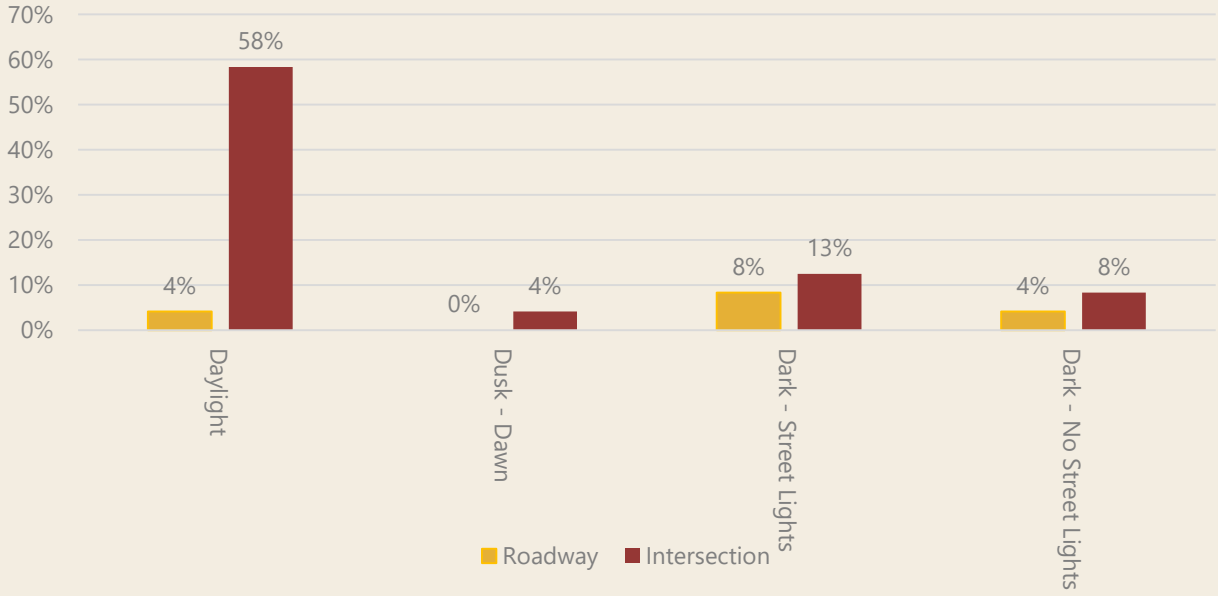
MOTOR VEHICLE INVOLVED WITH AND LOCATION TYPE

Figure 19 KSI Collisions: Motor Vehicle Involved With



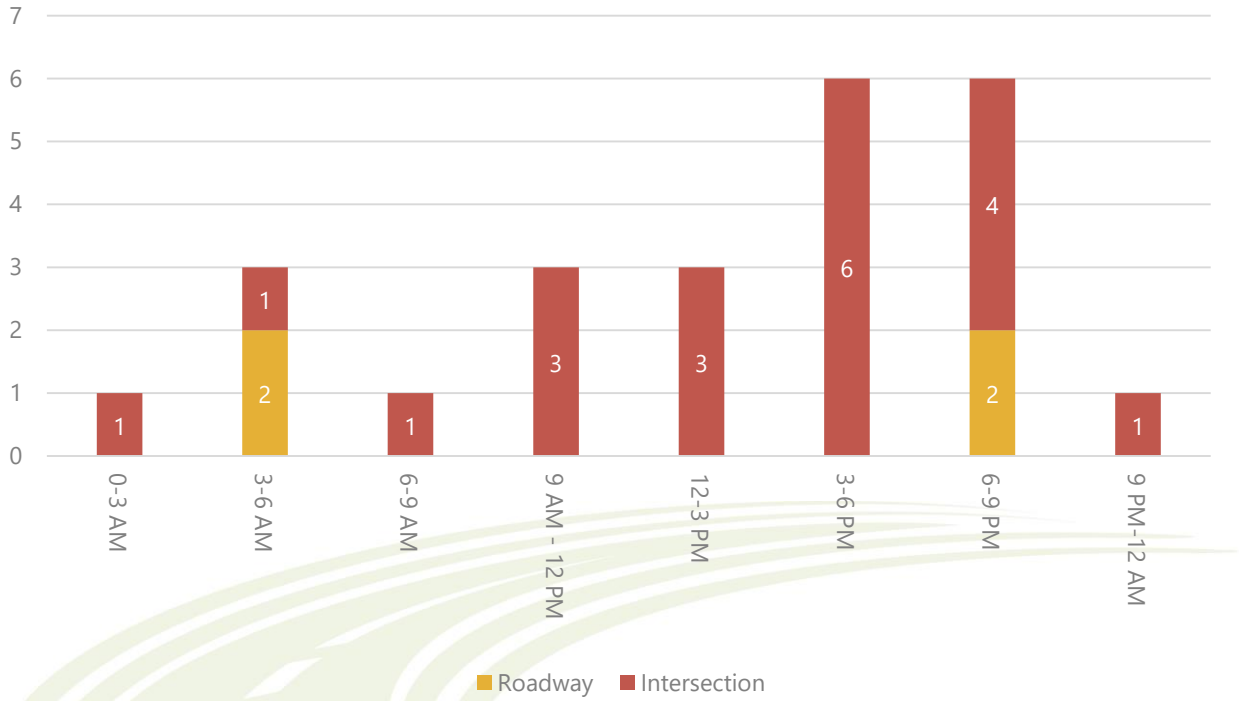
LIGHTING AND LOCATION TYPE

Figure 20 KSI Collisions: Lighting



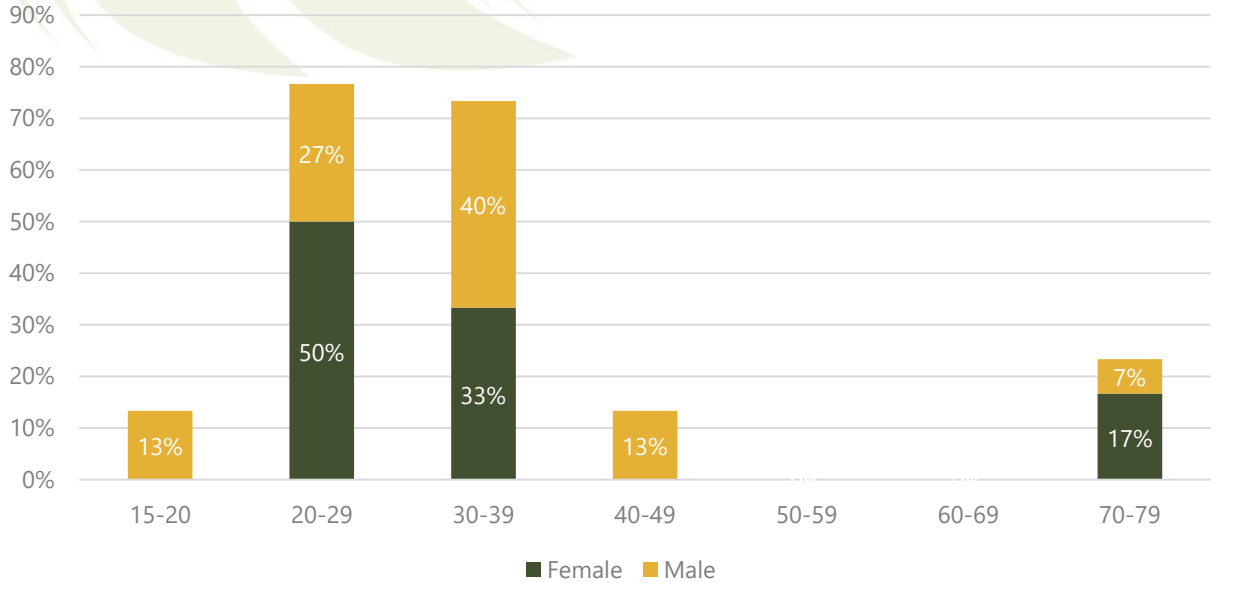
TIME OF DAY AND LOCATION TYPE

Figure 21 KSI Collisions: Time of Day



GENDER VS AGE

Figure 22 KSI Collisions by Gender and Age



GEOGRAPHIC COLLISION ANALYSIS

This section describes a detailed geographic collision analysis performed for injury collisions occurring on roadway segments and at intersections in the City of Oakley. The collision analysis of all injury collisions was used to identify five main collision factors that highlight the top trends among collisions in the City of Oakley. These five collision factors were identified to rear-end collisions, broadside collisions, unsafe speed violations, nighttime collisions, and head-on collisions.

REAR END TYPE COLLISIONS

Rear End collisions represented the highest proportion of total collisions (32%) and a similar trend for all injury collisions (32%). However, it represents only 4% of KSI collisions. **Figure 23** shows the distribution of rear-end collisions throughout the City of Oakley between 2017 and 2021. Main Street, Cypress Road, and Laurel Road have a higher concentration of rear-end collisions.

BROADSIDE TYPE COLLISIONS

Broadside collisions represented the highest proportion of KSI collisions (38%), while 20% of total collisions and 27% of all injury collisions are broadside. **Figure 24** shows the distribution of broadside collisions throughout the City of Oakley between 2017 and 2021. The intersections on Main Street at Big Break Road, Nelroy Road, and SR 160 on/off ramps observed a higher concentration of broadside collisions.

UNSAFE SPEED VIOLATIONS

Unsafe speed contributed to 28% of total collisions in Oakley. A similar trend of 29% was observed for all injury collisions. However, 13% of all KSI collisions were due to unsafe speed violations. **Figure 25** shows the distribution of unsafe speed collisions throughout the City of Oakley between 2017 and 2021. Main Street, Cypress Road, Empire Avenue, and Laurel Road have a higher concentration of unsafe speed collisions.

NIGHTTIME TYPE COLLISIONS

Collisions occurring during dark lighting conditions represented 34% of total collisions, and 31% of all injury collisions but rose to 38% for KSI-only collisions. **Figure 26** shows the distribution of nighttime collisions throughout the City of Oakley between 2017 and 2021. Main Street, East Cypress Road, and Laurel Road have a higher concentration of nighttime collisions.

HEAD-ON COLLISIONS

Head-On collisions accounted for 10% of total collisions, 13% of all injury collisions, and 17% of KSI-only collisions. All head-on KSI collisions were due to driving on the wrong side of the road. **Figure 27** shows the distribution of injury collisions due to improper turning throughout the City of Oakley

between 2017 and 2021. Main Street, East Cypress Road, Francisco Villa Drive, and Laurel Road have the highest concentration of head-on collisions.

The following figures detail concentrations of each of the above five collision factors on roadways throughout Oakley. All injury collisions, whether they occurred at an intersection or roadway segment, are considered in these maps (for example, roads where a particular collision factor is more concentrated may have collisions that occurred at an intersection within the segment, or along the segment itself away from an intersection). Note that the below maps were created using all injury collisions and does not include PDO collisions.

Figure 23 Citywide Rear End Collisions

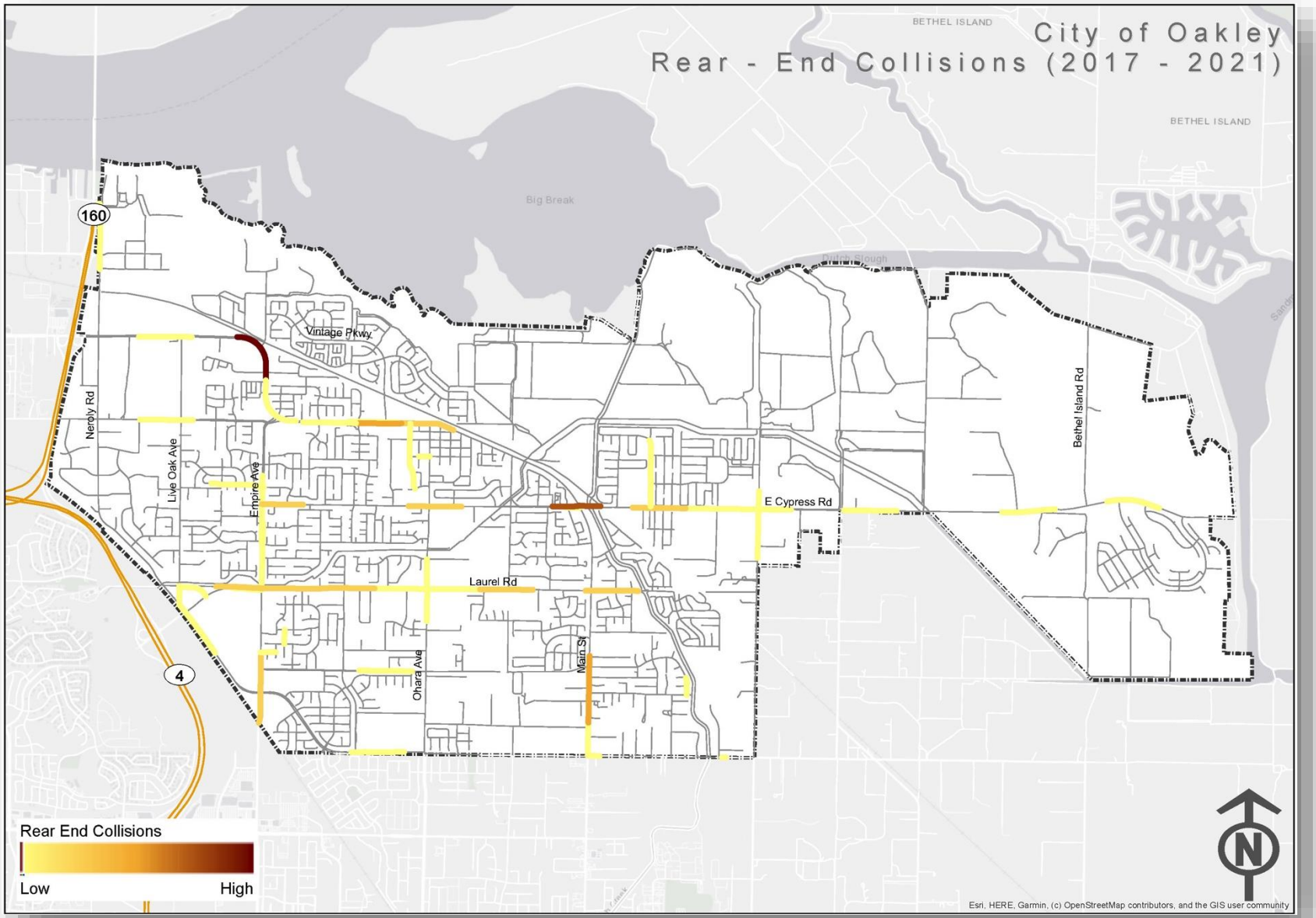


Figure 24 Citywide Broadside Collisions

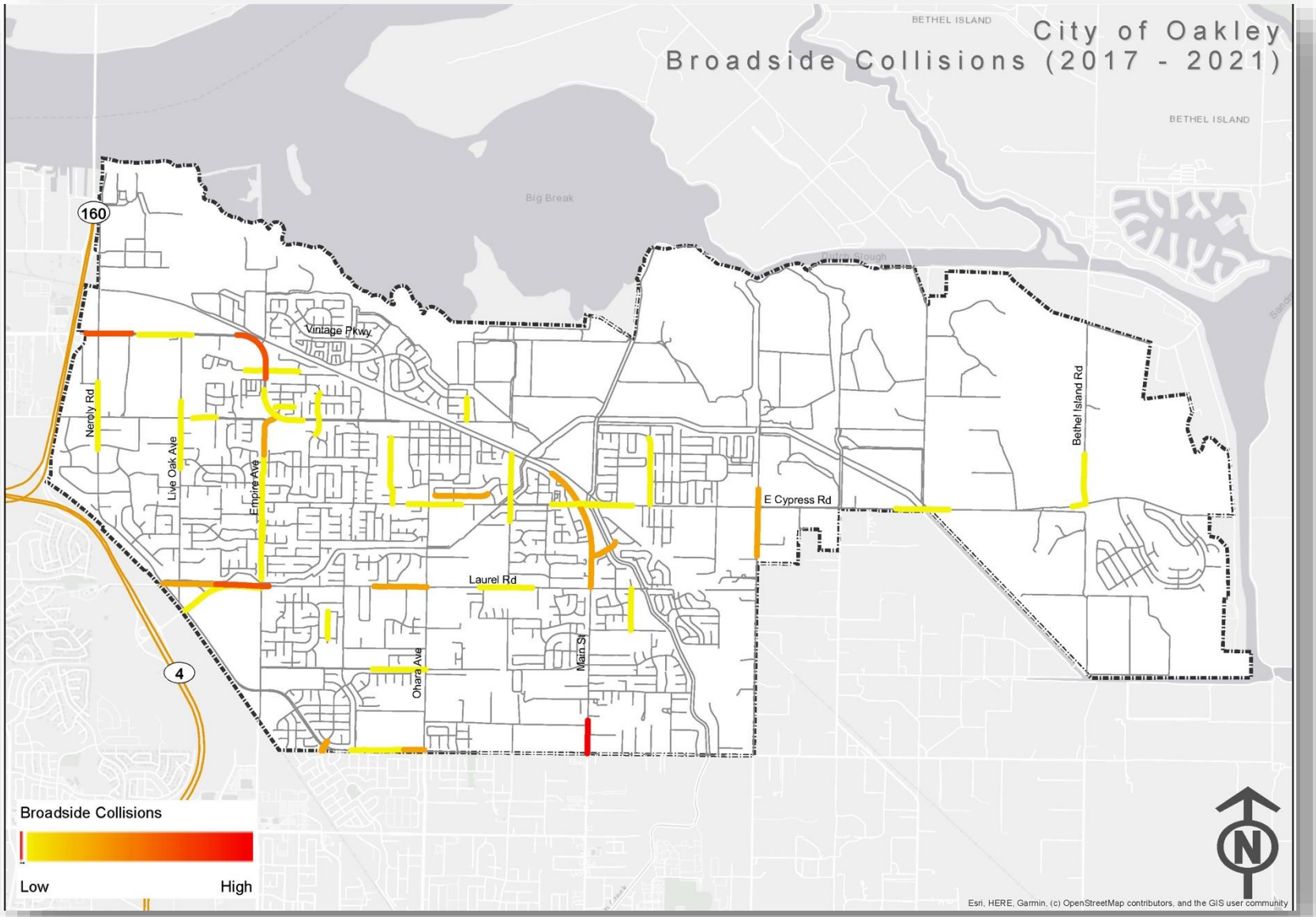


Figure 25 Citywide Unsafe Speed Violations

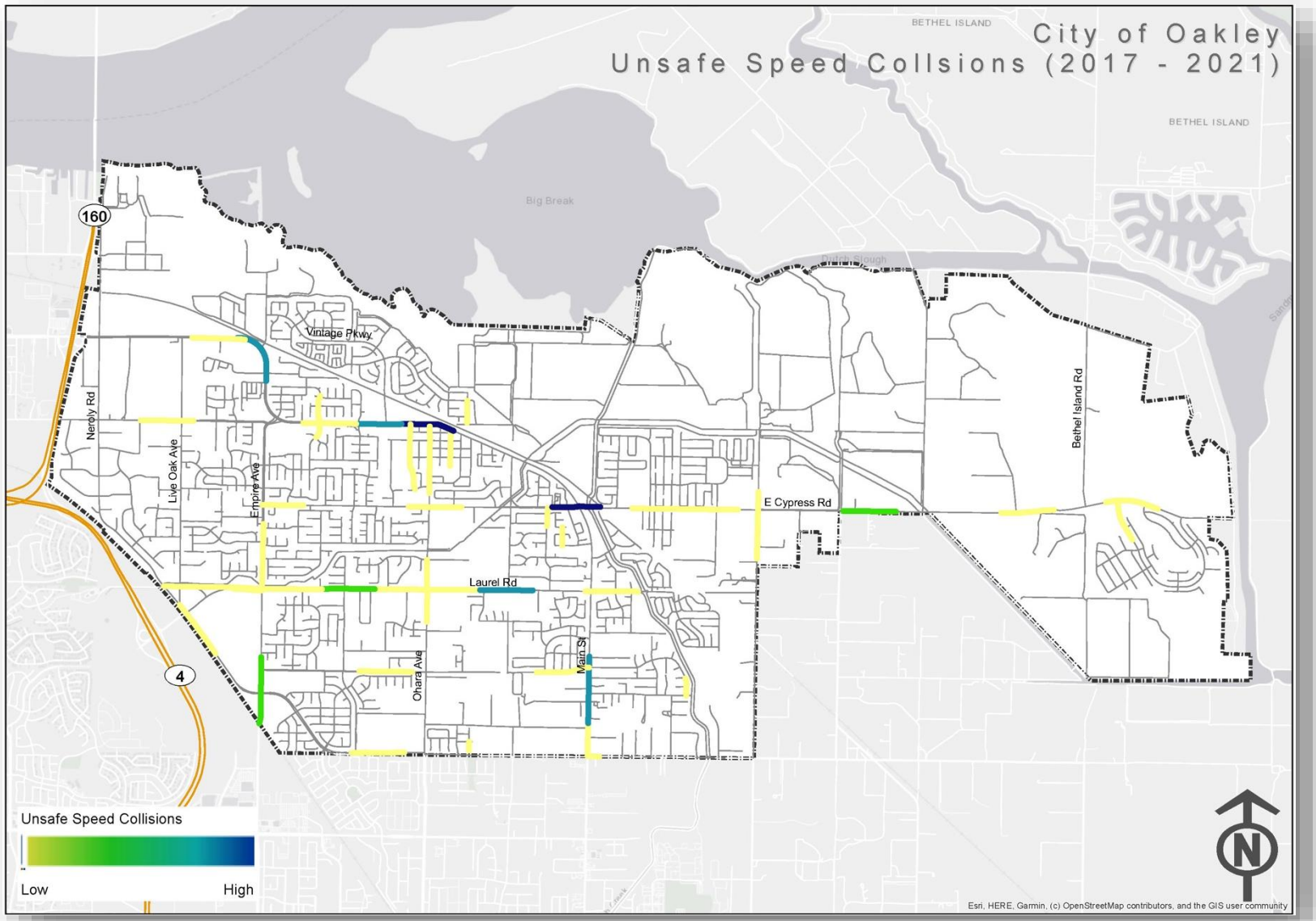


Figure 26 Citywide Nighttime Collisions

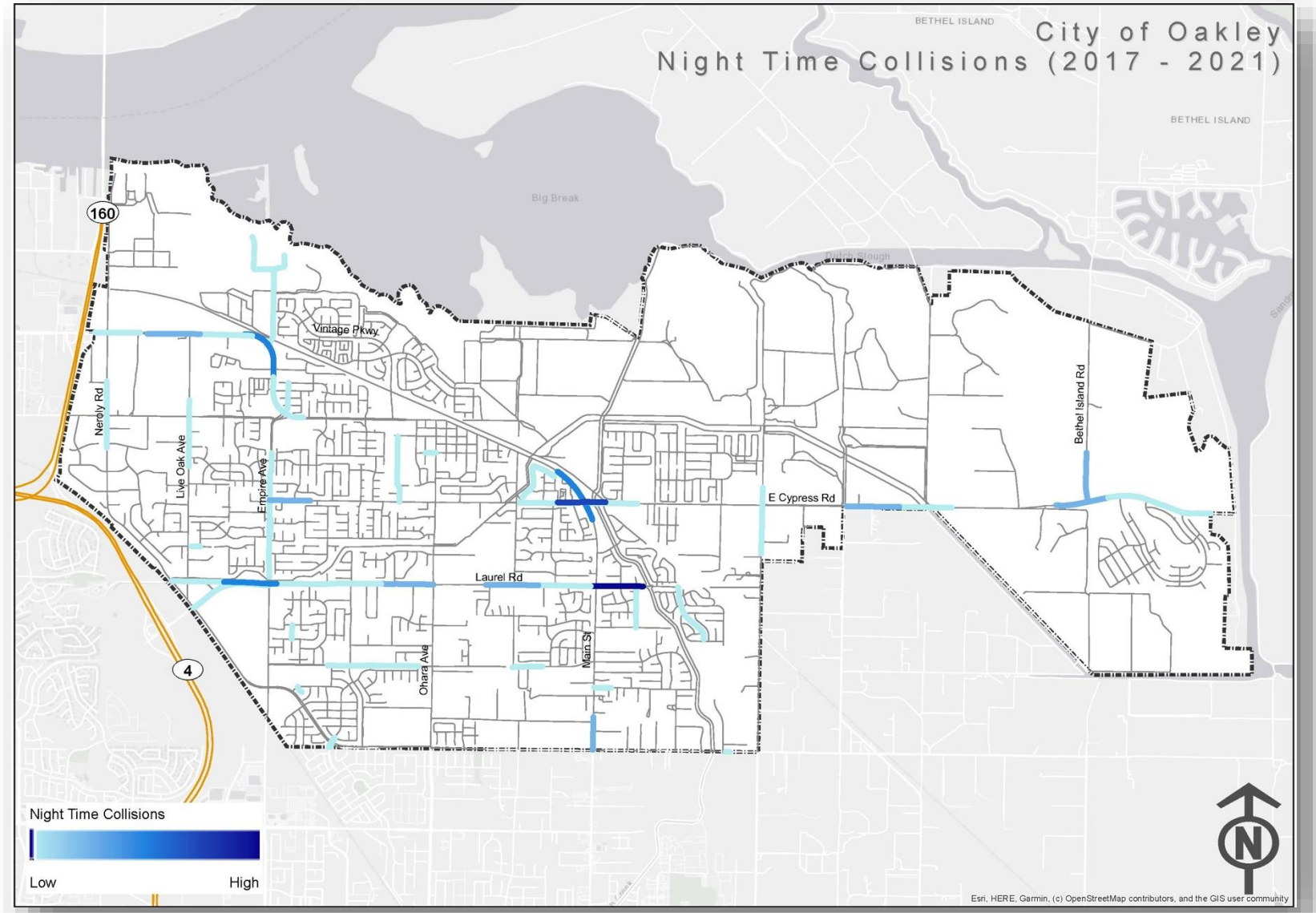
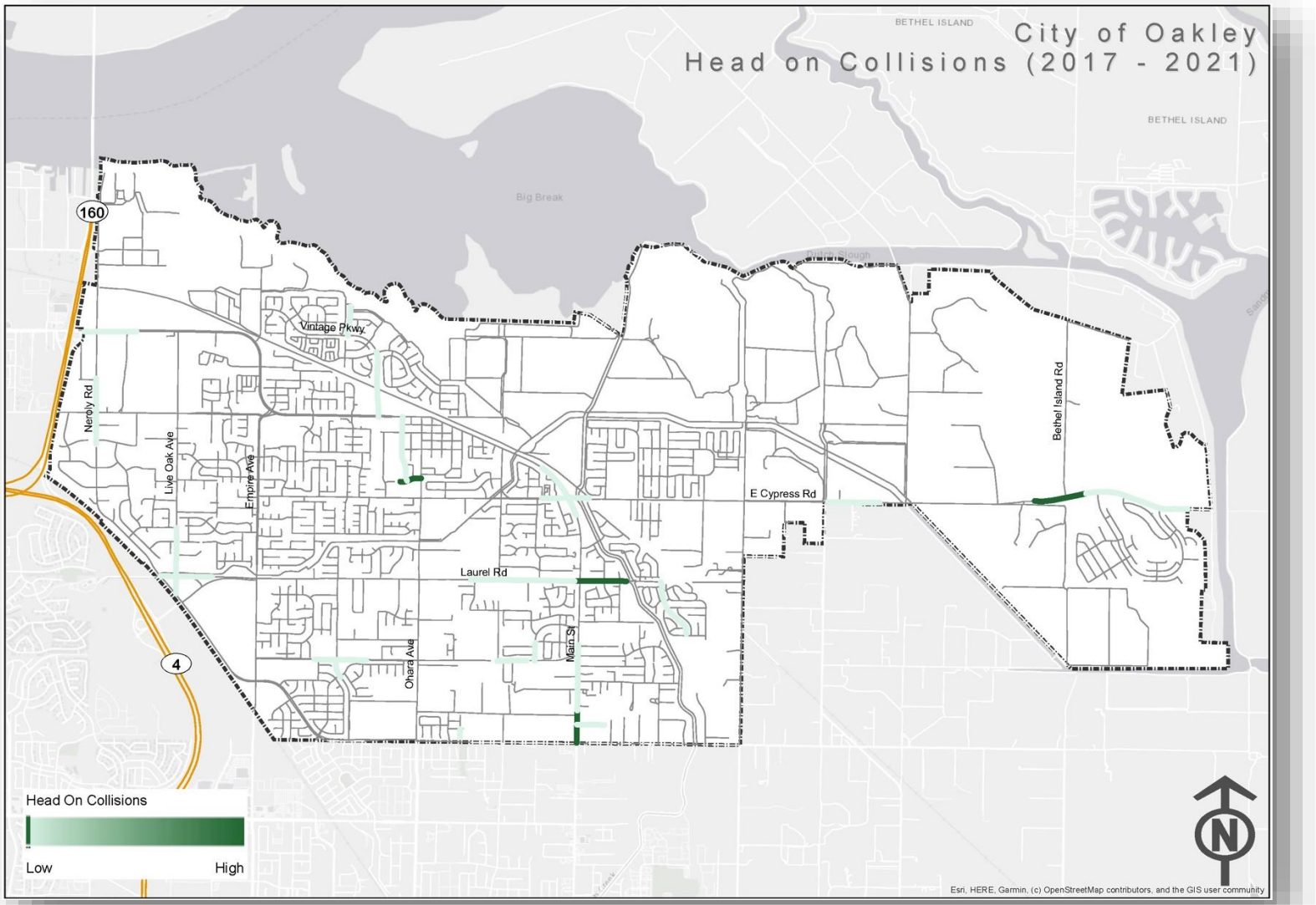


Figure 27 Citywide Head-On Collisions



COLLISION SEVERITY WEIGHT

The Equivalent Property Damage Only (EPDO) method was used to identify the high severity collision network. The EPDO method accounts for both the severity and frequency of collisions by converting each collision to an equivalent number of property damage only (PDO) collisions. The EPDO method assigns a crash cost and score to each collision according to the severity of the crash weighted by the comprehensive crash cost. These EPDO scores are calculated using a simplified version of the comprehensive crash costs per HSIP Cycle 11 guidance. The weights used in the analysis are shown below in **Table 3**.

Table 3 EPDO Score used in HSIP Cycle 11

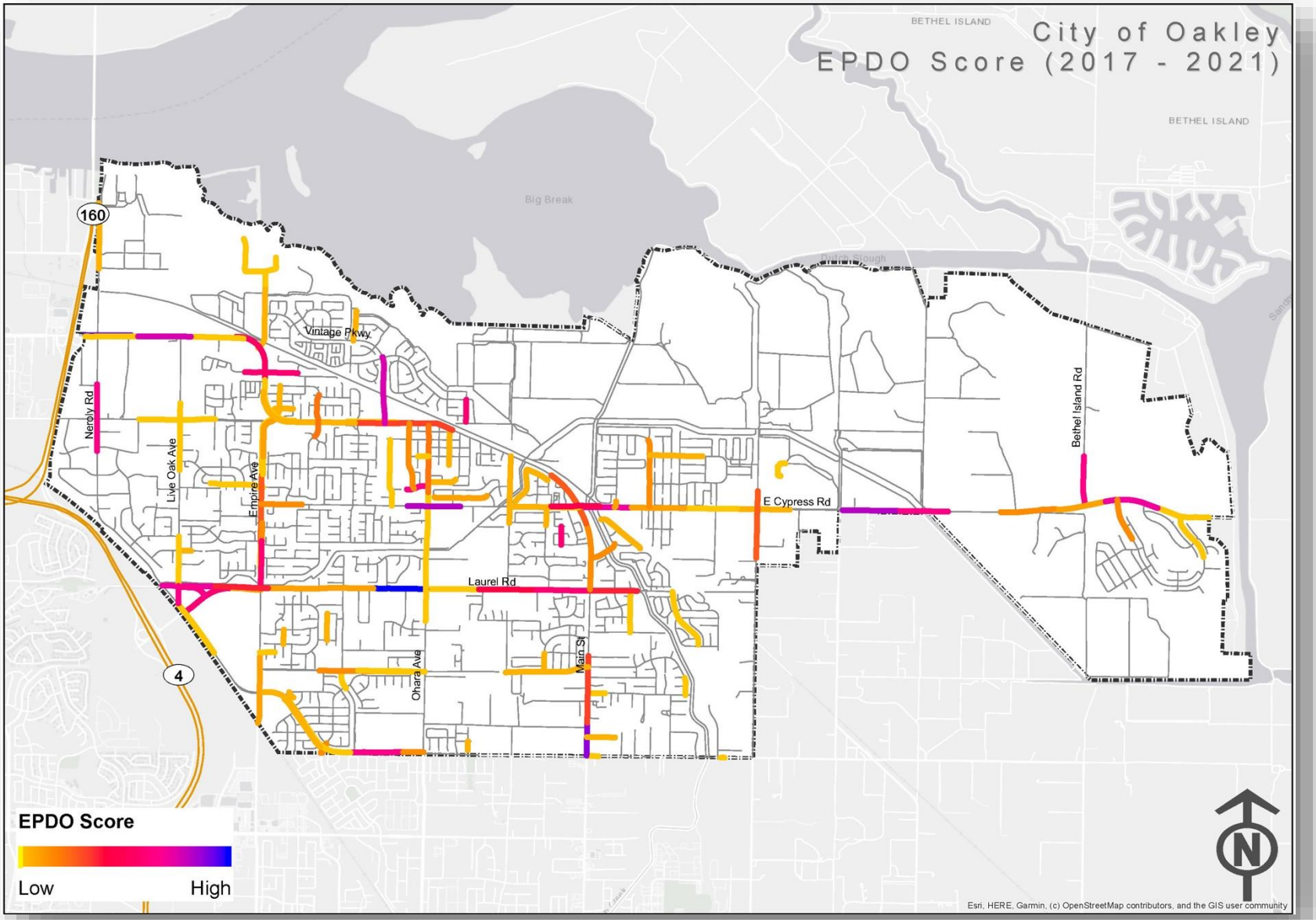
Collision Severity	EPDO Score
Fatal and Severe Injury Combined	165*
Visible Injury	11
Possible Injury	6
PDO	1

*This is the score used in HSIP Cycle 11 for collisions on roadways segments, to simplify the analysis this study uses the same score for all KSI collisions regardless of location.

EPDO is used because it provides a methodology for the project team to understand the locations in Oakley that are experiencing the most severe crashes. Because of the high score given to fatal and severe injury crashes, locations that have these types of crashes are more likely to receive a higher EPDO score than other locations that may have more collisions, but fewer killed or severe injury collisions. Locations that have the highest EPDO scores are selected for inclusion in the high collision network, shown in the next section. Identified intersections are scored based on collisions occurring at or within 250 feet of the intersection, while roadway segment locations are identified based on collisions that occur along the segment, except directly at an intersection (0 feet from intersection). Identifying the locations with the most severe crashes allows the team to focus recommended solutions and countermeasures at these locations.

The EPDO scores for all collisions can then be aggregated in a variety of ways to identify collision patterns, such as location hot spots. The weighted collisions for the City of Oakley were geolocated onto Oakley's road network. GIS is then used to calculate the EPDO score for each roadway segment and intersection citywide, which is then ranked according to its score. **Figure 28** shows the location and geographic concentration of all collisions (those that occurred at intersections and along roadway segments) by their EPDO score.

Figure 28 Citywide Equivalent Property Damage Only

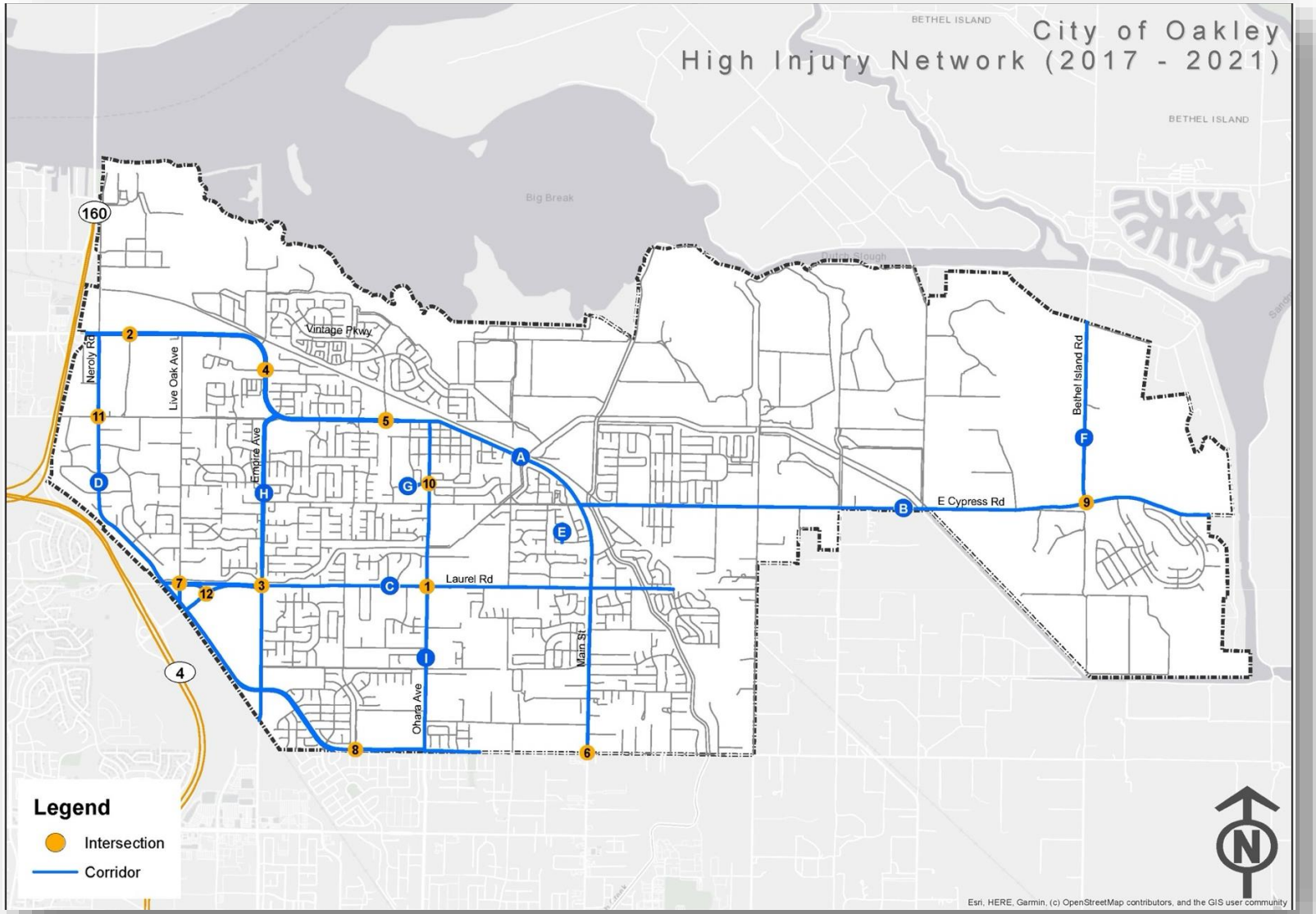


HIGH INJURY NETWORK

Following the detailed collision analysis, the next step was to identify the high-injury roadway segments and intersections in Oakley. The methodology for scoring the high-injury locations is the same method that used in the collision severity weight section. **Figure 29** shows the top 9 high-injury roadway segments and the top 12 high-injury intersections.

For the purposes of the high injury network analysis, intersections include collisions that occurred within 250 feet of it, and roadway segments include all collisions that occurred along the roadway except for collisions that occurred directly at an intersection. Such collisions are assigned a 0 value in distance from the intersection value column in the Statewide Integrated Traffic Records System (SWITRS).

Figure 29 Citywide High Injury Network (HIN)



INTERSECTION RANKING

12 intersections were identified as high collision intersections. There were a total of 40 injury collisions and 14 KSI collisions that occurred at these intersections during the five-year study period (2017-2021). The intersection of O'Hara Avenue and Laurel Road had the highest number of severe collisions.

Table 4 lists the top 12 identified high-risk intersections along with the number of injury collisions, the number of KSI collisions, and the severity weight for each intersection.

Table 4 High Collision Intersections

ID	Intersection	Total Injury Collisions	KSI Collisions	Severity Weight
1	O'Hara Ave and Laurel Rd	6	2	354
2	Main St and Sandy Ln	2	2	330
3	Empire Ave and Laurel Rd	6	1	195
4	Carol Ln and Main St	5	1	194
5	Main St and Vintage Pkwy	4	1	188
6	Main St/Brentwood Blvd and Delta Rd	4	1	183
7	Live Oak Ave and Nelroy Rd	3	1	177
8	Brown Rd and Neroly Rd	2	1	171
9	E Cypress Rd and Bethel Island Rd	2	1	171
10	Francisco Villa Dr and O'Hara Ave	2	1	171
11	Oakley Rd and Neroly Rd	2	1	171
12	Live Oak Ave and Laurel Rd	2	1	171

CORRIDOR RANKING

Nine corridors were identified as high-injury corridors. There are a total of 61 injury collisions and nine KSI collisions on these corridors during the five-year study period (2017-2021). The Main Street corridor had the highest number of KSI collisions with 21 collisions.

Table 5 lists the top nine identified high-collision corridors along with the number of injury collisions, the number of KSI collisions, corridor length, and the severity weight for each corridor.

Table 5 High Injury Corridors

ID	Corridors	Total	Length (miles)	Severity Weight
A	Main St: West City Limit to South City Limit	21	5	474
B	E Cypress Rd: Main St to East City Limit	12	3.8	400
C	Laurel Rd: West City Limit to Teton Rd	11	3	230
D	Neroly Rd: Main St to Silverspur Ln	7	4	216
E	Beechnut Ln: Cashew Ln to Almondtree Cir	1	0.1	165
F	Bethel Island Rd: E Cypress Rd to North City Limit (Sandmound Blvd)	1	1.1	165
G	Francisco Villa Dr: O'Hara Ave to Cul-de-sac	1	0.15	165
H	Empire Ave: Main St to South City Limit	4	1.9	29
I	O'Hara Ave: Main St to Nelroy Rd	3	2	23

5 EMPHASIS AREAS

Emphasis Areas are focus areas identified through analyzing the characteristics of collisions that have occurred in the City of Oakley within the last five years (2017-2021). Emphasis Areas help in identifying appropriate safety strategies and countermeasures that have the greatest potential to reduce collisions occurring at roadway segments and intersections. This chapter summarizes six emphasis areas identified for the City of Oakley. These emphasis areas were derived by focusing on the collisions that have occurred on the high-injury network identified in collision analysis for the City of Oakley.

There are a number of different approaches to traffic safety studies. Some methodologies focus more on a reactive and responsive approach and others focus on a more proactive systemic approach to traffic safety data. A reactive approach to road safety is based on the analysis of existing crash data. Road safety improvements proposed are considered in reaction to identified safety problems brought to light by crashes that have occurred after the road has been designed, and built, and opened. Traditional reactive road safety engineering processes include such activities as information collection and management (crash information systems), identification of problem locations on the road network, analysis, development, and implementation of countermeasures. The Hazard Elimination Program or a jurisdiction's high crash location list are examples of reactive approaches to crash frequency and/or severity reduction. A proactive approach focuses on the evolving "Science of Safety", that is, what is known about the evolving specific safety implications of highway design and operations decisions. The proactive approach applies this knowledge to the roadway design process or to the implementation of improvement plans on existing roads to diminish the potential of crashes occurring prior to the road being built or reconstructed. The Empirical Bayes method is an example of such proactive traffic safety approach that attempts to predict future crashes based on roadway typologies. Most methodologies use a balance of both reactive and systemic safety approaches.

Based on the systemic safety analysis that helped identified high-injury intersections and roadway segments, the top risk factors and emphasis areas determined for traffic safety in the City of Oakley are as follows –

- Improve Intersection safety
- Address Rear-end collisions
- Address Broadside collisions
- Reduce Unsafe speed violations
- Address Nighttime collisions
- Address Head-on collisions

The consolidated high-injury collision database can be found in **Appendix B**.

THE FIVE E'S OF TRAFFIC SAFETY

The LRSP utilizes a comprehensive approach to safety incorporating "5 E's of traffic safety": **E**ngineering, **E**ducation, **E**nforcement, **E**mergency Medical Services (EMS), and **E**quity. This approach recognizes that not all locations can be addressed solely by infrastructure improvements. Incorporating the 5 E's of traffic safety is often required to ensure successful implementation of significant safety improvements and reduce the severity and frequency of collisions throughout a jurisdiction.

Some of the common violation types that may require a comprehensive approach are speeding, failure-to-yield to pedestrians, red light running, aggressive driving, failure to wear safety belts, distracted driving, and driving while impaired. When locations are identified as having these types of violations, coordination with the appropriate law enforcement agencies is needed to arrange visible targeted enforcement to reduce the potential for future driving violations and related crashes and injuries.

To improve safety, education efforts can be used to supplement enforcement and improve the efficiency of each strategy. Education can also be employed in the short-term to address high crash locations until the recommended infrastructure project can be implemented. Similarly, Emergency Medical Services entails strategies around supporting organizations that provide rapid response and care when responding to collisions causing injury, by stabilizing victims and transporting them to facilities. Equity refers to examining the impact collisions have on disadvantaged communities and allocating resources to address them.

EXISTING TRAFFIC SAFETY EFFORTS IN THE CITY OF OAKLEY

The City of Oakley already has implemented safety strategies corresponding to the 5 E's of traffic safety. The strategies detailed in this chapter can supplement these existing programs and concentrate them on high injury collision locations and crash types. These initiatives are summarized in **Table 6** below:

Table 6 Existing Programs Summary

Document/ Program	Description	E's Addressed
Oakley Neighborhood Traffic Management Program Policy (2014)	This document establishes guidelines for neighborhoods and City staff as they work together to address various types of traffic conditions, such as speeding, cut-through traffic, truck intrusion, commercial parking spill-over, reduce number and severity of collisions and preserving emergency vehicle's response time .	Engineering, Enforcement
Street Smarts Diablo Region and 511 Contra Costa Programs	Street Smarts Diablo delivers bicycle and pedestrian safety programs at no cost to qualifying public schools in Central and East Contra Costa County. 511 Contra Costa is a county-wide program that strives to reduce traffic congestion and improve air quality by providing the public with information, resources, and tools that promote mobility options beyond driving alone which includes bike and pedestrian safety resources.	Education
Contra Costa County Vision Zero (2018)	CCTA developed a Countywide Vision Zero Framework, which was a key implementation recommendation of the Countywide Bike/Ped Plan adopted by the CCTA Board in July 2018. This effort is focused on bicycle/pedestrian safety and developed a countywide "high-injury network (HIN)", collision typologies, and a Vision Zero Transportation Safety Policy and an Implementation Guide for Local Agencies. This Guide also includes a Toolbox to improve the safety of people walking and biking.	Engineering, Education, Enforcements, EMS

FACTORS CONSIDERED IN THE DETERMINATION OF EMPHASIS AREAS

This section presents collision data analysis of collision type, collision factors, facility type, and roadway geometries, analyzed for the various emphasized areas. Emphasis areas were determined by factors that led to the highest amount of injury collisions, with a specific emphasis on killed or severely injured (KSI) collisions. The City of Oakley experienced a total of 93 injury collisions at high injury network locations during the 2017-2021 study period, including 20 killed or severely injured collisions. The data presented in each emphasis area is based on these collisions. This section also presents comprehensive programs, policies, and countermeasures to reduce collisions in specific emphasis areas.

Note: Engineering countermeasures are based on the Caltrans LRSM and are used in HSIP calls for projects. They are categorized as follows:

- S = Signalized Intersections Countermeasures
- NS = Non-Signalized Intersections Countermeasures
- R = Roadway Segments Countermeasures

An excerpt of the Caltrans LRSM providing additional details on each countermeasure is included in **Appendix C**.

EMPHASIS AREA 1 – IMPROVE INTERSECTION SAFETY

Intersection collisions made up the vast majority of collisions occurring on the Oakley high injury network during the study period, with a total of 76%. The 80% of killed or severely injured (KSI) collisions also occurred at intersections. The following collision data is based on only intersection collisions on the high injury network in the City of Oakley, followed by 4 E's strategies selected to address intersection collisions.

Table 7 Emphasis Area 1 Strategies

Objective:

Reduce the number of KSI collision at intersections.

	Strategy	Performance Measure	Agencies/ Organizations
Education	Conduct public information and education campaign for intersection safety laws regarding traffic signals, stop signs, and turning left or right.	Number of education campaigns or residents reached.	City/Police Department
Enforcement	Targeted enforcement at high-injury intersections to monitor right-of-way violations, speed limit laws and other violations that occur at intersections.	Decrease in number of citations and/or warnings issued over time due to increased driver compliance.	Police Department
Engineering	• S02, Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number • S03, Improve signal timing • S09, Install raised pavement markers • S16/NS04/NS05, Convert intersection to roundabout • NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs • NS07, Upgrade intersection pavement markings • NS08, Install Flashing Beacons at Stop-Controlled Intersections • NS09, Install flashing beacons as advance warning (Non-Signalized Intersection) (NS.I.) • NS10, Install transverse rumble strips on approaches • NS11, Improve sight distance to intersection (Clear Sight Triangles) • NS13, Install splitter-islands on the minor road approaches • NS14, Install raised median on approaches • NS19PB, Install raised medians (refuge islands) • Automated Red-light Enforcement	Number of intersections improved.	City
EMS	S05, Install emergency vehicle pre-emption systems Improve resource of deployment for emergency responses to collision sites. Ensure emergency routes are clear and well defined	EMS vehicle response time.	City/Fire Department & EMS Response Teams

EMPHASIS AREA 2 – ADDRESS REAR END COLLISIONS

There were 33 (35%) high injury network collisions classified as rear-end collisions, including one KSI collision. The following is based on only rear-end injury collisions on the high injury network, followed by 4 E's strategies to address them.

Table 8 Emphasis Area 2 Strategies

Objective:

Reduce the number of rear end KSI collisions.

	Strategy	Performance Measure	Agencies/ Organizations
Education	Conduct public information and education campaign for safety laws regarding unsafe speed and improper turning and its dangers.	Number of education campaigns or residents reached.	City/ Police Department
Enforcement	Targeted enforcement at high-injury locations where unsafe speed violations and improper turning are more common. Deploy a radar trailer at locations where instances of unsafe speed is more prevalent	Decrease in number of citations and/or warnings issued over time due to increased driver compliance.	Police Department
Engineering	• S02, Improve signal hardware • S07, Improve pavement friction (High Friction Surface Treatments) • S09, Install raised pavement markers and striping (Through Intersection) • S10, Install flashing beacons as advance warning (S.I.) • S16/NS04/NS05, Convert intersection to roundabout • NS07, Upgrade intersection pavement markings (NS.I.) • NS08, Install Flashing Beacons at Stop-Controlled Intersections • R21, Improve pavement friction (High Friction Surface Treatments) • R22, Install/Upgrade signs with new fluorescent sheeting • R27, Install delineators, reflectors and/or object markers • R26, Install dynamic/variable speed warning signs • R28, Install edge-lines and centerlines • Decrease width of travel lanes. • Simplify turn configurations. • Decrease curb radius of intersections. • Traffic calming strategies where appropriate.	Number of locations improved.	City
EMS	S05, Install emergency vehicle pre-emption systems Improve resource of deployment for emergency responses to collision sites. Ensure emergency routes are clear and well defined	EMS vehicle response time.	City/Fire Department & EMS Response Teams

EMPHASIS AREA 3 – REDUCE UNSAFE SPEED VIOLATIONS

A total of 34 (37%) high injury network collisions were due to unsafe speed, including seven KSI collisions. The following is based on only unsafe speed injury collisions on the high injury network, followed by 4 E's strategies to address them.

Table 9 Emphasis Area 3 Strategies

Objective:

Reduce the number of KSI unsafe speed collisions.

	Strategy	Performance Measure	Agencies/ Organizations
Education	Conduct public information and education campaign for safety laws regarding unsafe speed and its dangers.	Number of education campaigns or residents reached.	City/Police Department
Enforcement	Targeted enforcement at high-injury locations where unsafe speed violations are more common. Deploy a radar trailer at locations where instances of unsafe speed is more prevalent	Decrease in number of citations and/or warnings issued over time due to increased driver compliance.	Police Department
Engineering	• S02, Improve signal hardware • S09, Install raised pavement markers and striping (Through Intersection) • S16/NS04/NS05, Convert intersection to roundabout • NS07, Upgrade intersection pavement markings (NS.I.) • NS10, Install transverse rumble strips on approaches • R22, Install/Upgrade signs with new fluorescent sheeting • R27, Install delineators, reflectors and/or object markers • R26, Install dynamic/variable speed warning signs • R28, Install edge-lines and centerlines • Decrease width of travel lanes. • Simplify turn configurations. • Decrease curb radius of intersections. • Traffic calming strategies where appropriate.	Number of locations improved.	City
EMS	S05, Install emergency vehicle pre-emption systems Improve resource of deployment for emergency responses to collision sites. Ensure emergency routes are clear and well defined	EMS vehicle response time.	City/Fire Department & EMS Response Teams

EMPHASIS AREA 4 – ADDRESS BROADSIDE COLLISIONS

Broadside Collisions made up 23 (25%) of the high injury network collisions, including eight (KSI) collisions. The following collision data is based on only broadside injury collisions on the high injury network of the City of Oakley, followed by 4 E's strategies to address them.

Table 10 Emphasis Area 4 Strategies

Objective:

Reduce the number of KSI broadside collisions.

	Strategy	Performance Measure	Agencies/ Organizations
Education	Conduct public information and education campaigns for intersection safety laws regarding traffic lights, stop signs and turning left or right.	Number of education campaigns or residents reached.	City/Police Department
Enforcement	Targeted enforcement at high-injury locations where violations that lead to broadside collisions are more common, such as automobile right of way and traffic signal/stop sign violations.	Decrease in number of citations and/or warnings issued over time due to increased driver compliance.	Police Department
Engineering	• S02, Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number • S03, Improve signal timing (coordination, phases, red, yellow, or operation) • S07, Provide protected left turn phase (left turn lane already exists) • S08, Convert signal to mast arm (from pedestal-mounted) • S09, Install raised pavement markers and striping (Through Intersection) • S16/NS04/NS05, Convert intersection to roundabout • NS02, Convert to all-way STOP control (from 2-way or Yield control) • NS03, Install signals • NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs • NS07, Upgrade intersection pavement markings (NS.I.) • NS08, Install flashing beacons at stop controlled intersections • NS09, Install flashing beacons as advance warning (NS.I.) • NS11, Improve sight distance to intersection (Clear Sight Triangles) • NS13, add splitter-islands on the minor road approaches • NS14, install raised median on approaches	Number of locations improved to mitigate broadside collisions.	City
EMS	S05, Install emergency vehicle pre-emption systems Improve resource of deployment for emergency responses to collision sites. Ensure emergency routes are clear and well defined	EMS vehicle response time.	City/Fire Department & EMS Response Teams

EMPHASIS AREA 5 – IMPROVE NIGHTTIME COLLISIONS

Night or in low light (dawn/dusk) conditions totaled 27 (29%) of high injury network collisions, including nine KSI collisions. The following collision data is based on only nighttime injury collisions on the high injury network of the City of Oakley, followed by 4 E's strategies selected to address nighttime collisions.

Table 11 Emphasis Area 5 Strategies

Objective:

Reduce the number of KSI collisions that occur at night or dawn/dusk.

	Strategy	Performance Measure	Agencies/ Organizations
Education	Develop an awareness program to inform motorists of safe nighttime driving habits and the dangers of drunk driving, as well as high-injury collision locations and the most common violations/collision types occurring at night.	Number of education campaigns or residents reached.	City/Police Department
Enforcement	Targeted enforcement at high-injury intersections and roadway locations where nighttime collisions are more common. Establish DUI checkpoints at night and enforce over speeding where appropriate.	Decrease in number of citations and/or warnings issued over time due to increased driver compliance.	Police Department
Engineering	• S01, Add intersection lighting (Signalized Intersection => S.I.) • S02, Improve signal hardware • S10, Install flashing beacons as advance warning (S.I.) • NS01, Add intersection lighting • NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs • NS07, Upgrade intersection pavement markings (NS.I.) • NS08, Install Flashing Beacons at Stop-Controlled Intersections • NS09, Install flashing beacons as advance warning (NS.I.) • NS22PB, Install Rectangular Rapid Flashing Beacon (RRFB) • R01, Add Segment Lighting • R02, Remove or relocate fixed objects outside of Clear Recovery Zone • R22, Install/Upgrade signs with new fluorescent sheeting (regulatory or warning) • R23, Install chevron signs on horizontal curves • R25, Install curve advance warning signs (flashing beacon) • R27, Install delineators, reflectors and/or object markers • R28, Install edge-lines and centerlines • R31, Install edge-line rumble strips/stripes	Number of locations improved.	City
EMS	S05, Install emergency vehicle pre-emption systems Improve resource of deployment for emergency responses to collision sites. Ensure emergency routes are clear and well defined	EMS vehicle response time.	City/Fire Department & EMS Response Teams

EMPHASIS AREA 6 – ADDRESS HEAD-ON COLLISIONS

A total of ten (11%) high injury network collisions are classified as head-on collisions. However, of these ten collisions, none of them led to a fatality or severe injury. The following collision data is based on only head-on injury collisions on the high injury network of the City of Oakley, followed by 4 E's strategies selected to reduce head-on collisions.

Table 12 Emphasis Area 6 Strategies

Objective:

Reduce the number of KSI head-on collisions.

	Strategy	Performance Measure	Agencies/ Organizations
Education	Conduct public information and education campaigns on risks that can lead to head-on collisions, such as driving on wrong side of the road, distracted driving, driving under the influence, disregard of lane markings and signs.	Number of education campaigns or residents reached.	City/Police Department
Enforcement	Targeted enforcement at high-injury locations where wrong side driving violations are more common.	Decrease in number of citations and/or warnings issued over time due to increased driver compliance.	Police Department
Engineering	• S03, Improve signal timing (coordination, phases, red, yellow, or operation) • S06, Install left-turn lane and add turn phase (signal has no left-turn lane or phase before) • S07, Provide protected left turn phase (left turn lane already exists) • S09, Install raised pavement markers and striping (Through Intersection) • S10, Install flashing beacons as advance warning (S.I.) • S12, Install raised median on approaches (S.I.) • NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs • NS11, Improve sight distance to intersection (Clear Sight Triangles) • NS14, Install raised median on approaches (NS.I.) • NS18, Install left-turn lane (where no left-turn lane exists) • R01, Add Segment Lighting • R08, Install raised median • R22, Install/Upgrade signs with new fluorescent sheeting (regulatory or warning) • R30, Install centerline rumble strips/stripes • R31, Install edgeline rumble strips/stripes	Number of locations improved.	City
EMS	S05, Install emergency vehicle pre-emption systems Improve resource of deployment for emergency responses to collision sites. Ensure emergency routes are clear and well defined Increase the number of EMS personnel taking Traffic Incident Management Training	EMS vehicle response time.	City/Fire Department & EMS Response Teams

EQUITY

This section discusses opportunity areas to facilitate safety improvements with a focus on MTC (Metropolitan Transportation Commission) Equity Priority Communities (EPC) and SS4A (Safe Streets and Roads for All) Historically Disadvantaged Communities.

Equity Priority Communities

The Equity Priority Communities data for Plan Bay Area 2050 was obtained from BayViz. This data identifies neighborhoods in the San Francisco Bay Area designated as Equity Priority Communities (EPCs), previously known as Communities of Concern. EPCs are classified into three classes - High, Higher, and Highest - representing their priority status for investments. The EPC data was mapped to visualize the different EPC tiers within the City of Oakley.

The Metropolitan Transportation Commission (MTC) has developed criteria[2] to identify Equity Priority Communities (EPCs) in the San Francisco Bay Area. EPC status is based on demographic and socioeconomic factors from Census data measured at the census tract level.

Specific factors and thresholds used by MTC to designate highly disadvantaged tracts as EPCs include:

1. High concentration (70%+) of people of color
2. High share (28%+) of households below 200% of the federal poverty level
3. High share (12%+) of individuals with limited English proficiency
4. High share (15%+) of zero-vehicle households
5. High share (8%+) of adults over 75 years old
6. High share (12%+) of people with a disability
7. High share (18%+) of single-parent families
8. High share (14%+) of severely rent-burdened households (paying 50%+ of income on rent)

As per MTC, a census tract is designated an Equity Priority Community (EPC) if the tract has high percentages of both low-income households and people of color OR the tract has a high percentage of low-income households AND high percentages in at least three of the following categories: limited English, no vehicles, seniors over 75, disabilities, single parents, severe rent burden.

SS4A Underserved Communities

The US Department of Transportation (USDOT) has developed a list of SS4A Underserved Communities Census Tracts (historically disadvantaged communities). The disadvantaged census tracts identified in this list exceeded the 50th percentile (75th for resilience) across at least four of the following six transportation disadvantaged indicators. Each of the six disadvantage indicators are assembled at the census tract level using data from the Centre for Disease Control and Prevention (CDC) Social Vulnerability Index, Census American Community Survey,

[2] https://bayareametro.github.io/Spatial-Analysis-Mapping-Projects/Project-Documentation/Equity-Priority-Communities/#summary-of-mtc-epc-demographic-factors--demographic-factor-definitions

Environmental Protection Agency (EPA) Smart Location Map, US Department of Housing and Urban Development (HUD) Location Affordability Index, EPA Environmental Justice Screen, Federal Emergency Management Agency (FEMA) Resilience Analysis & Planning Tool, and FEMA National Risk Index.

1. The Transportation Access disadvantage indicator identifies communities and places that spend more, and longer, to get where they need to go (CDC Social Vulnerability Index, Census America Community Survey, EPA Smart Location Map, HUD Location Affordability Index).
2. The Health disadvantage indicator identifies communities based on variables associated with adverse health outcomes, disability, as well as environmental exposures (CDC Social Vulnerability Index).
3. The Environmental disadvantage identicator identifies communities with disproportionate pollution burden and inferior environmental quality (EPA EJ Screen).
4. The Economic disadvantage identicator identifies areas and populations with high poverty, low wealth, lack of local jobs, low homeownership, low educational attainment, and high inequality (CDC Social Vulnerability Index, Census America Community Survey, FEMA Resilience Analysis & Planning Tool).
5. The Resilience disadvantage indicator identifies communities vulnerable to hazards caused by climate change (FEMA National Risk Index).
6. The Equity disadvantage indicator identifies communities with a high percentile of persons (age 5+) who speak English "less than well" (CDC Social Vulnerability Index).

For the following analysis, Equity Priority Communities indicators within the City of Oakley are utilized to identify and prioritize the safety improvements within Oakley.

Overlay of Equity Priority Communities with High Injury Network

Eight of the 21 high risk locations identified in the LRSP are within an EPC which includes four high-injury intersections and portions of four high-injury roadway segments. Examples include Main Street, Neroly Rd, Empire Avenue and Francisco Villa Drive.

Figure 27 illustrates overlay of EPC census track over the identified high injury network of Oakley LRSP. Nearly 30 percent of citywide KSI collisions occurred in EPCs, though EPCs account for approximately 10% of the City's total area. **Figure 28** illustrates EPC overlay on KSI collision within Oakley. **Table 15** lists high injury locations within EPC and injury collision types.

Figure 30 Equity Priority Communities and High Injury Network

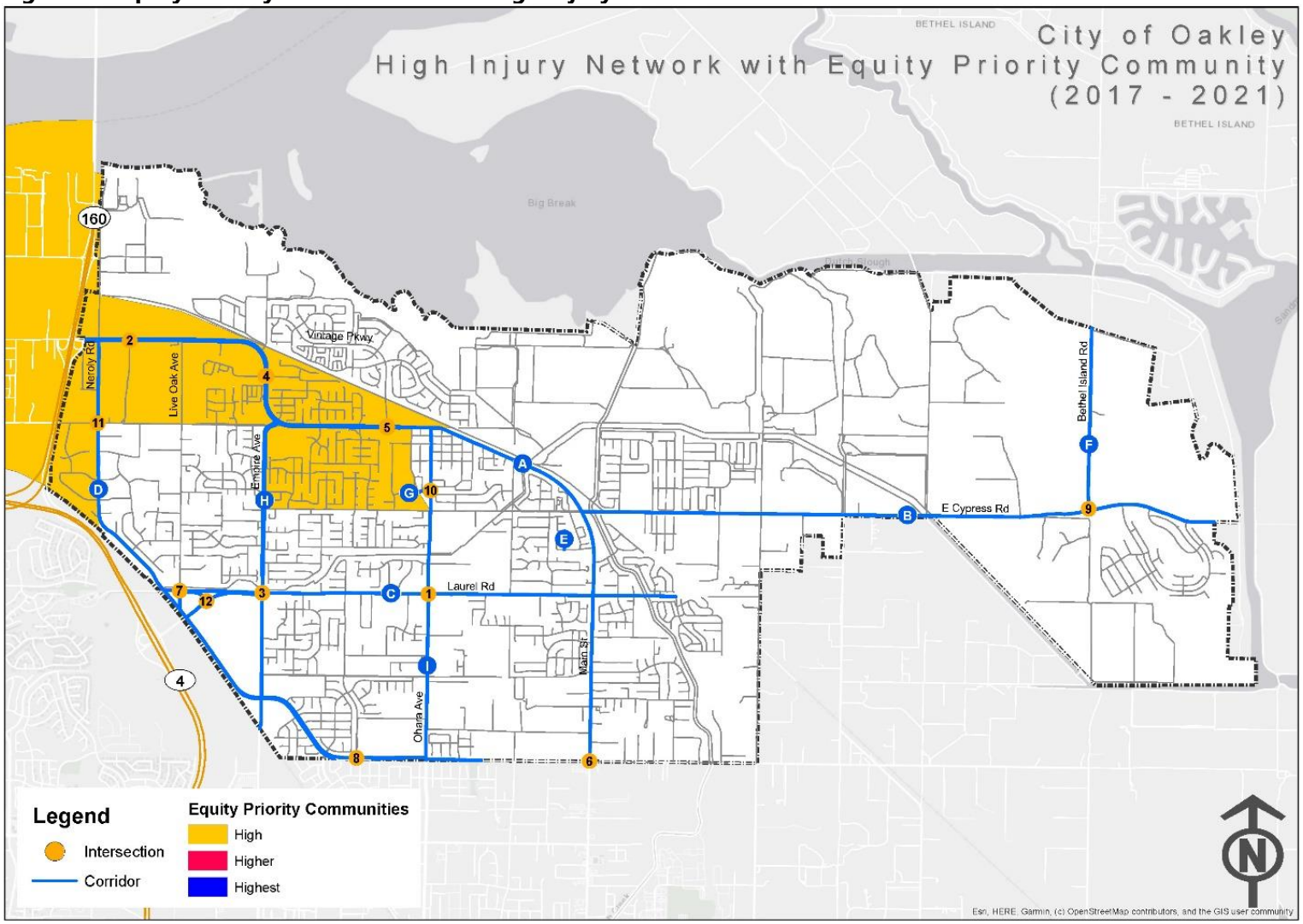


Figure 31 Equity Priority Communities and KSI Collisions

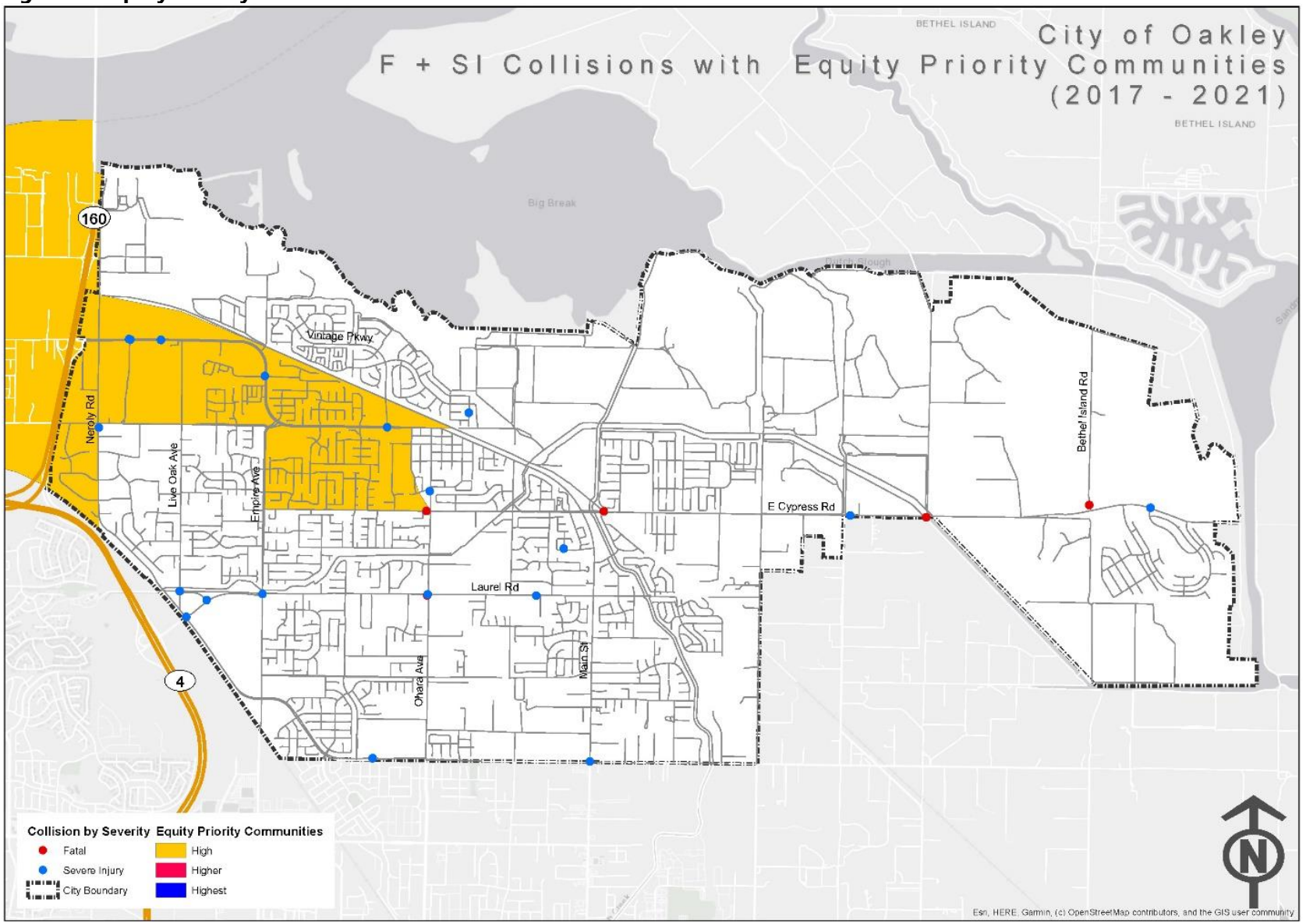


Table 13 Breakdown of crash types occurring at high injury locations in the EPC using TIMS data

Location	Summary of Injury Collisions (2017 -2021)
Main St and Sandy Ln	1 severe injury broadside, 1 severe injury pedestrian
Carol Ln and Main St	1 severe injury broadside, 2 complaint of pain broadside, 1 complaint of pain rear end
Main St and Vintage Pkwy	1 severe injury pedestrian, 1 visible injury pedestrian, 2 complaint of pain rear end
Oakley Rd and Neroly Rd	1 severe injury bicycle, 1 complaint of pain broadside
Main St: West City Limit to 2nd St	6 severe injury, 10 visible injury, 22 complaint of pain, 15 Rear End, 12 Broadside, 4 Vehicle/Pedestrian , 3 Hit Object, 2 Head-On, 2 Sideswipe
Empire Ave: Main St to Cypress Ave	1 severe injury, 2 visible injury, 15 complaint of pain, 9 Broadside, 6 Rear End, 1 Sideswipe, 1 Hit Object, 1 Vehicle/Pedestrian

The countermeasures proposed at the high injury locations within Oakley's EPCs address the crash trends described in the table above. For example, for broadside collision within Oakley's EPCs, LRSP identified countermeasures to address these crash trends include: signal hardware and signal timing upgrade, raised median on intersection approaches, and raised pavement markers. The detailed list of countermeasures are included in the Chapter 6.

Table 14 shows the cost estimates for individual safety projects recommended in the LRSP. The table also breaks down the aggregate investment amount by whether projects are located in Equity Priority Community (EPC) census tracts versus non-EPC areas of the city. Splitting the total estimated safety project costs into those two geographic allows for a comparison against the population percentages in EPC tracts and the rest of the city, providing an equitable breakdown of safety project spending. A detailed information of each safety projects, and benefit cost ratio is included in the Chapter 7.

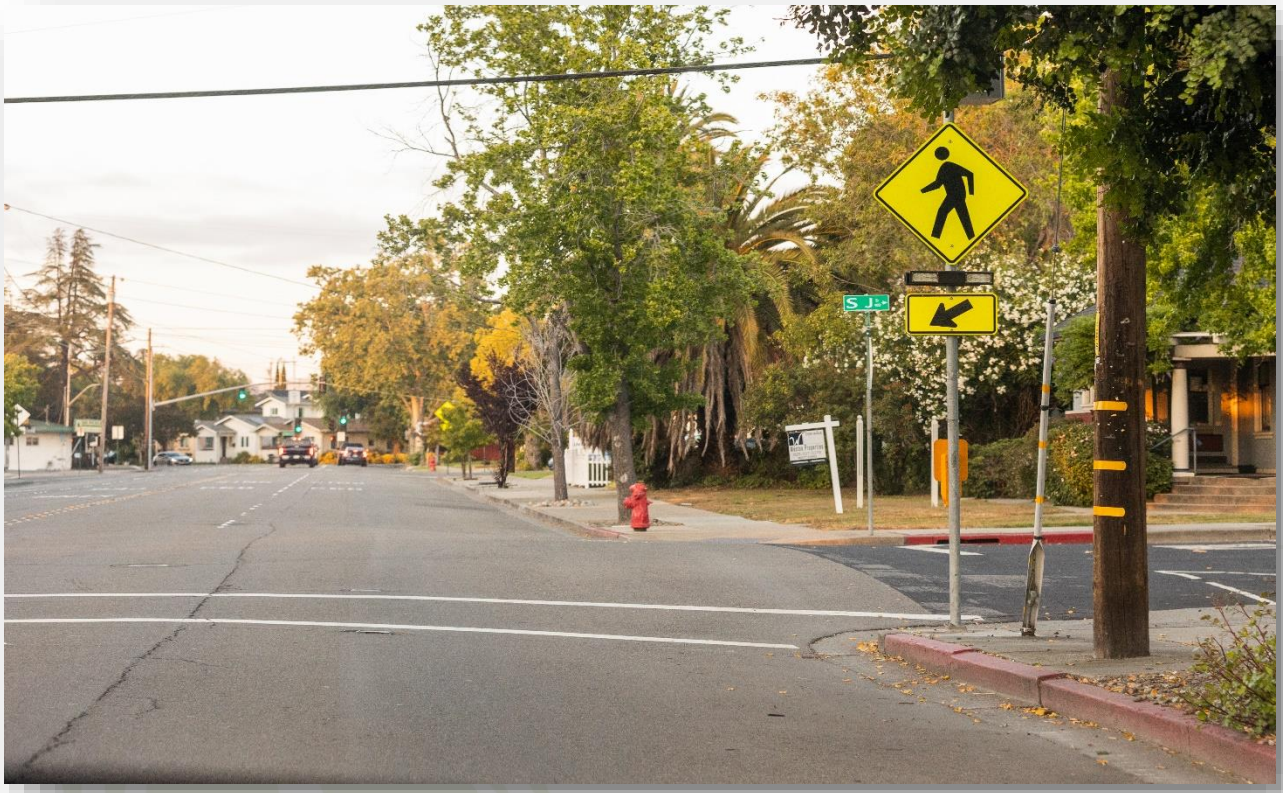
Table 14 Recommended Safety Project Cost Estimates with Equity Analysis

Safety Projects	Cost Estimates of recommended improvement in EPC	Cost Estimates of recommended improvement in Non EPC area	EPC	Non EPC
Project 1	$ 70,000	$ 163,100	30%	70%
Project 2	$ 210,000	$ 2,330,300	8%	92%
Project 3	$ 615,000	$ 237,900	72%	28%
Project 4	$ 140,000	$ 264,000	35%	65%
Project 5	$ 23,500	$ 192,300	11%	89%
TOTAL	**$ 1,058,500**	**$ 3,187,600**	**25%**	**75%**

As of 2020 census data, Oakley has a total population of 43,357 residents. Of those, 7,290 people (17% of the total) live in EPC tracts. When looking at the recommended safety project investments, projects in EPC tracts are being allocated approximately $1,058,500 out of the $4,246,100 total. That means EPC tract residents are receiving approximately 25% of the investment dollars, despite only being 17% of the population. Comparing these population and investment proportions shows that EPC communities are receiving a fair proportion of

safety project funds in relation to their share of Oakley's population. The EPC investment percentage is slightly higher than the population percentage, demonstrating equity in the allocation.

6 COUNTERMEASURE SECTION



IDENTIFICATION OF COUNTERMEASURES

Following the identification of high-risk locations and emphasis areas was the identification of appropriate safety countermeasures. The Caltrans LRSM provides 82 countermeasures, of which 21 are eligible in the current HSIP call for signalized intersections, 23 for un-signalized intersections, and 38 for roadway segments. The LRSM provides guidance on where to apply the countermeasures including the crash types each countermeasure would address, and a Crash Reduction Factor (CRF) for each countermeasure. The Federal Highway Administration (FHWA) CMF Clearinghouse and published research papers were reviewed by the project team to gain additional insight on CRFs and effectiveness of specific countermeasures.

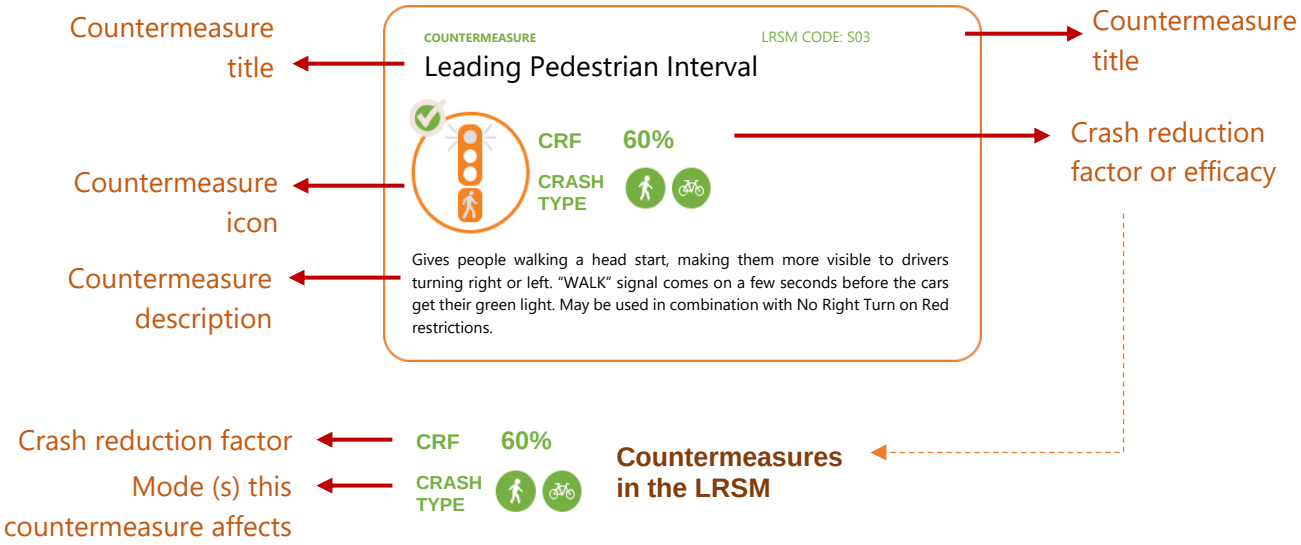
The project team reviewed the high-injury locations (intersections and roadway segments) using aerial photography, Google Maps Street View software, and in-person site visits. Crash characteristics of all injury collisions occurring on the High Injury Network were considered. After combining the physical and collision characteristics, the project team developed a table of preliminary countermeasures that address each of the five identified Emphasis Areas. Below are countermeasures for each high-risk location that were most commonly recommended among all Emphasis Areas. By doing this, the project team was able to identify countermeasures with the greatest opportunity for funding and systemic implementation.

COUNTERMEASURE TOOLBOX

Engineering countermeasures were selected for each of the high-risk locations and for the emphasis areas. These were based on approved countermeasures from the Caltrans LRSM used in HSIP grant calls for projects. The intention is to give the City potential countermeasures for each location that can be funded and implemented either in future HSIP calls for projects, or using other funding sources, such as the City's Capital Improvement Program. Non-engineering countermeasures were also selected using the 5 E's strategies, and are included with the emphasis areas. The countermeasure toolbox in **Appendix D** details the draft countermeasures for each high-risk location and emphasis area, separated by intersections and roadway segments. While some of these countermeasures might not be ideal for some safety projects, they are included to give the City a toolbox for implementing future safety improvements through other means, such as the Capital Improvement Program (CIP).

The countermeasures listed below are recommended countermeasures for high injury intersections and corridors. This list below provides a description of each countermeasure along with the CRF, federal funding eligibility, and opportunity for systemic implementation. An excerpt of the LRSM, detailing each available HSIP countermeasure referenced in the recommendations tables, are included as **Appendix C**.

WHAT YOU'LL SEE IN THIS TOOLBOX



Safety Research Sources

Application of Pedestrian Crossing Treatments for Streets and Highways, NCHRP, 2016.
California Local Roadway Safety Manual, Caltrans, FHWA & SafeTrec, 2020.
Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments, NCHRP, 2017.
Evaluation of Bicycle-Related Roadway Measures, Pedestrian and Bicycle Information Center, 2014.
Evaluation of Pedestrian-Related Roadway Measures, Pedestrian and Bicycle Information Center, 2014.

A. COUNTERMEASURES FOR SIGNALIZED INTERSECTIONS

COUNTERMEASURE LRSM CODE: S02

Improve Signal Hardware

CRF 15%

CRASH TYPE

Includes New LED lighting, signal back plates, retro-reflective tape outlining the back plates, or visors to increase signal visibility, larger signal heads, relocation of the signal heads, or additional signal heads.

COUNTERMEASURE LRSM CODE: S03

Improve Signal Timing

CRF 15%

CRASH TYPE

Includes adding phases, lengthening clearance intervals, eliminating or restricting higher-risk movements, and coordinating signals at multiple locations.

COUNTERMEASURE LRSM CODE: S09

Raised Pavement Marking & Striping

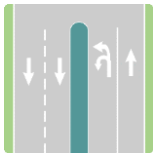
CRF 10%

CRASH TYPE

Adding clear pavement markings can guide motorists through complex intersections and approach and traverse through complex intersections.

COUNTERMEASURE LRSM CODE: S12/NS14

Raised Median on Approach



CRF 25%

CRASH TYPE

Raised medians next to left turn lanes at intersections offer a cost effective means for reducing crashes and improving operations at higher volume intersections

B. COUNTERMEASURES FOR NON- SIGNALIZED INTERSECTIONS

COUNTERMEASURE LRSM CODE: NS01

Intersection Lighting

CRF 40%

CRASH TYPE

Intersection lighting improves the ability of drivers to see pedestrians and cyclists, thus decreasing accidents involving them during nighttime. Additionally, it enhances driver awareness and response time.

COUNTERMEASURE LRSM CODE: NS06

Large or Additional Stop Signs

CRF 15%

CRASH TYPE

New stop signs at uncontrolled intersections with patterns of rear-end, right-angle, or turning collisions related to lack of driver awareness of the presence of the intersection.

COUNTERMEASURE LRSM CODE: NS07

Intersection Pavement Marking

CRF 25%

CRASH TYPE

The visibility of intersections and, thus, the ability of approaching drivers to perceive them can be enhanced by installing appropriate pavement delineation in advance of and at intersections will provide approaching motorists with additional information at these locations.

COUNTERMEASURE LRSM CODE: NS08

Flashing Beacons at Stop Controlled Intersection

CRF 25%

CRASH TYPE

Flashing beacons can reinforce driver awareness of the Non-Signalized intersection control and can help mitigate patterns of right-angle crashes related to stop sign violations.

COUNTERMEASURE LRSM CODE: NS09

Flashing Beacons as Advance warning

CRF 30%

CRASH TYPE

Intersections with patterns of crashes that could be related to lack of a driver's awareness of approaching intersection or controls at a downstream intersection.

COUNTERMEASURE LRSM CODE: NS03

Install Signals

CRF 30%

CRASH TYPE

Traffic signals can be used to prevent the most severe type crashes (right-angle, left-turn).

COUNTERMEASURE LRSM CODE: NS11

Sight Distance to Intersection

CRF 20%

CRASH TYPE

Non-signalized intersections with restricted sight distance and patterns of crashes related to lack of sight distance where sight distance can be improved by clearing roadside obstructions without major reconstruction of the roadway.

COUNTERMEASURE LRSM CODE: NS20PB

Pedestrian Crossing at Uncontrolled Location

CRF 25%

CRASH TYPE

Intersections where pedestrians are known to be crossing intersections that involve significant vehicular traffic.

C. COUNTERMEASURES FOR ROADWAYS

COUNTERMEASURE LRSM CODE: R02

Relocate Fixed Objects

CRF 35%

CRASH TYPE

A clear recovery zone should be developed on every roadway, as space is available. Relocate fixed objects such as utility poles, drainage structures, trees, and other fixed objects, such as the outside of a curve, end of lane drops, and in traffic islands.

COUNTERMEASURE LRSM CODE: R21

Improve Pavement Friction

CRF 55%

CRASH TYPE

Areas as noted having crashes on wet pavements or under dry conditions when the pavement friction available is significantly less than actual roadway speeds; including but not limited to curves, loop ramps, intersections, and areas with short stopping or weaving distances.

COUNTERMEASURE LRSM CODE: R22

Signs with New Fluorescent Sheeting

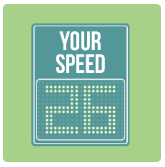
CRF 15%

CRASH TYPE

Intended to get the drivers attention and give them a visual warning by using fluorescent yellow sheeting (or other retroreflective material).

COUNTERMEASURE LRSM CODE: R26

Dynamic Speed Warning Signs



CRF 30%

CRASH TYPE

A roadway treatment that uses radar to alert drivers to their actual speed relative to the posted speed limit, encouraging drivers who exceed to the speed limit to slow down.

COUNTERMEASURE LRSM CODE: R27

Reflectors and Object Markers

CRF 15%

CRASH TYPE

Delineators, reflectors and/or object markers are intended to warn drivers of an approaching curve or fixed object that cannot easily be removed.

COUNTERMEASURE LRSM CODE: R28

Edge-line and Centerline

CRF 25%

CRASH TYPE

Installing edge-lines and centerlines where none exists or making significant upgrades to existing lines

COUNTERMEASURE LRSM CODE: R30/R31

Centerline/Edge-line Rumble Strips

CRF 15-20%

CRASH TYPE

Rumble strips provide an auditory indication and tactile rumble when driven on, alerting drivers that they are drifting out of their travel lane, giving them time to recover before they depart the roadway or cross the center line.

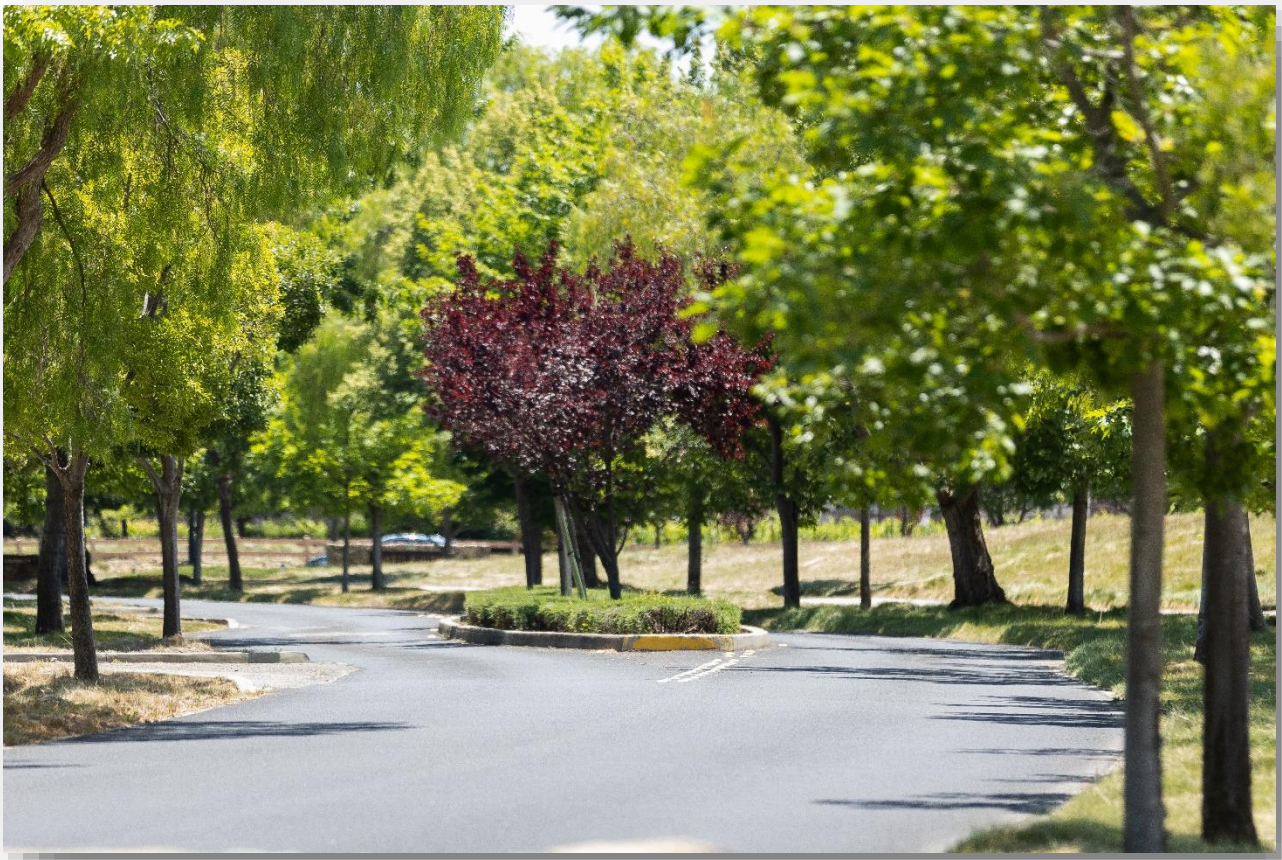
COUNTERMEASURE LRSM CODE: R32PB

Install Bike Lanes

CRF 45%

CRASH TYPE

Bikeways are most appropriate on streets with high volumes of bike traffic and/or high bike-vehicle collisions, presumably in an urban or suburban area.



7 VIABLE SAFETY PROJECTS

This chapter summarizes the process of selecting safety projects as part of the analysis for Oakley's LRSP. The next step after the identification of high-injury locations, emphasis areas and applicable countermeasures was to identify location specific safety improvements for all high-risk roadway segments and intersections.

Specific countermeasures and improvements were selected from the 2022 LRSM from Caltrans, where:

- S refers to improvements at signalized locations,
- NS refers to improvements at non-signalized locations, and
- R refers to improvements at roadway segments.

The corresponding number refers to the countermeasure number in the LRSM (2022). The countermeasures were grouped into safety projects for high-risk intersections and roadway segments. A total of five safety projects were developed. All countermeasures were identified based on the technical teams' assessment of viability that consisted of extensive analysis, observations, City staff input, and stakeholder/community input.

The most applicable and appropriate countermeasures as identified have been grouped together to form projects that can help make high-risk locations safer.

Table 14 lists the safety projects for high-risk intersections and roadway segments, along with total base planning level cost (2022 dollar amounts) estimates and the resultant preliminary Benefit-Cost (B/C) Ratio. The "Total Benefit" estimates were calculated for the proposed improvements being evaluated in the proactive safety analysis. This "Total Benefit" is divided by the "Total Cost per Location" estimates for the proposed improvements, giving the resultant B/C Ratio. The B/C Ratio Calculation follows the methodology as mentioned in the LRSM (2022).

Appendix E includes HSIP analyzer sheets which contains detailed methodology to calculate B/C Ratio for each project, as well as the complete cost, benefit and B/C Ratio calculation.

These safety projects were chosen based on the previously completed collisions analysis, which was used to identify main collision attributes that were found to be leading factors of fatal and severe collisions in Oakley. These collision factors are shown below, as well as viable safety projects that can help address these factors.

Rear End Collisions: 32% of collisions of all severity were rear end collisions. It also makes up 4% of KSI collisions. Rear end collisions can potentially be mitigated through upgrading signal hardware or adding retroreflective borders, improving signal timing, upgrading/adding intersection warning signs, or adding flashing beacons in advance of intersections. Methods to reduce speeding, such as traffic calming, can also help to address rear end collisions.

Broadside Collisions: For KSI collisions in Oakley, 38% of collisions were broadside collisions. This is higher than its share of collisions of all severity (27%). Broadside collisions can potentially be mitigated by increasing the visibility of an intersection through updated pavement markings, new or updated signage, lighting, advance flashing beacons, and improving sight distance.

Unsafe Speed Violations: 12% of KSI collisions in Oakley were due to unsafe speed violations, compared to 29% of collisions of all severity. Countermeasures such as traffic calming, dynamic speed warning signs, road diet can all help to address unsafe speed violation collisions.

Nighttime Collisions: 38% of KSI collisions in Oakley were nighttime collisions, compared to 31% of collisions of all severity. These collisions can potentially be mitigated with installing or upgrading street lighting with higher lumen, installing delineators, reflectors and object markers, adding fluorescent sheeting to traffic signs, and installing flashing beacons.

Head-on Collisions: 17% of collisions of all severity were head-on collisions. It also makes up 13% of KSI collisions. Head-on collisions can potentially be mitigated through installing raised median, centerline rumble strips, upgrade pavement markings and striping, widening medians and adding curve warning signs at horizontal curves.

The next step in the process will be to secure grant funding for the recommended safety projects. One of the grant program for the recommended projects is through the Federal Highway Safety Improvement Program

(HSIP). It should be noted that while the LRSP projects were based on high-risk locations, HSIP applications can be expanded to include many locations across the city. TJKM can work with the City to identify additional locations that may be beneficial to add to future HSIP applications and calculate the B/C Ratio.

Below is the list of identified projects for the City of Oakley, with a preliminary cost estimate for each location and the resulting benefit-cost ratio of the project (the title of each countermeasure is located in a separate table below):

Table 15 List of Viable Safety Projects for Signalized Intersections

Location	CM1	CM2	CM3	Total Benefit	Total Cost	B/C Ratio
Project 1: Signalized Intersections: Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number, Improve signal timing (coordination, phases, red, yellow, or operation), Install Raised Pavement Markers and Stripping Through Intersection						
O'Hara Ave and Laurel Rd	S02	S03		$10,023,620	$233,100	43.00
Empire Ave and Laurel Rd	S02	S03				
Carol Ln and Main St	S02	S03	S09			
Main St and Vintage Pkwy	S02	S03				
Brown Rd and Neroly Rd	S02	S03				
E Cypress Rd and Bethel Island Rd	S02	S03	S09			
Live Oak Ave and Laurel Rd	S02	S03	S09			
Project 2: Unsignalized Intersections: Install Signals (subject to Signal Warrant Study), Upgrade intersection pavement markings (NS.I.), Install raised median on approaches (NS.I.)						
Main St and Sandy Ln		NS07		$18,311,644	$2,540,300	7.21
Main St/Brentwood Blvd and Delta Rd		NS07	NS14			
Live Oak Ave and Neroly Rd	NS03					
Francisco Villa Dr and O'Hara Ave	NS03					
Oakley Rd and Neroly Rd		NS07	NS14			
Project 3: Unsignalized Intersections: Add intersection lighting, Install Flashing Beacons at Stop-Controlled Intersections Improve sight distance to intersection (Clear Sight Triangles)						
Main St and Sandy Ln	NS01			$7,333,938	$852,900	8.6
Live Oak Ave and Neroly Rd		NS08				
Oakley Rd and Neroly Rd		NS08	NS11			
Project 4: Roadway Segments: Install/Upgrade signs with new fluorescent sheeting (regulatory or warning), Install delineators, reflectors and/or object markers, Remove or relocate fixed objects outside of Clear Recovery Zone						
Main St: West City Limit to South City Limit	R22	R27		$28,863,685	$404,000	71.44
E Cypress Rd: Main St to East City Limit	R22	R27	R02			
Laurel Rd: West City Limit to Teton Rd	R22	R27				
Neroly Rd: Main St to Silverspur Ln	R22	R27	R02			
Beechnut Ln: Cashew Ln to Almondtree Cir	R22					
Bethel Island Rd: E Cypress Rd to North City Limit (Sandmound Blvd)	R22	R27	R02			
Francisco Villa Dr: O'Hara Ave to Cul-de-sac	R22	R27				

Location	CM1	CM2	CM3	Total Benefit	Total Cost	B/C Ratio
Empire Ave: Main St to South City Limit	R22	R27				
O'Hara Ave: Main St to Neroly Rd	R22	R27				
Project 5: Roadway Segments: Install edge-lines and centerlines, Install centerline rumble strips/stripes, Install edgeline rumble strips/stripes						
E Cypress Rd: Main St to East City Limit		R30		$6,797,021	$215,800	31.5
Neroly Rd: Main St to Silverspur Ln			R31			
Beechnut Ln: Cashew Ln to Almondtree Cir	R28					
Bethel Island Rd: E Cypress Rd to North City Limit (Sandmound Blvd)		R30				
Francisco Villa Dr: O'Hara Ave to Cul-de-sac	R28					

Table 16 List of Countermeasures used in the Safety Projects

	Countermeasure Name
S02	Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number
S03	Improve signal timing (coordination, phases, red, yellow or operation)
S09	Install raised pavement markers and striping (Through Intersection)
NS01	Add segment lighting (NS.I)
NS03	Install Signals
NS07	Upgrade intersection pavement markings (NS.I.)
NS08	Install Flashing Beacons at Stop-Controlled Intersections
NS11	Improve sight distance to intersection (Clear Sight Triangles)
NS14	Install raised median on approaches (NS.I.)
R02	Remove or relocate fixed objects outside of Clear Recovery Zone
R22	Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)
R27	Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)
R28	Install edge-lines and centerlines
R30	Install centerline rumble strips/stripes
R31	Install edgeline rumble strips/stripes

*Note: S refers to improvements at signalized locations, NS refers to improvements at non-signalized locations, and R refers to improvements at roadway segments.

8 IMPLEMENTATION AND EVALUATION

This chapter describes the steps the city may take to evaluate the success of this plan and steps needed to update the plan in the future. The LRSP is a guidance document and requires periodic updates to assess its efficacy and re-evaluate potential solutions. It is recommended to update the plan every two to five years in coordination with the identified safety partners. This document was developed based on community needs, stakeholder input, and collision analysis conducted to identify priority emphasis areas throughout the city. The implementation of strategies under each emphasis area would aim to reduce KSI collisions in the coming years.

IMPLEMENTATION

The LRSP is a guidance document that is recommended to be updated every two to five years in coordination with the safety partners. The LRSP document provides engineering, education, enforcement, and emergency medical service-related countermeasures that can be implemented throughout the City to reduce KSI collisions. It is recommended that the City of Oakley implement the selected projects in high-collision locations in coordination with other projects proposed for the City's infrastructure development in their future Capital Improvement Plans. After implementing countermeasures, the performance measures for each emphasis area should be evaluated periodically. The most important measure of success of the LRSP should be reducing KSI collisions throughout the City. If the number of KSI collisions does not decrease over time, then the emphasis areas and countermeasures should be re-evaluated.

Funding is a critical component of implementing any safety project. While the HSIP program is a common source of funding for safety projects, there are numerous other funding sources that could be pursued for such projects. (See **Table 15** below). In addition, **Appendix F** includes the list of ongoing or proposed roadway safety related projects in the City of Oakley.

Table 17 List of Potential Funding Sources

Funding Source	Funding Agency	Amount Available	Next Call for Projects	Applicable E's	Notes
Active Transportation Program	Caltrans, California Transportation Commission, MTC	~$450 million per cycle (every two years)	2024	Engineering, Education	Can use used for most active transportation related safety projects as well as education programs? Funding available through Caltrans or MTC
Highway Safety Improvement Program	Caltrans	Varies	2024	Engineering	Most common grant source for safety projects
One Bay Area Grant (OBAG) Cycle 4	MTC (Combines various federal funds)	TBD	County & Local Program: TBD	Engineering	Distributes federal funding to cities and counties in MTC region
Office of Traffic Safety Grants	California Office of Traffic Safety	Varies by grant	Closes January 31st annually	Education, Enforcement, Emergency Response	10 grants available to address various components of traffic safety
Affordable Housing and Sustainable Communities Program	Strategic Growth Council and Dept. of Housing and Community Development	~$10-15 million per award	TBD; most recent in 2023	Engineering, Education	Must be connected to affordable housing projects; typically focuses on bike/pedestrian infrastructure/ programs
Urban Greening	California Natural Resources Agency	$28.5 million	TBD; most recent in 2022	Engineering	Focused on bike/pedestrian infrastructure and greening public spaces
Local Streets and Road Maintenance and Rehabilitation	CTC (distributed to local agencies)	$1.5 billion statewide	N/A; distributed by formula	Engineering	Typically pays for road maintenance type projects
RAISE Grant	USDOT	~$1.5 billion	2023	Engineering	Typically used for larger infrastructure projects
Sustainable Transportation Equity Project	California Air Resources Board	~$19.5 million	TBD; most recent call in 2023	Engineering, Education	Targets projects that will increase transportation equity in disadvantaged communities
Transformative Climate Communities	Strategic Growth Council	~$105 million	TBD; most recent call in 2022	Engineering	Funds community-led projects that achieve major reductions in greenhouse gas emissions in disadvantaged communities
Safe Streets and Roads for All (SS4A)	USDOT	$200k - $50 million	2023	Engineering	Two types of SS4A grants available: Action Plan Grants and Implementation Grants

Clean California Local Grant Program	Caltrans	$100 – 5 million per award	2023	Engineering	Funding for local communities to beautify and improve local streets and roads, tribal lands, parks, pathways, and transit centers
Reconnecting Communities: Highways to Boulevards	Caltrans	$200,000–$2,000,000	September 20, 2023	Planning	The goal of the RC:H2B Pilot Program is to reconnect communities harmed by transportation infrastructure,
Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) Program	*USDOT*	*Min Award: $100,000*	*August 2023*	*18,*	*Engineering*

MONITORING AND EVALUATION

For the success of the LRSP, it is crucial to monitor and evaluate the 5 E-strategies continuously. Monitoring and evaluation help provide accountability, ensures the effectiveness of the countermeasures for each emphasis area, and help making decisions on the need for new strategies. The process would help the City make informed decisions regarding the implementation plan's progress and accordingly, update the goals and objectives of the plan.

After implementing countermeasures, the strategies should be evaluated annually as per their performance measures. The evaluation should be recorded in a before-after study to validate the effectiveness of each countermeasure as per the following observations:

- Number of Injury collisions
- Number of police citations
- Number of public comments and concerns

Evaluation should be conducted during similar time periods and durations each year. The most important measure of success of the LRSP should be reduction in injury collisions throughout the City. If the number of injury collisions doesn't decrease initially, then the countermeasures should be evaluated as per the other observations, as mentioned above. The effectiveness of the countermeasures should be compared to the goals for each emphasis area.

LRSP UPDATE

The LRSP is a guidance document and is recommended to be updated every two to five years after adoption. After monitoring performance measures focused on the status and progress of the E's strategies in each emphasis area, the next LRSP update can be tailored to resolve any continuing safety problems. An annual stakeholder meeting with the safety partners is also recommended to discuss the progress for each emphasis area and oversee the implementation plan. The document should then be updated as per the latest collision data, emerging trends, and the E strategies' progress and implementation.

APPENDIX A: SUMMARY OF PLANNING DOCUMENTS

Table 1: Matrix of Planning Goals, Policies, and Projects

Document	Highlights
City of Oakley General Plan 2022	GOAL 3.5 TRAFFIC SAFETY • Policy 3.5.1: Provide consistent, comprehensive traffic safety law enforcement throughout Oakley. • Policy 3.5.2: Design a roadway system that maximizes safety for all users and results in safe speeds on city streets. • Policy 3.5.3: Maintain roadway facilities to maximize safety, including use of traffic-calming measures where appropriate. • Policy 3.5.4: Incorporate mountable medians, shoulders to bypass queued vehicles, emergency signal preemption, and other features to improve emergency response times as appropriate and feasible on new roadways and on existing roadways. Implementation Programs: • 3.5.A. Allocate adequate resources for traffic enforcement activities. • 3.5.B. As part of the Capital Improvement Program, identify and prioritize projects that enhance and improve vehicular, bicycle, and pedestrian safety, including traffic-calming measures in areas with high accident rates. • 3.5.C. Ensure that new roadways are designed to minimize conflicts due to driveway access and parking. • 3.5.D. Ensure that adequate funding is available to maintain roadway marking, signs, and striping in optimal condition. • 3.5.E. Enhance safety at railroad grade crossings, including coordination with Contra Costa Water District, Diablo Water District, East Bay Regional Park District and Iron house Sanitary District in the construction at no cost to the City of a new controlled, at-grade crossing on the BNSF tracks by the northward extension of Rose Avenue. • 3.5.F. Coordinate with local fire protection and law enforcement agencies on emergency response routes and plans. • 3.5.G. Consider adoption of a Vision Zero Action Plan (or strategy) that prioritizes a systems-based approach to preventing traffic fatalities, focusing on the built environment, systems, including traffic-calming measures in areas with high accident rates, and policies that influence behavior as well as

Document	Highlights
	messaging that emphasizes that these traffic losses are preventable.
Oakley Downtown Specific Plan (2010)	Capital Improvement Projects in Downtown Area 1. Highway 4/Main Street Realignment: The Bypass is designed to encourage trucks and through-traffic to circumnavigate the core blocks between Vintage Parkway and Second Street, and allow the core to be revitalized as a pedestrian-oriented commercial district. 2. Main Street Frontage and Streetscape: Frontage curbs, gutter, and walks will be constructed where they do not exist, and street trees, pedestrian-oriented street lights, and enhanced pedestrian street crossings will be installed between Vintage Parkway and Fourth Street. 3. East Main Street Widening and Streetscape: Widen the street to four lanes between the bend at Second Street and the Contra Costa Canal. Install landscaped median islands and frontage street trees and street lights. 4. Downtown Side Street Improvements: Install Street trees, pedestrian-oriented street lights, and enhanced pedestrian street crossings between Main Street and Acme Street along Hall, O'Hara, Second, and Third Streets. 5. Building Facade Improvements: Assist property and business owners to upgrade the appearance of buildings along the Main Street frontage. 6. City Gateway Signs Priority Projects for Capital Funding to increase the Pedestrian Safety: 1. Main Street-Vintage to Second 2. East Main Street-Second to Fourth 3. East Main Street-Fourth to Rose Revitalization Goals 1. Improve Main Street's Overall Appearance 2. Enhance the Pedestrian Environment 3. Facilitate Realignment of Main Street/Highway 4 4. Promote Higher Density Infill Development

Document	Highlights
East Cypress Corridor Specific Plan (2006)	Goal: *Plan for a Circulation System Serving Motorists, Bicyclists, Equestrians and Pedestrians:* The circulation plan for the East Cypress Corridor Specific Plan provides for comprehensive circulation through a system of arterial, collector and local streets which accommodate bicycle and pedestrian travel as well as the safe and efficient movement of automobiles. The Specific Plan accommodates equestrian travel as well. • Bethel Island Road will be extended south from the intersection of East Cypress Road to Rock Slough. Bethel Island Road improvements will include a crossing at Rock Slough to be constructed in phases pursuant to the requirements of the City. The crossing at Rock Slough will be funded by the development and by mitigation funds collected by Contra Costa County. • Arterial and collector streets will include landscaped parkways and pedestrian walkways separated from the street to create an intimate environment promoting social interaction. • Streets will be designed to slow vehicular traffic through the use of traffic calming devices such as roundabouts, open space, landscaped areas and narrowed intersections to influence a driver's peripheral vision to encourage drivers to proceed more slowly. • A system of bikeways will be integrated into the design of the community to encourage bicycle travel as an alternative to the automobile. • A system of equestrian and multi-use trails will be built on top of the proposed engineered levees.
Oakley Neighborhood Traffic Management Program Policy (2014)	The applicable streets are local neighborhood streets with the goal to address community needs by: • Improving neighborhood safety for vehicles, pedestrians and bicyclists • Reducing the number and severity of vehicle related accidents • Maintaining the speed of motor vehicles to the posted speed limits • Preserving emergency vehicles' response times • Decreasing the volume of extraneous/cut-through traffic • Maximizing the community participation and support in the program

Document	Highlights
	• Limiting the impact on adjacent local streets and neighborhoods
City Of Oakley Capital Improvement Program (2021-22)	List of Street Improvement Projects: • Main Street/Rose Avenue Intersection Improvement Project: This project will construct signalization and the reconfiguration of the Main Street/Rose Avenue Intersection • Sellers Avenue Improvements and Widening Project: This project will construct the section of Sellers Avenue from the intersection at Riverrock Drive, to the gate at the Oakley Regional Community Park site. • East Cypress Road Widening (Knightsen Avenue to Jersey Island Road): This project will install a signal at the intersection of East Cypress Road and Knightsen Avenue in addition to widening and improving this intersection and East Cypress Road • Laurel Road Resurfacing Project (Empire Avenue to O'Hara Avenue): This project will repair and resurface Laurel Road from O'Hara Avenue to Empire Avenue. • FY 2021/22 Street Repair and Resurfacing Project: This project will repair and resurface streets in Oakley. • FY 2021/22 ADA Implementation Plan Project: This project will begin the implementation of the City of Oakley's ADA Transition Plan. • FY 2021/22 Street Restriping Project: This project will restripe major streets in Oakley. • FY 2021/22 Traffic Calming Project: This project will construct traffic calming measures. • FY 2021/22 Traffic Signal Modernization Project: This project will rehabilitate existing traffic signals. • O'Hara Avenue / Carpenter Road Intersection Improvement Project: This project will improve the traffic operations at this intersection by constructing dedicated left turn lanes on Carpenter Road on either side of O'Hara Avenue, installing video detection system and reconfiguring the striping at this intersection. • Main Street / Cypress Road Intersection Improvement Project: The scope of this project include addition of a dedicated right turn lane from Main Street into East Cypress Road, asphalt resurfacing of the intersection and striping after the paving work has been completed.

Document	Highlights
	• Main Street / Delta Road Intersection Signalization Project: This project will install a traffic signal at Main Street / Delta Road intersection along with lane widening and intersection improvements. • Main Street / Brownstone Road Intersection Signalization Project: This project will install traffic signal at Main Street/Brownstone Road intersection. • Hall Street Extension Project: This project will extend Hall Street north of Main Street to provide direct connection to the new parking lot that is constructed as part of the Downtown Gateway Plaza Roadway and Parking Lot Project.
Contra Costa Countywide Bike and Pedestrian Plan (2018)	Goals • Encourage more people to walk and bicycle • Increase safety and security for pedestrians and bicyclists • Create a safe, connected, and comfortable network of bikeways and walkways for all ages and abilities • Increase the livability and attractiveness of Contra Costa's communities and districts • Equitably serve all of Contra Costa's communities while ensuring that public investments are focused on projects with the greatest benefits Objectives • Increase the share of trips made by walking and bicycling in Contra Costa • Reduce the rate of pedestrian and bicycle fatalities and injuries per capita • Increase the number of miles of low-stress bikeways in Contra Costa • Increase the number of jurisdictions in Contra Costa with bicycle, pedestrian, or active transportation plans • Integrate complete street principles and best practices into Authority funding and design guidance
CCTA Transportation Expenditure Plan (2020)	Goals • Relieve Traffic Congestion on Highways and Interchanges • Make Bus, Ferry, Passenger Train, and BART Rides Safer, Cleaner, and More Reliable • Provide Accessible and Safe Transportation for Children, Seniors, Veterans, and People with Disabilities

Document	Highlights

	• Improve Transportation in Our Communities Projects
	• Enhance I-80, I-580 (Richmond-San Rafael Bridge), Transit, and BART Corridor
	  ◦ Improve Transit Reliability Along the I-80 Corridor
	  ◦ Relieve Congestion and Improve Local Access Along the I-80 Corridor
	  ◦ Improve Traffic Flow on Major Roads in West County
	  ◦ Enhance Ferry Service and Commuter Rail in West County
	  ◦ Improve Traffic Flow and Local Access to Richmond-San Rafael Bridge Along I-580 and Richmond Parkway
	  ◦ Seamless Connected Transportation Options

Contra Costa Countywide Transportation Safety Policy and Implementation Guide (2021)	• **A. SIGNAL TIMING & PHASING**
	  ◦ Additional Signal Heads
	  ◦ Extend Pedestrian Crossing Time
	  ◦ Flashing Yellow Turn Phase
	  ◦ Leading Pedestrian Interval
	  ◦ Pedestrian Phase Recall
	  ◦ Replace Permissive with Protected Left Turn
	  ◦ Pedestrian Scramble
	  ◦ Reduce Cycle Lengths
	  ◦ Coordinated Signal Operation
	  ◦ Extend Green Time for Bikes
	  ◦ Extend Yellow and All Red Time
	• **B. INTERSECTION & ROADWAY DESIGN**
	  ◦ Close Slip Lane
	  ◦ Raised Intersection
	  ◦ Convert Two-Way Stop to All-Way Stop
	  ◦ Install Sidewalk
	  ◦ Protected Intersection
	  ◦ Raised Median
	  ◦ Lane Narrowing
	  ◦ Road Diet
	  ◦ Widen Shoulder
	  ◦ Roundabout
	  ◦ Signal Head Improvements
	  ◦ Traffic Circles

Document	Highlights
	○ Programmable Signals/Visors/Louvers ○ Edge Line/Center Line Rumble Strips ○ Hardened Centerlines • **C. BIKEWAY DESIGN** ○ Bicycle Crossing (Solid Green Paint) ○ Bicycle Signal/Exclusive Bike Phase ○ Bike Detection ○ Class I Bicycle Path or Mixed Use Trail ○ Bike Box ○ Class II Bike Lane ○ Class IV Separated Bikeway ○ Green Bike Lane Conflict Zone Markings ○ Two-Stage Turn Queue Bike Box • **D. PEDESTRIAN CROSSINGS** ○ Install Pedestrian Countdown Timer ○ Pedestrian Hybrid Beacon (PHB) ○ Curb Extension ○ High-Visibility Crosswalk ○ Pedestrian Median Barrier ○ Raised Crosswalk ○ Pedestrian Refuge Island ○ Rectangular Rapid Flashing Beacon (RRFB) ○ Reduce Curb Radius ○ ADA-Compliant Directional Curb Ramps and Audible Push Buttons ○ Extended Time Push Button • **E. SIGNS & MARKINGS** ○ Prohibit Right-Turn-on-Red ○ Advance Yield Markings ○ Advance Stop Markings ○ Pedestrian Signs • **F. OTHER** ○ Access Management ○ Intersection & Street Scale Lighting ○ Remove Obstructions for Sightlines
CCTA Countywide Comprehensive Transportation Plan (2017)	• GOAL 1: Support the efficient, safe, and reliable movement of people and goods using all available travel modes • GOAL 2: Manage growth to sustain Contra Costa's economy, preserve its environment and support its communities

Document	Highlights
	• GOAL 3: Expand safe, convenient and affordable alternatives to the single-occupant vehicle • GOAL 4: Maintain the transportation system • GOAL 5: Continue to invest wisely to maximize the benefits of available funding

Contra Costa County Transportation Analysis Guidelines (2020)	Transportation Policy Framework
	• Senate Bill 743 – California Environmental Quality Act
	• County General Plan
	  • Growth Management Element
	  • Transportation and Circulation Element
	• Capital Road Improvement & Preservation Program
	• Complete Streets
	  • Contra Costa County Complete Streets Principles
	  • Contra Costa County Complete Streets Implementation Measures
	• Vision Zero Contra Costa County
	• County Ordinance Code
	  • Section 74-4.006 – Electric Vehicle ("EV") Charging
	  • Chapter 82-16 – Off-Street Parking
	  • Chapter 82-32 – Transportation Demand Management
	  • Title 9 - Subdivisions
	• Contra Costa Transportation Authority
	  • CCTA Technical Procedures
	  • CCTA Countywide Bicycle and Pedestrian Plan
	  • CCTA Action Plans for Routes of Regional Significance

APPENDIX B: CONSOLIDATED HIGH-INJURY COLLISION DATABASE

CASE_ID	ACCIDENT_YEAR	PROC_DATE	JURIS	COLLISION_DATE	COLLISION_TIME	OFFICER_ID	REPORTING_DISTRICT
8715293	2018	20181115	700	20181016	1515	OA030	2234
8317998	2017	20170309	700	20170203	823	OA028	
8803250	2019	20190222	700	20190113	1157	OA	OAK
8424913	2017	20170816	700	20170801	1854	OA034	OAKLE
8911126	2019	20200604	700	20191127	1756	OA029	2264
8682574	2018	20181005	700	20180815	1249	0A009	59
8743478	2018	20181217	700	20181114	1721	OA036	
8922483	2019	20190905	700	20190817	1059	OA321	OAK
9206888	2020	20210202	700	20201126	2115	OA040	59
9281700	2021	20210625	700	20210530	1324	OA032	OAK
9281879	2021	20210728	700	20210604	513	OA032	OAK
9288538	2021	20210910	700	20210616	1406	OA030	2252
9320356	2021	20220208	700	20210920	439	32	OAKLE
9356948	2021	20211109	700	20210919	2109	41	
9385476	2021	20220125	700	20211203	744	32	OAKLE
8461676	2017	20171025	700	20170915	648	OA009	59
9056955	2020	20200703	700	20200304	1354	OA009	59
8322940	2017	20170314	700	20170124	1526	OA013	DELTA
8663345	2018	20180718	700	20180525	1658	OA036	
9041612	2020	20200228	700	20200116	1421	OA009	59
9027522	2020	20200304	700	20200131	1519	OA032	OAK
9041616	2020	20200302	700	20200126	1418	OA032	OAK
9074357	2020	20200715	700	20200315	1340	OA032	OAK
9069561	2020	20200703	700	20200301	1106	OA032	OAK
8529543	2017	20180117	700	20171218	1916	OA034	DELTA
8657677	2018	20180829	700	20180709	654	OA009	59
8620491	2018	20180530	700	20180507	1058	OA009	59
8682562	2018	20181005	700	20180808	859	OA030	2239
8755110	2018	20181227	700	20181121	1108	OA030	2206
8715289	2018	20181115	700	20181004	518	OA037	2239
8868576	2019	20190606	700	20190521	1636	OA030	2206
8755421	2018	20190125	700	20181129	1840	OA036	
9186315	2020	20210202	700	20201110	1905	OA019	OAKLE
8776224	2018	20190130	700	20181227	1717	OA036	
	2021			44526			
8895413	2019	20190715	700	20190616	520	OA032	OAK
8995731	2019	20200109	700	20191122	1533	OA032	OAK
8995804	2019	20200206	700	20191201	702	OA032	
9282267	2021	20210713	700	20210612	1320	OA032	OAK
9370524	2021	20211227	700	20211123	1536	30	2235
8344382	2017	20170418	700	20170319	1741	OA030	2227
8463206	2017	20171030	700	20170918	1105	OA030	2246
8510347	2017	20171214	700	20171031	2050	OA027	OAKLE
8529531	2017	20180117	700	20171226	1136	OA030	2204
8575292	2018	20180321	700	20180223	1707	OA018	
8612448	2018	20180430	700	20180411	1255	OA009	59
8658090	2018	20181005	700	20180720	2339	OA034	DELTA

CASE_ID	DAY_OF_WEEK	CHP_SHIFT	POPULATION	CNTY_CITY_LOC	SPECIAL_COND	BEAT_TYPE	CHP_BEAT_TYPE
8715293	2	5	3	734	0	0	0
8317998	5	5	3	734	0	0	0
8803250	7	5	3	734	0	0	0
8424913	2	5	3	734	0	0	0
8911126	3	5	3	734	0	0	0
8682574	3	5	3	734	0	0	0
8743478	3	5	3	734	0	0	0
8922483	6	5	3	734	0	0	0
9206888	4	5	3	734	0	0	0
9281700	7	5	3	734	0	0	0
9281879	5	5	3	734	0	0	0
9288538	3	5	3	734	0	0	0
9320356	1	5	3	734	0	0	0
9356948	7	5	3	734	0	0	0
9385476	5	5	3	734	0	0	0
8461676	5	5	3	734	0	0	0
9056955	3	5	3	734	0	0	0
8322940	2	5	3	734	0	0	0
8663345	5	5	3	734	0	0	0
9041612	4	5	3	734	0	0	0
9027522	5	5	3	734	0	0	0
9041616	7	5	3	734	0	0	0
9074357	7	5	3	734	0	0	0
9069561	7	5	3	734	0	0	0
8529543	1	5	3	734	0	0	0
8657677	1	5	3	734	0	0	0
8620491	1	5	3	734	0	0	0
8682562	3	5	3	734	0	0	0
8755110	3	5	3	734	0	0	0
8715289	4	5	3	734	0	0	0
8868576	2	5	3	734	0	0	0
8755421	4	5	3	734	0	0	0
9186315	2	5	3	734	0	0	0
8776224	4	5	3	734	0	0	0
8895413	7	5	3	734	0	0	0
8995731	5	5	3	734	0	0	0
8995804	7	5	3	734	0	0	0
9282267	6	5	3	734	0	0	0
9370524	2	5	3	734	0	0	0
8344382	7	5	3	734	0	0	0
8463206	1	5	3	734	0	0	0
8510347	2	5	3	734	0	0	0
8529531	2	5	3	734	0	0	0
8575292	5	5	3	734	0	0	0
8612448	3	5	3	734	0	0	0
8658090	5	5	3	734	0	0	0

CASE_ID	CITY_DIVISION_LAPD	CHP_BEAT_CLASS	BEAT_NUMBER	PRIMARY_RD
8715293		0	53	OHARA AV
8317998		0		OHARA AV
8803250		0	53	OHARA AV
8424913		0	52	BRAZIL CT
8911126		0	52	BETHEL ISLAND RD
8682574		0	52	EAST CYPRESS RD
8743478		0	52	MAIN ST
8922483		0	52	EAST CYPRESS RD
9206888		0	52	EAST CYPRESS RD
9281700		0	52	EAST CYPRESS RD
9281879		0	52	BETHEL ISLAND RD
9288538		0	52	CYPRESS RD
9320356		0	52	EAST CYPRESS RD
9356948		0		BETHEL ISLAND RD
9385476		0	52	CYPRESS RD
8461676		0	52	EAST CYPRESS RD
9056955		0	52	EAST CYPRESS RD
8322940		0	53	NEROLY RD
8663345		0	3	EMPIRE AV
9041612		0	53	NEROLY RD
9027522		0	53	EMPIRE AV
9041616		0	53	EMPIRE AV
9074357		0	53	EMPIRE AV
9069561		0	53	OHARA AV
8529543		0	2	LAUREL RD
8657677		0	53	LAUREL RD
8620491		0	51	MAIN ST
8682562		0	53	LAUREL RD
8755110		0	51	MAIN ST
8715289		0	51	LAUREL RD
8868576		0	51	MAIN ST
8755421		0	53	LAUREL RD
9186315		0	51	MAIN ST
8776224		0	53	LAUREL RD
				2190 MAIN ST (STARBUCKS PLOT)
8895413		0	53	LAUREL RD
8995731		0	53	LAUREL RD
8995804		0	53	LAUREL RD
9282267		0	51	LAUREL RD
9370524		0	53	LAUREL RD
8344382		0	51	MAIN ST
8463206		0	52	MAIN ST
8510347		0	1	MAIN ST
8529531		0	51	MAIN ST
8575292		0	52	MAIN ST
8612448		0	53	MAIN ST
8658090		0	51	MAIN ST

CASE_ID	SECONDARY_RD	DISTANCE	DIRECTION	INTERSECTION	TJKM_Intersection	WEATHER_1	WEATHER_2
8715293	LAUREL RD	600	S	N	N	A	-
8317998	COVERED WAGON RD	68	N	N	Y	B	-
8803250	ACME ST	44	N	N	Y	A	-
8424913	BEECHNUT LN	321	S	N	N	A	-
8911126	EAST CYPRESS RD	93	N	N	Y	C	-
8682574	MACHADO LN	530	W	N	N	A	-
8743478	EAST CYPRESS RD	22	S	N	Y	A	-
8922483	KNIGHTSEN AV	116	E	N	Y	A	-
9206888	KNIGHTSEN AV	186	E	N	Y	A	-
9281700	BETHEL ISLAND RD	2112	W	N	N	A	-
9281879	CYPRESS RD	2112	E	N	N	A	-
9288538	SELLERS AV	164	W	N	Y	A	-
9320356	JERSEY ISLAND RD	3115	E	N	N	A	-
9356948	CYPRESS RD	2000	N	N	N	A	-
9385476	FRANK HENGEL WY	30	E	N	Y	A	-
8461676	BROADWAY	186	W	N	Y	A	-
9056955	KNIGHTSEN AV	299	E	N	N	A	-
8322940	NEROLY RD 1050	0		Y	Y	A	-
8663345	TRUMAN LN	18	S	N	Y	B	-
9041612	BROWN RD	214	W	N	Y	C	-
9027522	NEROLY RD	305	N	N	N	A	-
9041616	NEROLY RD	282	N	N	N	A	-
9074357	OAKLEY RD	274	S	N	N	C	-
9069561	FRANCISCO VILLA DR	17	S	N	Y	A	-
8529543	CREEKSIDE WY	123	E	N	Y	A	-
8657677	WOODHILL DR	154	E	N	Y	A	-
8620491	CAROL LN	0		Y	Y	A	-
8682562	EMPIRE AV	670	E	N	N	A	-
8755110	CAROL LN	106	S	N	Y	B	-
8715289	EMPIRE AV	452	E	N	N	A	-
8868576	CAROL LN	0		Y	Y	B	-
8755421	ROSE AV	44	W	N	Y	B	-
9186315	CAROL AVE	0		Y	Y	A	-
8776224	BROWN RD	127	W	N	Y	A	-
		0			Y	A	
8895413	MELLOWOOD DR	480	W	N	N	A	-
8995731	ROSE AV	50	W	N	Y	A	-
8995804	EMPIRE AV	55	E	-	Y	C	-
9282267	EMPIRE AV	137	W	N	Y	A	-
9370524	ROSE AV	14	W	N	Y	A	-
8344382	OHARA AV	48	E	N	Y	A	-
8463206	OHARA AV	119	E	N	Y	A	-
8510347	LIVE OAK AV	713	W	N	N	-	-
8529531	LIVE OAK AV	197	W	N	Y	A	-
8575292	MALICOAT AV	124	S	N	Y	A	-
8612448	VINTAGE PKWY	363	W	N	N	A	-
8658090	LIVE OAK AV	1792	E	N	N	A	-

CASE_ID	STATE_HWY_IND	CALTRANS_COUNTY	CALTRANS_DISTRICT	STATE_ROUTE	ROUTE_SUFFIX
8715293	N				
8317998	N				
8803250	N				
8424913	N				
8911126	N				
8682574	N				
8743478	N				
8922483	N				
9206888	N				
9281700	N				
9281879	N				
9288538	N				
9320356	N				
9356948	N				
9385476	N				
8461676	N		0	0	
9056955	N		0	0	
8322940	N				
8663345	N				
9041612	N		0	0	
9027522	N				
9041616	N				
9074357	N				
9069561	N				
8529543	N				
8657677	N				
8620491	N				
8682562	N				
8755110	N				
8715289	N				
8868576	N				
8755421	N				
9186315	N				
8776224	N				
8895413	N				
8995731	N				
8995804	N				
9282267	N				
9370524	N				
8344382	N				
8463206	N				
8510347	N				
8529531	N				
8575292	N				
8612448	N				
8658090	N				

CASE_ID	POSTMILE_PREFIX	POSTMILE	LOCATION_TYPE	RAMP_INTERSECTION	SIDE_OF_HWY	TOW_AWAY
8715293						Y
8317998						Y
8803250						Y
8424913						N
8911126						Y
8682574						Y
8743478						N
8922483						Y
9206888						Y
9281700						N
9281879						N
9288538						Y
9320356						Y
9356948						N
9385476						N
8461676		0		0		Y
9056955		0		0		Y
8322940						Y
8663345						Y
9041612		0		0		N
9027522						N
9041616						Y
9074357						Y
9069561						Y
8529543						Y
8657677						Y
8620491						Y
8682562						Y
8755110						Y
8715289						Y
8868576						Y
8755421						N
9186315						Y
8776224						Y
8895413						Y
8995731						N
8995804						Y
9282267						Y
9370524						N
8344382						Y
8463206						Y
8510347						N
8529531						Y
8575292						Y
8612448						Y
8658090						Y

CASE_ID	COLLISION_SEVERITY	NUMBER_KILLED	NUMBER_INJURED	PARTY_COUNT	PRIMARY_COLL_FACTOR
8715293	4	0	1	3	A
8317998	4	0	1	2	A
8803250	3	0	1	1	A
8424913	2	0	1	1	A
8911126	1	1	2	2	A
8682574	4	0	3	3	A
8743478	4	0	1	1	C
8922483	4	0	2	2	A
9206888	2	0	2	2	A
9281700	4	0	1	3	A
9281879	4	0	1	1	A
9288538	3	0	1	2	A
9320356	1	1	0	2	A
9356948	4	0	1	2	A
9385476	4	0	1	2	A
8461676	4	0	1	1	A
9056955	3	0	1	2	A
8322940	2	0	3	2	A
8663345	3	0	1	2	A
9041612	4	0	1	2	A
9027522	4	0	1	2	A
9041616	4	0	3	2	A
9074357	4	0	1	2	A
9069561	2	0	1	1	A
8529543	4	0	1	2	A
8657677	3	0	1	3	A
8620491	2	0	2	2	A
8682562	4	0	2	2	A
8755110	4	0	1	2	A
8715289	4	0	1	2	A
8868576	4	0	2	3	A
8755421	4	0	1	2	A
9186315	4	0	1	2	A
8776224	4	0	1	2	A
	3				
8895413	2	0	2	2	A
8995731	4	0	2	3	A
8995804	4	0	2	2	A
9282267	4	0	1	2	A
9370524	4	0	1	2	A
8344382	4	0	1	1	A
8463206	3	0	1	1	A
8510347	2	0	1	2	A
8529531	3	0	2	2	A
8575292	4	0	1	4	A
8612448	4	0	1	2	A
8658090	4	0	2	1	A

CASE_ID	PCF_CODE_OF_VIOL	PCF_VIOL_CATEGORY	PCF_VIOLATION	PCF_VIOL_SUBSECTION	HIT_AND_RUN
8715293	-	3	22350		N
8317998	-	8	22107		N
8803250	-	3	22350		N
8424913	-	3	22350		N
8911126	-	7	21658	A	N
8682574	-	3	22350		N
8743478	-	18			N
8922483	-	9	21801	A	N
9206888	-	1	23153	A	N
9281700	-	3	22350		N
9281879	-	5	21650		N
9288538	-	4	21703		N
9320356	-	6	21750		N
9356948	-	1	23152	A	N
9385476	-	3	22350		N
8461676	-	3	22350		N
9056955	-	3	22350		N
8322940	-	9	21804	A	N
8663345	-	8	22105		N
9041612	-	11	21955		N
9027522	-	3	22350		M
9041616	-	3	22350		N
9074357	-	9	21804	A	N
9069561	-	5	21650		N
8529543	-	5	21460	A	N
8657677	-	3	22350		N
8620491	-	12	21453	A	N
8682562	-	3	22350		N
8755110	-	8	22107		N
8715289	-	4	21703		N
8868576	-	12	21453	A	N
8755421	-	3	22350		N
9186315	-	12	21453	A	N
8776224	-	3	22350		N
		16			
8895413	-	5	21650		N
8995731	-	3	22350		M
8995804	-	1	23152	A	N
9282267	-	8	22107		N
9370524	-	3	22350		N
8344382	-	3	22350		N
8463206	-	3	22350		N
8510347	-	9	21801		F
8529531	-	8	22107		N
8575292	-	3	22350		N
8612448	-	3	22350		N
8658090	-	3	22350		N

CASE_ID	TYPE_OF_COLLISION	MVIW	PED_ACTION	ROAD_SURFACE	ROAD_COND_1	ROAD_COND_2	LIGHTING
8715293	C	C	A	A	H	-	A
8317998	-	-	A	B	H	-	A
8803250	F	J	A	A	H	-	A
8424913	H	I	A	A	H	-	A
8911126	B	C	A	B	H	-	D
8682574	C	C	A	A	H	-	A
8743478	F	A	A	D	-	-	C
8922483	A	C	A	A	H	-	A
9206888	-	-	A	A	H	-	C
9281700	C	C	A	A	H	-	A
9281879	H	J	A	A	H	-	B
9288538	C	C	A	A	H	-	A
9320356	B	C	A	A	H	-	D
9356948	A	C	A	A	H	-	C
9385476	C	C	A	A	H	-	A
8461676	F	A	A	A	H	-	B
9056955	C	C	A	A	H	-	A
8322940	D	C	A	A	H	-	A
8663345	D	C	A	A	H	-	A
9041612	G	B	D	B	H	-	A
9027522	C	C	A	A	H	-	A
9041616	C	C	A	A	H	-	A
9074357	D	C	A	B	H	-	A
9069561	A	I	A	A	H	-	A
8529543	A	C	A	A	H	-	C
8657677	C	C	A	A	H	-	A
8620491	D	D	A	A	H	-	A
8682562	C	C	A	A	H	-	A
8755110	C	C	A	B	H	-	A
8715289	C	C	A	A	H	-	C
8868576	D	C	A	A	H	-	A
8755421	C	C	A	B	H	-	C
9186315	D	C	A	A	H	-	C
8776224	C	C	A	A	H	-	E
	G	B					B
8895413	A	C	A	A	D	-	C
8995731	C	C	A	A	H	-	A
8995804	C	C	A	B	H	-	B
9282267	D	C	A	A	H	-	A
9370524	B	D	A	A	H	-	A
8344382	E	I	A	A	H	-	A
8463206	E	I	A	A	D	-	A
8510347	G	B	D	A	H	-	C
8529531	C	E	A	A	H	-	A
8575292	C	C	A	A	H	-	A
8612448	C	C	A	A	H	-	A
8658090	E	I	A	A	H	-	C

CASE_ID	CONTROL_DEVICE	CHP_ROAD_TYPE	PEDESTRIAN_ACCIDENT	BICYCLE_ACCIDENT	MOTORCYCLE_ACCIDENT
8715293	A	0			
8317998	-	0			
8803250	A	0			
8424913	A	0			Y
8911126	D	0			
8682574	A	0			
8743478	A	0			
8922483	A	0			
9206888	-	0			
9281700	A	0			
9281879	A	0			
9288538	A	0			Y
9320356	A	0			
9356948	D	0			
9385476	A	0			
8461676	A	0			
9056955	A	0			
8322940	D	0			
8663345	D	0			
9041612	A	0	Y		
9027522	A	0			
9041616	A	0			
9074357	A	0			
9069561	A	0			
8529543	A	0			
8657677	A	0			
8620491	A	0			
8682562	A	0			
8755110	D	0			
8715289	A	0			
8868576	A	0			
8755421	A	0			
9186315	A	0			
8776224	A	0			
8895413	D	0			
8995731	A	0			
8995804	A	0			
9282267	A	0			
9370524	A	0			Y
8344382	A	0			
8463206	D	0			
8510347	D	0	Y		Y
8529531	D	0			
8575292	A	0			
8612448	A	0			
8658090	A	0			

CASE_ID	TRUCK_ACCIDENT	NOT_PRIVATE_PROPERTY	ALCOHOL_INVOLVED	STWD_VEHTYPE_AT_FAULT
8715293		Y		A
8317998		Y		A
8803250		Y		A
8424913		Y		C
8911126		Y		A
8682574		Y		A
8743478		Y		-
8922483		Y		A
9206888		Y		A
9281700		Y		D
9281879		Y		A
9288538		Y		C
9320356		Y		A
9356948		Y	Y	A
9385476		Y		D
8461676		Y		D
9056955		Y		A
8322940		Y		A
8663345		Y		A
9041612		Y		N
9027522		Y		-
9041616		Y		A
9074357		Y		A
9069561		Y		A
8529543		Y		A
8657677		Y		A
8620491		Y		D
8682562		Y		A
8755110		Y		A
8715289		Y		A
8868576		Y		A
8755421		Y		A
9186315		Y		A
8776224		Y		A
8895413		Y		A
8995731		Y		A
8995804		Y	Y	A
9282267		Y		A
9370524		Y		C
8344382		Y		A
8463206		Y		A
8510347		Y		N
8529531		Y		A
8575292		Y		A
8612448		Y		D
8658090		Y		A

CASE_ID	CHP_VEHTYPE_AT_FAULT	COUNT_SEVERE_INJ	COUNT_VISIBLE_INJ	COUNT_COMPLAINT_PAIN
8715293	7	0	0	1
8317998	1	0	0	1
8803250	1	0	1	0
8424913	2	1	0	0
8911126	1	0	0	2
8682574	1	0	0	3
8743478	-	0	0	1
8922483	1	0	0	2
9206888	1	1	1	0
9281700	22	0	0	1
9281879	1	0	0	1
9288538	2	0	1	0
9320356	1	0	0	0
9356948	1	0	0	1
9385476	22	0	0	1
8461676	22	0	0	1
9056955	1	0	1	0
8322940	7	3	0	0
8663345	7	0	1	0
9041612	60	0	0	1
9027522		0	0	1
9041616	1	0	0	3
9074357	1	0	0	1
9069561	1	1	0	0
8529543	1	0	0	1
8657677	1	0	1	0
8620491	22	2	0	0
8682562	1	0	0	2
8755110	1	0	0	1
8715289	1	0	0	1
8868576	7	0	0	2
8755421	1	0	0	1
9186315	8	0	0	1
8776224	1	0	0	1
8895413	1	1	1	0
8995731	1	0	0	2
8995804	1	0	0	2
9282267	1	0	0	1
9370524	2	0	0	1
8344382	1	0	0	1
8463206	1	0	1	0
8510347	60	1	0	0
8529531	1	0	1	1
8575292	1	0	0	1
8612448	22	0	0	1
8658090	1	0	0	2

CASE_ID	COUNT_PED_KILLED	COUNT_PED_INJURED	COUNT_BICYCLIST_KILLED	COUNT_BICYCLIST_INJURED
8715293	0	0	0	0
8317998	0	0	0	0
8803250	0	0	0	0
8424913	0	0	0	0
8911126	0	0	0	0
8682574	0	0	0	0
8743478	0	0	0	0
8922483	0	0	0	0
9206888	0	0	0	0
9281700	0	0	0	0
9281879	0	0	0	0
9288538	0	0	0	0
9320356	0	0	0	0
9356948	0	0	0	0
9385476	0	0	0	0
8461676	0	0	0	0
9056955	0	0	0	0
8322940	0	0	0	0
8663345	0	0	0	0
9041612	0	1	0	0
9027522	0	0	0	0
9041616	0	0	0	0
9074357	0	0	0	0
9069561	0	0	0	0
8529543	0	0	0	0
8657677	0	0	0	0
8620491	0	0	0	0
8682562	0	0	0	0
8755110	0	0	0	0
8715289	0	0	0	0
8868576	0	0	0	0
8755421	0	0	0	0
9186315	0	0	0	0
8776224	0	0	0	0
8895413	0	0	0	0
8995731	0	0	0	0
8995804	0	0	0	0
9282267	0	0	0	0
9370524	0	0	0	0
8344382	0	0	0	0
8463206	0	0	0	0
8510347	0	1	0	0
8529531	0	0	0	0
8575292	0	0	0	0
8612448	0	0	0	0
8658090	0	0	0	0

CASE_ID	COUNT_MC_KILLED	COUNT_MC_INJURED	PRIMARY_RAMP	SECONDARY_RAMP	LATITUDE
8715293	0	0	-	-	37.98154692
8317998	0	0	-	-	37.98946409
8803250	0	0	-	-	37.99721981
8424913	0	1	-	-	37.98741945
8911126	0	0	-	-	37.99180165
8682574	0	0	-	-	37.99063
8743478	0	0	-	-	37.9905371
8922483	0	0	-	-	37.99062174
9206888	0	0	-	-	37.99062226
9281700	0	0	-	-	37.99066969
9281879	0	0	-	-	37.99143216
9288538	0	1	-	-	37.99072168
9320356	0	0	-	-	37.99055
9356948	0	0	-	-	37.99134
9385476	0	0	CO	-	37.99079
8461676	0	0	-	-	37.99064004
9056955	0	0	-	-	37.99062161
8322940	0	0	-	-	37.96892315
8663345	0	0	-	-	37.98724802
9041612	0	0	-	-	37.9688082
9027522	0	0	-	-	37.97484478
9041616	0	0	-	-	37.97478519
9074357	0	0	-	-	37.99694915
9069561	0	0	-	-	37.99227716
8529543	0	0	-	-	37.98337736
8657677	0	0	-	-	37.98328179
8620491	0	0	-	-	38.00214
8682562	0	0	-	-	37.98317255
8755110	0	0	-	-	38.0018258
8715289	0	0	-	-	37.98315506
8868576	0	0	-	-	38.00213812
8755421	0	0	-	-	37.98325203
9186315	0	0	-	-	38.00266686
8776224	0	0	-	-	37.9831656
					38.002667
8895413	0	0	-	-	37.98327895
8995731	0	0	-	-	37.98325256
8995804	0	0	-	-	37.98315536
9282267	0	0	-	-	37.98302317
9370524	0	1	-	-	37.98322
8344382	0	0	-	-	37.9978088
8463206	0	0	-	-	37.99780233
8510347	0	0	-	-	38.00516
8529531	0	0	-	-	38.00511087
8575292	0	0	-	-	37.97628352
8612448	0	0	-	-	37.99773057
8658090	0	0	-	-	38.00505429

CASE_ID	LONGITUDE
8715293	-121.7141545
8317998	-121.7140985
8803250	-121.7139548
8424913	-121.6991853
8911126	-121.6413027
8682574	-121.68397
8743478	-121.6970245
8922483	-121.6679043
9206888	-121.6676575
9281700	-121.6484663
9281879	-121.633874
9288538	-121.6780206
9320356	-121.65926
9356948	-121.6411
9385476	-121.6896
8461676	-121.665882
9056955	-121.6672707
8322940	-121.71999
8663345	-121.7324614
9041612	-121.722527
9027522	-121.7322971
9041616	-121.7322928
9074357	-121.7322741
9069561	-121.7140704
8529543	-121.690925
8657677	-121.7178659
8620491	-121.73241
8682562	-121.7300234
8755110	-121.7322153
8715289	-121.7308639
8868576	-121.7322306
8755421	-121.70521
9186315	-121.7322364
8776224	-121.723645
	-121.7321688
8895413	-121.7021544
8995731	-121.7052476
8995804	-121.7321528
9282267	-121.7328342
9370524	-121.70502
8344382	-121.7137976
8463206	-121.7135579
8510347	-121.74394
8529531	-121.7421621
8575292	-121.6959579
8612448	-121.7200857
8658090	-121.7352451

CASE_ID	ACCIDENT_YEAR	PROC_DATE	JURIS	COLLISION_DATE	COLLISION_TIME	OFFICER_ID	REPORTING_DISTRICT
8682373	2018	20181008	700	20180815	837	OA009	
8682566	2018	20181005	700	20180802	1603	OA030	2257
8803251	2019	20190225	700	20190202	1315	OA032	OAK
8819089	2019	20190423	700	20190315	1311	OA032	OAK
8847359	2019	20190516	700	20190503	1023	OA032	OAK
8903096	2019	20190802	700	20190714	1542	OA032	OAK
8922519	2019	20190905	700	20190808	746	OA030	2244
9056947	2020	20200703	700	20200320	1712	OA036	
8819093	2019	20190502	700	20190226	804	OA009	59
9242047	2021	20210415	700	20210221	1730	OA039	OAKLE
9272871	2021	20210804	700	20210617	1124	OA030	2227
9322634	2021	20211102	700	20210912	710	32	OAKLE
8661004	2018	20180813	700	20180604	1916	OA031	
9110130	2020	20201102	700	20200519	1234	OA009	59
8370107	2017	20170522	700	20170509	800	OA009	59
8444061	2017	20170914	700	20170802	1318	OA009	59
8661327	2018	20180719	700	20180601	1031	OA030	2246
8876836	2019	20190618	700	20190608	908	OA032	OAK
8878180	2019	20190617	700	20190531	1509	OA032	OAK
9356715	2021	20211110	700	20211014	856	13	DELTA
8625233	2018	20180530	700	20180506	1416	OA032	OAK
8755090	2018	20181227	700	20181129	1354	OA009	59
9074356	2020	20200715	700	20200315	1959	OA019	OAKLE
9205824	2020	20210212	700	20201219	1729	OA032	OAK
9100156	2020	20200804	700	20200413	1252	OA009	59
8682477	2018	20180907	700	20180725	1416	OA032	
9282060	2021	20210722	700	20210614	1548	OA030	2204
8871057	2019	20190611	700	20190508	722	OA303	2237
9027530	2020	20200303	700	20200129	1641	OA034	DELTA
8358820	2017	20170510	700	20170407	1727	OA029	
8465599	2018	20190208	700	20180417	510	OA030	2234
8881861	2019	20190711	700	20190523	1922	OA029	
9198226	2020	20210204	700	20201127	1846	OA028	
9322533	2021	20211027	700	20210907	1835	13	DELTA
9164473	2020	20201007	700	20200714	1058	OA015	
9023042	2020	20200514	700	20200103	1755	OA032	OAK
8336133	2017	20170626	700	20170226	29	OA020`	59
8847122	2019	20190514	700	20190415	935	OA009	59
9162263	2020	20201024	700	20200826	1542	OA017	57
8661000	2018	20180717	700	20180526	2212	OA029	
8819085	2019	20190408	700	20190323	1549	OA032	OAK
9248286	2021	20210415	700	20210311	1954	OA032	0AK
9385480	2021	20220125	700	20211223	1353	13	DELTA
8895449	2019	20190814	700	20190701	1949	OA029	
9028580	2020	20200310	700	20200102	1444	OA029	
9378249	2021	20220113	700	20211223	1729	13	

CASE_ID	DAY_OF_WEEK	CHP_SHIFT	POPULATION	CNTY_CITY_LOC	SPECIAL_COND	BEAT_TYPE	CHP_BEAT_TYPE
8682373	3	5	3	734	0	0	0
8682566	4	5	3	734	0	0	0
8803251	6	5	3	734	0	0	0
8819089	5	5	3	734	0	0	0
8847359	5	5	3	734	0	0	0
8903096	7	5	3	734	0	0	0
8922519	4	5	3	734	0	0	0
9056947	5	5	3	734	0	0	0
8819093	2	5	3	734	0	0	0
9242047	7	5	3	734	0	0	0
9272871	4	5	3	734	0	0	0
9322634	7	5	3	734	0	0	0
8661004	1	5	3	734	0	0	0
9110130	2	5	3	734	0	0	0
8370107	2	5	3	734	0	0	0
8444061	3	5	3	734	0	0	0
8661327	5	5	3	734	0	0	0
8876836	6	5	3	734	0	0	0
8878180	5	5	3	734	0	0	0
9356715	4	5	3	734	0	0	0
8625233	7	5	3	734	0	0	0
8755090	4	5	3	734	0	0	0
9074356	7	5	3	734	0	0	0
9205824	6	5	3	734	0	0	0
9100156	1	5	3	734	0	0	0
8682477	3	5	3	734	0	0	0
9282060	1	5	3	734	0	0	0
8871057	3	5	3	734	0	0	0
9027530	3	5	3	734	0	0	0
8358820	5	5	3	734	0	0	0
8465599	2	5	3	734	0	0	0
8881861	4	5	3	734	0	0	0
9198226	5	5	3	734	0	0	0
9322533	2	5	3	734	0	0	0
9164473	2	5	3	734	0	0	0
9023042	5	5	3	734	0	0	0
8336133	7	5	3	734	0	0	0
8847122	1	5	3	734	0	0	0
9162263	3	5	3	734	0	0	0
8661000	6	5	3	734	0	0	0
8819085	6	5	3	734	0	0	0
9248286	4	5	3	734	0	0	0
9385480	4	5	3	734	0	0	0
8895449	1	5	3	734	0	0	0
9028580	4	5	3	734	0	0	0
9378249	4	5	3	734	0	0	0

CASE_ID	CITY_DIVISION_LAPD	CHP_BEAT_CLASS	BEAT_NUMBER	PRIMARY_RD
8682373		0		MAIN ST
8682566		0	52	MAIN ST
8803251		0	51	MAIN ST
8819089		0	52	MAIN ST
8847359		0	51	MAIN ST
8903096		0	53	MAIN ST
8922519		0	52	MAIN ST
9056947		0	3	MAIN ST
8819093		0	52	EAST CYPRESS RD
9242047		0	1	MAIN ST
9272871		0	53	MAIN ST
9322634		0	51	MAIN ST
8661004		0	51	MAIN ST
9110130		0	52	MAIN ST
8370107		0	53	NEROLY RD
8444061		0	51	NEROLY RD
8661327		0	53	NEROLY RD
8876836		0	53	NEROLY RD
8878180		0	53	NEROLY RD
9356715		0	51	LAUREL RD
8625233		0	51	LAUREL RD
8755090		0	51	EMPIRE AV
9074356		0	51	LAUREL RD
9205824		0	53	LAUREL RD
9100156		0	53	LAUREL RD
8682477		0		OHARA AV
9282060		0	51	MAIN ST
8871057		0	51	VINTAGE PKWY
9027530		0	51	MAIN ST
8358820		0	52	LAUREL RD
8465599		0	53	LAUREL RD
8881861		0	53	LAUREL RD
9198226		0		LAUREL RD
9322533		0	53	LAUREL RD
9164473		0	53	LAUREL RD
9023042		0	51	OAKLEY RD
8336133		0	51	LAUREL RD
8847122		0	51	LAUREL RD
9162263		0	51	LAUREL RD
8661000		0	52	MAIN ST
8819085		0	51	MAIN ST
9248286		0	52	MAIN ST
9385480		0	52	DELTA RD
8895449		0	51	LIVE OAK AV
9028580		0		LIVE OAK AV
9378249		0		LIVE OAK AV

CASE_ID	SECONDARY_RD	DISTANCE	DIRECTION	INTERSECTION	TJKM_Intersection	WEATHER_1	WEATHER_2
8682373	NORCROSS LN	324	W	N	N	A	-
8682566	BROWNSTONE RD	90	N	N	Y	A	-
8803251	CAROL LN	680	S	N	N	A	-
8819089	DOUGLAS RD	80	S	N	Y	A	-
8847359	BIG BREAK RD	15	E	N	Y	A	-
8903096	VINTAGE PKWY	40	E	N	Y	A	-
8922519	RAYE AV	35	N	N	Y	A	-
9056947	NORCROSS LN	239	W	N	Y	A	-
8819093	EMERSON LAKE DR	0		Y	Y	B	-
9242047	VINTAGE PKWY	330	E	N	N	A	-
9272871	VINTAGE PKWY	155	E	N	Y	A	-
9322634	SANDY LN	100	W	N	Y	A	-
8661004	NEROLY RD	168	W	N	Y	A	-
9110130	BROWNSTONE RD	103	N	N	Y	A	-
8370107	OHARA AV	547	W	N	N	A	-
8444061	OAKLEY RD	116	S	N	Y	A	-
8661327	STONECROP DR	166	W	N	Y	A	-
8876836	EVERLASTING WY	155	E	N	Y	A	-
8878180	BROWN RD	345	E	N	N	A	-
9356715	LIVE OAK AV	171	E	N	Y	A	-
8625233	EMPIRE AV	0		Y	Y	A	-
8755090	LAUREL RD	0		Y	Y	B	-
9074356	EMPIRE AV	0		Y	Y	C	-
9205824	EMPIRE AV	0		Y	Y	A	-
9100156	EMPIRE AV	0		Y	Y	A	-
8682477	FRANCISCO VILLA DR	0		Y	Y	A	-
9282060	SANDY LN	0		Y	Y	A	-
8871057	MAIN ST	0		Y	Y	A	-
9027530	VINTAGE PKWY	0		Y	Y	A	-
8358820	OHARA AV	0		Y	Y	A	-
8465599	OHARA AV	0		Y	Y	A	-
8881861	OHARA AV	0		Y	Y	A	-
9198226	OHARA AV	0		Y	Y	A	-
9322533	OHARA AV	0		Y	Y	A	-
9164473	OHARA AV	0		Y	Y	A	-
9023042	NEROLY RD	0		Y	Y	A	-
8336133	NEROLY RD	0		Y	Y	A	-
8847122	LIVE OAK AV	0		Y	Y	B	-
9162263	LIVE OAK AV	0		Y	Y	A	-
8661000	DELTA RD	0		Y	Y	A	-
8819085	NEROLY RD	0		Y	Y	A	-
9248286	DELTA RD	0		Y	Y	A	-
9385480	DELTA RD 81	0		Y	Y	A	-
8895449	NEROLY RD	0		Y	Y	A	-
9028580	NEROLY RD	0		Y	Y	A	-
9378249	NEROLY RD	0		Y	Y	A	-

CASE_ID	STATE_HWY_IND	CALTRANS_COUNTY	CALTRANS_DISTRICT	STATE_ROUTE	ROUTE_SUFFIX
8682373	N				
8682566	N				
8803251	N				
8819089	N				
8847359	N				
8903096	N				
8922519	N				
9056947	N				
8819093	N				
9242047	N				
9272871	N				
9322634	N				
8661004	N		0	0	
9110130	N		0	0	
8370107	N				
8444061	N				
8661327	N				
8876836	N				
8878180	N				
9356715	N				
8625233	N				
8755090	N				
9074356	N				
9205824	N				
9100156	N		0	0	
8682477	N				
9282060	N				
8871057	N				
9027530	N				
8358820	N				
8465599	N				
8881861	N				
9198226	N				
9322533	N				
9164473	N		0	0	
9023042	N				
8336133	N				
8847122	N				
9162263	N				
8661000	N				
8819085	N				
9248286	N				
9385480	N				
8895449	N				
9028580	N				
9378249	N				

CASE_ID	POSTMILE_PREFIX	POSTMILE	LOCATION_TYPE	RAMP_INTERSECTION	SIDE_OF_HWY	TOW_AWAY
8682373						N
8682566						N
8803251						N
8819089						Y
8847359						N
8903096						Y
8922519						N
9056947						Y
8819093						Y
9242047						N
9272871						Y
9322634						N
8661004		0		0		N
9110130		0		0		Y
8370107						Y
8444061						N
8661327						Y
8876836						Y
8878180						N
9356715						
8625233						N
8755090						Y
9074356						N
9205824						Y
9100156		0		0		Y
8682477						N
9282060						Y
8871057						N
9027530						N
8358820						Y
8465599						Y
8881861						Y
9198226						Y
9322533						Y
9164473		0		0		Y
9023042						Y
8336133						N
8847122						N
9162263						Y
8661000						N
8819085						Y
9248286						Y
9385480						N
8895449						Y
9028580						Y
9378249						

CASE_ID	COLLISION_SEVERITY	NUMBER_KILLED	NUMBER_INJURED	PARTY_COUNT	PRIMARY_COLL_FACTOR
8682373	4	0	2	4	A
8682566	4	0	1	2	A
8803251	3	0	1	2	D
8819089	4	0	1	3	A
8847359	4	0	1	2	A
8903096	4	0	1	2	A
8922519	3	0	2	3	A
9056947	4	0	4	3	A
8819093	4	0	3	2	A
9242047	3	0	1	2	A
9272871	4	0	1	3	A
9322634	2	0	1	2	A
8661004	3	0	1	2	A
9110130	4	0	1	2	A
8370107	3	0	2	2	A
8444061	2	0	1	2	A
8661327	3	0	1	1	A
8876836	3	0	1	1	A
8878180	4	0	1	2	A
9356715	4	0	1	2	A
8625233	4	0	2	2	A
8755090	2	0	1	3	A
9074356	4	0	1	2	A
9205824	4	0	3	2	A
9100156	4	0	2	3	A
8682477	4	0	1	2	A
9282060	2	0	1	2	A
8871057	3	0	1	2	A
9027530	2	0	1	2	A
8358820	4	0	2	2	A
8465599	1	2	1	2	A
8881861	4	0	1	2	A
9198226	4	0	1	2	A
9322533	2	0	2	3	A
9164473	4	0	1	2	A
9023042	4	0	2	2	A
8336133	2	0	3	3	D
8847122	4	0	1	2	A
9162263	2	0	1	1	-
8661000	4	0	5	2	A
8819085	4	0	3	3	A
9248286	2	0	2	2	A
9385480	4	0	2	2	A
8895449	2	0	2	2	A
9028580	4	0	1	3	A
9378249	4	0	1	2	A

CASE_ID	PCF_CODE_OF_VIOL	PCF_VIOL_CATEGORY	PCF_VIOLATION	PCF_VIOL_SUBSECTION	HIT_AND_RUN
8682373	-	3	22350		N
8682566	-	8	22107		N
8803251	-	0			N
8819089	-	5	21650		N
8847359	-	3	22350		N
8903096	-	5	21650		N
8922519	-	3	22350		N
9056947	-	3	22350		N
8819093	-	3	22350		N
9242047	-	6	21755		N
9272871	-	3	22350		N
9322634	-	5	21650		N
8661004	-	8	22107		N
9110130	-	3	22350		F
8370107	-	9	21802	A	N
8444061	-	5	21650	1	N
8661327	-	8	22107		N
8876836	-	5	21650		N
8878180	-	3	22350		N
9356715	-	3	22350		N
8625233	-	12	21453	A	N
8755090	-	3	22350		N
9074356	-	3	22350		N
9205824	-	9	21453	C	N
9100156	-	12	21453	A	N
8682477	-	10	21950	A	N
9282060	-	9	21804	A	N
8871057	-	10	21950	A	N
9027530	-	10	21950	A	N
8358820	-	12	21453	A	N
8465599	-	12	21453	A	N
8881861	-	12	21453	A	N
9198226	-	12	21453	A	N
9322533	-	12	21453	A	N
9164473	-	12	21453	A	N
9023042	-	9	21802	A	N
8336133	-	0			N
8847122	-	21	22106		N
9162263	-				N
8661000	-	5	21460	A	N
8819085	-	12	21453	A	N
9248286	-	9	21802	A	N
9385480	-	3	22350		N
8895449	-	1	23152	A	N
9028580	-	3	22350		N
9378249	-	5	21651	A	N

CASE_ID	TYPE_OF_COLLISION	MVIW	PED_ACTION	ROAD_SURFACE	ROAD_COND_1	ROAD_COND_2	LIGHTING
8682373	C	C	A	A	H	-	A
8682566	D	C	A	A	H	-	A
8803251	D	G	A	A	H	-	A
8819089	A	C	A	A	H	-	A
8847359	C	C	A	A	H	-	A
8903096	C	C	A	A	H	-	A
8922519	C	C	A	A	H	-	A
9056947	C	C	A	A	H	-	A
8819093	C	C	A	A	H	-	A
9242047	B	C	A	A	H	-	A
9272871	C	C	A	A	H	-	A
9322634	G	B	E	A	H	-	B
8661004	D	G	A	A	H	-	A
9110130	C	C	A	A	H	-	A
8370107	D	C	A	A	H	-	A
8444061	A	G	A	A	H	-	A
8661327	E	I	A	A	H	-	A
8876836	E	I	A	A	H	-	A
8878180	C	C	A	A	H	-	A
9356715	C	C	A	A	H	-	A
8625233	D	C	A	A	H	-	A
8755090	C	C	A	B	H	-	A
9074356	C	C	A	B	H	-	C
9205824	D	C	A	-	H	-	C
9100156	D	D	A	A	H	-	A
8682477	A	B	B	A	H	-	A
9282060	D	C	A	A	H	-	A
8871057	G	G	A	A	H	-	A
9027530	G	B	B	A	H	-	A
8358820	B	C	A	A	H	-	A
8465599	D	C	A	A	H	-	C
8881861	B	C	A	A	H	-	A
9198226	B	C	A	A	H	-	C
9322533	D	C	A	A	H	-	A
9164473	B	C	A	A	H	-	A
9023042	D	C	A	A	H	-	D
8336133	D	C	A	A	H	-	C
8847122	C	C	A	A	H	-	A
9162263	E	I	A	A	H	-	A
8661000	A	C	A	A	H	-	D
8819085	D	C	A	A	H	-	A
9248286	D	C	A	A	H	-	D
9385480	C	C	A	A	H	-	A
8895449	D	C	A	A	H	-	A
9028580	D	C	A	A	H	-	A
9378249	A	C	A	A	H	-	D

CASE_ID	CONTROL_DEVICE	CHP_ROAD_TYPE	PEDESTRIAN_ACCIDENT	BICYCLE_ACCIDENT	MOTORCYCLE_ACCIDENT
8682373	A	0			
8682566	D	0			
8803251	A	0		Y	
8819089	D	0			
8847359	A	0			
8903096	A	0			
8922519	A	0			
9056947	D	0			
8819093	A	0			
9242047	D	0			Y
9272871	D	0			
9322634	A	0	Y		
8661004	D	0		Y	
9110130	D	0			
8370107	D	0			
8444061	A	0		Y	
8661327	D	0			
8876836	A	0			Y
8878180	A	0			
9356715	D	0			
8625233	A	0			
8755090	A	0			
9074356	A	0			
9205824	A	0			
9100156	A	0			
8682477	A	0	Y		
9282060	D	0			
8871057	A	0		Y	
9027530	A	0	Y		
8358820	A	0			
8465599	A	0			
8881861	A	0			
9198226	A	0			
9322533	A	0			
9164473	A	0			
9023042	A	0			
8336133	A	0			
8847122	A	0			
9162263	A	0			
8661000	D	0			
8819085	A	0			
9248286	A	0			Y
9385480	D	0			
8895449	D	0			
9028580	D	0			
9378249	A	0			

CASE_ID	TRUCK_ACCIDENT	NOT_PRIVATE_PROPERTY	ALCOHOL_INVOLVED	STWD_VEHTYPE_AT_FAULT
8682373		Y		D
8682566		Y		A
8803251		Y		-
8819089		Y		A
8847359		Y		A
8903096		Y		D
8922519		Y		A
9056947		Y		A
8819093	Y	Y		A
9242047		Y		C
9272871		Y		A
9322634		Y		A
8661004	Y	Y		F
9110130		Y		A
8370107		Y		A
8444061		Y		L
8661327		Y		A
8876836		Y		C
8878180		Y		A
9356715		Y		A
8625233		Y		A
8755090		Y		D
9074356		Y		A
9205824		Y		A
9100156		Y		A
8682477		Y		A
9282060		Y		A
8871057		Y		A
9027530		Y		D
8358820		Y		I
8465599		Y		A
8881861		Y		A
9198226		Y		I
9322533		Y		-
9164473		Y		A
9023042	Y	Y		A
8336133		Y		-
8847122		Y		A
9162263		Y		A
8661000		Y		D
8819085		Y		D
9248286		Y		A
9385480		Y		A
8895449		Y	Y	A
9028580		Y		A
9378249		Y		A

CASE_ID	CHP_VEHTYPE_AT_FAULT	COUNT_SEVERE_INJ	COUNT_VISIBLE_INJ	COUNT_COMPLAINT_PAIN
8682373	22	0	0	2
8682566	1	0	0	1
8803251	-	0	1	0
8819089	1	0	0	1
8847359	8	0	0	1
8903096	22	0	0	1
8922519	8	0	1	1
9056947	8	0	0	4
8819093	1	0	0	3
9242047	2	0	1	0
9272871	1	0	0	1
9322634	1	1	0	0
8661004	25	0	1	0
9110130	1	0	0	1
8370107	1	0	1	1
8444061	4	1	0	0
8661327	1	0	1	0
8876836	2	0	1	0
8878180	1	0	0	1
9356715	7	0	0	1
8625233	1	0	0	2
8755090	22	1	0	0
9074356	7	0	0	1
9205824	1	0	0	3
9100156	7	0	0	2
8682477	1	0	0	1
9282060	1	1	0	0
8871057	7	0	1	0
9027530	22	1	0	0
8358820	11	0	0	2
8465599	1	1	0	0
8881861	7	0	0	1
9198226	11	0	0	1
9322533	-	1	0	1
9164473	7	0	0	1
9023042	1	0	0	2
8336133	-	1	0	2
8847122	7	0	0	1
9162263	1	1	0	0
8661000	22	0	0	5
8819085	22	0	0	3
9248286	1	1	1	0
9385480	1	0	0	2
8895449	1	1	1	0
9028580	1	0	0	1
9378249	1	0	0	1

CASE_ID	COUNT_PED_KILLED	COUNT_PED_INJURED	COUNT_BICYCLIST_KILLED	COUNT_BICYCLIST_INJURED
8682373	0	0	0	0
8682566	0	0	0	0
8803251	0	0	0	1
8819089	0	0	0	0
8847359	0	0	0	0
8903096	0	0	0	0
8922519	0	0	0	0
9056947	0	0	0	0
8819093	0	0	0	0
9242047	0	0	0	0
9272871	0	0	0	0
9322634	0	1	0	0
8661004	0	0	0	1
9110130	0	0	0	0
8370107	0	0	0	0
8444061	0	0	0	1
8661327	0	0	0	0
8876836	0	0	0	0
8878180	0	0	0	0
9356715	0	0	0	0
8625233	0	0	0	0
8755090	0	0	0	0
9074356	0	0	0	0
9205824	0	0	0	0
9100156	0	0	0	0
8682477	0	1	0	0
9282060	0	0	0	0
8871057	0	0	0	1
9027530	0	1	0	0
8358820	0	0	0	0
8465599	0	0	0	0
8881861	0	0	0	0
9198226	0	0	0	0
9322533	0	0	0	0
9164473	0	0	0	0
9023042	0	0	0	0
8336133	0	0	0	0
8847122	0	0	0	0
9162263	0	0	0	0
8661000	0	0	0	0
8819085	0	0	0	0
9248286	0	0	0	0
9385480	0	0	0	0
8895449	0	0	0	0
9028580	0	0	0	0
9378249	0	0	0	0

CASE_ID	COUNT_MC_KILLED	COUNT_MC_INJURED	PRIMARY_RAMP	SECONDARY_RAMP	LATITUDE
8682373	0	0	-	-	37.99776
8682566	0	0	-	-	37.97159609
8803251	0	0	-	-	38.00031951
8819089	0	0	-	-	37.97549604
8847359	0	0	-	-	38.00442022
8903096	0	0	-	-	37.99783158
8922519	0	0	-	-	37.97757816
9056947	0	0	-	-	37.99783853
8819093	0	0	-	-	37.99183357
9242047	0	1	-	-	37.99776798
9272871	0	0	-	-	37.99776586
9322634	0	0	-	-	38.00516
8661004	0	0	-	-	38.00514345
9110130	0	0	-	-	37.97160632
8370107	0	0	-	-	37.96898
8444061	0	0	-	-	37.99745
8661327	0	0	-	-	37.97041274
8876836	0	1	-	-	37.9733393
8878180	0	0	-	-	37.96892316
9356715	0	0	-	-	37.9811
8625233	0	0	-	-	37.98314811
8755090	0	0	-	-	37.9831238
9074356	0	0	-	-	37.98314531
9205824	0	0	-	-	37.98314531
9100156	0	0	-	-	37.98314287
8682477	0	0	-	-	37.99232503
9282060	0	0	-	-	38.0051943
8871057	0	0	-	-	37.99779542
9027530	0	0	-	-	37.99781606
8358820	0	0	-	-	37.98317962
8465599	0	0	-	-	37.98317962
8881861	0	0	-	-	37.98317962
9198226	0	0	-	-	37.98317962
9322533	0	0	-	-	37.98327
9164473	0	0	-	-	37.98317471
9023042	0	0	-	-	37.99783604
8336133	0	0	-	-	37.9810318
8847122	0	0	-	-	37.98253618
9162263	0	0	-	-	37.98253618
8661000	0	0	-	-	37.9688736
8819085	0	0	-	-	37.96885641
9248286	0	1	-	-	37.9688736
9385480	0	0	-	-	37.96883357
8895449	0	0	-	-	37.98326789
9028580	0	0	-	-	37.98327233
9378249	0	0	-	-	37.98329

CASE_ID	LONGITUDE
8682373	-121.71735
8682566	-121.6959987
8803251	-121.73236
8819089	-121.6959872
8847359	-121.7329134
8903096	-121.7186517
8922519	-121.6959644
9056947	-121.7169869
8819093	-121.637596
9242047	-121.7176469
9272871	-121.7183128
9322634	-121.7473
8661004	-121.7514621
9110130	-121.6959987
8370107	-121.71611
8444061	-121.75064
8661327	-121.7266644
8876836	-121.7291796
8878180	-121.7205547
9356715	-121.7411
8625233	-121.7323554
8755090	-121.7323529
9074356	-121.7323473
9205824	-121.7323473
9100156	-121.732356
8682477	-121.7140573
9282060	-121.7474532
8871057	-121.7188564
9027530	-121.718841
8358820	-121.7141855
8465599	-121.7141855
8881861	-121.7141855
9198226	-121.7141855
9322533	-121.71413
9164473	-121.7141571
9023042	-121.750783
8336133	-121.7407351
8847122	-121.738502
9162263	-121.738502
8661000	-121.6960142
8819085	-121.6960375
9248286	-121.6960142
9385480	-121.6939826
8895449	-121.7415047
9028580	-121.7415002
9378249	-121.74159

APPENDIX C: LOCAL ROADWAY SAFETY MANUAL (LRSM) EXCERPT

Local Roadway Safety

A Manual for California's Local Road Owners

Version 1.6
April 2022

Created by Caltrans in conjunction with FHWA and SafeTREC
for the express benefit of California Local Agencies.

Caltrans

U. S. Department of Transportation
Federal Highway Administration

Safe Transportation
Research & Education Center
SafeTREC

Document History

Version 1.0: 4/20/2012

The California Department of Transportation - Division of Local Assistance developed the first version of the Local Roadway Safety Manual (Version 1.0) in 2012 to support the Cycle 5 HSIP call-for-projects.

Version 1.1: 4/26/2013

Based on feedback and lessons learned from Cycle 5, Caltrans updated Appendix B: "Table of Countermeasures and Crash Reduction Factors" to better clarify text in "Where to use", "Why it works", and "General Qualities" for several of the countermeasures included in the original manual.

No other changes were made to the Local Roadway Safety Manual as part of Version 1.1

Version 1.2: 03/10/2015

Based on feedback and lessons learned from Cycle 6, Caltrans made minor updates to the text of the document as needed for achieving consistency with overall Caltrans local HSIP guidance documents. The following sections were updated: 1.2, 4.2, 5.1, 6.2, and Appendix B, E, F & G.

Version 1.3: 04/29/2016

Caltrans made updates to the text of the document as needed in the following sections: 4.2, 5.1 and Appendix B.

Version 1.4: 06/08/2018

3/30/18 - Caltrans made updates to the crash costs in Appendix D, some of the website links in Appendix G, and some other texts of the document.
6/8/18 - Countermeasure S22 ("Modify signal phasing to implement a Leading Pedestrian Interval (LPI)") is added.

Version 1.5: April 2020

Caltrans added a few more countermeasures (e.g. Pedestrian Scramble, Install Separated Bike Lanes, Reduced Left-Turn Conflict Intersections, and Curve Shoulder widening), renumbered the countermeasures and updated the crash costs in Appendix D.

Version 1.6: April 2022

For Cycle 11 Call-for-projects, Countermeasure S04 (Provide Advanced Dilemma Zone Detection for high-speed approaches) was deleted and Countermeasure NS05mr (Convert intersection to mini-roundabout) added. The HSIP Funding Eligibility was changed to 90% except for S03, of which the HSIP Funding Eligibility stays at 50%. The crash costs in Appendix D were updated.

Future Updates:

In the future, Caltrans anticipates that additional changes will be needed to keep the Local Roadway Safety Manual consistent with future Calls-for-Projects' Guidelines and Application Instructions. In addition, new local HSIP programs, improvements to California data on local roadways, data analysis tools, and the latest safety research and methodologies may give rise to the need to make more significant changes to this manual.

Table of Contents

Foreword 1
1. Introduction and Purpose 2
1.1 California Local Roadway Safety Challenges and Opportunities 3
1.2 Safe System Approach 3
1.3 The State's Role in Local Roadway Safety 4
1.4 The Local Roadway Crash Problem 5
1.5 Reactive vs. Proactive Safety Issue Identification 6
1.6 Implementation Approaches 7
1.7 Our "Safety Challenge" for Local Agencies 10
1.8 Summary of information in this Document 11
2. Identifying Safety Issues 15
2.1 State and Local Crash Databases 16
2.2 Transportation Injury Mapping System (TIMS) 18
2.3 Law Enforcement Crash Reports 19
2.4 Observational Information 19
2.5 Public Notifications 20
2.6 Roadway Data and Devices 20
2.7 Exposure Data 21
2.8 Field Assessments and Road Safety Audits 22
3. Safety Data Analysis 23
3.1 Quantitative Analysis 23
3.2 Qualitative Analysis 25
4. Countermeasure Selection 28
4.1 Selecting Countermeasures and Crash Modification Factors / Crash Reduction Factors 29
4.2 List of Countermeasures 30
5. Calculating the B/C Ratio and Comparing Projects 36
5.1 Estimate the Benefit of Implementing Proposed Improvements 36
5.2 Estimate the Cost of Implementing Proposed Improvements 38
5.3 Calculate the B/C Ratio 38
5.4 Compare B/C Ratios and Consider the Need to Reevaluate Project Elements 39
6. Identifying Funding and Construct Improvements 40
6.1 Existing Funding for Low-cost Countermeasures 40
6.2 HSIP and Other Funding Sources 40
6.3 Project Development and Construction Considerations 41
7. Evaluation of Improvements 42
Appendix A: HSIP Call-for-Projects Process 43
Appendix B: Detailed Tables of Countermeasures 44
B.1 Intersection Countermeasures – Signalized 47
S01, Add intersection lighting (Signalized Intersection => S.I.) 47
S02, Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number 47
S03, Improve signal timing (coordination, phases, red, yellow, or operation) 48
S05, Install emergency vehicle pre-emption systems 49

S06, Install left-turn lane and add turn phase (signal has no left-turn lane or phase before) 49
S07, Provide protected left turn phase (left turn lane already exists) 50
S08, Convert signal to mast arm (from pedestal-mounted) 50
S09, Install raised pavement markers and striping (Through Intersection) 51
S10, Install flashing beacons as advance warning (S.I.) 51
S11, Improve pavement friction (High Friction Surface Treatments) 52
S12, Install raised median on approaches (S.I.) 52
S13PB, Install pedestrian median fencing on approaches 53
S14, Create directional median openings to allow (and restrict) left-turns and U-turns (S.I.) 53
S15, Reduced Left-Turn Conflict Intersections (S.I.) 54
S16, Convert intersection to roundabout (from signal) 55
S17PB, Install pedestrian countdown signal heads 55
S18PB, Install pedestrian crossing (S.I.) 56
S19PB, Pedestrian Scramble 56
S20PB, Install advance stop bar before crosswalk (Bicycle Box) 57
S21PB, Modify signal phasing to implement a Leading Pedestrian Interval (LPI) 57
B.2 Intersection Countermeasures – Non-signalized 58
NS01, Add intersection lighting (NS.I.) 58
NS02, Convert to all-way STOP control (from 2-way or Yield control) 58
NS03, Install signals 59
NS04, Convert intersection to roundabout (from all way stop) 59
NS05, Convert intersection to roundabout (from 2-way stop or Yield control) 60
NS05mr, Convert intersection to mini-roundabout 60
NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs 61
NS08, Install Flashing Beacons at Stop-Controlled Intersections 62
NS09, Install flashing beacons as advance warning (NS.I.) 62
NS10, Install transverse rumble strips on approaches 63
NS11, Improve sight distance to intersection (Clear Sight Triangles) 63
NS12, Improve pavement friction (High Friction Surface Treatments) 64
NS13, Install splitter-islands on the minor road approaches 64
NS14, Install raised median on approaches (NS.I.) 65
NS15, Create directional median openings to allow (and restrict) left-turns and u-turns (NS.I.) 65
NS16, Reduced Left-Turn Conflict Intersections (NS.I.) 66
NS17, Install right-turn lane (NS.I.) 67
NS18, Install left-turn lane (where no left-turn lane exists) 67
NS19PB, Install raised medians (refuge islands) 68
NS20PB, Install pedestrian crossing at uncontrolled locations (signs and markings only) 68
NS21PB, Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features) 69
NS22PB, Install Rectangular Rapid Flashing Beacon (RRFB) 69
NS23PB, Install Pedestrian Signal (including Pedestrian Hybrid Beacon (HAWK)) 70
B.3 Roadway Countermeasures 71
R01, Add Segment Lighting 71
R02, Remove or relocate fixed objects outside of Clear Recovery Zone 71
R03, Install Median Barrier 72
R04, Install Guardrail 72
R05, Install impact attenuators 73
R06, Flatten side slopes 73
R07, Flatten side slopes and remove guardrail 74
R08, Install raised median 74
R09, Install median (flush) 75
R10PB, Install pedestrian median fencing 75

R11, Install acceleration/ deceleration lanes 76
R12, Widen lane (initially less than 10 ft) 76
R13, Add two-way left-turn lane 77
R14, Road Diet (Reduce travel lanes and add a two way left-turn and bike lanes) 77
R15, Widen shoulder 78
R16, Curve Shoulder widening (Outside Only) 78
R17, Improve horizontal alignment (flatten curves) 79
R18, Flatten crest vertical curve 80
R19, Improve curve superelevation 80
R20, Convert from two-way to one-way traffic 81
R21, Improve pavement friction (High Friction Surface Treatments) 81
R22, Install/Upgrade signs with new fluorescent sheeting (regulatory or warning) 82
R23, Install chevron signs on horizontal curves 83
R24, Install curve advance warning signs 83
R25, Install curve advance warning signs (flashing beacon) 84
R26, Install dynamic/variable speed warning signs 84
R27, Install delineators, reflectors and/or object markers 85
R28, Install edge-lines and centerlines 86
R29, Install no-passing line 87
R30, Install centerline rumble strips/stripes 87
R31, Install edgeline rumble strips/stripes 88
R32PB, Install bike lanes 88
R33PB, Install Separated Bike Lanes 89
R34PB, Install sidewalk/pathway (to avoid walking along roadway) 89
R35PB, Install/upgrade pedestrian crossing (with enhanced safety features) 90
R36PB, Install raised pedestrian crossing 91
R37PB, Install Rectangular Rapid Flashing Beacon (RRFB) 91
R38, Install Animal Fencing 92
Appendix C: Summary of "Recommended Actions" 93
Appendix D: Benefit Cost Ratio (BCR) Calculations 97
Appendix E: Examples of Crash Data Collection and Analysis Techniques using TIMS 98
Appendix F: List of Abbreviations 99
Appendix G: References 100

Foreword

Why was this manual developed?

The California Department of Transportation - Division of Local Assistance's goal in developing this manual is to maximize the safety benefits for local roadways by encouraging all local agencies to proactively identify and analyze their safety issues and to position themselves to compete effectively in Caltrans' statewide, data-driven call-for-projects.

This goal is complicated by California's wide variety of local agencies, roadway types, and project types, including: rural vs. urban, low-volume vs. high-volume, and intersection vs. roadway segment vs. network-wide. This variety makes it difficult to administer a single program and provide one set of guidelines that meets the needs of all California's local roadway owners and users. Many of California's local agencies are also challenged by the lack of a basic safety analysis framework and analysis tools specifically designed for local roadway managers with widely varying responsibilities and safety training. Currently, there is a vast range of safety documents, program guidance, and analysis tools with a wide variety of complexity and applications. Without clear and simple safety guidance for locals, many agencies take a 'reactive' approach to safety, even when research has shown 'proactive' safety analysis of roadways is more effective in making system-wide safety improvements.

The Federal Highway Administration (FHWA) Office of Safety provides national leadership in identifying, developing, and delivering safety programs and products to local governments to improve highway safety on local and rural roads.[1] In 2010, FHWA published a set of three manuals designed specifically for rural road owners; Roadway Departure Safety, Intersection Safety, and Road Safety Information Analysis.[2] These manuals present a simple, data driven safety analysis framework for rural agencies across the nation. These manuals, in conjunction with Caltrans' ongoing short-term research and development contract with the Safe Transportation Research and Education Center (SafeTREC) at the University of California, Berkeley, provided a unique opportunity for Caltrans to pursue development of this document as a mirror of FHWA's new Manuals for Local Rural Road Owners. Much of the wording, formatting and references from these FHWA manuals have been directly incorporated into this manual for California's local road owners. Individual references to the FHWA manuals have not been included; instead these documents are intended to be referenced on a wholesale basis.

With FHWA's and SafeTREC's support and expertise, Caltrans was able to expedite the completion of this manual and can now offer California's local agencies a new tool intended to provide focused roadway safety information in one manual.

1. Introduction and Purpose

The information in this document is geared towards local road managers and other practitioners with responsibility for operating and maintaining local roads, regardless of safety-specific highway training. The primary goal of this document is to provide an easy-to-use and comprehensive framework of the steps and analysis tools needed to identify locations with roadway safety issues and the appropriate countermeasures. For novice practitioners, the concepts and framework will be new, while experienced safety practitioners may find this manual to be mostly review. In both cases, the manual will provide the practitioners with a good understanding of how to complete a proactive safety analysis and ensure they have the best opportunity to secure HSIP safety funding during Caltrans calls-for-projects.

It's expected that novice and experienced practitioners will utilize this manual to help position their local agency to better compete in future Caltrans' calls-for-projects for safety programs. Inexperienced local roadway practitioners are also a target audience for this manual to gain exposure to the basic concepts that make up a proactive safety analysis of a local agency's roadway network.

The intent of this manual is to focus on key safety activities that every local agency should conduct on an annual basis (or as established by the agency) with the objective of reducing the number and severity of crashes within their jurisdiction. This manual defines this overall process as a "proactive safety analysis" approach to roadway safety. The Highway Safety Manual (HSM), documents a very similar process and refers to it as the "Roadway Safety Management Process." While the process in this document is similar and suggests the same primary elements, the HSM goes into significantly more detail, focuses more on scientific and mathematical equations behind the process, and intends to provide a comprehensive understanding of the overall processes to be applied by individual agencies across the nation. In contrast, this manual attempts to streamline the discussion; and make accommodations for the more novice safety practitioners, provide an adequate understanding of the process to complete an initial safety analysis of their roadway network, and instruct them on how to prepare applications that will compete well in Caltrans' statewide calls-for-projects. In general, this manual is intended to follow the research and methodologies presented in the HSM; however, to support Caltrans' statewide calls-for-projects process, it is important to note this manual deviates from the HSM in areas related to countermeasure selection and benefit / cost calculations. The logic behind these deviations is explained at the specific topic sections.

This manual is not intended to cover many of the day-to-day basics of traffic engineering including: maintain standard signage per the Manual on Uniform Traffic Control Devices; maintain sight distance (cut vegetation, remove parking); maintain a recovery zone; work with local traffic law enforcement; monitor collisions; address complaints; and manage litigation. These activities are understood to be critical elements of a local agency's traffic engineering responsibilities, but are not within the intended scope of this document.

1.1 California Local Roadway Safety Challenges and Opportunities

California's local roads are managed by more than 600 local agencies, including: cities, counties, and tribal governments. These local roads vary from flat multi-lane urban arterials to rural gravel roads in mountainous areas. California local agencies invest extensive resources on roadway safety every year, yet many roadways operate with outdated or insufficient safety features. A portion of these roadways even lack basic signing, pavement markings, alignment, and traffic control devices. Limited funding often prevents agencies from constructing safety projects, which can be expected. At the same time, the lack of safety data, design challenges, and lack of adequate training also hinder local agencies' accurate evaluation of their roadway network safety issues, which is more preventable.

Many small California local agencies are challenged by a lack of crash data. Without data, they have no way to identify High Crash Concentration Locations (HCCLs) or high risk roadway features, which can leave them "flying blind" with respect to the safety of their overall roadway network. Without data and analysis results, local officials may overreact when a tragic crash occurs, resulting in resources being spent in areas that will not maximize the overall application of safety funds. In conjunction with the collision mapping and analysis tools developed by UC Berkeley's SafeTREC, this document helps ensure all California local agencies have direct access to data on fatal and injury crashes within their jurisdictions and the analysis tools to effectively assess and prioritize future safety projects.

1.2 Safe System Approach

The Infrastructure Investment and Jobs Act (IIJA), aka Bipartisan Infrastructure Law (BIL), was signed into law on November 15, 2021. Under IIJA, the Highway Safety Improvement Program (HSIP), codified as Section 148 of Title 23, United States Code (23 U.S.C §148), is a core federal-aid program to States for the purpose of achieving a significant reduction in fatalities and serious injuries on all public roads. The IIJA emphasizes the "safe system approach":

Safe system approach means a roadway design that emphasizes minimizing the risk of injury or fatality to road users; and that (i) takes into consideration the possibility and likelihood of human error; (ii) accommodates human injury tolerance by taking into consideration likely accident types, resulting impact forces, and the ability of the human body to withstand impact forces; and (iii) takes into consideration vulnerable road users. (23 U.S.C. 148(a)(9)).

FHWA recognizes that the funding available through HSIP alone will not achieve the goal of zero fatalities on the Nation's roads. The Safe System approach addresses the safety of all road users, including those who walk, bike, drive, ride transit, and travel by other modes. It involves a paradigm shift to improve safety culture, increase collaboration across all safety stakeholders, and refocus transportation system design and operation on anticipating human mistakes and lessening impact forces

to reduce crash severity and save lives. FHWA encourages States to prioritize safety in all Federal-aid investments and in all appropriate projects, using not only HSIP funding but also other Federal-aid funding.

The IIJA emphasizes the importance of vulnerable road user (non-motorized road user) safety in the HSIP by adding a definition for vulnerable road users, creating a vulnerable road user special rule, and requiring States to develop and update a vulnerable road user safety assessment. All of these provisions address the increasing number of fatalities involving vulnerable road users on U.S. roads. It is imperative that States consider the needs of all road users as part of the HSIP. Investment in highway safety improvement projects that promote and improve safety for all road users, particularly vulnerable road users, aligns with the IIJA and will help Build a Better America. States and other funding recipients should prioritize projects that maximize the existing right-of-way for accommodation of non-motorized modes and transit options that increase safety, equity, accessibility, and connectivity. Projects that separate users in time and space, match vehicle speeds to the built environment, and increase visibility (e.g., lighting) advance implementation of a Safe System approach and improve safety for vulnerable road users.

1.3 The State's Role in Local Roadway Safety

The California Department of Transportation (Caltrans)—Division of Local Assistance is responsible for administering California's HSIP safety funding intended for local roadway safety improvements. This funding primarily comes to the state through two federal programs: Highway Safety Improvement Program (HSIP)—a federal-aid program focused on reducing fatalities and serious injuries on all public roads; and the Active Transportation Program (ATP)—a federal aid and state funded program focused on improving safety and the overall use of non-motorized, active transportation modes of travel. Under SAFETEA-LU, High Risk Rural Roads Program (HR3) was established to focus on addressing rural road safety needs but in MAP-21 and FAST, it is now a 'special rule' under HSIP that if triggered, directs that a certain amount of HSIP funds will need to be allocated for those rural roads that meet the definition.

Caltrans' administration of these programs encompasses many responsibilities, including: establishing program guidance; reviewing applications for improvements on local roadways; ranking applications/projects on a statewide basis; selecting projects for funding based on the greatest potential for reducing fatalities and injuries; programming the selected projects in the Federal Statewide Transportation Improvement Program (FSTIP); and assisting with programming and delivery issues throughout the delivery of the local agency projects. One goal for developing this document is to improve Caltrans' overall data-driven approach to statewide project selection of safety projects and to maximize the long-term safety improvements across California. To show the relationship between Caltrans' project selection process and this manual, a diagram showing the HSIP Call-for-Projects Process is provided in Appendix A.

Many State Departments are also actively engaged in California's Strategic Highway Safety Plan (SHSP). Caltrans developed the SHSP in a cooperative process with local, State, federal, and private sector safety stakeholders. The SHSP is a data-driven, comprehensive plan that established statewide goals, objectives, integrated the five E's of traffic safety— engineering, enforcement, education, emergency response, and emerging technologies. This manual directly supports many of the emphasis areas of the California SHSP. Local agencies are encouraged to participate in ongoing SHSP update efforts and can find more information on the SHSP at the following website: https://dot.ca.gov/programs/safety-programs/shsp.

Local Roadway Safety Plan (LRSP) and Systemic Safety Analysis Report Program (SSARP)

The state-funded Systemic Safety Analysis Report Program (SSARP) was established in 2016. The intent of the SSARP was to assist local agencies in performing a collision analysis, identifying safety issues on their roadway networks, and developing a list of systemic low-cost countermeasures that can be used to prepare future HSIP and other safety program applications. Late 2019, the program was evolved to Local Roadway Safety Plan (LRSP) so that the focus is not just engineering solutions but also include safety improvements in other areas such as enforcement, Education and emergency response.

The state funding for the LRSP/SSARP program is made available by exchanging the local Highway Safety Improvement Program (HSIP) federal funds for State Highway Account (SHA) funds.

For more information, please visit the LRSP/SSARP webpage at https://dot.ca.gov/programs/local-assistance/fed-and-state-programs/highway-safety-improvement-program/local-roadway-safety-plans.

1.4 The Local Roadway Crash Problem

Approximately 3,000 people die in California traffic crashes every year, representing nearly 10% of all traffic fatalities in the United States. Fifty-seven percent of these fatalities occur on local roadways, while only forty-three percent occur on the California State Highway System. A comparison of rural and urban roadways shows that local rural roadways have fatality rates 2 to 3 times higher than urban roadways per vehicle miles traveled. Based on these statistics, the total annual cost of local roadway fatal crashes to California is over $6 billion, while only $100 million is available annually in HSIP safety funds.

These statistics demonstrate the large and complex safety issues facing California. Through the development of this document, Caltrans is striving to help local agencies proactively identify high risk roadway features, roadway network locations/corridors with the highest safety needs, and encourage them to select effective low-cost improvements, whenever appropriate.

1.5 Reactive vs. Proactive Safety Issue Identification

Safety issues are identified on local roadways through a wide range of approaches. Although no single approach works best for all local agencies, some are far more effective at improving long-term roadway safety. Many agencies, often larger ones, have staff whose full-time job is dedicated to roadway safety; allowing them to focus on safety initiatives, be trained in the latest safety research, and have access to safety analysis data, tools and procedures. These agencies often utilize a 'proactive' approach to analyze their roadway network and identify safety issues.

At the same time many agencies, often the smaller ones, lack the financial ability to dedicate large portions of their staff resources to analyze safety issues and their staff has limited access to roadway safety training, safety expertise, and the latest safety analysis tools and procedures. Unfortunately, this can often result in identifying their safety issues in 'reaction' to tragic events.

The following is a basic outline of the differences in proactive vs. reactive identification approaches used by local agencies:

Reactive Approach

For this document, an agency is considered to be utilizing a reactive approach to roadway safety if they primarily identify safety improvements in reaction to:

- Recent crashes triggering safety investigations
- Specific crash concentrations triggering safety investigations
- Stakeholder identification of locations with safety issues and requests for improvements
- New funding becoming available

Crash concentrations and crash trends may be missed if local agencies rely exclusively on these identifiers for their roadway safety effort. They may also miss many opportunities to effectively utilize low-cost, systemic type improvements. This document encourages local agencies to adopt a more proactive approach to their roadway safety.

Proactive Approach

An agency is considered to be using a proactive approach to roadway safety if they go beyond the elements of a reactive approach and identify safety improvements by analyzing the safety of their entire roadway network, in one of the following ways:

- One-time, network-wide safety analysis of their roadways driven by new source of funding.
- Routine safety analyses of the roadway network (Preferred Approach!)

Agencies with a proactive approach utilize both systemic and spot location improvements (as defined in section 1.5 below). Applying improvements systemically across an entire corridor or network allows an agency to proactively address locations that have not had crash concentrations in the past, but have

similar features as those currently experiencing high levels of crashes. In addition, even though a spot location improvement may be based on 'past' crashes, agencies making improvements based on countermeasures with proven crash reduction factors at their highest crash locations often have the best chance of proactively reducing future crashes.

This document encourages safety practitioners to pursue a proactive approach and routinely analyze the safety of their roadway networks to yield the best overall safety results.

1.6 Implementation Approaches

When an agency proactively identifies their safety issues throughout their roadway network, it is likely they will find high crash concentrations at intersections, roadway segments, and corridors. The safety practitioner should consider which implementation approach to utilize. Typical approaches include:

- Systemic Approach
- Spot Location Approach
- Comprehensive Approach incorporating human behavior issues

Each of these approaches has benefits and drawbacks. As Local agency practitioners identify their safety issues and analyze the data for crash patterns, they should be open to implementing a combination of these approaches, as documented in Sections 2 and 3 of this manual.

Systemic Approach

The Systemic Approach is primarily based on application of proven safety countermeasures at multiple crash locations, corridors, or geographic areas. Implementation of the Systemic Approach is generally based on 'system-wide' crash data with the estimates of the impacts being made in terms of benefits measured in traffic crash reduction and deployment cost. Identified locations experiencing high levels of crashes and locations with similar geometric features can be treated systemically with low-cost, proven safety countermeasures. *Note: The term "Systemic" used throughout in this manual is often exchanged with the term "Systematic" in many national safety documents and research studies. In general, safety practitioners will find these terms interchangeable. This manual uses "Systemic" to match the new HSM and the FHWA CMF Clearinghouse.*

Benefits of the Systemic Approach may include:

- Widespread effect. The Systemic Approach addresses safety issues at a large number of locations or on an entire local roadway network. It can also generate projects that combine HCCLs and locations with the potential for crashes and still have high Benefit to Cost (B/C) ratios. An example of this type of project could be upgrading pavement delineation and warning signs along a rural corridor: crashes may not have occurred on every curve or segment along the corridor, but all of the corridor's pavement delineation and warning signs can be upgraded at one time. For urban applications, an example could be protecting the left-turn phase of signalized intersections with

existing left-turn pockets: severe crashes may not have occurred at each of the left-turn movements, but with minor changes to the signal hardware and signing, all or many of a city's unprotected left-turn phases can be protected with one safety project.

- Crash type prevention. By focusing on a predominant crash type, an agency can address locations that have not experienced significant numbers of these types of crashes, but have similar characteristics or conditions as existing HCCLs. The resulting B/C ratios for these types of projects will be less than if only HCCLs are included; but by using low-cost countermeasures and including as many high crash locations as possible, the resulting B/C ratios should still be high enough to allow agencies to proactively address locations that have not experienced high numbers of these types of crashes. For urban areas, projects improving pedestrian crossings can be good examples of the Systemic Approach. By applying the countermeasures systemically, the agency can often justify these projects based on relatively high B/C ratios, even though some of the improvement locations have not experienced enough crashes to yield moderate-to-high B/C ratios on their own.
- Cost-effectiveness. Implementing low-cost solutions across an entire system or corridor can be a more cost-effective approach to addressing system-wide safety issues. Even though this approach does not address all (or total) safety issues for a given location, the deployment of low-cost countermeasures often result in the highest overall safety benefit for an agency with limited safety funding. An example of this would be an agency choosing to install rumble stripes along an entire corridor for equal or less money than realigning a small portion the roadway to fix a single curve.
- Reduced data needs. The Systemic Approach can be used without a detailed crash history for specific locations, thereby reducing data needs. For example, consider a long rural corridor, which includes a section that passes through an Indian Reservation: Even if there is no documented crash data for the portion of the corridor that passes through the reservation, the entire limits can be treated with the same low-cost improvements. As long as there are sufficient past crashes documented for the entire corridor, the project will still have a reasonably high B/C ratio.

Drawbacks of the Systemic Approach may include:

- Justifying improvements can be difficult. Because this approach does not always address locations with a history of crashes and active stakeholders, it can be difficult to justify the improvements. The Systemic Approach will rarely include a recommendation for a large-scale safety improvement at a single location. Since large-scale projects usually garner attention from decision makers, the media, elected officials, and the general public, safety practitioners often need to make additional efforts to explain the Systemic Approach and its benefits to those groups. Safety practitioners can utilize the high B/C ratios of these systemic projects to convey their benefits compared to high-profile, single location projects with lower B/C ratios.

Spot Location Approach

The Spot Location Approach is typically based on an analysis of crash history to identify locations that have significantly higher crashes and treat them accordingly. It is important to practitioners to

understand that for many locations, safety issues can be complicated and sometimes the most appropriate fixes are not quick, easy or cheap.

Benefits of the Spot Location Approach may include:

- Focus on demonstrated needs. The Spot Location Approach focuses directly on locations with a history of crashes and specifically addresses those crashes. Intersection improvements are some of the most common spot location projects. Intersections tend to have higher concentrations of crashes resulting from opposing traffic movements. These high crash concentrations often require stand-alone improvements to adequately resolve the safety issues.
- Justifying improvements can be easy. Because this approach addresses locations with a history of crashes, it is usually easy to justify improvements. For urban areas, reconfiguring/ reconstructing an entire intersection can be a good example of an effective Spot Location Approach. Large urban intersections can have extremely high crash concentrations, making major changes to the intersection the only way to significantly reduce future crashes. With these types of scenarios, even the highest cost countermeasures can be cost effective.
- If low-cost countermeasures are used, this approach can prove very cost effective. The Spot Location Approach does not always have to include moderate or high cost improvements. It is often appropriate for local agencies to make low-cost improvements at one location at a time. Ongoing maintenance and development projects offer great opportunities for these low-cost improvements to be constructed with no additional expense to local agencies.

Drawbacks of the Spot Location Approach may include:

- Assumption that the past equals the future. This approach assumes locations with a history of crashes will continue to experience the same number and type of crashes in the future. When agencies do not account for the random nature of roadway crashes (i.e., Regression to the Mean), moderate to high cost projects can be erroneously justified. Practitioners can mitigate this by using 5 years of crash data when analyzing their roadways. In addition, significant changes to land use or roadway characteristics in or around proposed projects can either increase or decrease the expected number of future crashes.
- Minimal overall benefit to the roadway network. Some local agencies use this approach with medium and high cost improvements at locations which do not represent their worst high crash concentration locations. The result can be projects with low B/C ratios and overall safety benefits that are not as high as if they utilized a Systemic Approach. This drawback can be minimized by safety practitioners who analyze their entire roadway network, propose spot location fixes only at their highest crash locations, and utilize lower cost countermeasures wherever appropriate.

The Spot Location Approach to traffic safety is ideally implemented along with the Systemic Approach to provide the best combination of safety treatments. For instance, the Spot Location Approach can be applied at locations where low-cost countermeasures are not expected to be effective in significantly

reducing future crashes or at those locations that have had low-cost countermeasures previously installed systemically but, after an assessment, continue to show a higher-than-average crash rate.

Comprehensive Approach

The Comprehensive Approach introduces the concept of the "5 E's of Safety": Education, Enforcement, Engineering, Emergency Response and Emerging Technologies. This approach recognizes that not all locations can be addressed solely by infrastructure improvements. Incorporating the "5 E's of Safety" is often required to achieve marked improvement in roadway safety. For instance, some roadway segments will be identified for which targeted enforcement is an appropriate countermeasure. Some of the most common violations are speeding, failure-to-yield, red light running, aggressive driving, failure to wear safety belts, distracted driving, and driving while impaired. When locations are identified as having these types of violations, coordination with the appropriate law enforcement agencies is needed to deploy visible targeted enforcement to reduce the potential for future driving violations and related crashes. To improve safety, education and outreach efforts can also be used to supplement enforcement efforts. Enforcement and/or education can also be effectively utilized as short-term ways to address high crash locations, until the recommended infrastructure project can be implemented.

1.7 Our "Safety Challenge" for Local Agencies

Caltrans, FHWA and Safe Transportation Research and Education Center (SafeTREC) "challenge" local agencies to initially commit one or more days to understanding and applying the concepts and tools outlined in this manual. Experienced safety practitioners working in agencies currently using a proactive approach can quickly review the topics in the manual and consider/test some of the new tools (e.g., TIMS) identified within it. In contrast, novice safety practitioners may need several days to better understand the underlying concepts in this manual to be able to complete the basic elements of a proactive safety analysis of their roadway network. In these situations, the room for knowledge growth, internal process improvements, and expected safety benefits will be even greater, which should more than offset the additional time invested.

By utilizing this simple framework for identifying, analyzing and implementing a proactive approach for improving safety on their roadways, practitioners will have a better understanding of their agencies' unique safety issues, the proven low-cost countermeasures that can reduce crashes, and the existing and future funding to implement the projects. This small investment of time will help local agencies achieve significant reductions in future fatalities, injuries and overall crashes. We believe these local agencies may also gain the added unexpected benefit of improved job satisfaction of those involved, as there are few more rewarding tasks than knowing that your efforts will result in future roadway users arriving safely at their destination instead of becoming statistics.

1.8 Summary of information in this Document

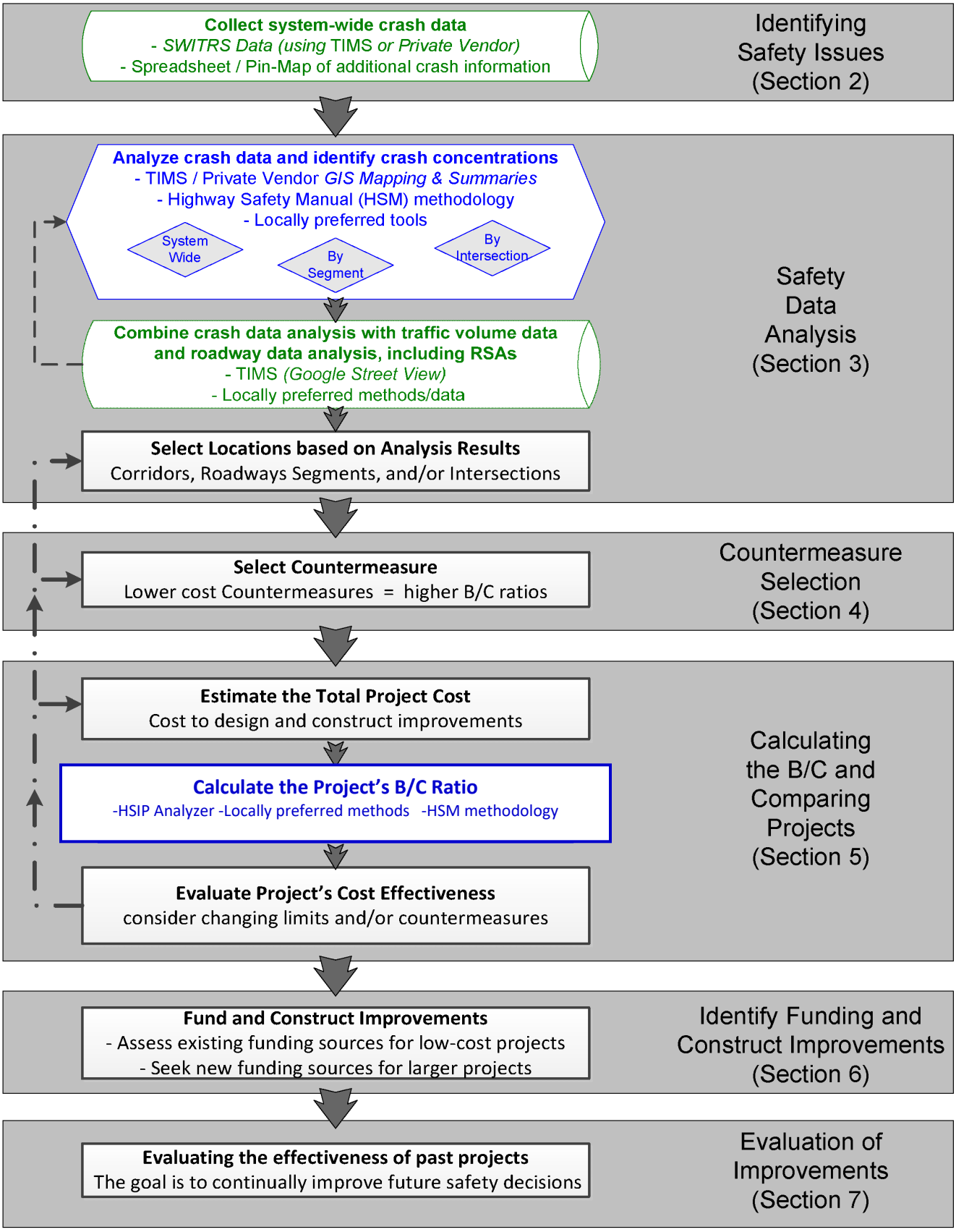
This document provides information on effectively identifying California's local roadway safety issues and the countermeasures that address them, ultimately leading to the effective implementation of safety projects that improve safety on local roadways. The document is not intended to be a comprehensive guide for roadway design and improvement or the only guide local agencies utilize for their safety analysis of their roadways.

Caltrans also expects this document will directly support its efforts in selecting local agency safety projects. The expectation is that as local agencies throughout the state utilize the proactive safety analysis approach outlined in this document, their applications for HSIP, and ATP projects will include lower cost improvements at locations with the highest safety needs. This will improve Caltrans' data-driven approach to statewide project selection of safety projects and maximize the safety benefits across California.

The proactive safety analysis framework incorporated in this document is summarized in Figure 1.

Figure 1

Local Roadway Safety: Proactive Safety Analysis Approach



The above flowchart illustrates how each of the individual sections of this document work together to make up a proactive safety analysis approach. These sections are briefly outlined below:

Section 2 of this manual provides an overview of the types of data to collect for the identification of roadway safety issues. It discusses sources of crash data and how they can be used.

Section 3 summarizes the types of analyses that can be conducted to determine what roadway countermeasures should be implemented. This section is the link between the data (Section 2) and the selection of appropriate countermeasures (Section 4). It provides definitions and examples of the qualitative and quantitative factors that should be considered when evaluating roadway safety issues.

Section 4 provides a description of selected countermeasures that have been shown to improve safety on local roads. It includes a basic set of strategies to implement at locations experiencing a history of crashes and their corresponding crash modification factors (CMF). The interrelationship between CMFs and Crash Reduction Factors (CRFs) are defined and used interchangeably throughout this document.

Section 5 defines a methodology for calculating a B/C ratio for a potential safety project. It includes sources for estimating projected costs and benefits and the specific values/formulas Caltrans uses for its statewide evaluations of HSIP projects. This section also discusses the potential value in reevaluating projects' overall cost effectiveness at this point in the safety analysis, including: refining the project's costs and/or changing the mix of countermeasures and locations.

Section 6 identifies existing and new funding opportunities for safety projects that local agencies should be considering. This section also briefly discusses some unique project development issues and strategies for safety projects as they proceed through design and construction.

Section 7 presents the process to complete an evaluation of installed treatments. After the countermeasures are installed, assessing their effectiveness will provide valuable information and can help determine which countermeasures should continue to be installed on other roadways to make them safer as well as those that should be limited or discontinued.

Appendix A presents a flowchart of the HSIP call-for-projects process. This flowchart demonstrates how this document interacts with these Caltrans calls-for-projects.

Appendix B contains Detailed Tables of countermeasures discussed in Section 4. This table includes detailed information about each countermeasure, including: where to use, why it works, general qualities (time, cost and effectiveness), crash type(s) addressed, crash reduction factor, and specific values for use in Caltrans HSIP calls-for-projects.

Appendix C includes a summary of "recommended actions" involved in a proactive safety analysis.

Appendix D contains the formulas used to calculate the B/C ratio of safety projects.

Appendix E presents TIMS tutorials that are available to assist local agencies in completing Caltrans call-for-projects application requirements and attachments. The tutorials include examples for Spot Location projects and systemic projects.

Appendix F presents a list of the abbreviations used in this document.

Appendix G presents a list of references.

2. Identifying Safety Issues

This document encourages local agency safety practitioners to proactively analyze their roadway networks with the intention of yielding the best overall safety benefits. When utilizing a proactive safety analysis approach, practitioners need to consider a wide range of data sources to get an overall picture of the safety needs.

There are a number of information sources that can be accessed to get a clearer picture of the roadway safety issues on the roadway network. These can be formal or informal sources, including:

Formal sources:

- State and local crash databases
- SafeTREC's TIMS website (or locally preferred mapping software)
- Law enforcement crash reports and citations
- Field assessments

Informal sources:

- Observational information from road maintenance crews, law enforcement, and first responders
- Citizen notification of safety concerns

Examining crash history will help practitioners identify locations with an existing roadway safety problem, and also identify locations that are susceptible to future roadway crashes. In addition to location identification, this data can provide information regarding crash causation that ultimately provides insight into identifying potentially effective countermeasures.

Emphasis on data-driven decisions is indicative of reliability and efficiency. The more reliable the data, the more likely the decisions regarding safety improvements will be effective. However, detailed, reliable crash data are not available in all areas. Under this circumstance, the practitioner should use the best available information and engineering judgment to make the best decisions. In an effort to mitigate these situations, UC Berkeley SafeTREC has developed the TIMS website, which includes GIS mapping tools to access fatal and injury crashes statewide. This site is now available to all California local agencies. See Section 2.2 for more details on TIMS.

It is generally accepted that at least 3 years, or preferably 5 years, of crash data be used for an analysis; additional years of crash data can provide better information. For low volume roadways and/or when only severe crashes are analyzed, more years of crash data may be necessary for an effective evaluation. Due to the randomness of crashes in a given year, a multi-year average of safety data will smooth outlier years of relatively high or low roadway crash rates. This concept is commonly referred to as "regression to the mean" and is critical in helping safety practitioners avoid making wrong inferences as they analyze their roadway network data. An example of this is an agency making a high-cost improvement at

a location in response to one or two tragic crashes. The Highway Safety Manual (HSM) includes more details on regression to the mean and methods to reduce the random nature of crashes.

There are some circumstances where additional years of crash data may not always be advantageous. First, it's important for practitioners to recognize that as more years of crash data are used, they need to consider changes in traffic patterns, physical infrastructure, land use, and demographics that may affect their projection of future crashes. Second, if practitioners only focus on many years of past crash data, they could miss emerging safety issues and crash trends. For these reasons, if practitioners sense one or more factors affecting crashes have changed or may be changing, they should consider looking at the crash data for the specific area on a yearly or 3-year moving average to expose any changes and crash trends that are occurring.

2.1 State and Local Crash Databases

California has a central repository for storing crash data called SWITRS, which stands for Statewide Integrated Traffic Records System. SWITRS is a comprehensive data source for doing roadway safety analysis that includes almost all public roads in the database except tribal roads which are currently not included. SWITRS information is available to California's local agencies, although many agencies have had difficulty identifying, extracting and utilizing their crash records from SWITRS. All California local agencies, especially those that currently have difficulty accessing and mapping crash data, are encouraged to utilize the SafeTREC TIMS website to access and map SWITRS data.

This document focuses on the SafeTREC TIMS website as a tool to access and map SWITRS data because TIMS is free to local agencies and the general public. At the same time, this document also acknowledges that TIMS currently does not offer some of the features currently available in some of the commercially available crash analysis software packages. For this reason, local agencies are encouraged to try TIMS, but they should not feel obligated to make a switch if they prefer using their vendor supplied crash analysis software. See section 2.2 for more details on TIMS.

Many agencies utilize one of several crash analysis software packages (e.g., Crossroads) to manage and access their crash records. Their use can be costly, but allows local road practitioners to identify locations with multiple roadway crashes, conduct an analysis that can produce predominant crash types, and identify associated roadway features that may have contributed. One drawback to agencies managing and updating their own individual databases is that the statewide database may become outdated and may not include the updated crash details like geo-coded locations. Agencies that manage and update their own individual databases are encouraged to share all updates, including any geo-coding information, with the SWITRS data managers at the California Highway Patrol. This will allow updated geo-coding and other crash features to be available on a statewide basis.

Recommended Action: Obtain at least 5 years of network-wide crash data to identify local roads that have a history of roadway crashes. This data will be used to identify predominant roadway crash locations, crash types and other common characteristics.

As practitioners gather formal and informal information relating to the safety of their roadway network, they are encouraged to develop one or more separate spreadsheets and/or pin-maps to help track and manage this data. (These spreadsheets/pin-maps should capture much of the data gathered in each of Sections 2.1 through 2.8). A spreadsheet and/or pin-map can serve as a database to help an agency identify locations and crash characteristics representing their greatest safety issues and guide them in identifying appropriate countermeasures.

The following spreadsheet is offered as an example, but each agency's spreadsheet should be reformatted to include data to meet their needs. Agencies should consider printing their spreadsheets on 'legal' or '11 x 17' paper for easy review of their data.

	General Information		Crash Information			Evaluation / Action		
Location & Date	Source/Type of information	Safety Issue/Problem	Nature of Crashes	Time of Day	Weather/Traffic Conditions	Staff Evaluation	Recommend Action	Resolution
1) Intersection "X"								
1) Feb 7, 2010	Input from law enforcement	Clearance Intervals need adjustment	V1-WB V2-SB Side-swipe	21:30	Dry, Night, Free-flowing	R. Jones 2/26/10	Increase all-red interval	Completed 2/26/10
1) Mar 9, 2010	Citizen Complaint	Ped Crossing unsafe due to RT turns	N/A	N/A	N/A	R. Jones 3/12/10	No RT on Red (Need study)	
2) Intersection "Y"								
2)								
3) Roadway Segment (PM 5.3 to PM 7.8)								
PM 6.4 to 6.8 Sep 29, 2011	Maintenance data	Extensive skid marks. Speed of Travel?	General WB: ROR	N/A	Dry Free-flowing	J. Smith 10/1/11	High Friction Overlay	Preparing HSIP App.
PM 7.1 Jan 5, 2011	Input from law enforcement	Stop Sign missing	N/A	N/A	N/A	J. Smith 1/5/11	Informed Maintenance	New sign 1/5/11

An example of a pin-map, which could be modified to capture much of the data gathered in Section 2, is shown in the following section as part of the TIMS output.

2.2 Transportation Injury Mapping System (TIMS)

The Safe Transportation Research and Education Center (SafeTREC) at the University of California, Berkeley, has developed a powerful website with tools for California's local agencies to gather data for their safety analyses. Their Transportation Injury Mapping System (TIMS) website provides safety practitioners with California crash data (SWITRS, i.e. Statewide Integrated Traffic Records System) and collision mapping and analysis tools. California local agencies are encouraged to utilize TIMS at: https://tims.berkeley.edu/

Site Features:

- Applications to query map and download geo-referenced SWITRS data.
- Summary tables based on data included in SWITRS individual crash reports. These summary tables can be generated based on specified data fields or spatial limits.
- Virtual field review by connecting the crash location to Google maps and Google Street View, allowing the examination of the existing roadway infrastructure and dimensions.
- A 'Help Tab' that provides step-by-step instructions.

Please note that SafeTREC is not able to incorporate all SWITRS crashes into TIMS due to poor crash location descriptions in the crash reports. Currently, TIMS includes the majority of California fatal and injury crashes but does not include Property Damage Only collisions.

Recommended Action: Consider augmenting your local agency's data collection approach with information available using the suite of TIMS tools. The TIMS tools (and/or purchased software applications) can help the safety practitioner complete or assist with each of the actions in Sections 2.1 through 2.8. This website includes several tutorials specifically designed to support the individual sections of this document. Local practitioners may find the TIMS output files as a great starting point to build their tracking spreadsheet discussed in the recommendation of Section 2.1.

2.3 Law Enforcement Crash Reports

Both State and local law enforcement officials can be an important source of roadway crash data. The actual law enforcement crash reports can be valuable in identifying the location and contributing circumstances to roadway crashes (e.g., did the highway hardware and features operate as intended: end treatment worked, no barrier in the passenger compartment, pavement not slippery when wet, signs visible, signal timing, etc.). The following variables can and should be extracted and compiled from the crash reports:

- Location
- Date and time
- Crash type
- Crash severity
- Weather conditions
- Lighting conditions
- Sequence of events and most harmful events
- Contributing circumstances
- Driver Variables: age of driver, DUIs, use of seat belt, etc.

Similar to the crash database, the information in the crash reports can be used to assist in the identification of potential infrastructure and non-infrastructure safety treatments and the deployment approach.

Recommended Action: Develop a working relationship with law enforcement officials responsible for enforcement and crash investigations. This could foster a partnership where sharing crash reports and safety information on problem roadway segments becomes an everyday occurrence. Practitioners with limited access to crash data are encouraged to use TIMS to assess the local crash report data.

2.4 Observational Information

Law enforcement officers, local agency maintenance crews, and Emergency Medical Services personnel can serve as valuable resources to identify problem areas. Since they travel extensively on local roads, they can continuously monitor roads for actual or potential problems (e.g., poor delineation, fixed objects near the roadway, missing signs, signs of vehicles leaving the road). Law enforcement observations of driver behavior and roadway elements can provide valuable information to the local road agency. Additionally, law enforcement officers are sometimes aware of problem areas based on citations written, even if crashes related to the violations have not yet occurred. Road maintenance crews may keep logs of their work, including sign and guardrail replacements, debris removal, and edge drop-off repairs. These logs can provide supplemental information about crashes and HCCLs that may not have been reported to law enforcement. Finally, Emergency Medical Service Crash Reports can provide an entirely different perspectives and set of observations relating to crash occurrences.

Information obtained from road maintenance crews, law enforcement officers, and Emergency Medical Services personnel can help support all three methods of implementation approaches: Spot Location treatments, systemic deployments, and the Comprehensive Approach. Often, traffic violations such as speeding and impaired driving lend themselves to education and enforcement solutions to address these behaviors and supplement the intended infrastructure countermeasures.

Recommended Action: Add information received from law enforcement, road maintenance crew, and Emergency Medical Service observations to the agency's tracking spreadsheet and/or pin-maps. Develop a system for maintenance crews to report and record observed roadway safety issues and a mechanism to address them.

2.5 Public Notifications

Occasionally, when unsafe situations are observed, local citizens may notify the local government by email, letter, telephone, or at a public meeting. Information identifying safety issues on local roads may also come from community or regional newspapers, newsletters, correspondence, and from local homeowner and neighborhood associations. These sources can serve as indicators that a safety issue may exist and may warrant further review and analysis to determine the extent of the issues. Citizen reports can be tracked along with official crash data; however, safety practitioners should not regard these reports as factual, unless proven by other methods. Local safety databases should only contain objective and verifiable data.

Recommended Action: Review and summarize information received from these sources, identifying segments or corridors with multiple notifications and record the locations, dates, and nature of the problem that are cited. Add information received from public notifications to tracking spreadsheets and/or pin-maps once confirmed.

2.6 Roadway Data and Devices

It is also valuable to obtain information about the existing roadway infrastructure. Currently, many local agencies have few of their roadway characteristics in a database. For these agencies, the establishment of a roadway database could be a long-term goal. The following roadway characteristics are often used to assist practitioners in safety analyses of roadway segments:

- Roadway surface (dirt, aggregate, asphalt, concrete)
- Roadway geometry (horizontal, vertical, flat)
- Lane information (number, width)
- Shoulder information (width, type)
- Median (type, width)
- Traffic control devices present (signs, pavement marking, signals, rumble stripes etc.)

- Roadside safety hardware (e.g., guardrail, crash cushions, drainage structures)

The TIMS site, described in Section 2.2, can provide safety practitioners with much of this roadway data virtually by using Google Maps and Google Street View. By utilizing TIMS (and/or private for-profit vendors), safety practitioners can save hours and even days of driving during the initial steps in the safety analysis of their network. Once agencies start to define individual safety projects for funding and future construction, actual field reviews are needed to ensure a complete understanding of the project location and context.

As local practitioners gather information about their existing roadway infrastructure, they need to determine whether it complies with the minimum standards for signs, breakaway supports, signals, pavement markings, protective barriers, etc. Practitioners should use the most current *California - Manual on Uniform Traffic Control Devices* (CA-MUTCD), which provides the minimum standard requirements for traffic control devices on all public streets, highways, bikeways, and private roads open to public travel.[6] In addition to ensuring compliance with the MUTCD, geometric standards for sight distance, curve radius, and intersection skew angle and roadway standards for lane width, shoulder width, clear recovery zone, and super-elevation should also be evaluated.

Roadway information can be combined with crash data to help local practitioners identify appropriate locations and treatments to improve safety. For example, if a local rural segment is experiencing a high number of horizontal curve-related crashes, analysis of the inventory of roadway elements could reveal that the roadway does not have sufficient signage installed in advance of many of those curves to give motorists warning of the pending change in roadway geometry.

Recommended Action: Identify and track roadway characteristics for the intersections, roadway segments, and corridors, including compliance with the minimum standards. At a minimum, this should be done for locations being considered for safety improvements, but ideally agencies would establish an extensive database of roadway data to help them proactively identify high risk roadway features.

2.7 Exposure Data

The number of crashes can sometimes provide misleading information about the most appropriate locations for treatment. Introducing exposure data helps to create a more effective comparison of locations. Exposure data provides a common metric to the crash data so roadway segments and intersections can be compared more appropriately, helping local agencies prioritize their potential safety improvements.

The most common type of exposure data used on roadway segments is traffic volume. Ideally, volume would be broken down by pedestrians, bicycles, cars, motorcycles, and large trucks. A count of the number of vehicles and non-motorized users can provide information for comparison. For example, if

two roadway segments have the same number of crashes but different traffic volumes, the segment with fewer vehicles (i.e., less exposure) will have a higher crash rate, meaning that vehicles were more likely to experience a crash along that roadway segment. In situations where traffic volume is not available, segment length or population can serve as an effective exposure element for comparison.

Recommended Action: Consider the availability of exposure data and track it along with the other crash data to help prioritize potential locations for safety improvements.

2.8 Field Assessments and Road Safety Audits

Local road practitioners should always consider conducting field assessments in conjunction with their collection of crash data to help identify problem locations. An assessment can be as informal as driving, walking or virtually viewing the road network looking for evidence of roadway crashes. Ideally, informal field assessments are to be performed by multidisciplinary teams that include a traffic safety expert, law enforcement personnel, and others. The team can visit several sites and document evidence of crashes or deficiencies on the roadway or roadside, including: damaged trees or fences, skid marks, ruts on the shoulder, car parts on the shoulder, and/or pavement drop-offs. This information, along with observations of actual driver-behavior, can be used to develop recommendations for improvement.

Field reviews can also be more formalized such as in conducting a Road Safety Audit (RSA). A RSA is a formal safety performance examination of an existing or future road by an independent, multidisciplinary team. The team examines and reports on existing or potential road safety issues and identifies opportunities for safety improvements for all road users. Agencies considering RSAs for the first time are encouraged to consider requesting support from FHWA. For more information on FHWA's free RSA support, go to their website at: http://safety.fhwa.dot.gov/rsa/.

Informal field assessments and more formal RSAs provide an opportunity for local safety practitioners to gather and summarize all of the information sources discussed in Section 2. They can also be used to identify potential project delivery obstacles. The field assessments/RSAs should identify major environmental, right-of-way, infrastructure, and operational issues that need to be considered when applying countermeasures.

Recommended Action: Consider completing formal or informal field assessments and RSAs at certain locations to help ensure all relevant information is collected and available for the safety practitioners to complete their safety analysis and identify the most appropriate countermeasures. It's recommended that local agencies develop simple straightforward criteria on when one of these will be undertaken. The information gathered during the assessments should be added to the agency's tracking spreadsheet, as discussed in section 2.

3. Safety Data Analysis

Proactive safety analysis will assist in making informed decisions on the type, deployment levels, and locations for safety countermeasures. This builds on the previous discussions on information sources that identify safety issues. 'Safety Data Analysis' is one of the most critical steps in an agency's overall proactive safety analysis approach. Ideally, agencies regularly analyze the safety data for their entire roadway networks to identify and prioritize the locations with the most severe safety issues. This step is often skipped by agencies reacting to a recent tragic crash and the corresponding public outcry, which may leave their most critical safety locations undetected.

As agencies analyze their safety data, they will need to select the implementation approach that most effectively address the safety issues identified; Systemic Approach, Spot Location Approach, Comprehensive Approach, or a combination of these approaches. For example, if a high number of crashes are occurring at a particular curve or along a short segment of roadway, a spot treatment may be appropriate. However, systemic treatment of multiple locations experiencing similar crash types may be necessary and most beneficial for reducing overall fatalities and injuries. These implementation approaches were described in Section 1.5. With all of the approaches, safety practitioners should be looking for patterns in the crash data and not just the total number of crashes. These patterns include: types of crashes, severity of crashes, mode of travel, pavement conditions, time of day, etc. Identifying and analyzing the patterns in the crash data will help ensure the most appropriate countermeasure is selected and the safety problems are effectively addressed.

3.1 Quantitative Analysis

Crash data analysis is used to determine the extent of the roadway safety issues, the priority for application of scarce resources, and the selection of appropriate countermeasures. The two main quantitative analysis methods for roadway crashes are crash frequency and crash rate.

Crash Frequency

Crash frequency is defined as the number of crashes occurring within a determined study area. A practitioner can determine crash volumes using methods discussed in Section 2, including: State crash database (SWITRS), TIMS, local agency crash databases, law enforcement crash reports, pin-maps, etc. The practitioner should analyze the data to identify locations and crash characteristics with the highest frequency. There are numerous methods to assist practitioners in this process. Each agency will have their own preferred methods for initially selecting their top priority locations. The following are a few examples of the methods used to determine Crash Frequency:

- Summarize the crashes by attributes such as type, severity and location to identify patterns in the crash data and the most significant problem locations.
    - Top 10 (or 20) lists of intersections and roadway segments. It is common to weight more severe crashes higher in this process.

- Spatially display the sites on a pin-map or a GIS software package.
    - For small or rural agencies with lower volume roadways, network-wide pin-maps may be all that is needed to identify the highest priority locations.
- Develop collision diagrams showing the direction of movement of vehicles, types of crashes, and pedestrians involved in the crashes.

As stated earlier, this manual acknowledges many local agency safety practitioners may have their preferred methods for completing these analyses. For those agencies that do not and for those willing to try something new, Caltrans recommends using the TIMS website along with the processes outlined in this document to complete these analyses.

Once the crash frequency information is collected and displayed, the practitioner can complete a methodical analysis by geographic area, route, or a cluster analysis to determine which locations have experienced a high or moderate level of crashes. The resulting crash information can be further analyzed for recurring patterns or events. As agencies consider their locations with high levels of crashes, they should understand the overall random nature of crashes and the concept of "regression to the mean", as discussed in Section 2. Otherwise, if the natural variations in crash occurrence are not accounted for, a site might be selected for study when the number of crashes is randomly high, or overlooked when the number of crashes is randomly low.

Crash Rate

Crash rate analysis can be a useful tool to determine how a specific roadway or segment compares with similar roadway types on the network. A simple count of the number of crashes can be inadequate when comparing multiple roadways of varying lengths and/or traffic volume. Local agencies are also encouraged to compare their crashes with those occurring in similar areas around the state; doing so will help in determining just how severe the number and types of crashes are in the local area. When working with limited budgets, Crash Rates are often used to prioritize locations for safety improvements that will achieve the greatest safety benefits with limited resources. Where traffic volume data is unavailable, other information can be used to provide exposure information. One often-used factor is the length of the roadway segment on each route studied. Comparing the number of roadway crashes per mile or per intersection can help an agency identify potential opportunities to improve safety. The FHWA Roadway Departure Safety and Intersection Safety manuals include the following formulas for calculating crash rates on roadway segments and intersections:

The crash rate for crashes on a roadway is calculated as:

R = (C x 100,000,000) / (V x 365 x N x L)

Where:

R = Crash rate for the road segment expressed as crashes per 100 million vehicle-miles of travel,
C = Total number of crashes in the study period
V = Traffic volumes using Average Annual Daily Traffic (AADT) volumes
N = Number of years of data
L = Length of the roadway segment in miles

The crash rate for crashes at an intersection is calculated as:

R = (1,000,000 x C) / (365 x N x V)

Where:

R = Crash rate for the intersection expressed as crashes per million entering vehicles (MEV)
C= Total number of intersection-related crashes in the study period
N = Number of years of data
V = Traffic volumes entering the intersection daily

Similar to Crash Frequency, there are numerous methods for local safety practitioners to utilize Crash Rate in their safety data analysis and each will have their own preferred methods for initially selecting their top priority locations. The following are a few examples:

- Top 10 (or 20) lists of roadway segments with the highest crashes in relationship to roadway length, traffic volumes, and/or population density.
- Top 10 (or 20) lists of intersections, sorted by crash rate.
- Top 10 (or 20) lists of the highest volume intersections, sorted by crash frequency or rate.

Even though crash frequency and crash rate are helpful for local agency safety practitioners to effectively rank their most critical locations for improvements, the lack of reliable statewide traffic volumes for all roadway types precludes Caltrans from using the crash rate methodology in their statewide project scoring and ranking processes for the HSIP (discussed in more detail in Section 5).

Recommended Action: Complete a quantitative analysis of the roadway data using both Crash Frequency and Crash Rate methodologies. Safety practitioners should look for patterns in the crash data, including: types of crashes, severity of crashes, mode of travel, pavement conditions, roadway characteristics, time of day, intersection control, etc.

3.2 Qualitative Analysis

Qualitative analysis considers the physical characteristics of the roadway network, through the examination of maps, photographs, and field assessments. Certain roadway infrastructure characteristics relate to design standard and compliance issues and should continually be identified and upgraded on a network-wide basis (e.g., signing and pavement delineation characteristics relating to CA-MUTCD compliance as discussed in more detail below). Other roadway characteristics are more important as they relate to locations with high crash frequencies and rates (e.g., well defined pedestrian

paths crossing the roadway or a high number of utility poles/fixed objects adjacent to the edge of travel way). All of these characteristics should to be accounted for in an agency's proactive safety analysis.

Ensuring Compliance with CA-MUTCD and Design Standards

It is important for local agencies to continually evaluate their roadways for compliance with the minimum safety standards. The CA-MUTCD provides the minimum standard requirements for traffic control devices on all public streets, highways, bikeways, and private roads open to public travel. In addition to ensuring compliance with the CA-MUTCD, geometric standards should be evaluated as they relate to sight distance, curve radius, and intersection skew angle and roadway standards for lane width, shoulder width, clear recovery zone, and super-elevation. Many local agencies have their own specific roadway design standards, while others rely on Caltrans' Highway Design Manual[7], FHWA's "Green Book" policy manual[8] and PEDSAFE guide[9], and AASHTO's Roadside Design Guide[10]. If the traffic control devices or roadway geometry are not in compliance, appropriate devices/countermeasures should be installed. Non-compliance is an important consideration that can affect road safety and may have liability implications for a jurisdiction. Using CA-MUTCD compliant devices results in uniformity among California roadways and serves to meet road user expectations.

Field Assessments

While the qualitative analysis of compliance issues should continually occur on a network-wide basis, a qualitative analysis should also occur for each of the locations and corridors identified as a result of a 'Quantitative Analysis'. The consideration of roadway infrastructure characteristics in conjunction with crash frequency or crash rate gives a more complete picture of overall safety and should be used in an agency's identification and prioritization process for locations needing safety improvements. The qualitative assessment of HCCLs can be completed through the examination of maps and photographs, but the importance of in-field assessments by multi-disciplinary teams should not be underestimated. In some cases, field reviews of all potential project locations may not be practical, so safety practitioners are encouraged to utilize internet-mapping tools to view maps and photographs and virtually visit these sites from their offices.

Actual field visits or RSAs can be done at the highest priority locations before or during the countermeasure selection process. In many cases, field assessments are often the only way for practitioners to identify potential countermeasure implementation and project delivery obstacles. Without in-field assessments, right-of-way, infrastructure, and operational constraints can be overlooked, including: sensitive environmental resources (widening may not be feasible next to wetlands), roadway users (rumble strips may not be feasible on roadways with high bicycle volumes and narrow shoulders), or nearby roadway stakeholders (flashing beacons may be problematic for adjacent residents.) Assessments can provide critical information for local practitioners as they prioritize their crash locations and select countermeasures with the greatest potential for cost effective deployment.

Recommended Action: Incorporate qualitative analysis elements into agency's proactive analysis approach. Consider completing field assessments and RSAs to identify locations with roadway

infrastructure characteristics that relate to both compliance issues and high crash frequencies/rates. As part of field assessments, common roadway and crash characteristics should be identified for the potential systemic deployment of countermeasures. Rather than reviewing all crash sites individually, agencies may find the use of Internet mapping tools offers significant time savings. For agencies without a preferred virtual field review method, the SafeTREC TIMS website automatically links the SWITRS crash locations to Google Maps and Google Street View.

Caltrans recommends all agencies complete both quantitative and qualitative analyses before starting their applications for HSIP program funding. The findings from these analyses should be documented in spreadsheets and/or pin-maps similar to the ones discussed in Section 2.

4. Countermeasure Selection

Once locations and crash problems are identified as illustrated in Sections 2 and 3, the safety practitioners will need to select the set of proposed safety improvements to reduce the likelihood of future crashes. Individual elements of standard safety improvements are referred to as countermeasures and most countermeasures have corresponding Crash Modification Factors (CMFs).

When applied correctly, CMFs can help agencies identify the expected safety impacts of installing various countermeasures to reduce crashes. CMFs are multiplicative factors used to estimate the expected number of crashes after implementing a given countermeasure at a specific site (the lower the CMF, the greater the expected reduction in crashes). Crash Reduction Factors (CRFs) are directly connected to the CMFs and are another indication of the effectiveness of a particular treatment, measured by the percentage of crashes the countermeasure is expected to reduce. The CRF for a countermeasure is defined mathematically as (1 – CMF) (the higher the CRF, the greater the expected reduction in crashes). *NOTE: Given that CRF values can be more intuitive when analyzing roadways for potential "reductions" in crashes; this document shows CRF values in the countermeasure tables. The terms CMFs and CRFs are used interchangeably throughout the text of this section and in other sections of this document.*

In an effort to stretch the limited highway safety funding, local transportation agencies are encouraged to identify and implement the optimal combination of countermeasures to achieve the greatest benefits. Combined with crash cost data and project cost information, CRFs can help safety practitioners compare the B/C ratio of multiple countermeasures and then choose the most appropriate application for their proposed safety improvement projects.

As agencies consider the overall scope/cost of their projects, they also need to consider the number of locations to which each countermeasure may be applied in order to maximize the B/C ratio and the overall effectiveness of their limited safety funding. For HCCLs with varying causes, the Spot Location Approach may be the most appropriate. In contrast, the Systemic Approach should be considered where a high proportion of similar crash types tend to occur at locations that share common geometric or operational elements. In these situations, installing the same low-cost safety countermeasure at multiple locations can increase the cost effectiveness of the safety improvement, allowing an increased number of treatments to be applied.

It is important to note that there are many safety issues and corresponding countermeasures that are more "maintenance" in nature (e.g., visibility issues relating to the need for brush clearing and roadway departure issues relating to the need to replace shoulder backing). As these issues are identified when investigating crash locations, it's expected that the local safety practitioners would take the necessary steps to remedy the situation in the short-term. For this reason, most of the common maintenance-type safety countermeasures are not included in this document.

4.1 Selecting Countermeasures and Crash Modification Factors / Crash Reduction Factors

Selecting an appropriate countermeasure and corresponding CMF is similar to choosing the right tool for a job. In some cases, a countermeasure and CMF may not be perfect, but will still work well enough to get the job done by providing a reasonable estimation of the countermeasure's effect. In other cases, using an improper countermeasure or CMF may do more harm than good. Applying a CMF that does not fit a specific situation may give a false sense of the countermeasure's safety effectiveness and may result in an increased safety problem.

The Federal Highway Administration (FHWA) is leading a concerted effort to develop information on CMFs and makes it available to State and local agencies to assist with highway safety planning. The CMF Clearinghouse, a free online database introduced in 2009 and accessible at http://www.cmfclearinghouse.org/, details the varying quality and reliability of CMFs available to transportation professionals.

FHWA has identified three main considerations to assure appropriate selection of CMFs for a given countermeasure: the **availability** of relevant CMFs, the **applicability** of available CMFs, and the **quality** of applicable CMFs. The following sections detail these considerations and describe how Caltrans recommended CRF and service life values meet these criteria.

Availability: The availability of a CMF that applies to a specific situation depends on whether research has been conducted to determine the safety effects of a particular countermeasure or combination of countermeasures, and whether researchers have documented it. The CMF Clearinghouse contains more than 2,900 CMFs and receives quarterly updates to include the latest research.

At this point, Caltrans has established a small subset of 82 countermeasures and a single CRF for each of these countermeasures that must be used when submitting applications for Caltrans statewide calls-for-projects. This methodology allows for a statewide data-driven process that facilitates a fair and accurate comparison of project applications. (The reason for limiting the number of countermeasures is further explained below under “applicability”).

Applicability: In general, once a local safety practitioner determines that one or more CMFs exist for a specific countermeasure, the next step is to determine which CMF is the most applicable. Applicability depends on how closely the CMF represents the situation to which it will be applied. Safety practitioners should evaluate the potentially applicable CMFs, eliminating any that are not appropriate for the situation. Practitioners should only choose the most appropriate CMFs for their specific project based on factors including but not limited to: urban areas vs. rural areas; low vs. high traffic volumes; 2-lane vs. 6-lane roadways; individual vs. combination treatments; signalized vs. non-signalized intersections; and minor crashes vs. fatal crashes. If practitioners choose to use a CMF outside the range of applicability, the safety effect will likely be over or underestimated.

The mix of countermeasures and CRFs included in this document is intended to meet Caltrans' goal for a data-driven award process for local agencies to follow that allows for a fair and accurate comparison of project applications. Where possible and appropriate, the CRF value intended for use in statewide calls-for-projects is based on research studies that specifically established the CRF to be used for 'all' project areas, roadway types, and traffic volumes. Where not all applicability factors have already been established by prior research, Caltrans worked closely with FHWA to approximate CRFs for countermeasures often utilized by local agencies.

Quality: Often a search of the CMF Clearing House results in multiple CMFs for the same countermeasure. A practitioner needs to examine the quality of each CMF. The quality of a CMF can vary greatly depending on several factors associated with the process of developing the CMF. The primary factors that determine the quality of a CMF are the study design, sample size, standard error, potential bias, and data source. The CMF Clearinghouse provides a star rating for each based on a scale of 1 to 5, where 5 indicates the highest quality. The most reliable CMFs in the HSM are indicated with a bold font.

Wherever possible, the CRFs included in this document are based on research that has a CMF Clearinghouse star rating of 3 or more. For countermeasures that do not have corresponding research of a star rating of 3 or more but were deemed important to provide flexibility to local practitioners, Caltrans worked closely with FHWA to establish CRFs based on the best available research.

4.2 List of Countermeasures

The list of countermeasures discussed in this section is not an all-inclusive list, and only includes those available in the Caltrans' HSIP Cycle 11 Call-for-projects. Only thoroughly researched countermeasures with a readiness to be applied by local agencies on a statewide basis are utilized. In addition, the California Local HSIP program places further restrictions on the eligibility of some countermeasures to meet the most critical needs on California local roadways. Practitioners are encouraged to utilize the FHWA CMF Clearinghouse for a more comprehensive list as they establish their local agency specific set of proposed improvements and prioritize their projects.

The countermeasures listed in the following three tables have been sorted into 3 categories: Signalized Intersection, Non-Signalized Intersection, and Roadway Segment. Pedestrian and bicycle related countermeasures have been included in each of these categories, as the consideration of non-motorized travel is important for all roadway classifications and locations. The countermeasures included in these tables are also used in the HSIP Analyzer. When selecting countermeasures and CMFs to apply to their specific safety needs, local agency safety practitioners should consider the **availability, applicability**, and **quality** of CMFs, as discussed in section 4.1.

Only Crash Types, CRFs, Expected Lives, and HSIP Funding Eligibility of the countermeasures for use in Caltrans local HSIP program are provided in this section. Fields in the countermeasure tables are:

- **Crash Types -** "All", "P & B" (Pedestrian and Bicycle), "Night", "Emergency Vehicle", or "Animal".
- **CRF -** Crash Reduction Factor used for HSIP calls-for-projects.
- **Expected Life -** 10 years or 20 years.
- **Funding Eligibility –** the maximum HSIP reimbursement ratio for HSIP Cycle 11 Call-for-projects.
    - Eighty-one (81) countermeasures: 90%
    - One (1) countermeasure: 50% (CM No. S03: Improve signal timing, as this CM will improve the signal operation rather than merely the safety.)
- **Systemic Approach Opportunity -** Opportunity to Implement Using a Systemic Approach: "Very High", "High", "Medium" or "Low".

The list of countermeasures presented in this section is intended to be a quick-reference summary. Appendix B of this manual provides more details on each of these countermeasures including Where to use, Why it works, General Qualities (Time, Cost and Effectiveness), and information from FHWA CMF Clearinghouse (Crash Types Addressed and range of Crash Reduction Factor).

Recommended Action: At this point, agencies should use all information and results obtained by completing the actions in Sections 2, 3 and 4 to select the appropriate countermeasures for their HCCLs and systemic improvements. As novice safety practitioners select countermeasures, they must realize that a reasonable level of traffic 'engineering judgment' is required and that this manual should not be used as a simple cheat-sheet for preparing and submitting applications for funding.

Table 2. Countermeasures for Non-Signalized Intersections

No.	Type	Countermeasure Name	Crash Type	CRF	Expected Life (Years)	HSIP Funding Eligibility	Systemic Approach Opportunity?
NS01	Lighting	Add intersection lighting (NS.I.)	Night	40%	20	90%	Medium
NS02	Control	Convert to all-way STOP control (from 2-way or Yield control)	All	50%	10	90%	High
NS03	Control	Install signals	All	30%	20	90%	Low
NS04	Control	Convert intersection to roundabout (from all way stop)	All	Varies	20	90%	Low
NS05	Control	Convert intersection to roundabout (from stop or yield control on minor road)	All	Varies	20	90%	Low
NS05mr*	Control	Convert intersection to mini-roundabout	All	30%	20	90%	Medium
NS06	Operation/ Warning	Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs	All	15%	10	90%	Very High
NS07	Operation/ Warning	Upgrade intersection pavement markings (NS.I.)	All	25%	10	90%	Very High
NS08	Operation/ Warning	Install Flashing Beacons at Stop-Controlled Intersections	All	15%	10	90%	High
NS09	Operation/ Warning	Install flashing beacons as advance warning (NS.I.)	All	30%	10	90%	High
NS10	Operation/ Warning	Install transverse rumble strips on approaches	All	20%	10	90%	High
NS11	Operation/ Warning	Improve sight distance to intersection (Clear Sight Triangles)	All	20%	10	90%	High
NS12	Operation/ Warning	Improve pavement friction (High Friction Surface Treatments)	All	55%	10	90%	Medium
NS13	Geometric Mod.	Install splitter-islands on the minor road approaches	All	40%	20	90%	Medium
NS14	Geometric Mod.	Install raised median on approaches (NS.I.)	All	25%	20	90%	Medium
NS15	Geometric Mod.	Create directional median openings to allow (and restrict) left-turns and u-turns (NS.I.)	All	50%	20	90%	Medium
NS16	Geometric Mod.	Reduced Left-Turn Conflict Intersections (NS.I.)	All	50%	20	90%	Medium
NS17	Geometric Mod.	Install right-turn lane (NS.I.)	All	20%	20	90%	Low
NS18	Geometric Mod.	Install left-turn lane (where no left-turn lane exists)	All	35%	20	90%	Low
NS19PB	Ped and Bike	Install raised medians / refuge islands (NS.I.)	P & B	45%	20	90%	Medium
NS20PB	Ped and Bike	Install pedestrian crossing at uncontrolled locations (new signs and markings only)	P & B	25%	10	90%	High
NS21PB	Ped and Bike	Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)	P & B	35%	20	90%	Medium
NS22PB	Ped and Bike	Install Rectangular Rapid Flashing Beacon (RRFB)	P & B	35%	20	90%	Medium
NS23PB	Ped and Bike	Install Pedestrian Signal (including Pedestrian Hybrid Beacon (HAWK))	P & B	55%	20	90%	Low

*CM NS05mr is a new countermeasure added for HSIP Cycle 11 Call-for-projects.

Table 1. Countermeasures for Signalized Intersections

No.	Type	Countermeasure Name	Crash Type	CRF	Expected Life (Years)	HSIP Funding Eligibility	Systemic Approach Opportunity?
S01	Lighting	Add intersection lighting (S.I.)	Night	40%	20	90%	Medium
S02	Signal Mod.	Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number	All	15%	10	90%	Very High
S03	Signal Mod.	Improve signal timing (coordination, phases, red, yellow, or operation)	All	15%	10	50%	Very High
~~S04*~~	~~Signal Mod.~~	~~Provide Advanced Dilemma Zone Detection for high speed approaches~~	~~All~~	~~40%~~	~~10~~	~~90%~~	~~High~~
S05	Signal Mod.	Install emergency vehicle pre-emption systems	Emergency Vehicle	70%	10	90%	High
S06	Signal Mod.	Install left-turn lane and add turn phase (signal has no left-turn lane or phase before)	All	55%	20	90%	Low
S07	Signal Mod.	Provide protected left turn phase (left turn lane already exists)	All	30%	20	90%	High
S08	Signal Mod.	Convert signal to mast arm (from pedestal-mounted)	All	30%	20	90%	Medium
S09	Operation/ Warning	Install raised pavement markers and striping (Through Intersection)	All	10%	10	90%	Very High
S10	Operation/ Warning	Install flashing beacons as advance warning (S.I.)	All	30%	10	90%	Medium
S11	Operation/ Warning	Improve pavement friction (High Friction Surface Treatments)	All	55%	10	90%	Medium
S12	Geometric Mod.	Install raised median on approaches (S.I.)	All	25%	20	90%	Medium
S13PB	Geometric Mod.	Install pedestrian median fencing on approaches	P & B	35%	20	90%	Low
S14	Geometric Mod.	Create directional median openings to allow (and restrict) left-turns and u-turns (S.I.)	All	50%	20	90%	Medium
S15	Geometric Mod.	Reduced Left-Turn Conflict Intersections (S.I.)	All	50%	20	90%	Medium
S16	Geometric Mod.	Convert intersection to roundabout (from signal)	All	Varies	20	90%	Low
S17PB	Ped and Bike	Install pedestrian countdown signal heads	P & B	25%	20	90%	Very High
S18PB	Ped and Bike	Install pedestrian crossing (S.I.)	P & B	25%	20	90%	High
S19PB	Ped and Bike	Pedestrian Scramble	P & B	40%	20	90%	High
S20PB	Ped and Bike	Install advance stop bar before crosswalk (Bicycle Box)	P & B	15%	10	90%	Very High
S21PB	Ped and Bike	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	P & B	60%	10	90%	Very High

*CM S04 has been deleted in HSIP Cycle 11 Call-for-projects.

Table 3. Countermeasures for Roadways

No.	Type	Countermeasure Name	Crash Type	CRF	Expected Life (Years)	HSIP Funding Eligibility	Systemic Approach Opportunity?
R01	Lighting	Add segment lighting	Night	35%	20	90%	Medium
R02	Remove/ Shield Obstacles	Remove or relocate fixed objects outside of Clear Recovery Zone	All	35%	20	90%	High
R03	Remove/ Shield Obstacles	Install Median Barrier	All	25%	20	90%	Medium
R04	Remove/ Shield Obstacles	Install Guardrail	All	25%	20	90%	High
R05	Remove/ Shield Obstacles	Install impact attenuators	All	25%	10	90%	High
R06	Remove/ Shield Obstacles	Flatten side slopes	All	30%	20	90%	Medium
R07	Remove/ Shield Obstacles	Flatten side slopes and remove guardrail	All	40%	20	90%	Medium
R08	Geometric Mod.	Install raised median	All	25%	20	90%	Medium
R09	Geometric Mod.	Install median (flush)	All	15%	20	90%	Medium
R10PB	Geometric Mod.	Install pedestrian median fencing on approaches	P & B	35%	20	90%	Low
R11	Geometric Mod.	Install acceleration/ deceleration lanes	All	25%	20	90%	Low
R12	Geometric Mod.	Widen lane (initially less than 10 ft)	All	25%	20	90%	Medium
R13	Geometric Mod.	Add two-way left-turn lane	All	30%	20	90%	Medium
R14	Geometric Mod.	Road Diet (Reduce travel lanes and add a two way left-turn and bike lanes)	All	35%	20	90%	Medium
R15	Geometric Mod.	Widen shoulder	All	30%	20	90%	Medium
R16	Geometric Mod.	Curve Shoulder widening (Outside Only)	All	45%	20	90%	Medium
R17	Geometric Mod.	Improve horizontal alignment (flatten curves)	All	50%	20	90%	Low
R18	Geometric Mod.	Flatten crest vertical curve	All	25%	20	90%	Low
R19	Geometric Mod.	Improve curve superelevation	All	45%	20	90%	Medium
R20	Geometric Mod.	Convert from two-way to one-way traffic	All	35%	20	90%	Medium
R21	Geometric Mod.	Improve pavement friction (High Friction Surface Treatments)	All	55%	10	90%	High

Table 3. Countermeasures for Roadways (Continued)

No.	Type	Countermeasure Name	Crash Type	CRF	Expected Life (Years)	HSIP Funding Eligibility	Systemic Approach Opportunity?
R22	Operation/ Warning	Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)	All	15%	10	90%	Very High
R23	Operation/ Warning	Install chevron signs on horizontal curves	All	40%	10	90%	Very High
R24	Operation/ Warning	Install curve advance warning signs	All	25%	10	90%	Very High
R25	Operation/ Warning	Install curve advance warning signs (flashing beacon)	All	30%	10	90%	High
R26	Operation/ Warning	Install dynamic/variable speed warning signs	All	30%	10	90%	High
R27	Operation/ Warning	Install delineators, reflectors and/or object markers	All	15%	10	90%	Very High
R28	Operation/ Warning	Install edge-lines and centerlines	All	25%	10	90%	Very High
R29	Operation/ Warning	Install no-passing line	All	45%	10	90%	Very High
R30	Operation/ Warning	Install centerline rumble strips/stripes	All	20%	10	90%	High
R31	Operation/ Warning	Install edgeline rumble strips/stripes	All	15%	10	90%	High
R32PB	Ped and Bike	Install bike lanes	P & B	35%	20	90%	High
R33PB	Ped and Bike	Install Separated Bike Lanes	P & B	45%	20	90%	High
R34PB	Ped and Bike	Install sidewalk/pathway (to avoid walking along roadway)	P & B	80%	20	90%	Medium
R35PB	Ped and Bike	Install/upgrade pedestrian crossing (with enhanced safety features)	P & B	35%	20	90%	Medium
R36PB	Ped and Bike	Install raised pedestrian crossing	P & B	35%	20	90%	Medium
R37PB	Ped and Bike	Install Rectangular Rapid Flashing Beacon (RRFB)	P & B	35%	20	90%	Medium
R38	Animal	Install animal fencing	Animal	80%	20	90%	Medium

5. Calculating the B/C Ratio and Comparing Projects

Practitioners need to consider the expected B/C ratio of their proposed projects. This is an important step in a proactive safety analysis process because it provides two key pieces of information: First, it defines the cost effectiveness of the proposed projects; and second, it gives the safety practitioner a means to help prioritize their safety projects both inside the agency's traffic safety section and against other proposed operational and maintenance projects competing for funding.

5.1 Estimate the Benefit of Implementing Proposed Improvements

Sections 2 through 4 provide the practitioner all the information needed to calculate the expected 'Benefit' of the proposed safety projects. The resulting expected benefit value is derived by applying the proposed countermeasures and corresponding CMFs to the expected crashes. It is of critical importance for the practitioner to understand that misapplication of a CMF will lead to misinformed decisions. Four main factors need to be considered when applying countermeasures and CMFs to calculate the expected benefit value: (1) how to estimate the number of expected crashes without treatment, (2) how to apply CMFs by type and severity, (3) how to apply multiple CMFs if multiple treatments are to be included in the same project, and (4) how to apply a benefit value by crash severity. The following text explains how these factors affect the expected benefit value in more detail.

Estimating expected crashes without treatment: Before applying CMFs, local safety practitioners first need to select countermeasures and CMFs. The CMF is applied to the expected safety performance (expected crashes) without any treatment in order to estimate the expected crashes with the treatment. The reduction in expected crashes multiplied by the expected costs per each crash gives the practitioner the expected benefit.

As mentioned earlier in this manual, the random nature of roadway crashes suggests that over time the number of crashes at any particular locations will change. This concept is known as "regression to the mean" and it gives rise to the concern that a site might be selected for study when the crashes are at a randomly high fluctuation, or overlooked from study when the site is at a randomly low fluctuation. The HSM presents several methods for estimating the expected safety performance of a roadway or intersection including the Empirical Bayes method, which combines observed information from the site of interest with information from similar sites to estimate the expected crashes without treatment. Another common way to minimize the impact of regression to the mean is to increase the number of years of crash data being analyzed.

For statewide calls-for-projects, Caltrans strives to ensure that all projects are fairly ranked based on a consistent statewide approach. Given this, Caltrans has avoided using methodology requiring agencies to mathematically adjust their crash data (e.g., Empirical Bayes) and instead has opted to use 5 years of "observed crashes" in estimating "expected crashes."

Applying CMFs by type and severity: Section 4.1 of this manual discusses the application of CMFs and the need for them to represent the situation to which they will be applied. It also stresses the need for

practitioners to choose the most appropriate CMFs for their specific project. In many circumstances, estimating the change in crashes by type and severity is useful; however, local safety practitioners only can use this approach when CMFs exist for the specific crash types and severities in question. If practitioners choose to use a CMF outside the range of applicability, the safety effect may be over- or underestimated. (For example: past research relating to installing a channelized left turn lane, has estimated CMFs as high as 68% for Right-Angle crashes of all severities and as low as 11% for Rear-End crashes with severities of only fatal and injury).

Applying multiple CMFs: In real-world scenarios, transportation agencies commonly install more than one countermeasure per project as part of their safety improvement program. This leads to the question, "What is the safety effect of the combined countermeasures?" The calculation methods that Transportation agencies use include: applying the CMF for the single countermeasure expected to achieve the greatest reduction, applying CMFs separately by crash type and summing them to get a project-level effect, and applying CMFs based on a review of crash patterns, etc. Regardless of the specific method employed, “engineering judgment” is required when combining multiple CMFs and it is important for local agencies to apply their method consistently throughout their analysis to ensure a fair comparison of projects.

One common practice is to assume that CMFs are multiplicative when they are applied to the same set of crash data. In other words, each successive countermeasure will achieve an additional benefit when implemented in combination with other countermeasures. The multiplicative method is a common, generally accepted method and is presented in the HSM and in the CMF Clearinghouse. This method is also used in the HSIP calls-for-projects.

To allow agencies maximum flexibility in combining countermeasures and locations into a single project while ensuring all projects can be consistently ranked on a statewide basis, Caltrans only allows up to three (3) individual countermeasures can be utilized in the B/C ratio for a project location site. The CMFs are multiplicative if there are multiple countermeasures, i.e. each successive countermeasure will achieve an additional benefit based on the remainder of the crashes after the effect of the prior countermeasures, not the original number of the crashes.

More information on these requirements and procedures are provided in the documents (Application Form Instructions, etc.) for each call-for-projects.

Applying benefit value by crash severity: The last step in estimating the overall benefit of a proposed improvement project is to multiply the expected reduction in crashes by a generally accepted value for the “cost” of crashes. In other words, the expected “benefit” value for a project is actually the expected “reduction in costs” value from reducing future crashes. There are many sources for the costs of crashes (e.g., HSM, FHWA & National Safety Council) and some of the sources vary widely depending on how they account for the economic value of a life and when the numbers were last updated.

When calculating the "benefit" to be used in calculating an improvement's B/C ratio, it is important for the practitioner to consider whether a total benefit value for the "life" of the improvement is needed or if the benefit value should be annualized (i.e., benefit per year). Whichever method is used to calculate the overall cost of the improvements must also be used for calculating the benefit.

Caltrans has currently chosen to use published Cost-of-Crash values from the first edition of the HSM and increase the values by 4% annually. These values may be updated in the future, when updated cost-of-crash values are published by FHWA or another national source. The specific values for each of the crash severities and the formulas uses to calculate the total benefit are shown in Appendix D.

Recommended Action: Prepare Total Benefit estimates for the proposed projects being evaluated in the proactive safety analysis.

5.2 Estimate the Cost of Implementing Proposed Improvements

After calculating the expected benefit of the proposed safety projects, the next step for the practitioner is to develop an estimate of the Total Project Costs. These costs need to include both the construction costs and the project development and administration costs. The most common approach to estimating construction costs is through an "Engineer's Cost Estimate." A Template for Detailed Engineer's Estimate and Cost Breakdown by Countermeasures is included in the HSIP funding application website. When calculating the administration costs for a project, the complexity of the improvements must be accounted for: Low-cost countermeasures, typically used in the Systemic Approach, often have minimal environmental and right-of-way impacts and require minimal design effort. In contrast, many medium to high cost improvements tend to have greater impacts to the environment and right-of-way and require significant design efforts. It's crucial to account for these differences to accurately determine the true B/C ratio of the projects and prioritize them correctly.

When an agency is initially evaluating several potential locations and countermeasures as part of their proactive safety analysis or in preparing for Caltrans call-for-projects, they should consider first using rough 'ballpark' cost estimates using previous projects that had similar scope, if possible. Ballpark cost estimates can allow the practitioner to quickly establish B/C ratios for all of their potential projects and identify the projects with high cost effectiveness and with a reasonable chance of receiving HSIP funding in a Caltrans call-for-projects.

Recommended Action: Prepare 'Total Project Cost' estimates for the proposed projects being evaluated in the proactive safety analysis.

5.3 Calculate the B/C Ratio

In general, the B/C ratio is calculated by taking a project's overall benefit (as calculated in Section 5.1) and dividing it by the project's overall cost (as calculated in Section 5.2). There are, however, several

methods and input-factors available for calculating a project's B/C ratio and practitioners may want to consider other methods as defined in the HSM.

Based on Caltrans' need for a fair, data-driven, statewide project selection process for HSIP call-for-projects, Caltrans requires the B/C ratio for all applications to be completed using the same process. Applicants must utilize the HSIP Analyzer to calculate the B/C ratio of the project. Additional details and formulas included in the calculation are included in this document as Appendix D.

Recommended Action: Calculate the B/C ratio for each of the proposed projects being evaluated in the proactive safety analysis.

5.4 Compare B/C Ratios and Consider the Need to Reevaluate Project Elements

By implementing a comprehensive proactive safety analysis approach, agencies will likely identify more potential safety projects than they can fund and deliver. It will be important for an agency to prioritize their projects internally before funding is sought. It is not uncommon for projects to have a B/C ratio as low as 0.1 or as high as 100. Once the relative cost effectiveness of an agency's potential projects has been established, the projects with low to mid-ranged B/C ratios should be reassessed. Projects with very low initial B/C ratios may be dropped while projects with low to mid ranged B/C ratios may be redefined by changing the limits of the proposed improvements to focus on higher crash locations or incorporating lower-cost countermeasures. This reiterative process is illustrated in Figure 1 in Section 1 of this document.

At the conclusion of this step, the local agency should have several potential safety projects ready to move into the project development and construction phases. Ideally, there will be a variety of low cost safety projects and potentially a few higher cost roadway reconstruction projects. How each local agency prioritizes their list of safety improvements will vary, but projects with the highest B/C ratios should generally have a high overall priority. It should be understood that available funding will play a key role in local agency prioritization (e.g., higher-cost projects may have to wait for funding to become available while low-cost improvements with lower B/C ratios can be constructed with in-house maintenance crews), but in the goal of maximizing overall safety benefits, the role of politics and public influence should be minimized.

Recommended Action: Compare, reevaluate, and prioritize the potential safety projects. Consider changing the project limits to maximize the number of fatal and injury crashes addressed within the limits. Consider lower cost countermeasures in areas where high and medium cost countermeasures resulted in low B/C ratios.

6. Identifying Funding and Construct Improvements

Funding strategies for implementing safety projects need to vary as widely as local agency's roadway types, project costs, and proposed improvements. At this point in the proactive safety analysis process, local agencies should have several potential safety projects ready to move into the project development and construction phases. There are likely a wide range of 'approaches' to fund each of these projects. This section of the document discusses some of the most common approaches.

6.1 Existing Funding for Low-cost Countermeasures

For projects utilizing low-cost countermeasures, the total project cost may be low enough that the agency can construct the project using its existing roadway funding by utilizing the ongoing activities of their roadway maintenance staff and equipment. Other low-cost projects (e.g., overlays, sealcoats, drainage, signing, and striping projects) may be more important to incorporate into larger maintenance projects. It is common for agencies to have 1-, 5-, and 10-year plans for making these standard maintenance improvements. With upfront planning and coordination between agency staff, the low-cost safety projects identified through the proactive safety analysis can be incorporated with minimal costs to an agency's maintenance program. Maximizing the cost effectiveness of the program may even allow the transportation managers to justify increasing the funding for their overall roadway maintenance program.

In addition to their maintenance program, transportation managers should also strategically seek out planned capital improvement and development projects that can incorporate low and medium cost countermeasures identified in their safety analysis. Local agencies may also find opportunities to partner with private enterprises and insurance companies to fund special safety projects that further both organizations' strategic goals.

Recommended Action: Survey planned maintenance, developer and capital projects to determine whether they overlap any of the proposed safety projects. Where projects overlap, leverage the existing funding sources to include safety countermeasures.

6.2 HSIP and Other Funding Sources

In addition to the HSIP Program, the Division of Local Assistance's web site includes several other Caltrans administered funding programs:
https://dot.ca.gov/programs/local-assistance

Recommended Action: Consider all potential funding opportunities to incorporate the identified safety countermeasures.

6.3 Project Development and Construction Considerations

In general, roadway safety projects don't garner the same level of attention from decision makers, media, elected officials, and the general public, that large operational and development-driven projects do. As a result, local safety practitioners and project sponsors often find their projects have difficulty in competing for the agencies' limited project delivery resources. Establishing and implementing a comprehensive safety analysis process can assist safety practitioners in delivering their safety programs in many ways, including:

- Credibility and awareness to individual projects and delivery schedules.
- Increased stakeholders tracking and delivery of a project when low-cost improvements are incorporated into ongoing maintenance and capital projects.
- An increased focus on low-cost countermeasures typically corresponds to projects with less environmental, right-of-way and other impacts; resulting in projects that have streamlined project delivery processes and short construction schedules.

Recommended Action: Safety practitioners should follow their safety projects all the way through the project delivery and construction process. In addition, they should establish a safety program delivery plan that brings awareness and support to the expedited delivery of safety projects. Where possible, safety practitioners should involve the media and even consider having their own program intended to "toot their own safety-horn."

7. Evaluation of Improvements

Evaluation of the effectiveness of roadway treatments following installation should be used to guide future decisions regarding roadway countermeasures. Field reviews should also be conducted shortly after the project is completed to insure the project is operating as intended.

A record of crash history and countermeasure installation forms the foundation for assessing how well the implemented strategies have performed. An important database to maintain is a current list of installed countermeasures with documented "when/where/why" information. Periodic assessments will provide the necessary information to make informed decisions on whether each countermeasure contributed to an increase in safety, whether the countermeasure could or should be installed at other locations, and which factors may have contributed to each countermeasure's success.

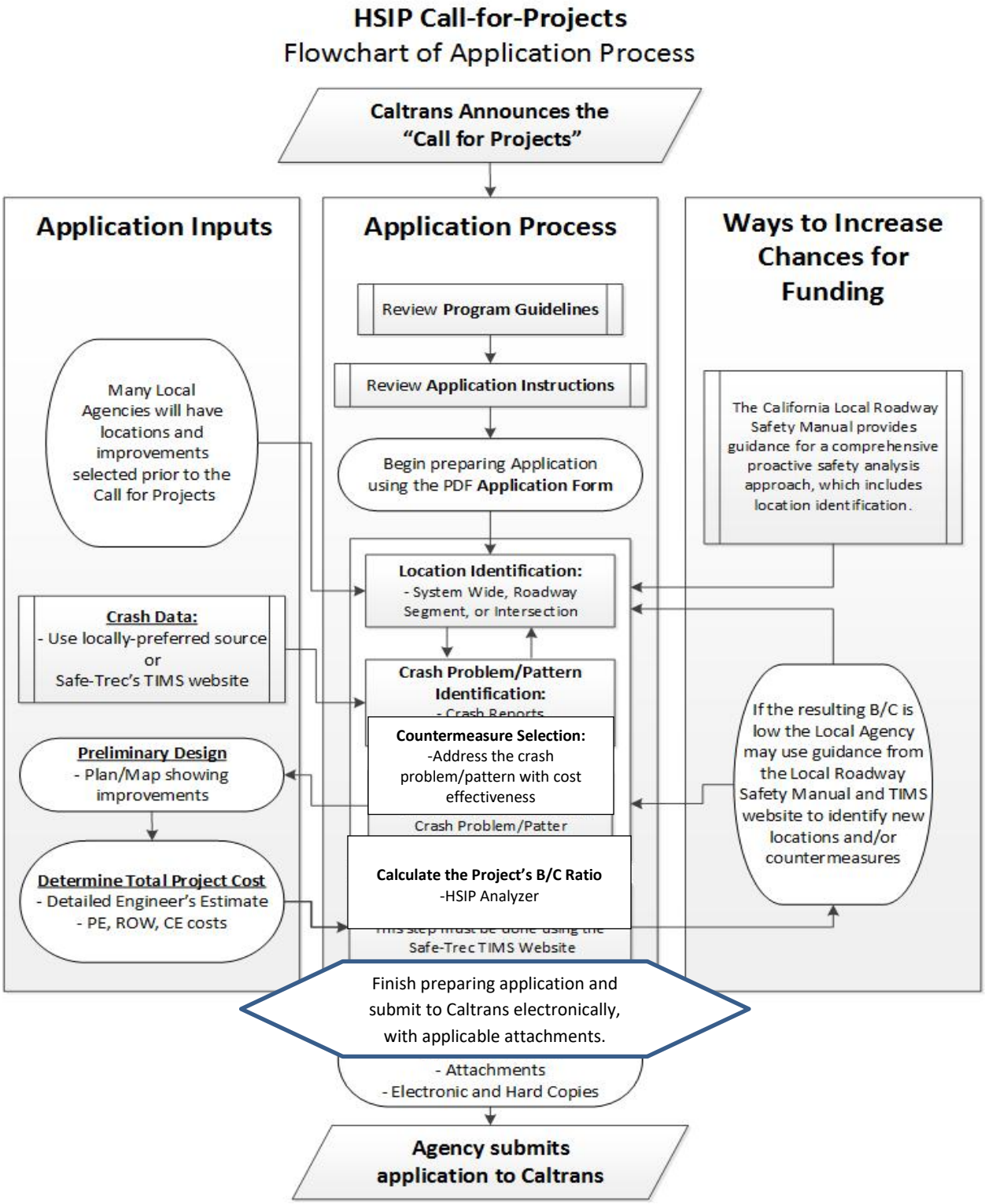
In order to perform the assessment, it is necessary to collect the required information for a certain period after strategies have been deployed at the locations. The time period varies, but whenever possible, 3 to 5 years is recommended to reduce the effects of the random nature of roadway crashes (i.e., Regression to the Mean). The information required may consist of public input and complaints, police reports, observations from maintenance crews, and local and State crash data.

It is important to keep the list of safety installations up-to-date since it will serve as a record of countermeasure deployment history (see table below for an example). By using this type of system, assessment dates can be scheduled to review the crashes and other pertinent information on segments where roadway countermeasures have been installed. Making "after" assessments will inform the practitioner on the effectiveness of past improvements and can provide data to help justify the value of continuing and expanding the local agency's safety program in the future.

Location	Type of Countermeasure Installed	Date Installed	Crashes Before (Duration and Severity)	Crashes After (Duration and Severity)	Comments

Recommended Action: Develop a spreadsheet or database to track future safety project installations and record 3 or more years of "before" and "after" crash information at those locations. Once safety countermeasures are constructed, schedule and track assessment dates to ensure they happen.

Appendix A: HSIP Call-for-Projects Process



Appendix B: Detailed Tables of Countermeasures

The intent of the information contained in this appendix is to provide local agency safety practitioners with a list of effective countermeasures that are appropriate remedies to many common safety issues. The tables in Section 4.2 present a quick summary of the specific values that the Caltrans Division of Local Assistance uses to assess and select projects for its calls- for-projects. In addition to the same information as in Section 4.2, this appendix also includes notes for Caltrans HSIP calls-for-projects and "General information" regarding where the countermeasure should be used, why it works, the general qualities that can be used to suggest the potential complexity of installation, and information from FHWA CMF Clearinghouse on the type of crashes where the countermeasure is best used and a range of their expected overall effectiveness.

The countermeasures have been sorted into 3 categories: Signalized Intersection, Non-Signalized Intersection, and Roadway Segment. Pedestrian and bicycle related countermeasures have been included in each of these categories.

Caltrans gives careful consideration to the fair application of its calls-for-projects process. Starting in 2012, the award of safety funding has been solely based on a determined benefit-to-cost ratio for each project. The fixed set of countermeasures and CRFs included in these tables are intended to allow for all projects to be evaluated consistently and fairly throughout the project selection process. However, at this time, there are no CRFs/CMFs available for several safety improvements, such as: "dynamic/variable speed regulatory signs", "non-motorized signs and markings (regulatory and warning)", "Square-up (reduce curve radius) turn lanes" and non-infrastructure elements. These safety improvement items can be included in project applications, but they will not be included into the B/C ratio calculations, unless the safety improvements meet the intent of other separate countermeasures included in the attached lists. Caltrans is interested in adding these countermeasures (and many others) to these tables once CRFs/CMFs have been established. Caltrans will continue to periodically update this list of allowable countermeasures and CRFs as new safety research data becomes available. With this in mind, Caltrans is interested in feedback and suggestions from local agency safety practitioners on the overall countermeasure list as well as specific details of individual countermeasures, including locally developed safety effectiveness information.

Caltrans used the following references to assist its team in developing the information shown in the following tables. Safety Practitioners are encouraged to utilize these references for a more expansive list of countermeasures and CRFs / CMFs.

The Crash Modification Factors Clearinghouse
https://www.cmfclearinghouse.org/

NCHRP Report 500 Series: Volumes 4, 5, 6, 7, 10, 12, 13, and others
https://www.trb.org/Main/Blurbs/152868.aspx

Highway Safety Manual (HSM)
http://www.highwaysafetymanual.org

Pedestrian and Bicycle - Tools to Diagnose and Solve the Problem
https://safety.fhwa.dot.gov/ped_bike/tools_solve/

FHWA Local and Rural Road / Training, Tools, Guidance and Countermeasures for Locals
https://safety.fhwa.dot.gov/local_rural/training/

For each countermeasure (CM):

(Title) CM No., CM Name

- CM No. is
  - S01 through S21PB for Intersection Countermeasures – Signalized,
  - NS01 through NS23PB for Intersection Countermeasures – Unsignalized, or
  - R01 through R38 for Roadway Countermeasures.

For HSIP Calls-for-projects:

- **Funding Eligibility -** 90% or 50%.
- **Crash Types Addressed -** "All", "Pedestrian and Bicycle", "Night", "Emergency Vehicle", or "Animal".
- **CRF -** Crash Reduction Factor used for HSIP calls-for-projects.
- **Expected Life -** 10 years or 20 years.
- **Notes -** Specific requirements are provided for utilizing the countermeasure on applications for Caltrans statewide calls-for-projects.
-

General Information:

- **Where to use** – Roadway segments and intersections with specific common characteristics can be addressed with similar countermeasures that are most effective.
- **Why it works** – A discussion of the benefit of a countermeasure is important to determine its appropriateness in addressing certain roadway crash types at areas with specific issues as determined by the data and roadway features.
- **General Qualities (Time, Cost and Effectiveness)** – This category is more subjective and can vary substantially. 'Time' refers to the approximate relative time it can take to implement the countermeasure. Costs can vary considerably due to local conditions, so 'cost' represents the relative cost of applying a countermeasure. A relative overall 'effectiveness' is also provided for some countermeasures. All of this subjective information may not be applicable to the unique circumstances for the agency and should not be utilized without verification by the safety practitioner.

- **FHWA CMF Clearinghouse**

- **Crash Types Addressed** – In order to effectively reduce the number and severity of roadway crashes, it is necessary to match countermeasures to the crash types they are intended to address. Depending on the type of problem, one or more of a range of countermeasures could be the most effective way to reduce the number and severity of future crashes.
- **Crash Reduction Factor** – The crash reduction factor (CRF) is an indication of the effectiveness of a particular treatment, measured by the percentage of crashes it is expected to reduce. Note: As mentioned earlier in this section, the effectiveness of a countermeasure can also be expressed as a Crash Modification Factor (CMF), which is defined mathematically as 1 – CRF. However, this document uses CRFs as they can be more insightful when analyzing roadways for potential "reductions" in crashes. There is a range of CRF values that exist for each of the countermeasures (or similar countermeasures). The range of CRFs is provided to give local safety practitioners a clear understanding that they may need to go to the FHWA CMF Clearinghouse to find the most appropriate countermeasure and CRF for their specific projects and local prioritization.

B.1 Intersection Countermeasures – Signalized

S01, Add intersection lighting (Signalized Intersection => S.I.)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	"night" crashes	40%	20 years
Notes:	This CM only applies to "night" crashes (all types) occurring within limits of the proposed roadway lighting 'engineered' area.		

General information				
Where to use:				
Signalized intersections that have a disproportionate number of night-time crashes and do not currently provide lighting at the intersection or at its approaches. Crash data should be studied to ensure that safety at the intersection could be improved by providing lighting (this strategy would be supported by a significant number of crashes that occur at night).				
Why it works:				
Providing lighting at the intersection itself, or both at the intersection and on its approaches, improves the safety of an intersection during nighttime conditions by (1) making drivers more aware of the surroundings at an intersection, which improves drivers' perception-reaction times, (2) enhancing drivers' available sight distances, and (3) improving the visibility of non-motorists. Intersection lighting is of particular benefit to non-motorized users. Lighting not only helps them navigate the intersection, but also helps drivers see them better.				
General Qualities (Time, Cost and Effectiveness):				
A lighting project can usually be completed relatively quickly, but generally requires at least 1 year to implement because the lighting system must be designed and the provision of electrical power must be arranged. The provision of lighting involves both a fixed cost for lighting installation and an ongoing maintenance and power cost which results in a moderate to high cost. Some locations can result in high B/C ratios, but due to higher costs, these projects often result in medium to low B/C ratios.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Night, All	CRF:	20-74%

S02, Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	15%	10 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the upgraded signals. This CM does not apply to improvements like "battery backup systems", which do not provide better intersection/signal visibility or help drivers negotiate the intersection (unless applying past crashes that occurred when the signal lost power). If new signal mast arms are part of the proposed project, CM "S2" should not be used and the signal improvements would be included under CM "S7".		

General information				
Where to use:				
Signalized intersections with a high frequency of right-angle and rear-end crashes occurring because drivers are unable to see traffic signals sufficiently in advance to safely negotiate the intersection being approached. Signal intersection improvements include new LED lighting, signal back plates, retro-reflective tape outlining the back plates, or visors to increase signal visibility, larger signal heads, relocation of the signal heads, or additional signal heads.				
Why it works:				
Providing better visibility of intersection signals aids the drivers' advance perception of the upcoming intersection. Visibility and clarity of the signal should be improved without creating additional confusion for drivers.				
General Qualities (Time, Cost and Effectiveness):				
Installation costs and time should be minimal as these type strategies are classified as low cost and implementation does not typically require the approval process normally associated with more complex projects. When considered at a single location, these low cost improvements are usually funded through local funding by local maintenance crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in low to moderate cost projects that are more appropriate to seek state or federal funding.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Rear-End, Angle	CRF:	0-46%

S03, Improve signal timing (coordination, phases, red, yellow, or operation)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
50%	All	15%	10 years

Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new signal timing. For projects coordination signals along a corridor, the crashes related to side-street movements should not be applied. This CM does not apply to projects that only 'study' the signal network and do not make physical timing changes, including corridor operational studies and improvements to Traffic Operation Centers (TOCs). In Caltrans calls for projects, this CM has a HSIP reimbursement ratio of 50%, considering that it will improve the signal operation rather than merely the safety.

General information
Where to use:
Locations that have a crash history at multiple signalized intersections. Signalization improvements may include adding phases, lengthening clearance intervals, eliminating or restricting higher-risk movements, and coordinating signals at multiple locations. Understanding the corridor or roadway's crash history can provide insight into the most appropriate strategy for improving safety.
Why it works:
Certain timing, phasing, and control strategies can produce multiple safety benefits. Sometimes capacity improvements come along with the safety improvements and other times adverse effects on delay or capacity occur. Corridor improvements often have the highest benefit but may take longer to implement. Projects focused on capacity improvements (without a separate focus on signal timing safety needs) may not result in a reduction in future crashes.
General Qualities (Time, Cost and Effectiveness):
In general, these low-cost improvements to multiple signalized intersections can be implemented in a short time. Typically these low cost improvements are funded through local funding by local maintenance crews. However, some projects requiring new interconnect infrastructure can have moderate to high costs making them more appropriate to seek state or federal funding. The expected effectiveness of this CM must be assessed for each individual project.

FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	0 - 41%

~~S04, Provide Advanced Dilemma-Zone Detection for high speed approaches~~

~~For HSIP Cycle 11 Call-for-projects~~			
~~Funding Eligibility~~	~~Crash Types Addressed~~	~~CRF~~	~~Expected Life~~
~~90%~~	~~All~~	~~40%~~	~~10 years~~

~~Notes:~~	~~This CM only applies to crashes occurring on the approaches / influence area of the new detection and signal timing.~~

~~General information~~
~~**Where to use:**~~
~~More rural/remote areas that have a high frequency of right-angle and rear-end crashes. The Advanced Dilemma Zone Detection system enhances safety at signalized intersections by modifying traffic control signal timing to reduce the number of drivers that may have difficulty deciding whether to stop or proceed during a yellow phase. This may reduce rear-end crashes associated with unsafe stopping and angle crashes due to illegally continuing into the intersection during the red phase.~~
~~**Why it works:**~~
~~Clearance times provide safe, orderly transitions in ROW assignment between conflicting streams of traffic. An Advanced Dilemma Zone Detection system has several benefits relative to traditional multiple detector systems, which have upstream detection for vehicles in the dilemma zone but do not take the speed or size of individual vehicles into account. These benefits include: Reducing the frequency of red-light violations; Reducing the frequency of crashes associated with the traffic signal phase change (for example, rear-end and angle crashes); Reducing delay and stop frequency on the major road and a reduction in overall intersection delay.~~
~~**General Qualities (Time, Cost and Effectiveness):**~~
~~Installation costs should be low and the time to implement short. Additional modifications to the traffic signal controller may also necessary. In general, This CM can be very effective and can be considered on a systematic approach. Video detection equipment is now available for this purpose, making installation and maintenance more efficient.~~

~~**FHWA CMF Clearinghouse:**~~	~~Crash Types Addressed:~~	~~All~~	~~CRF:~~	~~39%~~

S05, Install emergency vehicle pre-emption systems

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Emergency Vehicle - only	70%	10 years
Notes:	This CM only applies to "E.V." crashes occurring on the approaches / influence area of the new pre-emption system.		

General information
Where to use:
Corridors that have a history of crashes involving emergency response vehicles. The target of this strategy is signalized intersections where normal traffic operations impede emergency vehicles and where traffic conditions create a potential for conflicts between emergency and nonemergency vehicles. These conflicts could lead to almost any type of crash, due to the potential for erratic maneuvers of vehicles moving out of the paths of emergency vehicles
Why it works:
Providing emergency vehicle preemption capability at a signal or along a corridor can be a highly effective strategy in two ways; any type of crash could occur as emergency vehicles try to navigate through intersections and as other vehicles try to maneuver out of the path of the emergency vehicles. In addition, a signal preemption system can decrease emergency vehicle response times therefore decreasing the time in receiving emergency medical attention, which is critical in the outcome of any crash. When data is not available for past crashes with emergency vehicles, an agency may consider combining the E.V. pre-emption improvements into a comprehensive project that also makes significant signal hardware and/or signal timing improvements.
General Qualities (Time, Cost and Effectiveness):
Costs for installation of a signal preemption system will vary from medium to high, based upon the number of signalized intersections at which preemption will be installed and the number of emergency vehicles to be outfitted with the technology. The number of detectors, a requirement for new signal controllers, and the intricacy of the preemption system could increase costs. This CM is considered systemic as it is usually implemented on a corridor-basis.

FHWA CMF Clearinghouse:	Crash Types Addressed:	Emergency Vehicle - only	CRF:	70%

S06, Install left-turn lane and add turn phase (signal has no left-turn lane or phase before)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	55%	20 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new left turn lanes. This CM does NOT apply to converting a single-left into double-left turn.		

General information
Where to use:
Intersections that do not currently have a left turn lane or a related left-turn phase that are experiencing a large number of crashes. Many intersection safety problems can be traced to difficulties in accommodating left-turning vehicles, in particular where there is currently no accommodation for left turning traffic. A key strategy for minimizing collisions related to left-turning vehicles (angle, rear-end, sideswipe) is to provide exclusive left-turn lanes and the appropriate signal phasing, particularly on high-volume and high-speed major-road approaches. Agencies need to document their consideration of the MUTCD, Section 4D.19 guidelines; the section on implementing protected left-turn phases.
Why it works:
Left-turn lanes allow separation of left-turn and through-traffic streams, thus reducing the potential for rear-end collisions. Left-turn phasing also provides a safer opportunity for drivers to make a left-turn. The combination of left-turn storage and a left turn signal has the potential to reduce many collisions between left-turning vehicles and through vehicles and/or non-motorized road users.
General Qualities (Time, Cost and Effectiveness):
Implementation time may vary from months to years. At some locations, left-turn lanes can be quickly installed simply by restriping the roadway. At other locations, widening of the roadway, acquisition of additional right-of-way, and extensive environmental processes may be needed. Such projects require a substantial time for development and construction. Costs are highly variable and range from very low to high. Installing a protected left turn lane and phase where none exists results in a high Crash Reduction Factor and is often highly effective.

FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	17 - 58 %

S07, Provide protected left turn phase (left turn lane already exists)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	30%	20 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new left turn phases. This CM does NOT apply to converting a single-left into double-left turn (unless the single left is unprotected and the proposed double left will be protected).		

General information				
Where to use:				
Signalized intersections (with existing left turns pockets) that currently have a permissive left-turn or no left-turn protection that have a high frequency of angle crashes involving left turning, opposing through vehicles, and non-motorized road users. A properly timed protected left-turn phase can also help reduce rear-end and sideswipe crashes between left-turning vehicles and the through vehicles as well as vehicles behind them. Protected left-turn phases are warranted based on such factors as turning volumes, delay, visibility, opposing vehicle speed, distance to travel through the intersection, presence of non-motorized road users, and safety experience of the intersections. Agencies need to document their consideration of the MUTCD, Section 4D.19 guidelines; the section on implementing protected left-turn phases.				
Why it works:				
Left turns are widely recognized as the highest-risk movements at signalized intersections. Providing Protected left-turn phases (i.e., the provision for a specific phase for a turning movement) for signalized intersections with existing left turn pockets significantly improve the safety for left-turn maneuvers by removing the need for the drivers to navigate through gaps in oncoming/opposing through vehicles. Where left turn pockets are not protected, the pedestrian and bicyclist crossing phase often conflicts with these left turn maneuvers. Drivers focused on navigating the gaps of oncoming cars may not anticipate and/or perceive the non-motorized road users.				
General Qualities (Time, Cost and Effectiveness):				
If the existing traffic signal only requires a minor modification to allow for a protected left-turn phase, then the cost would also be low. The time to implement this countermeasure is short because there is no actual construction that has to take place. In-house signal maintainers can perform this operation once the proper signal phasing is determined so the cost is low. In addition, the countermeasure is tried and proven to be effective. Has the potential of being applied on a systemic/systematic approach.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Rear-End, Sideswipe, Broadside	CRF:	16 - 99%

S08, Convert signal to mast arm (from pedestal-mounted)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	30%	20 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the converted signal heads that are relocated from median and/or outside shoulder pedestals to signal heads on master arms over the travel-lanes. Projects using CM "S7" should not also apply "S2" in the B/C calc.		

General information				
Where to use:				
Intersections currently controlled by pedestal mounted traffic signals (in medians and/or on outside shoulder) that have a high frequency of right-angle and rear-end crashes occurring because drivers are unable to see traffic signals in advance to safely negotiate the intersection. Intersections that have pedestal-mounted signals may have poor visibility and can result in vehicles not being able to stop in time for a signal change. Care should be taken to place the new signal heads (with back plates) as close to directly over the center of the travel lanes as possible.				
Why it works:				
Providing better visibility of intersection signs and signals aids the drivers' advance perception of the upcoming intersection. Visibility and clarity of the signal should be improved without creating additional confusion or distraction for drivers.				
General Qualities (Time, Cost and Effectiveness):				
Dependent on the scope of the project. Costs are generally moderate for this type of project. There is usually no right-of-way costs, minimal roadway reconstruction costs, and a shorter project development timeline. At the same time, new mast arms can be expensive. Some locations can result in high B/C ratios, but due to moderate costs, some locations may result in medium to low B/C ratios.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Rear-End, Angle	CRF:	12 - 74%

S09, Install raised pavement markers and striping (Through Intersection)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	10%	10 years
Notes:	This CM only applies to crashes occurring in the intersection and influence areas of the new pavement markers and/or markings.		

General information				
Where to use:				
Intersections where the lane designations are not clearly visible to approaching motorists and/or intersections noted as being complex and experiencing crashes that could be attributed to a driver's unsuccessful attempt to navigate the intersection. Driver confusion can exist in regard to choosing the proper turn path or where through-lanes do not line up. This is especially relevant at intersections where the overall pavement area of the intersection is large, and multiple turning lanes are involved or other unfamiliar elements are presented to the driver.				
Why it works:				
Adding clear pavement markings can guide motorists through complex intersections. When drivers approach and traverse through complex intersections, drivers may be required to perform unusual or unexpected maneuvers. Providing more effective guidance through an intersection will minimize the likelihood of a vehicle leaving its appropriate lane and encroaching upon an adjacent lane.				
General Qualities (Time, Cost and Effectiveness):				
Costs of implementing this strategy will vary based on the scope and number of applications. Applying raised pavement markers is relatively low cost but can be variable and determined largely by the material used for pavement markings (paint, thermoplastic, epoxy, RPMs etc.). When using this type delineators, an issue of concern is the cost-to-service-life of the material. (Note: When HSIP safety funding is used for these installations in high-wear-locations, the local agency is expected to maintain the improvement for a minimum of 10 years.) When considered at a single location, these low cost improvements are usually funded through local funding by local maintenance crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Wet, Night, All	CRF:	10 - 33%

S10, Install flashing beacons as advance warning (S.I.)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	30%	10 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new flashing beacons.		

General information				
Where to use:				
At signalized intersections with crashes that are a result of drivers being unaware of the intersection or are unable to see the traffic control device in time to comply.				
Why it works:				
Increased driver awareness of an approaching signalized intersection and an increase in the driver's time to react. Driver awareness of both downstream intersections and traffic control devices is critical to intersection safety. Crashes often occur when the driver is unable to perceive an intersection, signal head or the back of a stopped queue in time to react. Advance flashing beacons can be used to supplement and call driver attention to intersection control signs. Most advance warning flashing beacons can be powered by solar, thus reducing the issues relating to power source.				
General Qualities (Time, Cost and Effectiveness):				
Before choosing this CM, the agency needs to confirm the ability to provide power to the site (solar may be an option). Flashing beacons can be constructed with minimal design, environmental and right-of-way issues and have relatively low costs. This combined with a relatively high CRF, can result in high B/Cs for locations with a history of crashes and lead to a high effectiveness.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Rear End, Angle	CRF:	36 - 62%

S11, Improve pavement friction (High Friction Surface Treatments)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	55%	10 years
Notes:	This CM only applies to crashes occurring within the limits of the improved friction overlay. This CM is not intended to apply to standard chip-seal or open-graded maintenance projects for long segments of corridors or structure repaving projects intended to fix failed pavement.		

General information				
Where to use:				
Nationally, this countermeasure is referred to as "High Friction Surface Treatments" or HFST. Signalized Intersections noted as having crashes on wet pavements or under dry conditions when the pavement friction available is significantly less than needed for the actual roadway approach speeds. This treatment is intended to target locations where skidding and failure to stop is determined to be a problem in wet or dry conditions and the target vehicle is unable to stop due to insufficient skid resistance.				
Why it works:				
Improving the skid resistance at locations with high frequencies of wet-road crashes and/or failure to stop crashes can result in reductions of 50 percent for wet-road crashes and 20 percent for total crashes. Applying HFST can double friction numbers, e.g. low 40s to high 80s. This CM represents a special focus area for both FHWA and Caltrans, which means there are extra resources available for agencies interested in more details on High Friction Surface Treatment projects.				
General Qualities (Time, Cost and Effectiveness):				
This strategy can be relatively inexpensive and implemented in a short timeframe. The installation would be done by either agency personnel or contractors and can be done by hand or machine. In general, This CM can be very effective and can be considered on a systematic approach.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Wet, Night, ALL	CRF:	10 - 62 %

S12, Install raised median on approaches (S.I.)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	25%	20 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new raised median. All new raised medians funded with HSIP funding should not include the removal of the existing roadway structural section and should be doweled into the existing roadway surface. This requirement is being implemented to maximize the safety-effectiveness of the limited HSIP funding and to minimize project impacts. Landscaping, if included in the project, is considered non-participating.		

General information				
Where to use:				
Intersections noted as having turning movement crashes near the intersection as a result of insufficient access control. Application of this CM should be based on current crash data and a clearly defined need to restrict or accommodate the movement.				
Why it works:				
Raised medians next to left-turn lanes at intersections offer a cost-effective means for reducing crashes and improving operations at higher volume intersections. The raised medians prohibit left turns into and out of driveways that may be located too close to the functional area of the intersection.				
General Qualities (Time, Cost and Effectiveness):				
Raised medians at intersections may be most effective in retrofit situations where high volumes of turning vehicles have degraded operations and safety, and where more extensive CMs would be too expensive because of limited right-of-way and the constraints of the built environment. The result is This CM can be very effective and can be considered on a systematic approach. Raised medians can often be installed directly over the existing pavement. When agencies opt to install landscaping in conjunction with new raised medians, the portion of the cost for landscaping and other non-safety related items that exceeds 10% of the project total cost is not federally participated and must be funded by the applicant.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Angle	CRF:	21 -55 %

S13PB, Install pedestrian median fencing on approaches

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Pedestrian and Bicycle	35%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring on the approaches/influence area of the new pedestrian median fencing.		

General information				
Where to use:				
Signalized Intersections with high pedestrian-generators nearby (e.g. transit stops) may experience a high volumes of pedestrians J-walking across the travel lanes at mid-block locations instead of walking to the intersection and waiting to cross during the walk-phase. When this safety issue cannot be mitigated with signal timing and shoulder/sidewalk treatments, then installing a continuous pedestrian barrier in the median may be a viable solution.				
Why it works:				
Adding pedestrian median fencing has the opportunity to enhance pedestrian safety at locations noted as being problematic involving pedestrians running/darting across the roadway outside the intersection crossings. Pedestrian median fencing can significantly reduce this safety issue by creating a positive barrier, forcing pedestrians to the designated pedestrian crossing.				
General Qualities (Time, Cost and Effectiveness):				
Costs associated with this strategy will vary widely depending on the type and placement of the median fencing. Impacts to transit and other land uses may need to be considered and controversy can delay the implementation. In general, this CM can be effective as a spot-location approach.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian, Bicycle	CRF:	25- 40%

S14, Create directional median openings to allow (and restrict) left-turns and U-turns (S.I.)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	50%	20 years
Notes:	This CM only applies to crashes occurring in the intersection / influence area of the new directional openings.		

General information				
Where to use:				
Crashes related to turning maneuvers include angle, rear-end, pedestrian, and sideswipe (involving opposing left turns) type crashes. If any of these crash types are an issue at an intersection, restriction or elimination of the turning maneuver may be the best way to improve the safety of the intersection.				
Why it works:				
Restricting turning movement into and out of an intersection can help reduce conflicts between through and turning traffic. The number of access points, coupled with the speed differential between vehicles traveling along the roadway, contributes to crashes. Affecting turning movements by either allowing them or restricting them, based on the application, can ensure safe movement of traffic.				
General Qualities (Time, Cost and Effectiveness):				
Turn prohibitions that are implemented by closing a median opening can be implemented quickly. The cost of this strategy will depend on the treatment. Impacts to businesses and other land uses must be considered and controversy can delay the implementation. In general, This CM can be very effective and can be considered on a systematic approach.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	51%

S15, Reduced Left-Turn Conflict Intersections (S.I.)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	50%	20 years
Notes:	This CM only applies to crashes occurring in the intersection / influence area of the new Reduced Left-Turn Conflict.		

General information

Where to use and Why it works:

Reduced left-turn conflict intersections are geometric designs that alter how left-turn movements occur in order to simplify decisions and minimize the potential for related crashes. Two highly effective designs that rely on U-turns to complete certain left-turn movements are known as the restricted crossing U-turn (RCUT) and the median U-turn (MUT).

Restricted Crossing U-turn (RCUT):

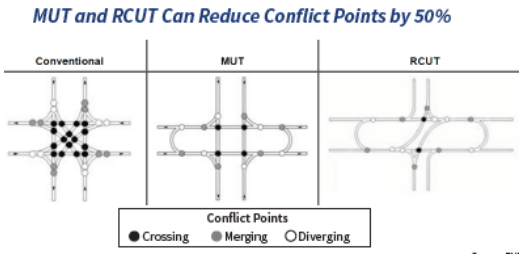
The RCUT intersection modifies the direct left-turn and through movements from cross-street approaches. Minor road traffic makes a right turn followed by a U-turn at a designated location (either signalized or unsignalized) to continue in the desired direction.

The RCUT is suitable for a variety of circumstances, including along rural, high-speed, four-lane, divided highways or signalized routes. It also can be used as an alternative to signalization or constructing an interchange. RCUTs work well when consistently used along a corridor, but also can be used effectively at individual intersections.

Median U-turn (MUT)

The MUT intersection modifies direct left turns from the major approaches. Vehicles proceed through the main intersection, make a U-turn a short distance downstream, followed by a right turn at the main intersection. The U-turns can also be used for modifying the cross-street left turns.

The MUT is an excellent choice for heavily traveled intersections with moderate left-turn volumes. When implemented at multiple intersections along a corridor, the efficient two-phase signal operation of the MUT can reduce delay, improve travel times, and create more crossing opportunities for pedestrians and bicyclists.



General Qualities (Time, Cost and Effectiveness):

Implementing this strategy may take from months to years, depending on whether additional R/W is required. Such projects require a substantial time for development and construction. Costs are highly variable and range from very low to high. The expected effectiveness of this CM must be assessed for each individual location.

FHWA CMF Clearinghouse:	Crash Types Addressed:	Angle/Left-turn/Rear-End/All	CRF:	34.8-100%

S16, Convert intersection to roundabout (from signal)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	Varies	20 years
Notes:	This CM only applies to crashes occurring in influence area of the new roundabout. This CM is not intended for mini-roundabouts. The benefit of this CM is calculated using Caltrans procedure. The CRF is dependent on the ADT, project location (Rural/Urban) and the roundabout type (1 lane or 2 lanes). The benefit comes from both the reduction in the number and the severity of the crashes.		

General information				
Where to use:				
Signalized intersections that have a significant crash problem and the only alternative is to change the nature of the intersection itself. Roundabouts can also be very effective at intersections with complex geometry and intersections with frequent left-turn movements.				
Why it works:				
The types of conflicts that occur at roundabouts are different from those occurring at conventional intersections; namely, conflicts from crossing and left-turn movements are not present in a roundabout. The geometry of a roundabout forces drivers to reduce speeds as they proceed through the intersection. This helps keep the range of vehicle speed narrow, which helps reduce the severity of crashes when they do occur. Pedestrians only have to cross one direction of traffic at a time at roundabouts, thus reducing their potential for conflicts.				
General Qualities (Time, Cost and Effectiveness):				
Provision of a roundabout requires substantial project development. The need to acquire right-of-way is likely and will vary from site to site and depends upon the geometric design. These activities may require up to 4 years or longer to implement. Costs are variable, but construction of a roundabout to replace an existing signalized intersection are relatively high. The result is this CM may have reduced relative-effectiveness compared to other CMs.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	35 - 67%

S17PB, Install pedestrian countdown signal heads

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Pedestrian and Bicycle	25%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the intersection/crossing with the new countdown heads.		

General information				
Where to use:				
Signals that have signalized pedestrian crossing with walk/don't walk indicators and where there have been pedestrian vs. vehicle crashes.				
Why it works:				
A pedestrian countdown signal contains a timer display and counts down the number of seconds left to finish crossing the street. Countdown signals can reassure pedestrians who are in the crosswalk when the flashing "DON'T WALK" interval appears that they still have time to finish crossing. Countdown signals begin counting down either when the "WALK" or when the flashing "DON'T WALK" interval appears and stop at the beginning of the steady "DON'T WALK" interval. These signals also have been shown to encourage more pedestrians to use the pushbutton rather than jaywalk.				
General Qualities (Time, Cost and Effectiveness):				
Costs and time of installation will vary based on the number of intersections included in this strategy and if it requires new signal controllers capable of accommodating the enhancement. When considered at a single location, these low cost improvements are usually funded through local funding by local crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian, Bicycle	CRF:	25%

S18PB, Install pedestrian crossing (S.I.)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Pedestrian and Bicycle	25%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the intersection/crossing with the new crossing. This CM is not intended to be used for high-cost aesthetic enhancements to intersection crosswalks (i.e. stamped concrete or stamped asphalt).		

General information
Where to use:
Signalized Intersections with no marked crossing and pedestrian signal heads, where pedestrians are known to be crossing intersections that involve significant turning movements. They are especially important at intersections with (1) multiphase traffic signals, such as left-turn arrows and split phases, (2) school crossings, and (3) double-right or double-left turns. At signalized intersections, pedestrian crossings are often safer when the left turns have protected phases that do not overlap the pedestrian walk phase.
Why it works:
Adding pedestrian crossings has the opportunity to enhance pedestrian safety at locations noted as being problematic. Nearly one-third of all pedestrian-related crashes occur at or within 50 feet of an intersection. Of these, 30 percent may involve a turning vehicle. Another 22 percent of pedestrian crashes involve a pedestrian either running across the intersection or darting out in front of a vehicle whose view was blocked just prior to the impact. Finally, 16 percent of these intersection-related crashes occur because of a driver violation (e.g., failure to yield right-of-way). When agencies opt to install aesthetic enhancement to intersection crosswalks like stamped concrete/asphalt, the project design and construction costs can significantly increase. For HSIP applications, these costs must be accounted for in the B/C calculation, but these costs (over standard crosswalk markings) must be tracked separately and are not federally reimbursable and will increase the agency's local-funding share for the project costs.
General Qualities (Time, Cost and Effectiveness):
Costs associated with this strategy will vary widely, depending if curb ramps and sidewalk modifications are required with the crossing. When considered at a single location, these low cost improvements may be funded through local funding by local crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate to high cost projects that are appropriate to seek state or federal funding.

FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian, Bicycle	CRF:	25%

S19PB, Pedestrian Scramble

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Pedestrian and Bicycle	40%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the intersection with the new pedestrian crossing.		

General information
Where to use:
Pedestrian Scramble is a form of pedestrian "WALK" phase at a signalized intersection in which all vehicular traffic is required to stop, allowing pedestrians/bicyclists to safely cross through the intersection in any direction, including diagonally. Pedestrian Scramble may be considered at signalized intersections with very high pedestrian/bicycle volumes, e.g. in an urban business district.
Why it works:
Pedestrian Scramble has been shown to reduce injury risk and increase bicycle ridership due to its perceived safety and comfort.
General Qualities (Time, Cost and Effectiveness):
Not involving any additional R/W, Pedestrian Scramble should not require a long development process and should be implemented reasonably soon. A systemic approach may be used in implementing this CM, resulting in cost efficiency with low to moderate cost.

FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian, Bicycle	CRF:	-10% to 51%

S20PB, Install advance stop bar before crosswalk (Bicycle Box)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Pedestrian and Bicycle	15%	10 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the intersection-crossing with the new advanced stop bars.		

General information				
Where to use:				
Signalized Intersections with a marked crossing, where significant bicycle and/or pedestrians volumes are known to occur.				
Why it works:				
Adding advance stop bar before the striped crosswalk has the opportunity to enhance both pedestrian and bicycle safety. Stopping cars well before the crosswalk provides a buffer between the vehicles and the crossing pedestrians. It also allows for a dedicated space for cyclists, making them more visible to drivers (This dedicated space is often referred to as a bike-box.)				
General Qualities (Time, Cost and Effectiveness):				
Costs and time of installation will vary based on the number of intersections included in this strategy and if it requires new signal controllers capable of accommodating the enhancement. When considered at a single location, these low cost improvements are usually funded through local funding by local crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian, Bicycle	CRF:	35%

S21PB, Modify signal phasing to implement a Leading Pedestrian Interval (LPI)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Pedestrian and Bicycle	60%	10 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the intersections with signalized pedestrian crossing with the newly implemented Leading Pedestrian Interval (LPI).		

General information				
Where to use:				
Intersections with signalized pedestrian crossing that have high turning vehicles volumes and have had pedestrian vs. vehicle crashes.				
Why it works:				
A leading pedestrian interval (LPI) gives pedestrians the opportunity to enter an intersection 3-7 seconds before vehicles are given a green indication. With this head start, pedestrians can better establish their presence in the crosswalk before vehicles have priority to turn left. LPIs provide (1) increased visibility of crossing pedestrians; (2) reduced conflicts between pedestrians and vehicles; (3) Increased likelihood of motorists yielding to pedestrians; and (4) enhanced safety for pedestrians who may be slower to start into the intersection.				
General Qualities (Time, Cost and Effectiveness):				
Costs for implementing LPIs are very low, since only minor signal timing alteration is required. This makes it an easy and inexpensive countermeasure that can be incorporated into pedestrian safety action plans or policies and can become routine agency practice. When considered at a single location, the LPI is usually local-funded. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian, Bicycle	CRF:	59%

B.2 Intersection Countermeasures – Non-signalized

NS01, Add intersection lighting (NS.I.)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Night	40%	20 years
Notes:	This CM only applies to "night" crashes (all types) occurring within limits of the proposed roadway lighting 'engineered' area.		

General information
Where to use:
Non-signalized intersections that have a disproportionate number of night-time crashes and do not currently provide lighting at the intersection or at its approaches. Crash data should be studied to ensure that safety at the intersection could be improved by providing lighting (this strategy would be supported by a significant number of crashes that occur at night).
Why it works:
Providing lighting at the intersection itself, or both at the intersection and on its approaches, improves the safety of an intersection during nighttime conditions by (1) making drivers more aware of the surroundings at an intersection, which improves drivers' perception-reaction times, (2) enhancing drivers' available sight distances, and (3) improving the visibility of non-motorists. Intersection lighting is of particular benefit to non-motorized users as lighting not only helps them navigate the intersection, but also helps drivers see them better.
General Qualities (Time, Cost and Effectiveness):
A lighting project can usually be completed relatively quickly, but generally requires at least 1 year to implement because the lighting system must be designed and the provision of electrical power must be arranged. The provision of lighting involves both a fixed cost for lighting installation and an ongoing maintenance and power cost. For rural intersections, studies have shown the installation of streetlights reduced nighttime crashes at unlit intersections and can be more effective in reducing nighttime crashes than either rumble strips or overhead flashing beacons. Some locations can result in high B/C ratios, but due to higher costs, these projects often result in medium to low B/C ratios.

FHWA CMF Clearinghouse:	Crash Types Addressed:	Night, All	CRF:	25- 50%

NS02, Convert to all-way STOP control (from 2-way or Yield control)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	50%	10 years
Notes:	This CM only applies to crashes occurring in the intersection and/or influence area of the new control. CA-MUTCD warrant must be met.		

General information
Where to use:
Unsignalized intersection locations that have a crash history and have no controls on the major roadway approaches. However, all-way stop control is suitable only at intersections with moderate and relatively balanced volume levels on the intersection approaches. Under other conditions, the use of all-way stop control may create unnecessary delays and aggressive driver behavior. MUTCD warrants should always be followed.
Why it works:
All-way stop control can reduce right-angle and turning collisions at unsignalized intersections by providing more orderly movement at an intersection, reducing through and turning speeds, and minimizing the safety effect of any sight distance restrictions that may be present. Advance public notification of the change is critical in assuring compliance and reducing crashes.
General Qualities (Time, Cost and Effectiveness):
The costs involved in converting to all-way stop control are relatively low. All-way stop control can normally be implemented at multiple intersections with just a change in signing on intersection approaches, and typically are very quick to implement. When considered at a single location, these low cost improvements are usually funded through local funding by local maintenance crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding.

FHWA CMF Clearinghouse:	Crash Types Addressed:	Left-turn, Angle	CRF:	6 - 80%

NS03, Install signals

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	30%	20 years
Notes:	This CM only applies to crashes occurring in the intersection and/or influence area of the new signals. **All new signals must meet MUTCD "safety" warrants: 4, 5 or 7.** Given the over-arching operational changes that occur when an intersection is signalized, no other intersection CMs can be applied to the intersection crashes in conjunction with this CM.		

General information				
Where to use:				
Traffic signals can be used to prevent the most severe type crashes (right-angle, left-turn). Consideration to signalize an unsignalized intersection should only be given after (1) less restrictive forms of traffic control have been utilized as the installation of a traffic signal often leads to an increased frequency of crashes (rear-end) on major roadways and introduces congestion and (2) signal warrants have been met. Refer to the CA MUTCD, Section 4C.01, Studies and Factors for Justifying Traffic Control Signals.				
Why it works:				
Traffic signals have the potential to reduce the most severe type crashes but will likely cause an increase in rear-end collisions. A reduction in overall injury severity is likely the largest benefit of traffic signal installation.				
General Qualities (Time, Cost and Effectiveness):				
Typical traffic signal costs fall in the medium to high category and are affected by application, type of signal and right-of-away considerations. Projects of this magnitude should only be considered after alternate and lesser means of correction have been evaluated. Some locations can result in high B/C ratios, but due to higher costs, these projects often result in medium to low B/C ratios.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	0 - 74%

NS04, Convert intersection to roundabout (from all way stop)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	Varies	20 years
Notes:	This CM only applies to crashes occurring in the intersection and/or influence area of the new control. The benefit of this CM is calculated using Caltrans procedure. The CRF is dependent on the ADT, project location (Rural/Urban) and the roundabout type (1 lane or 2 lanes). The benefit comes from both the reduction in the number and the severity of the crashes.		

General information				
Where to use:				
Intersections that have a high frequency of right-angle and left-turn type crashes. Whether such intersections have existing crash patterns or not, a roundabout provides an alternative to signalization. The primary target locations for roundabouts should be moderate-volume unsignalized intersections. Roundabouts may not be a viable alternative in many suburban and urban settings where right-of-way is limited.				
Why it works:				
Roundabouts provide an important alternative to signalized and all-way stop-controlled intersections. Modern roundabouts differ from traditional traffic circles in that they operate in such a manner that traffic entering the roundabout must yield the right-of-way to traffic already in it. Roundabouts can serve moderate traffic volumes with less delay than all-way stop-controlled intersections and provide fewer conflict points. Crashes at roundabouts tend to be less severe because of the speed constraints and elimination of left-turn and right-angle movements.				
General Qualities (Time, Cost and Effectiveness):				
Construction of roundabouts are usually relatively costly and major projects, requiring the environmental process, right-of-way acquisition, and implementation under an agency's long-term capital improvement program. (For this reason, roundabouts may not be appropriate for California's Federal Safety Programs that have relatively short delivery requirements.) Even with roundabouts higher costs, they still can have a relatively high effectiveness.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Left-turn, Angle	CRF:	12 - 78 %

NS05, Convert intersection to roundabout (from 2-way stop or Yield control)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	Varies	20 years
Notes:	This CM only applies to crashes occurring in the intersection and/or influence area of the new control. The benefit of this CM is calculated using Caltrans procedure. The CRF is dependent on the ADT, project location (Rural/Urban) and the roundabout type (1 lane or 2 lanes). The benefit comes from both the reduction in the number and the severity of the crashes.		

General information				
Where to use:				
Intersections that have a high frequency of right-angle and left-turn type crashes. Whether such intersections have existing crash patterns or not, a roundabout provides an alternative to signalization. The primary target locations for roundabouts should be moderate-volume unsignalized intersections. Roundabouts may not be a viable alternative in many suburban and urban settings where right-of-way is limited.				
Why it works:				
Roundabouts provide an important alternative to signalized and all-way stop-controlled intersections. Modern roundabouts differ from traditional traffic circles in that they operate in such a manner that traffic entering the roundabout must yield the right-of-way to traffic already in it. Roundabouts can serve moderate traffic volumes with less delay than all-way stop-controlled intersections and provide fewer conflict points. Crashes at roundabouts tend to be less severe because of the speed constraints and elimination of left-turn and right-angle movements.				
General Qualities (Time, Cost and Effectiveness):				
Construction of roundabouts are usually relatively costly and major projects, requiring the environmental process, right-of-way acquisition, and implementation under an agency's long-term capital improvement program. (For this reason, roundabouts may not be appropriate for California's Federal Safety Programs that have relatively short delivery requirements.) Even with roundabouts higher costs, they still can have a relatively high effectiveness.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Left-turn, Angle	CRF:	12 - 78 %

NS05mr, Convert intersection to mini-roundabout

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	30%	20 years
Notes:	This CM only applies to crashes occurring in the intersection and/or influence area of the new control.		

General information				
Where to use:				
Mini-roundabouts are characterized by a small diameter (45-90 ft) and traversable islands (central island and splitter islands). Mini-roundabouts offer most of the benefits of regular roundabouts with the added benefit of a smaller footprint. They are best suited to environments where speeds are already low and environmental constraints would preclude the use of a larger roundabout. Mini-roundabouts are most effective in lower speed environments in which all approaching roadways have posted speed of 30 mph or less and an 85th-percentile speed of less than 35 mph near the proposed yield and/or entrance line. For any location with an 85th-percentile speed above 35 mph, the mini-roundabout can be included as part of a broader system of traffic calming measures to achieve an appropriate speed environment.				
Why it works:				
Mini-roundabouts may be an optimal solution for a safety or operational issue at an existing intersection where there is insufficient right-of-way for a standard roundabout installation. The benefits of mini-roundabouts are the Compact size, operational efficiency, traffic safety improvement and traffic Calming.				
General Qualities (Time, Cost and Effectiveness):				
Construction costs for mini-roundabouts vary widely depending upon the extent of sidewalk modifications or other geometric improvements and the types of materials used. In most cases, mini-roundabouts have been installed with little or no pavement widening and with only minor changes to curbs and sidewalks. Construction costs can be minimum for an installation consisting entirely of pavement markings and signage or moderate for mini-roundabouts that include raised islands and pedestrian improvements.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	NA	CRF:	NA

NS06, Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	15%	10 years
Notes:	This CM only applies to crashes occurring in the influence area of the new signs. The influence area must be determined on a location by location basis.		

General information				
Where to use:				
The target for this strategy should be approaches to unsignalized intersections with patterns of rear-end, right-angle, or turning collisions related to lack of driver awareness of the presence of the intersection.				
Why it works:				
The visibility of intersections and, thus, the ability of approaching drivers to perceive them can be enhanced by installing larger regulatory and warning signs at or prior to intersections. A key to success in applying this strategy is to select a combination of regulatory and warning sign techniques appropriate for the conditions on a particular unsignalized intersection approach.				
General Qualities (Time, Cost and Effectiveness):				
Signing improvements do not require a long development process and can typically be implemented quickly. Costs for implementing this strategy are nominal and depend on the number of signs. When considered at a single location, these low cost improvements are usually funded through local funding by local maintenance crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	11 - 55%

NS07, Upgrade intersection pavement markings (NS.I.)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	25%	10 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new pavement markings. This CM is not intended to be used for general maintenance activities (i.e. the replacement of existing pavement markings in-kind) and must include upgraded safety features over the existing pavement markings and striping.		

General information				
Where to use:				
Unsignalized intersections that are not clearly visible to approaching motorists, particularly approaching motorists on the major road. The strategy is particularly appropriate for intersections with patterns of rear-end, right-angle, or turning crashes related to lack of driver awareness of the presence of the intersection. Also at minor road approaches where conditions allow the stop bar to be seen by an approaching driver at a significant distance from the intersection. Typical improvements include "Stop Ahead" markings and the addition of Centerlines and Stop Bars.				
Why it works:				
The visibility of intersections and, thus, the ability of approaching drivers to perceive them can be enhanced by installing appropriate pavement delineation in advance of and at intersections will provide approaching motorists with additional information at these locations. Providing visible stop bars on minor road approaches to unsignalized intersections can help direct the attention of drivers to the presence of the intersection. Drivers should be more aware that the intersection is coming up, and therefore make safer decisions as they approach the intersection.				
General Qualities (Time, Cost and Effectiveness):				
Pavement marking improvements do not require a long development process and can typically be implemented quickly. Costs for implementing this strategy are nominal and depend on the number of markings. When considered at a single location, these low cost improvements are usually funded through local funding by local maintenance crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding. Note: When federal safety funding is used for these installations in high-wear-locations, the local agency is expected to maintain the improvement for a minimum of 10 years.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	13 - 60%

NS08, Install Flashing Beacons at Stop-Controlled Intersections

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	15%	10 years
Notes:	This CM only applies to crashes occurring on the stop-controlled approaches / influence area of the new beacons.		

General information				
Where to use:				
Flashing beacons can reinforce driver awareness of the Non-Signalized intersection control and can help mitigate patterns of right-angle crashes related to stop sign violations. Post-mounted advanced flashing beacons or overhead flashing beacons can be used at stop-controlled intersections to supplement and call driver attention to stop signs.				
Why it works:				
Flashing beacons provide a visible signal to the presence of an intersection and can be very effective in rural areas where there may be long stretches between intersections as well as locations where night-time visibility of intersections is an issue.				
General Qualities (Time, Cost and Effectiveness):				
Flashing beacons can be constructed with minimal design, environmental and right-of-way issues and have relatively low costs. Before choosing this CM, the agency needs to confirm the ability to provide power to the site (solar may be an option). In general, This CM can be very effective and can be considered on a systematic approach.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Angle, Rear-End	CRF:	5-34%

NS09, Install flashing beacons as advance warning (NS.I.)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	30%	10 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new beacons placed in advance of the intersection.		

General information				
Where to use:				
Non-Signalized Intersections with patterns of crashes that could be related to lack of a driver's awareness of approaching intersection or controls at a downstream intersection.				
Why it works:				
Advance flashing beacons can be used to supplement and call driver attention to intersection control signs. Flashing beacons are intended to reinforce driver awareness of the stop or yield signs and to help mitigate patterns of crashes related to intersection regulatory sign violations. Most advance warning flashing beacons can be powered by solar, thus reducing the issues relating to power source.				
General Qualities (Time, Cost and Effectiveness):				
Use of flashing beacons requires minimal development process, allowing flashing beacons to be installed within a short time period. Before choosing this CM, the agency needs to confirm the ability to provide power to the site (solar may be an option). In general, This CM can be very effective and can be considered on a systematic approach.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Angle, Rear-End	CRF:	36 - 62%

NS10, Install transverse rumble strips on approaches

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	20%	10 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new rumble strips.		

General information				
Where to use:				
Transverse rumble strips are installed in the travel lane for the purposes of providing an auditory and tactile sensation for each motorist approaching the intersection. They can be used at any stop or yield approach intersection, often in combination with advance signing to warn of the intersection ahead. Due to the noise generated by vehicles driving over the rumble strips, care must be taken to minimize disruption to nearby residences and businesses.				
Why it works:				
When motorists are traveling along the roadway, they are sometimes unaware they are approaching an intersection. This is especially true on rural roads, as there may be fewer clues indicating an intersection ahead. Transverse rumble strips warn motorists that something unexpected is ahead that they need to pay attention to.				
General Qualities (Time, Cost and Effectiveness):				
Use of transverse rumble strips requires minimal development process, allowing transverse rumble strips to be installed within a short time period. In general, This CM can be very effective and can be considered on a systematic approach, although care should be taken to not over-use this CM. Note: When federal safety funding is used for these installations in high-wear-locations, the local agency is expected to maintain the improvement for a minimum of 10 years.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	0 - 35%

NS11, Improve sight distance to intersection (Clear Sight Triangles)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	20%	10 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the significantly improved new sight distance. Minor/incidental improvements to sight distance would not likely result in the CRF shown below.		

General information				
Where to use:				
Unsignalized intersections with restricted sight distance and patterns of crashes related to lack of sight distance where sight distance can be improved by clearing roadside obstructions without major reconstruction of the roadway.				
Why it works:				
Adequate sight distance for drivers at stop or yield-controlled approaches to intersections has long been recognized as among the most important factors contributing to overall safety at unsignalized intersections. By removing sight distance restrictions (e.g., vegetation, parked vehicles, signs, buildings) from the sight triangles at stop or yield-controlled intersection approaches, drivers will be able see approaching vehicles on the main line, without obstruction and therefore make better decisions about entering the intersection safely.				
General Qualities (Time, Cost and Effectiveness):				
Projects involving clearing sight obstructions on the highway right-of-way can typically be accomplished quickly, assuming the objects are readily moveable. Clearing sight obstructions on private property requires more time for discussions with the property owner. Costs will generally be low, assuming that in most cases the objects to be removed are within the right-of-way. In general, this CMs can be very effective and can be implemented by agencies' maintenance staff and/or implemented on a systematic approach. Usually only high-cost removals would be good candidates for Caltrans Federal Safety Funding. Note: When federal safety funding is used to remove vegetation that has the potential to grow back, the local agency is expected to maintain the improvement for a minimum of 10 years.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	11 - 56%

NS12, Improve pavement friction (High Friction Surface Treatments)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	55%	10 years
Notes:	This CM only applies to crashes occurring within the limits of the improved friction overlay. This CM is not intended to apply to standard chip-seal or open-graded maintenance projects for long segments of corridors or structure repaving projects intended to fix failed pavement.		

General information				
Where to use:				
Nationally, this countermeasure is referred to as "High Friction Surface Treatments" or HFST. Non-signalized Intersections noted as having crashes on wet pavements or under dry conditions when the pavement friction available is significantly less than needed for the actual roadway approach speeds. This treatment is intended to target locations where skidding and failure to stop is determined to be a problem in wet or dry conditions and the target vehicle is unable to stop due to insufficient skid resistance.				
Why it works:				
Improving the skid resistance at locations with high frequencies of wet-road crashes and/or failure to stop crashes can result in reductions of 50 percent for wet-road crashes and 20 percent for total crashes. Applying HFST can double friction numbers, e.g. low 40s to high 80s. This CM represents a special focus area for both FHWA and Caltrans, which means there are extra resources available for agencies interested in more details on High Friction Surface Treatment projects.				
General Qualities (Time, Cost and Effectiveness):				
This strategy can be relatively inexpensive and implemented in a short timeframe. The installation would be done by either agency personnel or contractors and can be done by hand or machine. In general, This CM can be very effective and can be considered on a systematic approach.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Wet, Night, ALL	CRF:	10 - 62 %

NS13, Install splitter-islands on the minor road approaches

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	40%	20 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of **the new splitter island on the minor road approaches.**		

General information				
Where to use:				
Minor road approaches to unsignalized intersections where the presence of the intersection or the stop sign is not readily visible to approaching motorists. The strategy is particularly appropriate for intersections where the speeds on the minor road are high. In creation of a splitter island allows for an additional stop sign to be placed in the median for the minor approach.				
Why it works:				
The installation of splitter islands allows for the addition of a stop sign in the median to make the intersection more conspicuous. Additionally, the splitter island on the minor-road provides for a positive separation between turning vehicles on the through road and vehicles stopped on the minor road approach.				
General Qualities (Time, Cost and Effectiveness):				
Splitter islands at non-signalized intersections can usually be installed with minimal roadway reconstruction and relatively quickly. In general, This CM can be very effective and can be considered on a systematic approach.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Angle, Rear-End	CRF:	35 - 100 %

NS14, Install raised median on approaches (NS.I.)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	25%	20 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new raised median. All new raised medians funded with federal HSIP funding should not include the removal of the existing roadway structural section and should be doweled into the existing roadway surface. This requirement is being implemented to maximize the safety-effectiveness of the limited HSIP funding and to minimize project impacts. Landscaping, if included in the project, is considered non-participating.		

General information				
Where to use:				
Where related or nearby turning movements affect the safety and operation of an intersection. Effective access management is key to improving safety at, and adjacent to, intersections. The number of intersection access points coupled with the speed differential between vehicles traveling along the roadway often contributes to crashes. Any access points within 250 feet upstream and downstream of an intersection are generally undesirable.				
Why it works:				
Raised medians with left-turn lanes at intersections offer a cost-effective means for reducing crashes and improving operations at higher volume intersections. The raised medians also prohibit left turns into and out of driveways that may be located too close to the functional area of the intersection.				
General Qualities (Time, Cost and Effectiveness):				
Raised medians at intersections may be most effective in retrofit situations where high volumes of turning vehicles have degraded operations and safety, and where more extensive approaches would be too expensive because of limited right-of-way and the constraints of the built environment. Because raised medians limit property access to right turns only, the need for providing alternative access ways should be considered. In general, This CM can be very effective and can be considered on a systematic approach. When agencies opt to install landscaping in conjunction with new raised medians, the portion of the cost for landscaping and other non-safety related items that exceeds 10% of the project total cost is not federally participated and must be funded by the applicant.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	20 - 39 %

NS15, Create directional median openings to allow (and restrict) left-turns and u-turns (NS.I.)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	50%	20 years
Notes:	This CM only applies to crashes occurring in the intersection / influence area of the new directional openings.		

General information				
Where to use:				
Crashes related to turning maneuvers include angle, rear-end, pedestrian, and sideswipe (involving opposing left turns) type crashes. If any of these crash types are an issue at an intersection, restriction or elimination of the turning maneuver may be the best way to improve the safety of the intersection. Because raised medians limit property access to right turns only, they should be used in conjunction with efforts to provide alternative access ways and promote driveway spacing objectives.				
Why it works:				
Agencies are increasingly using access management techniques on urban and suburban arterials to manage the number of conflicts experienced at an intersection. A key element of access management is to restrict certain movements, create directional median openings, or close median openings that are deemed too close to an intersection.				
General Qualities (Time, Cost and Effectiveness):				
Turn prohibitions that are implemented by closing a median opening can usually be implemented quickly. Costs are highly variable but in many cases could be considered low. In some cases this strategy may involve acquiring access or constructing replacement access; those actions will significantly increase the cost of the project. Impacts to businesses and other land uses must be considered and controversy can delay the implementation. In general, This CM can be very effective and can be considered on a systematic approach.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	51%

NS16, Reduced Left-Turn Conflict Intersections (NS.I.)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	50%	20 years
Notes:	This CM only applies to crashes occurring in the intersection / influence area of the new Reduced Left-Turn Conflict.		

General information

Where to use and Why it works:

Reduced left-turn conflict intersections are geometric designs that alter how left-turn movements occur in order to simplify decisions and minimize the potential for related crashes. Two highly effective designs that rely on U-turns to complete certain left-turn movements are known as the restricted crossing U-turn (RCUT) and the median U-turn (MUT).

Restricted Crossing U-turn (RCUT):

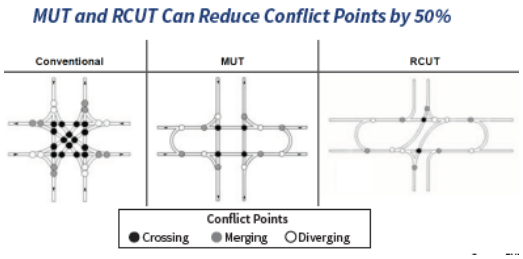
The RCUT intersection modifies the direct left-turn and through movements from cross-street approaches. Minor road traffic makes a right turn followed by a U-turn at a designated location (either signalized or unsignalized) to continue in the desired direction.

The RCUT is suitable for a variety of circumstances, including along rural, high-speed, four-lane, divided highways or signalized routes. It also can be used as an alternative to signalization or constructing an interchange. RCUTs work well when consistently used along a corridor, but also can be used effectively at individual intersections.

Median U-turn (MUT)

The MUT intersection modifies direct left turns from the major approaches. Vehicles proceed through the main intersection, make a U-turn a short distance downstream, followed by a right turn at the main intersection. The U-turns can also be used for modifying the cross-street left turns.

The MUT is an excellent choice for heavily traveled intersections with moderate left-turn volumes. When implemented at multiple intersections along a corridor, the efficient two-phase signal operation of the MUT can reduce delay, improve travel times, and create more crossing opportunities for pedestrians and bicyclists.



General Qualities (Time, Cost and Effectiveness):

Implementing this strategy may take from months to years, depending on whether additional R/W is required. Such projects require a substantial time for development and construction. Costs are highly variable and range from very low to high. The expected effectiveness of this CM must be assessed for each individual location.

FHWA CMF Clearinghouse:	Crash Types Addressed:	Angle/Left-turn/Rear-End/All	CRF:	34.8-100%

NS17, Install right-turn lane (NS.I.)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	20%	20 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new right-turn lanes. This CM is not eligible for use at existing all-way stop intersections.		

General information				
Where to use:				
Many collisions at unsignalized intersections are related to right-turn maneuvers. A key strategy for minimizing such collisions is to provide exclusive right-turn lanes, particularly on high-volume and high-speed major-road approaches. When considering new right-turn lanes, potential impacts to non-motorized users should be considered and mitigated as appropriate. When considering new right-turn lanes, potential impacts to non-motorized users should be considered and mitigated as appropriate.				
Why it works:				
The strategy is targeted to reduce the frequency of rear-end collisions resulting from conflicts between vehicles turning right and following vehicles and vehicles turning right and through vehicles coming from the left on the cross street. Right-turn lanes also remove slow vehicles that are decelerating to turn right from the through-traffic stream, thus reducing the potential for rear-end collisions. Right-turn lanes can increase the length of the intersection crossing and create an additional potential conflict point for non-motorized users.				
General Qualities (Time, Cost and Effectiveness):				
Implementing this strategy may take from months to years. At some locations, right-turn lanes can be quickly and simply installed by restriping the roadway. At other locations, widening of the roadway, acquisition of additional right-of-way, and extensive environmental processes may be needed. Such projects require a substantial time for development and construction. Costs are highly variable and range from very low to high. The expected effectiveness of this CM must be assessed for each individual location.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	14 - 26 %

NS18, Install left-turn lane (where no left-turn lane exists)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	35%	20 years
Notes:	This CM only applies to crashes occurring on the approaches / influence area of the new left-turn lanes. This CM does NOT apply to converting a single-left into double-left turn. This CM is not eligible for use at existing all-way stop intersections.		

General information				
Where to use:				
Many collisions at unsignalized intersections are related to left-turn maneuvers. A key strategy for minimizing such collisions is to provide exclusive left-turn lanes, particularly on high-volume and high-speed major-road approaches. When considering new left-turn lanes, potential impacts to non-motorized users should be considered and mitigated as appropriate.				
Why it works:				
Adding left-turn lanes remove vehicles waiting to turn left from the through-traffic stream, thus reducing the potential for rear-end collisions. Because they provide a sheltered location for drivers to wait for a gap in opposing traffic, left-turn lanes may encourage drivers to be more selective in choosing a gap to complete the left-turn maneuver. This strategy may reduce the potential for collisions between left-turn and opposing through vehicles.				
General Qualities (Time, Cost and Effectiveness):				
Implementing this strategy may take from months to years. At some locations, left-turn lanes can be quickly and simply installed by restriping the roadway. At other locations, widening of the roadway, acquisition of additional right-of-way, and extensive environmental processes may be needed. Such projects require a substantial time for development and construction. Costs are highly variable and range from very low to high. The expected effectiveness of this CM must be assessed for each individual location.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	9 -55 %

NS19PB, Install raised medians (refuge islands)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Pedestrian and Bicycle	45%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the crossing with the new islands. All new raised medians funded with federal HSIP funding should not include the removal of the existing roadway structural section and should be doweled into the existing roadway surface. This requirement is being implemented to maximize the safety-effectiveness of the limited HSIP funding and to minimize project impacts. Landscaping, if included in the project, is considered non-participating.		

General information				
Where to use:				
Intersections that have a long pedestrian crossing distance, a higher number of pedestrians, or a crash history. Raised medians decrease the level of exposure for pedestrians and allow pedestrians to concentrate on (or cross) only one direction of traffic at a time.				
Why it works:				
Raised pedestrian refuge islands, or medians at crossing locations along roadways, are another strategy to reduce exposure between pedestrians and motor vehicles. Refuge islands and medians that are raised (i.e., not just painted) provide pedestrians more secure places of refuge during the street crossing. They can stop partway across the street and wait for an adequate gap in traffic before completing their crossing.				
General Qualities (Time, Cost and Effectiveness):				
Median and pedestrian refuge areas are a low-cost countermeasure to implement. This cost can be applied to retrofit improvements or if it is a new construction project, implementing this countermeasure is even more cost-effective. In general, This CM can be very effective and can be considered on a systematic approach. When agencies opt to install landscaping in conjunction with new raised medians, the portion of the cost for landscaping and other non-safety related items that exceeds 10% of the project total cost is not federally participated and must be funded by the applicant.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian and Bicycle	CRF:	30 - 56 %

NS20PB, Install pedestrian crossing at uncontrolled locations (signs and markings only)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Pedestrian and Bicycle	25%	10 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the intersection/crossing with the new crossing. This CM is not intended to be used for high-cost aesthetic enhancements to intersection crosswalks (i.e. stamped concrete or stamped asphalt).		

General information				
Where to use:				
Non-signalized intersections without a marked crossing, where pedestrians are known to be crossing intersections that involve significant vehicular traffic. They are especially important at school crossings and intersections with right and/or left turns pockets. See Zegeer study (Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations) for additional guidance regarding when to install a marked crosswalk.				
Why it works:				
Adding pedestrian crossings has the opportunity to enhance pedestrian safety at locations noted as being problematic. Pavement markings delineate a portion of the roadway that is designated for pedestrian crossing. These markings will often be different for controlled verses uncontrolled locations. The use of "ladder", "zebra" or other enhanced markings at uncontrolled crossings can increase both pedestrian and driver awareness to the increased exposure at the crossing. Incorporating advanced "stop" or "yield" markings provides an extra safety buffer and can be effective in reducing the 'multiple-threat' danger to pedestrians. Nearly one-third of all pedestrian-related crashes occur at or within 50 feet of an intersection. Of these, 30 percent may involve a turning vehicle. There are several types of pedestrian crosswalks, including: continental, ladder, zebra, and standard. When agencies opt to install aesthetic enhancement to intersection crosswalks like stamped concrete/asphalt, the project design and construction costs can significantly increase. For HSIP applications, these costs must be accounted for in the B/C calculation, but these costs (over standard crosswalk markings) must be tracked separately and are not federally reimbursable and will increase the agency's local-funding share for the project costs.				
General Qualities (Time, Cost and Effectiveness):				
Costs associated with this strategy will vary widely, depending upon if curb ramps and sidewalk modifications are required with the crossing. When considered at a single location, these low cost improvements are usually funded through local funding by local crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian and Bicycle	CRF:	25 %

NS21PB, Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Pedestrian and Bicycle	35%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the new crossing (influence area) with enhanced safety features. This CM is not intended to be used for high-cost aesthetic enhancements to intersection crosswalks (i.e. stamped concrete or stamped asphalt).		

General information
Where to use:
Non-signalized intersections where pedestrians are known to be crossing intersections that involve significant vehicular traffic. They are especially important at school crossings and intersections with turn pockets. Based on the Zegeer study (Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations) at many locations, a marked crosswalk alone may not be sufficient to adequately protect non-motorized users. In these cases, **flashing beacons, curb extensions, advanced "stop" or "yield" markings, and other safety features** should be added to complement the standard crossing elements.
Why it works:
Adding pedestrian crossings that include enhances safety features has the opportunity to enhance pedestrian safety at locations noted as being especially problematic. The enhanced safety elements help delineate a portion of the roadway that is designated for pedestrian crossing. Incorporating advanced "yield" markings provide an extra safety buffer and can be effective in reducing the 'multiple-threat' danger to pedestrians. Nearly one-third of all pedestrian-related crashes occur at or within 50 feet of an intersection. When agencies opt to install aesthetic enhancement to intersection crosswalks like stamped concrete/asphalt, the project design and construction costs can significantly increase. For HSIP applications, these costs must be accounted for in the B/C calculation, but these costs (over standard crosswalk markings) must be tracked separately and are not federally reimbursable and will increase the agency's local-funding share for the project costs.
General Qualities (Time, Cost and Effectiveness):
Costs associated with this strategy will vary widely, depending upon the types of enhanced features that will be combined with the standard crossing improvements. The need for new curb ramps and sidewalk modifications will also be a factor. This CM may be effectively and efficiently implemented using a systematic approach with more than one location and can have relatively high B/C ratios based on past non-motorized crash history.

FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian and Bicycle	CRF:	37%

NS22PB, Install Rectangular Rapid Flashing Beacon (RRFB)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Pedestrian and Bicycle	35%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the influence area (expected to be a maximum of within 250') of the crossing which includes the RRFB.		

General information
Where to use:
Rectangular Rapid Flashing Beacon (RRFB) includes pedestrian-activated flashing lights and additional signage that enhance the visibility of marked crosswalks and alert motorists to pedestrian crossings. It uses an irregular flash pattern that is similar to emergency flashers on police vehicles. RRFBs are installed at unsignalized intersections and mid-block pedestrian crossings.
Why it works:
RRFBs can enhance safety by increasing driver awareness of potential pedestrian conflicts and reducing crashes between vehicles and pedestrians at unsignalized intersections and mid-block pedestrian crossings. The addition of RRFB may also increase the safety effectiveness of other treatments, such as crossing warning signs and markings.
General Qualities (Time, Cost and Effectiveness):
RRFBs are a lower cost alternative to traffic signals and hybrid signals. This CM can often be effectively and efficiently implemented using a systematic approach with numerous locations.

FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian, Bicycle	CRF:	7 – 47.4%

NS23PB, Install Pedestrian Signal (including Pedestrian Hybrid Beacon (HAWK))

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Pedestrian and Bicycle	55%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the intersection/crossing with the new signal. For HAWK or other pedestrian signals, the justification may be Warrant 4, 5 and/or 7, or passing the test in Figure 4F-1/4F-2 in Chapter 4F of CA MUTCD. Please refer to Chapter 4F of CA MUTCD for more details		

General information				
Where to use:				
Intersections noted as having a history of pedestrian vs. vehicle crashes and in areas where the likelihood of the pedestrian presence is high. Corridors should also be assessed to determine if there are adequate safe opportunities for non-motorists to cross and if a pedestrian signal, or a Pedestrian Hybrid Beacon (PHB) (also called High-Intensity Activated crossWalK beacon (HAWK)) are needed to provide an active warning to motorists when a pedestrian is in the crosswalk.				
Why it works:				
Adding a pedestrian signal has the opportunity to greatly enhance pedestrian safety at locations noted as being problematic. Nearly one-third of all pedestrian-related crashes occur at or within 50 feet of an intersection. In combination with this CM, better guidance signs and markings for non-motorized and motorized roadway users should be considered, including: sign and markings directing pedestrians and cyclists on appropriate/legal travel paths and signs and markings warning motorists of non-motorized uses of the roadway that should be expected.				
General Qualities (Time, Cost and Effectiveness):				
The cost of improvements are generally high, but can vary dependent on the type of signal and overall scope of the project. In most cases the project duration can be short. The expected effectiveness of this CM must be assessed for each individual location.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian and Bicycle	CRF:	15 - 69%

B.3 Roadway Countermeasures

R01, Add Segment Lighting

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Night	35%	20 years
Notes:	This CM only applies to "night" crashes (all types) occurring within limits of the proposed roadway lighting 'engineered' area.		

General information				
Where to use:				
Where to use: Noted substantial patterns of nighttime crashes. In particular, patterns of rear-end, right-angle, turning or roadway departure collisions on the roadways may indicate that night-time drivers can be unaware of the roadway characteristics.				
Why it works:				
Providing roadway lighting improves the safety during nighttime conditions by (1) making drivers more aware of the surroundings, which improves drivers' perception-reaction times, (2) enhancing drivers' available sight distances to perceive roadway characteristic in advance of the change, and (3) improving non-motorist's visibility and navigation.				
General Qualities (Time, Cost and Effectiveness):				
It expected that projects of this type may be constructed in a year or two and are relatively costly. There are several types of costs associated with providing lighting, including the cost of providing a permanent source of power to the location, the cost for the luminaire supports (i.e., poles), and the cost for routinely replacing the bulbs and maintenance of the luminaire supports. Some locations can result in high B/C ratios, but due to higher costs, these projects often result in medium to low B/C ratios.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Night, All	CRF:	18 - 69 %

R02, Remove or relocate fixed objects outside of Clear Recovery Zone

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	35%	20 years
Notes:	This CM only applies to crashes occurring within the limits of the new clear recovery zone (per Caltrans' HDM).		

General information				
Where to use:				
Known locations or roadway segments prone to collisions with fixed objects such as utility poles, drainage structures, trees, and other fixed objects, such as the outside of a curve, end of lane drops, and in traffic islands. A clear recovery zone should be developed on every roadway, as space is available. In situations where public right-of-way is limited, steps should be taken to request assistance from property owners, as appropriate.				
Why it works:				
While this strategy does not prevent the vehicle leaving the roadway, it does provide a mechanism to reduce the severity of a resulting crash. A clear zone is an unobstructed, traversable roadside area that allows a driver to stop safely or regain control of a vehicle that has left the roadway. Removing or moving fixed objects, flattening slopes, or providing recovery areas reduces the likelihood of a crash.				
General Qualities (Time, Cost and Effectiveness):				
Projects involving removing fixed objects from highway right-of-way can typically be accomplished quickly, assuming the objects are readily moveable. Clearing objects on private property requires more time for discussions with the property owner. Costs will generally be low, assuming that in most cases the objects to be removed are within the right-of-way. This CMs can be very effective and can be implemented by agencies' maintenance staff and/or implemented on a systematic approach. High-cost removals or removals implemented using a systematic approach would be good candidates for Caltrans Federal Safety Funding.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Fixed Object	CRF:	17 - 100 %

R03, Install Median Barrier

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	25%	20 years
Notes:	Note: For Caltrans' statewide Calls-for-Projects, this CM only applies to crashes occurring within the limits of the new barrier.		

General information
Where to use:
Areas where crash history indicates drivers are unintentionally crossing the median and the cross-overs are resulting in high severity crashes. The installation of median barriers can increase the number of PDO and non-severe injuries. The net result in safety from this countermeasure is connected more to reducing the severity of crashes not the number of crashes. It is recommended to review the warrants as outlined in Chapter 7 of the Caltrans Traffic Manual when considering whether to install median barriers.
Why it works:
This strategy is designed to prevent head-on collisions by providing a barrier between opposing lanes of traffic. The variety of median barriers available makes it easier to choose a site-specific solution. The main advantage is the reduction of the severity of the crashes. The key to success would be in selecting an appropriate barrier based on the site, previous crash history, maintenance needs, and median width.
General Qualities (Time, Cost and Effectiveness):
This strategy would in many cases be possible to implement within a short period after site selection. Costs will vary depending on the type of median barrier selected and whether the strategy is implemented as a stand-alone project or incorporated as part of a reconstruction or resurfacing effort. Maintenance costs and worker exposure will also vary depending on the type of barrier selected. The expected effectiveness of this CM must be assessed for each individual location.

FHWA CMF Clearinghouse:	Crash Types Addressed:	Head-on	CRF:	0 - 94 %

R04, Install Guardrail

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	25%	20 years
Notes:	This CM only applies to crashes occurring within the limits of the new guardrail. This CM is not intended to be used for general maintenance activities (i.e. the replacement of existing damaged rail). For projects proposing to upgrade existing guardrail to current standards, this CM and corresponding CRF should only be applied to locations where past crash data or engineering judgment applied to the existing rail conditions suggests the upgraded guardrail may result in fewer or less severe crashes (justifying the use of the 25% CRF for this CM).		

General information
Where to use:
Guardrail is installed to reduce the severity of lane departure crashes. However, guardrail can reduce crash severity only for those conditions where striking the guardrail is less severe than going down an embankment or striking a fixed object. Guardrail should only be installed where it is clear that crash severity will be reduced, or there is a history of run-off-the-road crashes at a given location that have resulted in severe crashes. New and upgraded guardrail and end-treatments must meet current safety standards; see Method for Assessing Safety Hardware (MASH) for more information. Caltrans (or other national accepted guidance) slope/height criteria need to be considered and documented.
Why it works:
Guardrail redirects a vehicle away from embankment slopes or fixed objects and dissipates the energy of an errant vehicle.
General Qualities (Time, Cost and Effectiveness):
Strategies range from relatively inexpensive too costly. Costly projects may include those that upgrade existing guardrail applications to more semi-rigid and rigid barrier systems over extended distances. In general, this CMs can be effective and can be implemented by agencies' maintenance staff and/or implemented on a systematic approach.

FHWA CMF Clearinghouse:	Crash Types Addressed:	Fixed Object, Run-off Road	CRF:	11 - 78 %

R05, Install impact attenuators

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	25%	10 years
Notes:	This CM only applies to crashes occurring within the limits of the new attenuators. This CM is not intended to be used for general maintenance activities (i.e. the replacement of existing damaged attenuators). For projects proposing to upgrade existing attenuators to current standards, this CM and corresponding CRF should only be applied to locations where past crash data or engineering judgment applied to the existing attenuator conditions suggests the upgraded attenuators may result in fewer or less severe crashes (justifying the use of the 25% CRF for this CM).		

General information				
Where to use:				
Impact attenuators are typically used to shield rigid roadside objects such as concrete barrier ends, steel guardrail ends and bridge pillars from oncoming automobiles. Attenuators should only be installed where it is impractical for the objects to be removed. New and upgraded barrier end-treatments must meet current safety standards; see MASH for more information.				
Why it works:				
Attenuators bring an errant vehicle to a more-controlled stop or redirect the vehicle away from a rigid object. Attenuators are effective at absorbing impact energy and increasing occupant safety. They also tend to draw attention to the fixed object, which helps drivers steer clear of the fixed objects.				
General Qualities (Time, Cost and Effectiveness):				
Costs depending on the scope of the project, type(s) used, and associated ongoing maintenance costs. Time to install is fairly quick once site is identified.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Fixed Object, Run-off Road	CRF:	5 - 50 %

R06, Flatten side slopes

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	30%	20 years
Notes:	This CM only applies to crashes occurring within the limits of the new side slopes. Minor/incidental flattening of side slopes would not likely result in the CRF shown below and may not be appropriate for use in Caltrans B/C calculations.		

General information				
Where to use:				
Roadways experiencing frequent lane departure crashes that result in roll-over type crashes as a result of the roadway slope being so severe as to not accommodate a reasonable degree of driver correction. When there is a need to reduce the severity of lane departure crashes without installing a barrier system that could result in increased numbers of crashes.				
Why it works:				
Flattened slopes provide a greater area for a driver to regain control of a vehicle. Steep slopes, ditches or unprotected hazardous drops-offs adjacent to a travel lane offer little opportunities to correct an inappropriate action by a driver and can result in sever crashes.				
General Qualities (Time, Cost and Effectiveness):				
Roadside modifications range from relatively inexpensive to very costly. Strategies that include creating safer side slopes where none exists can be moderately expensive based on the scope of the project and the associated clearing, grading, etc. The potential for high environmental and right-of-way impacts is high which can take several years to clear. In other cases This CM can be effective and can be implemented by agencies' maintenance staff and/or implemented on a systematic approach.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Fixed Object, Run-off Road	CRF:	5 - 62 %

R07, Flatten side slopes and remove guardrail

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	40%	20 years
Notes:	This CM only applies to crashes occurring within the limits of both the removed guardrail and the new side slopes.		

General information				
Where to use:				
Locations where high number of crashes originate as a lane departure and result in collision with guardrail or a fixed object located on the side slope shielded by guardrail. The guardrail may or may not meet current standards. Even though guardrails are generally installed to reduce the severity of departure crashes, they still can result in severe crashes in some locations.				
Why it works:				
Flattened side slopes and an unobstructed clear zone provide a greater area for a driver to regain control of a vehicle. The existing guardrail may help protect the steep slopes, fixed objects, or unprotected hazardous drops-offs adjacent to a travel lane, but removing all of these obstacles generally improves safety.				
General Qualities (Time, Cost and Effectiveness):				
Roadside modifications range from relatively inexpensive to very costly. Strategies that include creating safer side slopes where none exists can be moderately expensive based on the scope of the project and the associated clearing, grading, etc. The potential for high environmental and right-of-way impacts is high which can take several years to clear.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Roll Over, Fixed Object	CRF:	42%

R08, Install raised median

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	25%	20 years
Notes:	This CM only applies to crashes occurring within the limits of the new raised median. All new raised medians funded with federal HSIP funding should not include the removal of the existing roadway structural section and should be doweled into the existing roadway surface. This requirement is being implemented to maximize the safety-effectiveness of the limited HSIP funding and to minimize project impacts. Landscaping, if included in the project, is considered non-participating.		

General information				
Where to use:				
Areas experiencing head-on collisions that may be affected by both the number of vehicles that cross the centerline and by the speed of oncoming vehicles. Installing a raised median is a more restrictive approach in that it represents a more rigid barrier between opposing traffic. Application of raised medians on roadways with higher speeds is not advised - instead a median barrier should be considered. Including landscaping in new raised medians can be counterproductive to the HSIP safety goals and should only be done in ways that do not increase drivers' exposure to fixed objects and that will maintain driver's sight distance needs throughout the life of the proposed landscaping. **Agencies need to consider and document impacts of additional turning movements at nearby intersections.**				
Why it works:				
Adding raised medians is a particularly effective strategy as it adds to or reallocates the existing cross section to incorporate a buffer between the opposing travel lanes and reinforces the limits of the travel lane. Raised median may also be used to limit unsafe turning movements along a roadway.				
General Qualities (Time, Cost and Effectiveness):				
In some cases this strategy may be a retrofit into the existing roadway by utilizing a portion of the existing paved shoulder. These raised medians can be installed directly over the existing pavement. Cost and time to implement could significantly increase if the paved area is not sufficient to include a median. The surface treatment of the raised median also significantly affects their cost-effectiveness: standard concrete or other hardscape surfaces are usually more cost effective than landscaped medians. When agencies opt to install landscaping in conjunction with new raised medians, the project design and construction costs can significantly increase due to excavation, backfill/top-soil, water-connection, irrigation, planting, maintenance needed for the landscaping. When agencies opt to install landscaping in conjunction with new raised medians, the portion of the cost for landscaping and other non-safety related items that exceeds 10% of the project total cost is not federally participated and must be funded by the applicant.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Head-on	CRF:	20 - 75 %

R09, Install median (flush)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	15%	20 years
Notes:	This CM only applies to crashes occurring within the limits of the new flush median. The new median must be a minimum of 4 feet wide (or "wider" if a narrow median exists before the proposed project).		

General information
Where to use:
Areas experiencing head-on collisions that may be affected by both the number of vehicles that cross the centerline and by the speed of oncoming vehicles. Roadways with oversized lanes offer an opportunity to restripe the roadway to reduce the lanes to standard widths and use the extra width for the median.
Why it works:
Adding medians is a particularly effective strategy as it adds to or reallocates the existing cross section to incorporate a narrow buffer median between opposing flows, thereby providing a greater opportunity to correct an errant maneuver and further reinforce the limits of the travel lane. Application widths can vary based on the available cross section and intended application. Additional safety can be provided by combining this CM with rumble strips.
General Qualities (Time, Cost and Effectiveness):
In some cases this strategy may be retrofitted into the existing roadway by utilizing a portion of the existing paved shoulder and can ultimately be as simple as restriping the roadway. Costs and time to implement could significantly increase if the paved area is not sufficient to include a median.

FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	15 - 78 %

R10PB, Install pedestrian median fencing

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Pedestrian and Bicycle	35%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring on the approaches/influence area of the new pedestrian median fencing.		

General information
Where to use:
Roadway segments with high pedestrian-generators and pedestrian-destinations nearby (e.g. transit stops) may experience a high volume of pedestrians J-walking across the travel lanes at mid-block locations instead of walking to the nearest intersection or designated mid-block crossing. When this safety issue cannot be mitigated with shoulder, sidewalk and/or crossing treatments, then installing a continuous pedestrian barrier in the median may be a viable solution.
Why it works:
Adding pedestrian median fencing has the opportunity to enhance pedestrian safety at locations noted as being problematic involving pedestrians running/darting across the roadway outside designated pedestrian crossings. Pedestrian median fencing can significantly reduce this safety issue by creating a positive barrier, forcing pedestrians to the designated pedestrian crossing.
General Qualities (Time, Cost and Effectiveness):
Costs associated with this strategy will vary widely depending on the type and placement of the median fencing. Impacts to transit and other land uses may need to be considered and controversy can delay the implementation. In general, this CM can be effective as a spot-location approach.

FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian, Bicycle	CRF:	25 - 40%

R11, Install acceleration/ deceleration lanes

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	25%	20 years
Notes:	This CM only applies to crashes occurring within the limits of the new accel/decel lanes on high speed roadways. Significant improvements to the merge length for lane-drop locations is also an acceptable use of this CM.		

General information				
Where to use:				
Areas proven to have crashes that are the result of drivers not being able to turn onto a high speed roadway to accelerate until the desired roadway speed is reached and areas that do not provide the opportunity to safety decelerate to negotiate a turning movement. This CM can also be used to improve the safety of merging vehicles at a lane-drop location.				
Why it works:				
A lane that does not provide enough deceleration length and storage space for turning traffic may cause the turn queue to back up into the adjacent through lane. This can contribute to rear-end and sideswipe crashes. An acceleration lane is an auxiliary or speed-change lane that allows vehicles to accelerate to highway speeds (high speed roadways) before entering the through-traffic lanes of a highway. Additionally, if acceleration by entering traffic takes place directly on the traveled way, it may disrupt the flow of through-traffic and cause rear-end and sideswipe collisions.				
General Qualities (Time, Cost and Effectiveness):				
Costs are highly variable. Where sufficient median or shoulder space exists it may be possible to provide acceleration/deceleration lanes at a moderate cost. Where the roadway must be widened and additional right-of-way must be acquired, higher costs and a lengthy time-to-construct are likely. The expected effectiveness of this CM must be assessed for each individual location.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Sideswipe, Rear-End	CRF:	10 - 75 %

R12, Widen lane (initially less than 10 ft)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	25%	20 years
Notes:	Note: For Caltrans' statewide Calls-for-Projects, this CM only applies to crashes occurring within the limits of the widened lanes. Widening must a minimum of 1 foot.		

General information				
Where to use:				
Horizontal curves or tangents and low speed or high speed roadways identified as having lane departure crashes, sideswipe or head-on crashes that can be attributed to an existing pavement width less than 10 feet.				
Why it works:				
Increasing pavement width can affect almost all crash types. A common practice is to widen the traveled way on horizontal curves to make operating conditions on curves comparable to those on tangents. Speed is a primary consideration when evaluating potential adverse impacts of lane width on safety. On high-speed, rural two-lane highways, an increased risk of cross-centerline head-on or cross-centerline sideswipe crashes is a concern because drivers may have more difficulty staying within the travel lane.				
General Qualities (Time, Cost and Effectiveness):				
Costs will depend on the amount of reconstruction necessary and on whether additional right-of-way is required. In general, this is one of the higher-cost strategies recommended, but it can also be very beneficial. Since this is a relatively expensive treatment, one of the keys to creating a cost effective project with at least a medium B/C ratio is targeting higher-hazard roadways.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	5 - 70 %

R13, Add two-way left-turn lane

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	30%	20 years
Notes:	This CM only applies to crashes occurring within the limits of the new lane, where an existing median did not already exist.		

General information
Where to use:
Roadways having a high frequency of drivers being rear-ended while attempting to make a left turn across oncoming traffic. Also can be effective for drivers crossing the centerline of an undivided multilane roadway inadvertently.
Why it works:
Two-way left-turn lanes provide a buffer between opposing directions of travel and separate left turning traffic from through traffic. They can also help to allow vehicles to begin to accelerate before entering the through-traffic lanes. They reduce the disruption of flow of through-traffic and reducing rear-end and sideswipe collisions. For some roadways the option of converting a four-lane undivided arterials to two-vehicle-lane roadways with a center left-turn lane and bike lanes should be considered (see "Road Diet" CM.)
General Qualities (Time, Cost and Effectiveness):
In some cases this strategy may be retrofitted into the existing roadway by utilizing a portion of the existing paved shoulder and can ultimately be as simple as restriping the roadway. Costs and time to implement could significantly increase if the paved area is not sufficient to include a median, requiring new right-of-way, and having significant environmental impacts. The expected effectiveness of this CM must be assessed for each individual location as the B/C ratios will vary from low to high.

FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	8 - 50 %

R14, Road Diet (Reduce travel lanes and add a two way left-turn and bike lanes)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	35%	20 years
Notes:	This CM only applies to crashes occurring within the limits of the new lane striping. "Intersection" crashes can only be applied when they resulted from turning movements that had no designated turn lanes/phases in the existing condition and the Road Diet will provide turn lanes/phases for these movements. This CM does not apply to roadway sections that already included left turn lanes or two way left turn lanes before the lane reductions. New bike lanes are also expected to be part of these projects. if any pavement is planned to be removed for the purpose of adding landscaping, planter-boxes, or other non-roadway user features, the cost should be non-participating.		

General information
Where to use:
Areas noted as having a higher frequency of head-on, left-turn, and rear-end crashes with traffic volumes that can be handled by only 2 free flowing lanes. Using this strategy in locations with traffic volumes that are too high could result in diversion of traffic to routes less safe than the original four-lane design. It may also result in congestion levels that contribute to other crashes.
Why it works:
The application of this strategy usually reduces the roadway segment speeds and serious head-on crashes. In many cases the extra pavement width can be used for the installation of bike lanes. In addition to increasing bicycle safety, these bike lanes can improve the safety of on-street parking.
General Qualities (Time, Cost and Effectiveness):
Implementation would require more time than in other low-cost treatments to complete environmental analyses, traffic studies and public input. Projects that only require new lane markings and minor signalization modifications will have relatively low cost and can be very effective and can be considered on a systematic approach. These striping and signal modification costs should be considered part of this CM and not an additional CM. (If additional signal hardware improvements are being made, over what is needed for the road diet, then the Improve Signal Hardware CM may also be used.) Often road diet projects need a seal-coat placed on the roadway to fully remove the old striping. These seal coats are considered part of the proper installation of this CM. In contrast, structural-overlays should not be considered part of this CM and are not considered eligible for funding in the California Local HSIP.

FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	26 - 43 %

R15, Widen shoulder

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	30%	20 years
Notes:	This CM only applies to crashes occurring within the limits of the new paved shoulder. A minimum of 2 feet width must be added and the new/resulting shoulders must be a minimum of 4 feet wide. This CM is not eligible unless it is done as the last step of an "incremental approach", for which the agency documents that: 1) they have already pursued and installed lower cost and lower impact CMs (i.e. signing/striping upgrades to MUTCD standards/recommendations, rumble strips, etc.), 2) they have already monitored the crash occurrences after these improvements were installed, and 3) the 'after' crash rate is still unacceptably high. This 'incremental approach' (or a special exception from the HSIP program manager) must be documented in the Narrative Questions in the application and a summary of the 'before' and 'after' crash analysis must be attached to the application.		

General information				
Where to use:				
Roadways that have a frequent incidence of vehicles leaving the travel lane resulting in an unsuccessful attempt to reenter the roadway. The probability of a safe recovery is increased if an errant vehicle is provided with an increased paved area in which to initiate such a recovery.				
Why it works:				
Based on the best available research, adding shoulder or widening an existing shoulder provides a greater area to regain control of a vehicle, as well as lateral clearance to roadside objects such as guardrail, signs and poles. They may also provide space for disabled vehicles to stop or drive slowly, provide increased sight distance for through vehicles and for vehicles entering the roadway, and in some cases reduce passing conflicts between motor vehicles and bicyclists and pedestrians. The likely safety benefits for adding or widening an existing shoulder generally increase as the widening width increases - practitioners should refer to NCHRP Report 500 Series, the CMF Clearinghouse or other references for more details.				
General Qualities (Time, Cost and Effectiveness):				
Shoulder widening costs would depend on whether new right-of-way is required and whether extensive roadside modification is needed. Since shoulder widening can be a relatively expensive treatment, one of the keys to creating a cost effective project with at least a medium B/C ratio is targeting higher-hazard roadways.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Fixed Object, Run-off Road, Sideswipe	CRF:	15 - 75 %

R16, Curve Shoulder widening (Outside Only)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	45%	20 years
Notes:	This CM only applies to crashes occurring within the limits (or influence area) of the new shoulder widening at curves. A minimum of 2-4 feet width must be added to the outside of horizontal curves and the new traversable shoulder must be a minimum of 4 feet wide.		

General information	
Where to use:	
Roadway curves noted as having frequent lane departure crashes due to inadequate or no shoulders, resulting in an unsuccessful attempt to reenter the roadway.	
Why it works:	
Adding shoulders (outside only) creates a recovery area in which a driver can regain control of a vehicle, as well as lateral clearance to roadside objects.	
General Qualities (Time, Cost and Effectiveness):	
To minimize the R/W needs and the cost, only outside shoulder at curves is to be widened. This CM can be implemented in a relatively short timeframe.	
FHWA CMF Clearinghouse:	NA

R17, Improve horizontal alignment (flatten curves)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	50%	20 years

Notes:	This CM only applies to crashes occurring within the limits (or influence area) of the improved alignment. **This CM is not eligible unless** it is done as the last step of an "incremental approach", including: the agency documents that: 1) they have already pursued and installed lower cost and lower impact CMs (i.e. signing/striping upgrades to MUTCD standards/recommendations, rumble strips, etc.), 2) they have already monitored the crash occurrences after these improvements were installed, and 3) the 'after' crash rate is still unacceptably high. This 'incremental approach' (or a special exception from the HSIP program manager) must be documented in the Narrative Questions in the application and a summary of the agency's 'before' and 'after' crash analysis must be attached to the application.

General information				
Where to use:				
Roadways with horizontal curves that have experienced lane departure crashes as a result of a roadway segment having compound curves or a severe radius. This strategy should generally be considered only when less expensive strategies involving clearing of specific sight obstructions or modifying traffic control devices have been tried and have failed to ameliorate the crash patterns.				
Why it works:				
Increasing the radius of a horizontal curve can be very effective in improving the safety performance of the curve. Curve modification reduces the likelihood of a vehicle leaving its lane, crossing the roadway centerline, or leaving the roadway at a horizontal curve; and minimizes the adverse consequences of leaving the roadway. Horizontal alignment improvement projects are expected to include standard/improved superelevation elements, which should be considered part of this CM and not an additional CM.				
General Qualities (Time, Cost and Effectiveness):				
This strategy is a long-term, higher-cost alternative for improving the safety of a horizontal curve because it usually involves total reconstruction of the roadway. It may also require acquisition of additional right-of-way and an environmental review. This strategy, albeit costly, has shown that increasing the radius of curvature can significantly reduce total curve-related crashes by up to 80 percent. The expected effectiveness of this CM must be assessed for each individual location.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	24 - 90%

R18, Flatten crest vertical curve

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	25%	20 years
Notes:	This CM only applies to crashes occurring within the limits (or influence area) of the improved alignment. This CM is not eligible unless it is done as the last step of an "incremental approach", including: the agency documents that: 1) they have already pursued and installed lower cost and lower impact CMs (i.e. signing/striping upgrades to MUTCD standards/recommendations, rumble strips, etc.), 2) they have already monitored the crash occurrences after these improvements were installed, and 3) the 'after' crash rate is still unacceptably high. This 'incremental approach' (or a special exception from the HSIP program manager) must be documented in the Narrative Questions in the application and a summary of the agency's 'before' and 'after' crash analysis must be attached to the application.		

General information				
Where to use:				
The target for this strategy is usually unsignalized intersections with restricted sight distance due to vertical geometry and with patterns of crashes related to that lack of sight distance that cannot be ameliorated by less expensive methods. This strategy should generally be considered only when less expensive strategies involving clearing of specific sight obstructions or modifying traffic control devices have been tried and have failed to ameliorate the crash patterns.				
Why it works:				
Adequate sight distance for drivers at stopped approaches to intersections has long been recognized as among the most important factors contributing to overall intersection safety. Vertical alignment improvement projects are expected to include standard/improved superelevation elements, which should be considered part of this CM and not an additional CM.				
General Qualities (Time, Cost and Effectiveness):				
Projects involving changing the horizontal and/or vertical alignment to provide more sight distance are quite extensive and usually take several years to accomplish. If additional right-of-way is required or environmental impacts are expected, these projects will require a substantial period of time. Since this is usually an expensive treatment, one of the keys to creating a cost effective project with at least a medium B/C ratio is targeting higher-hazard locations.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	20 - 51 %

R19, Improve curve superelevation

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	45%	20 years
Notes:	This CM only applies to crashes occurring within the limits (or influence area) of the improved superelevation. This CM does not apply to sections of roadways where the horizontal or vertical alignments are changing via another CM.		

General information				
Where to use:				
Roadways noted as having frequent lane departure crashes and inadequate or no superelevation. Safety can be enhanced when the superelevation is improved or restored along curves where the actual superelevation is less than the optimal.				
Why it works:				
Superelevation works with friction between the tires and pavement to counteract the forces on the vehicle associated with cornering. Many curves may have inadequate superelevation because of vehicles traveling at higher speeds than were originally designed for, because of loss of effective superelevation after resurfacing, or because of changes in design policy after the curve was originally constructed.				
General Qualities (Time, Cost and Effectiveness):				
This strategy can be a higher-cost alternative for improving the safety of a curve because it involves reconstruction to some degree. Other projects may be able to be constructed by simple overlays and minimal reconstruction of roadways features. When simple overlay fixes are pursued, a systematic installation approach may be appropriate. The expected effectiveness of this CM must be assessed for each individual location.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Run-off Road, All	CRF:	40 - 50 %

R20, Convert from two-way to one-way traffic

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	35%	20 years
Notes:	This CM only applies to crashes occurring within the limits of the new one-way sections.		

General information				
Where to use:				
One-way streets can offer improved signal timing and accommodate odd-spaced signals. One-way streets can simplify crossings for pedestrians, who must look for traffic in only one direction. While studies have shown that conversion of two-way streets to one-way generally reduces pedestrian crashes and the number of conflict points, one-way streets tend to have higher speeds which creates new problems. Care must be taken not to create conditions that cause driver confusion and erratic maneuvers.				
Why it works:				
Studies have shown a 10 to 50-percent reduction in total crashes after conversion of a two-way street to one-way operation. While studies have shown that con-version of two-way streets to one-way generally reduces pedestrian crashes, one-way streets tend to have higher speeds which creates new problems. At the same time, this strategy (1) increases capacity significantly and (2) can have safety-related drawbacks including pedestrian confusion and minor sideswipe crashes.				
General Qualities (Time, Cost and Effectiveness):				
The costs will vary depending on length of treatment and if the conversion requires modification to signals. Conversion costs can be high to build "crossovers" where the one-way streets convert back to two-way streets and to rebuild traffic signals. It's also likely that these types of modifications will require public involvement and could significantly add to the time it takes to complete the project. The expected effectiveness of this CM must be assessed for each individual location.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	26 - 43 %

R21, Improve pavement friction (High Friction Surface Treatments)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	55%	10 years
Notes:	This CM only applies to crashes occurring within the limits of the improved friction overlay. This CM is not intended to apply to standard chip-seal or open-graded **maintenance** projects for long segments of corridors or structure repaving projects intended to fix failed pavement.		

General information				
Where to use:				
Nationally, this countermeasure is referred to as "High Friction Surface Treatments" or HFST. Areas as noted having crashes on wet pavements or under dry conditions when the pavement friction available is significantly less than actual roadway speeds; including but not limited to curves, loop ramps, intersections, and areas with short stopping or weaving distances. This treatment is intended to target locations where skidding is determined to be a problem, in wet or dry conditions and the target vehicle is one that runs (skids) off the road or is unable to stop due to insufficient skid resistance.				
Why it works:				
Improving the skid resistance at locations with high frequencies of wet-road crashes and/or failure to stop crashes can result in a reduction of 50 percent for wet-road crashes and 20 percent for total crashes. Applying HFST can double friction numbers, e.g. low 40s to high 80s. This CM represents a special focus area for both FHWA and Caltrans, which means there are extra resources available for agencies interested in more details on High Friction Surface Treatment projects.				
General Qualities (Time, Cost and Effectiveness):				
This strategy can be relatively inexpensive and implemented in a short timeframe. The installation would be done by either agency personnel or contractors and can be done by hand or machine. In general, This CM can be very effective and can be considered on a systematic approach.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Wet, Rear-End, All	CRF:	17 - 68 %

R22, Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	15%	10 years
Notes:	This CM only applies to crashes occurring within the influence area of the new/upgraded signs. This CM is not intended for maintenance upgrades of street-name, parking, guide, or any other signs without a primary focus on roadway safety. **This CM is not eligible unless** it is done as part of a larger sign audit project, including the study of: 1) the existing signs' locations, sizes and information per MUTCD standards, 2) missing signs per MUTCD standards, and 3) sign retroreflectivity. The overall sign audit scope (or a special exception from the HSIP program manager) must be documented in the Narrative Questions in the application. Based on the scope of the project/audit, it may be appropriate to combine other CMs in the B/C calculation.		

General information				
Where to use:				
The target for this strategy should be on roadway segments with patterns of head on, nighttime, non-intersection, run-off road, and sideswipe crashes related to lack of driver awareness of the presence of a specific roadway feature or regulatory requirement. Ideally this type of safety CM would be combined with other sign evaluations and upgrades (install chevrons, warning signs, delineators, markers, beacons, and relocation of existing signs per MUTCD standards.)				
Why it works:				
This strategy primarily addresses crashes caused by lack of driver awareness (or compliance) roadway signing. It is intended to get the drivers attention and give them a visual warning by using fluorescent yellow sheeting (or other retroreflective material).				
General Qualities (Time, Cost and Effectiveness):				
Signing improvements do not require a long development process and can typically be implemented quickly. Costs for implementing this strategy are nominal and depend on the number of signs. When considered at a single location, these low cost improvements are usually funded through local funding by local maintenance crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding. When considering any type of federally funded sign upgrade project, California local agencies are encouraged to consider "Roadway Safety Signing Audit (RSSA) and Upgrade Projects". Including RSSAs in the development phase of sign projects are expected to identify non-standard (per MUTCD) sign features and missing signs that may otherwise go unnoticed. More information on RSSA is available on the Local Assistance HSIP webpage.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Head on, Run-off road, Sideswipe, Night	CRF:	18 - 35%

R23, Install chevron signs on horizontal curves

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	40%	10 years
Notes:	This CM only applies to crashes occurring within the influence area of the new signs. (i.e. only through the curve).		

General information				
Where to use:				
Roadways that have an unacceptable level of crashes on relatively sharp curves during periods of light and darkness. Ideally this type of safety CM would be combined with other sign evaluations and upgrades (install warning signs, delineators, markers, beacons, and relocation of existing signs per MUTCD standards.)				
Why it works:				
Post-mounted chevrons are intended to warn drivers of an approaching curve and provide tracking information and guidance to the drivers. While they are intended to act as a warning, it should also be remembered that the posts, placed along the roadside, represent a possible object with which an errant vehicle can crash into. Design of posts to minimize damage and injury is an important part of the considerations to be made when selecting these treatments.				
General Qualities (Time, Cost and Effectiveness):				
Signing improvements do not require a long development process and can typically be implemented quickly. Costs for implementing this strategy are nominal and depend on the number of signs. When considered at a single location, these low cost improvements are usually funded through local funding by local maintenance crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding. When considering any type of federally funded sign upgrade project, California local agencies are encouraged to consider "Roadway Safety Signing Audit (RSSA) and Upgrade Projects". Including RSSAs in the development phase of sign projects are expected to identify non-standard (per MUTCD) sign features and missing signs that may otherwise go unnoticed. More information on RSSA is available on the Local Assistance HSIP webpage.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Run-off Road, All	CRF:	6 - 64 %

R24, Install curve advance warning signs

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	25%	10 years
Notes:	This CM only applies to crashes occurring within the influence area of the new signs. (i.e. only through the curve)		

General information				
Where to use:				
Roadways that have an unacceptable level of crashes on relatively sharp curves during periods of light and darkness. This countermeasure may also include horizontal alignment and/or advisory speed warning signs. Ideally this type of safety CM would be combined with other sign evaluations and upgrades (install warning signs, chevrons, delineators, markers, beacons, and relocation of existing signs per MUTCD standards.)				
Why it works:				
This strategy primarily addresses problem curves, and serves as an advance warning of an unexpected or sharp curve. It provides advance information and gives drivers a visual warning that their added attention is needed.				
General Qualities (Time, Cost and Effectiveness):				
Signing improvements do not require a long development process and can typically be implemented quickly. Costs for implementing this strategy are nominal and depend on the number of signs. When considered at a single location, these low cost improvements are usually funded through local funding by local maintenance crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding. When considering any type of federally funded sign upgrade project, California local agencies are encouraged to consider "Roadway Safety Signing Audit (RSSA) and Upgrade Projects". Including RSSAs in the development phase of sign projects are expected to identify non-standard (per MUTCD) sign features and missing signs that may otherwise go unnoticed. More information on RSSA is available on the Local Assistance HSIP webpage.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Run-off Road, All	CRF:	20 - 30 %

R25, Install curve advance warning signs (flashing beacon)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	30%	10 years
Notes:	This CM only applies to crashes occurring within the influence area of the new signs. (i.e. only through the curve)		

General information				
Where to use:				
Roadways that have an unacceptable level of crashes on relatively sharp curves. Flashing beacons in conjunction with warning signs should only be used on horizontal curves that have an established severe crash history to help maintain their effectiveness.				
Why it works:				
This strategy primarily addresses problem curves, and serves as an enhanced advance warning of an unexpected or sharp curve. It provides advance information and gives drivers a visual warning that their added attention is needed. Flashing beacons are an added indication that a curve may be particularly challenging.				
General Qualities (Time, Cost and Effectiveness):				
Use of flashing beacons requires minimal development process, allowing flashing beacons to be installed within a short time period. Before choosing this CM, the agency needs to confirm the ability to provide power to the site (solar may be an option). In general, This CM can be very effective and can be considered on a systematic approach.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	30 %

R26, Install dynamic/variable speed warning signs

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	30%	10 years
Notes:	This CM only applies to crashes occurring within the influence area of the new signs. (i.e. through the curve) {**<u>This CM does not apply to dynamic regulatory speed warning signs.</u>** There are currently no nationally accepted CRFs for dynamic regulatory signs (also known as Radar Speed Feedback Signs). CRFs are being developed and Caltrans hopes to include these CMs and CRFs in future calls for projects.}		

General information				
Where to use:				
Curvilinear roadways that have an unacceptable level of crashes due to excessive speeds on relatively sharp curves.				
Why it works:				
This strategy primarily addresses crashes caused by motorists traveling too fast around sharp curves. It is intended to get the drivers attention and give them a visual warning that they may be traveling over the recommended speed for the approaching curve. Care should be taken to limit the placement of these signs to help maintain their effectiveness.				
General Qualities (Time, Cost and Effectiveness):				
Use of dynamic speed warning signs requires minimal development process, allowing them to be installed within a short time period. Before choosing this CM, the agency needs to confirm the ability to provide power to the site (solar may be an option). In general, This CM can be very effective and can be considered on a systematic approach.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	0 - 41 %

R27, Install delineators, reflectors and/or object markers

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	15%	10 years
Notes:	This CM only applies to crashes occurring within the limits / influence area of the new features. {**This is not a striping-related CM**}		

General information
Where to use:
Roadways that have an unacceptable level of crashes on curves (relatively flat to sharp) during periods of light and darkness. Any road with a history of fixed object crashes is a candidate for this treatment, as are roadways with similar fixed objects along the roadside that have yet to experience crashes. If a fixed object cannot be relocated or made break-away, placing an object marker can provide additional information to motorists. Ideally this type of safety CM would be combined with other sign evaluations and upgrades (install warning signs, chevrons, beacons, and relocation of existing signs per MUTCD standards.)
Why it works:
Delineators, reflectors and/or object markers are intended to warn drivers of an approaching curve or fixed object that cannot easily be removed. They are intended to provide tracking information and guidance to the drivers. They are generally less costly than Chevron Signs as they don't require posts to place along the roadside, avoiding an additional object with which an errant vehicle can crash into.
General Qualities (Time, Cost and Effectiveness):
These improvements do not require a long development process and can typically be implemented quickly. Costs for implementing this strategy are nominal and depend on the number of locations. When considered at a single location, these low cost improvements are usually funded through local funding by local maintenance crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in low to moderate cost projects that are more appropriate to seek state or federal funding. When considering any type of federally funded sign upgrade project, California local agencies are encouraged to consider "Roadway Safety Signing Audit (RSSA) and Upgrade Projects". Including RSSAs in the development phase of sign projects are expected to identify non-standard (per MUTCD) sign features and missing signs that may otherwise go unnoticed. More information on RSSA is available on the Local Assistance HSIP webpage.

FHWA CMF Clearinghouse:	Crash Types Addressed:	All	CRF:	0 - 30 %

R28, Install edge-lines and centerlines

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	25%	10 years
Notes:	This CM only applies to crashes occurring within the limits of the new centerlines and/or edge-lines. This CM is not intended to be used for general maintenance activities (i.e. the replacement of existing striping and RPMs in-kind) and must include upgraded safety features over the existing striping. For two lane roadways allowing passing, a striping audit must be done to ensure the passing limits meeting the MUTCD standards. Both the centerline and edge-lines are expected to be upgraded, unless prior approval is granted by Caltrans staff in writing and attached to application.		

General information				
Where to use:				
Any road with a history of run-off-road right, head-on, opposite-direction-sideswipe, or run-off-road-left crashes is a candidate for this treatment - install where the existing lane delineation is not sufficient to assist the motorist in understanding the existing limits of the roadway. Depending on the width of the roadway, various combinations of edge line and/or center line pavement markings may be the most appropriate. Incorporating raised/reflective pavement markers (RPMs) into centerlines (and edge-lines) should be considered as it has been shown to improve safety.				
Why it works:				
Installing edge-lines and centerlines where none exists or making significant upgrades to existing lines (paint to thermoplastic, adding audible disks/bumps in the thermoplastic stripes, or adding RPMs) are intended/designed to help drivers who might leave the roadway because of their inability to see the edge of the roadway along the horizontal edge of the pavement or cross-over the centerline of the roadway into oncoming traffic. New pavement marking products tend to be more durable, are all-weather, more visible, and have a higher retroreflectivity than traditional pavement markings.				
General Qualities (Time, Cost and Effectiveness):				
These improvements do not require a long development process and can typically be implemented quickly. Costs for implementing this strategy are nominal and depend on the number and length of locations. This CM can be effectively and efficiently implemented using a systematic approach with numerous and long locations, resulting in low to moderate cost projects that are more appropriate to seek state or federal funding. When considering any type of federally funded striping upgrade project, California local agencies are encouraged to consider "Roadway Safety Striping Audit and Upgrade Projects". Including wide-scale striping audits in the development phase of striping projects are expected to identify non-standard (per MUTCD) striping/marking features, no-passing zone limits needing adjustment, and missing striping/markings that may otherwise go unnoticed. More information on this concepts is available on the Local Assistance HSIP webpage under an RSSA example document. Note: When federal safety funding is used for these installations in high-wear-locations, the local agency is expected to maintain the improvement for a minimum of 10 years.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Head-on, Run-off Road, All	CRF:	0 - 44 %

R29, Install no-passing line

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	45%	10 years
Notes:	This CM only applies to crashes occurring within the limits of the new or extended no-passing zones.		

General information
Where to use:
Roadways that have a high percentage of head-on crashes suggesting that many head-on crashes may relate to failed passing maneuvers. No-passing lines should be installed where drivers "passing sight distance" is not available due to horizontal or vertical obstructions. General restriping projects can be good opportunities to reevaluate and incorporate new no-passing zones limits. The incorporation 'No Passing Zone' pennants should also be considered when reevaluating the limits of no-passing zones. Installing no-passing limits in areas that are not warranted may reduce the overall safety of the corridor as drivers may become frustrated and attempt passing maneuvers at other locations without the necessary sight distance.
Why it works:
When the centerline markings do not differentiate between passing and no-passing areas, drivers may have difficulty determining where passing maneuvers can be completed safely. Providing clear and engineered passing and no-passing areas can encourage drivers to wait patiently for safe passing areas and avoid aggressively looking for passing opportunities.
General Qualities (Time, Cost and Effectiveness):
These improvements do not require a long development process and can typically be implemented quickly. Costs for implementing this strategy are nominal and depend on the number and length of locations. When considered at a single location, these low cost improvements are usually funded through local funding by local maintenance crews. However, This CM can be effectively and efficiently implemented using a systematic approach with numerous and long locations, resulting in low to moderate cost projects that are more appropriate to seek state or federal funding.

FHWA CMF Clearinghouse:	Crash Types Addressed:	Head-on, Side-swipe	CRF:	40 - 53%

R30, Install centerline rumble strips/stripes

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	20%	10 years
Notes:	This CM only applies to crashes occurring within the limits of the new rumble strips/stripes.		

General information
Where to use:
Center Line rumble strips/stripes can be used on virtually any roadway – especially those with a history of head-on crashes. It is recommended that rumble strips/stripes be applied systematically along an entire route instead of only at spot locations. For all rumble strips/stripes, pavement condition should be sufficient to accept milled rumble strips. Care should be taken when considering installing rumble strips in locations with residential land uses or in areas with high bicycle volumes.
Why it works:
Rumble strips provide an auditory indication and tactile rumble when driven on, alerting drivers that they are drifting out of their travel lane, giving them time to recover before they depart the roadway or cross the center line. Additionally, rumble stripes (pavement marking in the rumble itself) provide an enhanced marking, especially in wet dark conditions.
General Qualities (Time, Cost and Effectiveness):
These improvements do not require a long development process and can typically be implemented quickly. Costs for implementing this strategy are nominal and depend on the number and length of locations. This CM can be effectively and efficiently implemented using a systematic approach with numerous and long locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding.

FHWA CMF Clearinghouse:	Crash Types Addressed:	Head-on, Side-swipe, All	CRF:	15 - 68%

R31, Install edgeline rumble strips/stripes

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	All	15%	10 years
Notes:	This CM only applies to crashes occurring within the limits of the new rumble strips/stripes.		

General information				
Where to use:				
Shoulder and edge line milled rumble strips/stripes should be used on roads with a history of roadway departure crashes. It is recommended that rumble strips/stripes be applied systematically along an entire route instead of only at spot locations. For all rumble strips/stripes, pavement condition should be sufficient to accept milled rumble strips. Special requirements may apply and care should be taken when considering installing rumble strips in locations with residential land uses or in areas with high bicycle volumes.				
Why it works:				
Rumble strips provide an auditory indication and tactile rumble when driven on, alerting drivers that they are drifting out of their travel lane, giving them time to recover before they depart the roadway or cross the center line. Additionally, rumble stripes (pavement marking in the rumble itself) provide an enhanced marking, especially in wet dark conditions.				
General Qualities (Time, Cost and Effectiveness):				
These improvements do not require a long development process and can typically be implemented quickly. Costs for implementing this strategy are nominal and depend on the number and length of locations. This CM can be effectively and efficiently implemented using a systematic approach with numerous and long locations, resulting in moderate cost projects that are more appropriate to seek state or federal funding.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Run-off Road	CRF:	10 - 41%

R32PB, Install bike lanes

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Pedestrian and Bicycle	35%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring within the limits of the Class II (not Class III) bike lanes. When an off-street bike-path is proposed that is not adjacent to the roadway, the applicant must document the engineering judgment used to determine which "Ped & Bike" crashes to apply.		

General information				
Where to use:				
Roadway segments noted as having crashes between bicycles and vehicles or crashes that may be preventable with a buffer/shoulder. Most studies suggest that bicycle lanes may provide protection against bicycle/motor vehicle collisions. Striped bike lanes can be incorporated into a roadway when is desirable to delineate which available road space is for exclusive or preferential use by bicyclists.				
Why it works:				
Most studies present evidence that bicycle lanes provide protection against bicycle/motor vehicle collisions. Bicycle lanes provide marked areas for bicyclist to travel along the roadway and provide for more predictable movements for both bicyclist and motorist. Evidence also shows that riding with the flow of vehicular traffic reduces bicyclists' chances of collision with a motor vehicle. Locations with bicycle lanes have lower rates of wrong-way riding. In combination with this CM, better guidance signs and markings for non-motorized and motorized roadway users should be considered, including: sign and markings directing cyclists on appropriate/legal travel paths and signs and markings warning motorists of non-motorized uses of the roadway that should be expected.				
General Qualities (Time, Cost and Effectiveness):				
Adding striped bicycle lanes can range from the simply restriping the roadway and minor signing to projects that require roadway widening, right-of-way, and environmental impacts. It is most cost efficient to create bike lanes during street reconstruction, street resurfacing, or at the time of original construction. The expected effectiveness of this CM must be assessed for each individual location. For simple installation scenarios, This CM can be very effective and can be considered on a systematic approach.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian, Bicycle	CRF:	0 - 53 %

R33PB, Install Separated Bike Lanes

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Pedestrian and Bicycle	45%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring within the limits of the separated bike lanes. When an off-street bike-path is proposed that is not adjacent to the roadway, the applicant must document the engineering judgment used to determine which "Ped & Bike" crashes to apply.		

General information				
Where to use:				
Separated bikeways are most appropriate on streets with high volumes of bike traffic and/or high bike-vehicle collisions, presumably in an urban or suburban area. Separation types range from simple, painted buffers and flexible delineators, to more substantial separation measures including raised curbs, grade separation, bollards, planters, and parking lanes. These options range in feasibility due to roadway characteristics, available space, and cost. In some cases, it may be possible to provide additional space in areas where pedestrian and bicyclists may interact, such as the parking buffer, or loading zones, or extra bike lane width for cyclists to pass one another.				
Why it works:				
Separated bike lanes provide increased safety and comfort for bicyclists beyond conventional bicycle lanes. By separating bicyclists from motor traffic, "protected" or physically separated bike lanes can offer a higher level of comfort and are attractive to a wider spectrum of the public. Intersections and approaches must be carefully designed to promote safety and facilitate left-turns for bicyclists from the primary corridor to cross street. In combination with this CM, better guidance signs and markings for non-motorized and motorized roadway users should be considered, including: sign and markings directing cyclists on appropriate/legal travel paths and signs and markings warning motorists of non-motorized uses of the roadway that should be expected.				
General Qualities (Time, Cost and Effectiveness):				
The cost of Installing separated bike lanes can be low to medium or high, depending on whether roadway widening, right-of-way and environmental impacts are involved. It is most cost efficient to create bike lanes during street reconstruction, street resurfacing, or at the time of original construction. The expected effectiveness of this CM must be assessed for each individual location.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian, Bicycle	CRF:	3.7 - 100 %

R34PB, Install sidewalk/pathway (to avoid walking along roadway)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Pedestrian and Bicycle	80%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring within the limits of the new walkway. This CM is not intended to be used where an existing sidewalk is being replaced with a wider one, unless prior Caltrans approval is included in the application. When an off-street multi-use path is proposed that is not adjacent to the roadway, the applicant must document the engineering judgment used to determine which "Ped & Bike" crashes to apply.		

General information
Where to use:
Areas noted as not having adequate or no sidewalks and a history of walking along roadway pedestrian crashes. In rural areas asphalt curbs and/or separated walkways may be appropriate.
Why it works:
Sidewalks and walkways provide people with space to travel within the public right-of-way that is separated from roadway vehicles. The presence of sidewalks on both sides of the street has been found to be related to significant reductions in the "walking along roadway" pedestrian crash risk compared to locations where no sidewalks or walkways exist. Reductions of 50 to 90 percent of these types of pedestrian crashes. In combination with this CM, better guidance signs and markings for non-motorized and motorized roadway users should be considered, including: sign and markings directing pedestrians and cyclists on appropriate/legal travel paths and signs and markings warning motorists of non-motorized uses of the roadway that should be expected.
General Qualities (Time, Cost and Effectiveness):

Costs for sidewalks will vary, depending upon factors such as width, materials, and existing of curb, gutter and drainage. Asphalt curbs and walkways are less expensive, but require more maintenance. The expected effectiveness of this CM must be assessed for each individual location. These projects can be very effective in areas of high-pedestrian volumes with a past history of crashes involving pedestrians.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian, Bicycle	CRF:	65 - 89 %

R35PB, Install/upgrade pedestrian crossing (with enhanced safety features)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Pedestrian and Bicycle	35%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the influence area (expected to be a maximum of within 250') of the new crossing which includes new enhanced safety features. Note: This CM is not intended to be combined with the "Install raised pedestrian crossing" when calculating the improvement's B/C ratio. This CM is not intended to be used for high-cost aesthetic enhancements (i.e. stamped concrete or stamped asphalt).		

General information				
Where to use:				
Roadway segments with no controlled crossing for a significant distance in high-use midblock crossing areas and/or multilane roads locations. Based on the Zegeer study (Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations) at many locations, a marked crosswalk alone may not be sufficient to adequately protect non-motorized users. In these cases, flashing beacons, curb extensions, medians and pedestrian crossing islands and/or other safety features should be added to complement the standard crossing elements. For multi-lane roadways, advance "yield" markings can be effective in reducing the 'multiple-threat' danger to pedestrians.				
Why it works:				
Adding pedestrian crossings has the opportunity to greatly enhance pedestrian safety at locations noted as being problematic. The enhanced safety elements, which may include curb extensions, medians and pedestrian crossing islands, beacons, and lighting, combined with pavement markings delineating a portion of the roadway that is designated for pedestrian crossing. Care must be taken to warn drivers of the potential for pedestrians crossing the roadway and enhanced improvements added to the crossing increase the likelihood of pedestrians crossing in a safe manner. In combination with this CM, better guidance signs and markings for non-motorized and motorized roadway users should be considered, including: sign and markings directing pedestrians and cyclists on appropriate/legal travel paths and signs. When agencies opt to install aesthetic enhancement to crossing like stamped concrete/asphalt, the project design and construction costs can significantly increase. For HSIP applications, these costs must be accounted for in the B/C calculation, but these costs (over standard crosswalk markings) must be tracked separately and are not federally reimbursable and will increase the agency's local-funding share for the project costs.				
General Qualities (Time, Cost and Effectiveness):				
Costs associated with this strategy will vary widely, depending on the extent of the curb extensions, raised medians, flashing beacons, and other pedestrian safety elements that are needed with the crossing. When considered at a single location, these improvements can sometimes be low cost and funded through local funding by local crews. This CM can often be effectively and efficiently implemented using a systematic approach with numerous locations, resulting in moderate to high cost projects that are appropriate to seek state or federal funding.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian, Bicycle	CRF:	8 - 56%

R36PB, Install raised pedestrian crossing

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Pedestrian and Bicycle	35%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the area with the new raised crossing. Note: This CM is not intended to be combined with the "Install pedestrian crossing (with enhanced safety features)" when calculating the improvement's B/C ratio.		

General information				
Where to use:				
On lower-speed roadways, where pedestrians are known to be crossing roadways that involve significant vehicular traffic. Based on the Zegeer study (Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations) at many locations, a marked crosswalk alone, may not be sufficient to adequately protect non-motorized users. In these cases, raised crossings can be added to complement the standard crossing elements. Special requirements may apply and extra care should be taken when considering installing raised crossings to ensure unintended safety issues are not created, such as: emergency vehicle access or truck route issues.				
Why it works:				
Adding a raised pedestrian crossing has the opportunity to enhance pedestrian safety at locations noted as being especially problematic. The raised crossing encourages motorists to reduce their speed and provides improved delineation for the portion of the roadway that is designated for pedestrian crossing. In combination with this CM, better guidance signs and markings for non-motorized and motorized roadway users should be considered, including: sign and markings directing pedestrians and cyclists on appropriate/legal travel paths.				
General Qualities (Time, Cost and Effectiveness):				
Costs associated with this strategy will vary widely, depending upon the elements of the raised crossing and the need for new curb ramps and sidewalk modifications. This CM may be effectively and efficiently implemented using a systematic approach with more than one location and can have medium to high B/C ratios based on past non-motorized crash history.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian, Bicycle	CRF:	30 - 46%

R37PB, Install Rectangular Rapid Flashing Beacon (RRFB)

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Pedestrian and Bicycle	35%	20 years
Notes:	This CM only applies to "Ped & Bike" crashes occurring in the influence area (expected to be a maximum of within 250') of the crossing which includes the RRFB.		

General information				
Where to use:				
Rectangular Rapid Flashing Beacon (RRFB) includes pedestrian-activated flashing lights and additional signage that enhance the visibility of marked crosswalks and alert motorists to pedestrian crossings. It uses an irregular flash pattern that is similar to emergency flashers on police vehicles. RRFBs are installed at unsignalized intersections and mid-block pedestrian crossings.				
Why it works:				
RRFBs can enhance safety by increasing driver awareness of potential pedestrian conflicts and reducing crashes between vehicles and pedestrians at unsignalized intersections and mid-block pedestrian crossings. The addition of RRFB may also increase the safety effectiveness of other treatments, such as crossing warning signs and markings.				
General Qualities (Time, Cost and Effectiveness):				
RRFBs are a lower cost alternative to traffic signals and hybrid signals. This CM can often be effectively and efficiently implemented using a systematic approach with numerous locations.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Pedestrian, Bicycle	CRF:	7 – 47.4%

R38, Install Animal Fencing

For HSIP Cycle 11 Call-for-projects			
Funding Eligibility	Crash Types Addressed	CRF	Expected Life
90%	Animal	80%	20 years
Notes:	This CM only applies to "animal" crashes occurring within the limits of the new fencing.		

General information				
Where to use:				
At locations with high percent of vehicular/animal crashes (reactive) or where there is a known high percent of animals crossing due to migratory patterns (proactive).				
Why it works:				
Animal fencing helps to channelize the identified animals to a natural or man-made crossing, eliminating the conflict between vehicles and animals on the same place. Animal fencing is typically installed at a bridge location with its "run of need" dependent on the surrounding terrain.				
General Qualities (Time, Cost and Effectiveness):				
Time to install fencing can be moderate to lengthy depending on the environmental commitments and agreed upon solution to mitigating project impacts. Costs will be fairly low and depend on the "run of need" length. There will be minimal reoccurring maintenance costs on keeping the fence intact. The expected effectiveness of this CM must be assessed for each individual location.				
FHWA CMF Clearinghouse:	Crash Types Addressed:	Animal	CRF:	70 - 90 %

Appendix C: Summary of "Recommended Actions"

The information contained here represent a brief summary of each section of this manual as well as the Summary of "Recommended Actions" from Sections 2 through 7. This is intended to be a quick-reference for local agency practitioners working on a "proactive safety analysis" of their roadway network.

Introduction and Purpose

As safety practitioners consider implementing a 'proactive safety analysis approach' they should consider the overall context of the safety issues facing California local agencies and Caltrans primary goals for preparing this Safety manual for California's local roadway owners. Figure 1 provides a flowchart of the process and Appendices E and F provide examples and lessons learned from recent statewide calls-for-projects.

Identifying Safety Issues

This section provides an overview of the types of data to collect for the identification of roadway safety issues. It discusses sources of crash data and how they can be used. As practitioners gather information they are encouraged to develop one or more separate spreadsheets and/or pin-maps to help track and manage this data. The following spreadsheet is offered as an example, but each agency's spreadsheet should include data and be formatted as necessary to meet their needs.

	General Information		Crash Information			Evaluation / Action		
Location & Date	Source/Type of information	Safety Issue/Problem	Nature of Crashes	Time of Day	Weather/Traffic Conditions	Staff Evaluation	Recommend Action	Resolution
1) Intersection "X"								
2) Roadway Segment (PM 5.3 to PM 7.8)								

State and Local Crash Databases

Recommended Action: Obtain at least 3 years of network-wide crash data to identify local roads that have a history of roadway crashes. This will be used to identify predominant roadway crash locations, crash types and other common characteristics.

Transportation Injury Mapping System (TIMS)

Recommended Action: Consider augmenting your local agency's data collection approach with information available using the suite of TIMS tools. The TIMS tools (and/or tools from private for-profit vendors) can help the safety practitioner access and manage their crash data.

Law Enforcement Crash Reports

Recommended Action: Develop a working relationship with law enforcement officials responsible for enforcement and crash investigations. This could foster a partnership where sharing crash reports and

safety information on problem roadway segments becomes an everyday occurrence. Practitioners with limited access to crash data are encouraged to use TIMS to assess the local crash report data.

Observational Information

Recommended Action: Gather information received from law enforcement and road maintenance crew observations. Develop a system for maintenance crews to report and record observed roadway safety issues and a mechanism to address them.

Public Notifications

Recommended Action: Review and summarize information received from these sources, identifying segments or corridors with multiple notifications and record the locations, dates, and nature of the problem that are cited.

Roadway Data and Devices

Recommended Action: Identify and track roadway characteristics for the intersections, roadway segments, and corridors, including compliance with the minimum standards. At a minimum, this should be done for locations being considered for safety improvements, but ideally agencies would establish an extensive database of roadway data to help them proactively identify high risk roadway features.

Exposure Data

Recommended Action: Consider the availability of exposure data and track it along with the other crash data to help prioritize potential locations for safety improvements.

Field Assessments and Road Safety Audits

Recommended Action: Consider completing formal or informal field assessments and RSAs at certain locations to help ensure all relevant information is collected and available for the safety practitioners to complete their safety analysis and identification of the most appropriate countermeasures. Develop simple straightforward criteria on when one of these will be undertaken.

Safety Data Analysis

This section summarizes the types of analyses that can be conducted to determine what roadway countermeasures should be implemented. This section is the link between the data (Section 2) and the selection of appropriate countermeasures (Section 4). It provides definitions and examples of the qualitative and quantitative factors that should be considered when evaluating roadway safety issues.

Quantitative Analysis

Recommended Action: Complete a quantitative analysis of their roadway data using both Crash Frequency and Crash Rate methodologies, including:

Crash Frequency

Top 10 (or 20) lists of intersections and roadway segments.

For lower volume roadways, network wide pin-maps may be more effective.

Develop collision diagrams showing the direction of movement of vehicles and pedestrians.

Crash Rate

Top 10 (or 20) lists of roadway segments in relationship to length, volumes, and/or density.

Top 10 (or 20) lists of intersections, sorted by crash rate.

Top 10 (or 20) lists of the highest volume intersections, sorted by crash frequency or rate.

Qualitative Analysis

Recommended Action: Consider completing field assessments and RSAs to identify roadway infrastructure characteristics relating to both locations with compliance issues and locations with high crash frequencies/rates. As part the field assessments, common roadway and crash characteristics should be identified for the potential systemic deployment of countermeasures.

Caltrans recommends all agencies complete both quantitative and qualitative analyses before starting their applications for HSIP program funding. The findings from these analyses should be documented in spreadsheets and/or pin-maps similar to the ones discussed in Section 2.

Countermeasures

This Section provides a description of selected countermeasures that have been shown in this manual. It includes a basic set of strategies to implement at locations experiencing a history of crashes and their corresponding crash modification factors (CMF). NOTE: Crash Reduction Factors (CRFs) are directly connected to the CMFs and are another indication of the effectiveness of a particular treatment. The CRF for a countermeasure is defined mathematically as 1 – CMF. The terms CMFs and CRFs are used interchangeably throughout this document.

Selecting Countermeasures and Crash Modification Factors / Crash Reduction Factors

Countermeasure Details and Characteristics

Recommended Action: Agencies should use all information and results obtained through completing the actions in Sections 2, 3 and 4 to select the appropriate countermeasures for their HCCLs and systemic improvements. As novice safety practitioners select countermeasures, they must realize that a reasonable level of traffic 'engineering judgment' is required and that this manual and should not be used as a simple cheat-sheet for preparing and submitting applications for funding.

Calculating the B/C ratio and Comparing Projects

This section defines a methodology for calculating a benefit to cost (B/C) ratio for a potential safety project. It includes sources for estimating projected costs and benefits and the specific values/formulas Caltrans uses for its statewide evaluations of HSIP projects. This section also discusses the potential value in reevaluating projects' overall cost effectiveness.

Estimating the Benefit of Implementing Proposed Improvements

Recommended Action: Prepare 'Total Benefit' estimates for the proposed projects being evaluated in the proactive safety analysis.

Estimating the Cost of Implementing Proposed Improvements

Recommended Action: Prepare 'Total Project Cost' estimates for the proposed projects being evaluated in the proactive safety analysis.

Calculating the B/C Ratio

Recommended Action: Calculate the B/C ratio for each of the proposed projects being evaluated in the proactive safety analysis.

Compare B/C Ratios and Consider the Need to Reevaluate Project Elements

Recommended Action: Compare, reevaluate, and prioritize the potential safety projects. Consider changing the project limits or utilizing lower cost countermeasures for projects with low initial B/C ratios.

Identifying Funding and Construct Improvements

This section identifies existing and new funding opportunities for safety projects that local agencies should be considering. This section also briefly discusses some unique project development issues and strategies for safety projects as they proceed through design and construction.

Existing Funding for Low-cost Countermeasures

Recommended Action: Survey planned maintenance, developer and capital projects to determine whether they overlap any of the proposed safety projects. Where projects overlap, leverage the existing funding sources to include safety countermeasures.

Other Funding Sources

Recommended Action: Consider all potential funding opportunities to incorporate the identified safety countermeasures including the HSIP and ATP Programs.

Project Development and Construction Considerations

Recommended Action: Safety practitioners should follow their safety projects all the way through the project delivery and construction process. In addition, they should establish a safety program delivery plan that brings awareness and support to the expedited delivery of safety projects. Where possible, safety practitioners should involve the media and even consider having their own program intended to "toot their own safety-horn."

Evaluation Improvements

This section presents the process to complete an evaluation of installed treatments. After the countermeasures are installed, assessing their effectiveness will provide valuable information and can help determine which countermeasures should continue to be installed on other roadways to make them safer as well.

Recommended Action: Develop a spreadsheet to track future safety project installations and record 3+ years of "before" and "after" crash information at those locations. Once safety countermeasures are constructed, schedule and track assessment dates to ensure they happen.

Appendix D: Benefit Cost Ratio (BCR) Calculations

This appendix includes the Benefit Cost methodology used in the Caltrans calls-for-projects in the HSIP programs. The HSM, Part B - Chapter 7, includes more details on conducting Economic Appraisal for roadway safety projects. Local agencies will be required to utilize the HSIP Analyzer to calculate the Benefit Cost Ratio (BCR) as part of their application for HSIP funding. Starting in Cycle 7 call for projects, the fatality and severe injury costs have been combined for calculating the benefit. Because fatality figures are small and are a matter of randomness, this change is being made to reduce the possibility of selecting an improvement project on the basis of randomness.

1) $Benefit\ (Annual) = \sum_{s=0}^{3} \frac{CRF \times N \times CC_{ave}}{Y}$

- CRF : Crash reduction factor in each countermeasure.
- S : Severity (0: PDO, 1: Minor Injury, 2: Injury, 3: Severe Injury/Fatal). See the below table.
- N : Number of Crashes, in severity levels, related to selected countermeasure.
- Y : Crash data time period (Year).
- CC_{ave} : Crash costs in severity levels.

Severity (S)	Crash Severity *	Location Type	Crash Cost ***
3	**Fatality and Severe Injury Combined (KA)	Signalized Intersection	$1,787,000
3		Non Signalized Intersection	$2,843,000
3		Roadway	$2,461,000
2	Evident Injury – Other Visible (B)		$159,900
1	Possible Injury–Complaint of Pain (C)		$90,900
0	Property Damage Only (O)		$14,900

* The letters in parenthesis (K, A, B, C and O) refer to the KABCO scale; it is commonly used by law enforcement agencies in their crash reporting efforts and is further documented in the HSM.

** Figures were calculated based on an average Fatality (K) / Severe Injury (A) ratio for each area type, a crash cost for a Fatality (K) of $8,112,200, and a crash cost of a Severe/Disabling Injury (A) of $437,100. These costs are used in the HSIP Analyzer.

*** Based on Table 7-1, Highway Safety Manual (HSM), First Edition, 2010. Adjusted to 2022 Dollars.

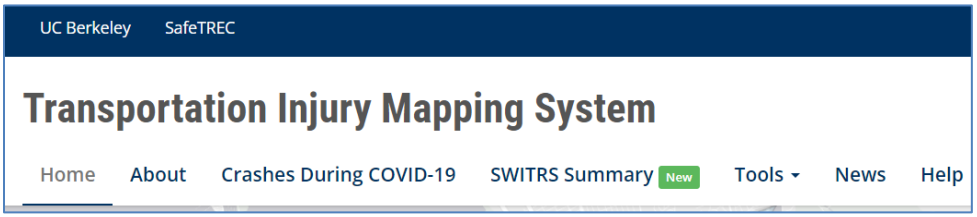
2) *Benefit (Life) = Benefit (annual) x Years of service life*

3) BCR (each countermeasure): $Benefit\ \ Cost\ Ratio_{(CM)} = \frac{Benefit\ (Life)_{(CM)}}{Total\ \Pr oject\ Cost_{(CM)}}$

4) BCR (project): $BCR\ (Project) = \frac{\sum_{CM=1}^{n} Benefit\ (Life)_{(CM)}}{Total\ \ Pr oject\ Cost}$

Appendix E: Examples of Crash Data Collection and Analysis Techniques using TIMS

As demonstrated throughout the manual, SafeTREC's TIMS website http://tims.berkeley.edu/ can be used to assist local agencies in completing a proactive safety analysis of their roadway network. *(Note: This manual focuses on TIMS as a tool to access and map SWITRS data because TIMS is free to local agencies and the general public. Local agencies are encouraged to try TIMS, but they should not feel obligated to make a switch if they prefer using their vendor-supplied crash analysis software to complete their data collection and analysis process).*



SWITRS Query & Map:

The SWITRS Query & Map application is a tool for accessing and mapping fatal and injury collision data from the California Statewide Integrated Traffic Records System (SWITRS).

SWITRS GIS Map:

The SWITRS GIS Map offers an interactive map-centric approach to viewing and querying SWITRS collision data, with the capability of multiple tasks including Rank by Intersection, Collision Diagram, etc.

Collision Diagram Tool:

The Collision Diagram tool allows users to generate an interactive collision diagram. The Collision Diagram is accessible through SWITRS GIS Map after a set of collisions is selected.

ATP Maps & Summary Data:

The ATP Maps & Summary Data tool utilizes interactive collision maps to find pedestrian and bicycle collisions hot spot and generate data summaries within specified project and/or community limits. Though it is designed to support the California Active Transportation Program (ATP), this tool may be useful in developing an HSIP project targeting pedestrian and bicycle safety issues.

Appendix F: List of Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ATP	Active Transportation Program
B/C; BCR	Benefit Cost Ratio
Caltrans	California Department of Transportation (Division of Local Assistance)
CA-MUTCD	California - Manual on Uniform Traffic Control Devices
CM	Countermeasure
CMF	Crash Modification Factor
CRF	Crash Reduction Factor
"5 E's of Safety"	Education, Enforcement, Engineering, Emergency Response and Emerging Technologies
EMS	Emergency Medical Services
FHWA	Federal Highway Administration
HCCL	High Crash Concentration Location
HR3	High Risk Rural Roads Program
HSIP	Highway Safety Improvement Program
HSM	Highway Safety Manual
RSA	Roadway Safety Audit
SafeTREC	Safe Transportation Research and Education Center (SafeTREC) at the University of California, Berkeley
SHSP	Strategic Highway Safety Plan
SWITRS	Statewide Integrated Traffic Records System
TIMS	Transportation Injury Mapping System (a product of SafeTREC)

Appendix G: References

1. FHWA, Office of Safety website: Local and Rural Road Safety Program
   - https://safety.fhwa.dot.gov/local_rural/

2. Highway Safety Manual (HSM). Product of the American Association of State Highway and Transportation Officials.
   - http://www.highwaysafetymanual.org/Pages/default.aspx

3. National Highway Traffic Safety Administration (NHTSA): National Center for Statistics and Analysis (NCSA) Motor Vehicle Traffic Crash Data Resource
   - https://crashstats.nhtsa.dot.gov/

4. California - Manual on Uniform Traffic Control Devices (CA-MUTCD)
   - https://dot.ca.gov/programs/safety-programs/camutcd

5. Caltrans' website on the Highway Design Manual
   - https://dot.ca.gov/programs/design/manual-highway-design-manual-hdm

6. FHWA, Research and Development website for Bikesafe and Pedsafe
   - https://safety.fhwa.dot.gov/ped_bike/tools_solve/

7. AASHTO - A Policy on Geometric Design of Highways and Streets ("Green Book")

   AASHTO - the Roadside Design Guide
   - https://store.transportation.org/

8. FHWA – Public Roads Magazine:
   - https://highways.dot.gov/public-roads/home

APPENDIX D: COUNTERMEASURE TOOLBOX

Table 3. High-risk Intersections

ID	Intersection	Control	Consolidated CMs (HSIP-Eligible - Refer to LRSM* 2022)				Collision Info (2017-2022)	Additional CM (non-HSIP)	EA - 1 Improve Intersection Safety			EA - 2 Address Rear-end collisions			EA - 3 Address Broadside collisions			EA - 4 Reduce Unsafe speed violations			EA - 5 Address Nighttime collisions			EA - 6 Address Head-on collisions		
			CM1	CM2	CM3	CM4			CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3
1	O'Hara Ave and Laurel Rd	Signalized	S02	S03	S12		1 F, 2 SI, 5 CoP, 4 sideswipe, 3 broadside, 1 nightime, 7 Signal/sign violation	Redlight Camera, Extend the length of merging lane or add a travel lane on east leg	S02	S03					S03	S12					S09	S10				
2	Main St and Sandy Ln	One Way Stop Controlled	NS06	NS07	NS20PB	NS01	2 SI, 1 Ped, 1 broadside, 1 wrong side of road, 1 Auto ROW	Install sidewalk on Main St between Nelroy and Sandy (R34PB)	NS06	NS07	NS20PB				NS06	NS07					NS01					
3	Empire Ave and Laurel Rd	Signalized	S02	S03			1 SI, 11 CoP, 6 Rear end, 6 broadside, 3 Unsafe Speed, 2 DUI, 2 Improper Turning, 2 AutoROW, 2 Signal&Sign violation	Provide Advanced Dilemma Zone Detection for high speed approaches	S02	S03		S02	S03		S02	S03		S02	S03							
4	Carol Ln and Main St	Signalized	S02	S03	S09		1 SI, 5 CoP, 4 Broadside, sideswipe, 1 rear end, 4 Signal&Sign violation, 2 improper turning	Redlight Camera	S02	S03	S09	S02	S03		S02	S03										
5	Main St and Vintage Pkwy	Signalized	S02	S03			1 SI, 1 VI, 2 CoP, 1 Ped, 1 Bike, 2 rear end, 2 PedROW, 1 Unsafe speed, 1 Wrong side	No RTOR	S02	S03		S02	S03					S02	S03							
6	Main St/Brentwood Blvd and Delta Rd	Two Way Stop Controlled	NS03	NS07	NS14	NS01	1 SI, 3 CoP, 1 motorcycle, 3 broadside, 1 head-on, 2 AutoROW, 1 wrong side, 1 Signal&Sign violation, 1 nighttime	Traffic signal being install by the city, Pavement resurface and restriping	NS03	NS07	NS14				NS03	NS07	NS14				NS01	NS09		NS14	NS07	
7	Live Oak Ave and Nelroy Rd	All Way Stop Controlled	NS03	NS08			1 SI, 3 CoP, 2 head-on, 2 broadside, 2 wrong side, 1 DUI, 1 unsafe speed	Wrong Way - Do not Enter' signs	NS03	NS08					NS03	NS08		NS08	NS09					NS14	NS07	
8	Brown Rd and Neroly Rd	Signalized	S02	S03			2 CoP, Rear end, 2 unsafe speed	Provide Advanced Dilemma Zone Detection for high speed approaches	S02	S03		S02	S03					S02	S03							
9	E Cypress Rd and Bethel Island Rd	Signalized	S02	S03	S09		1 Fatal, 1 CoP, 1 sideswipe, 1 nightime, 1 wrongside of road, 1 unsafe lane change	Wrong Way - Do not Enter' signs	S02	S03																
10	Francisco Villa Dr and O'Hara Ave	One Way Stop Controlled	NS03	NS07	NS09	NS14	1 SI, 1 VI, 2 CoP, 2 Ped, 3 head-on, 2 wrong side, 2 PedROW, 1 fixed object	Wrong Way - Do not Enter' signs, Pavement resurface, Restrict on-street parking near intersection	NS03	NS07	NS09													NS14	NS07	
11	Oakley Rd and Neroly Rd	All Way Stop Controlled	NS11	NS07	NS08	NS14	1 SI, 1 CoP, 1 Bike, 1 head-on, 1 broadside, 1 wrong side, 1 AutoROW		NS11	NS07	NS08													NS07		
12	Live Oak Ave and Laurel Rd	Signalized	S02	S03	S09		1 SI, 3 CoP, 2 headon, 2 broadside, 2 wrongside, 1 DUI, 1 Signal Violation	Redlight Camera, Wrong Way - Do not Enter' signs	S02	S03	S09				S02	S03										

Code	Countermeasure Name
HSIP/Non-HSIP Code	
S01	Add intersection lighting
S02	Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number
S03	Improve signal timing (coordination, phases, red, yellow, or operation)
S05	Install emergency vehicle pre-emption systems
S06	Install left-turn lane and add turn phase (signal has no left-turn lane or phase before)
S07	Provide protected left turn phase (left turn lane already exists)
S08	Convert signal to mast arm (from pedestal-mounted)
S09	Install raised pavement markers and striping (Through Intersection)
S10	Install flashing beacons as advance warning (S.I.)
S11	Improve pavement friction (High Friction Surface Treatments)
S12	Install raised median on approaches (S.I.)
S13PB	Install pedestrian median fencing on approaches
S14	Create directional median openings to allow (and restrict) left-turns and U-turns (S.I.)
S15	Reduced Left-Turn Conflict Intersections (S.I.)
S16	Convert intersection to roundabout (from signal)
S17PB	Install pedestrian countdown signal heads
S18PB	Install pedestrian crossing (S.I.)
S19PB	Pedestrian Scramble
S20PB	Install advance stop bar before crosswalk (Bicycle Box)
S21PB	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)

Code	Countermeasure Name
NS01	Add intersection lighting (NS.I.)
NS02	Convert to all-way STOP control (from 2-way or Yield control)
NS03	Install Signals
NS04	Convert intersection to roundabout (from all way stop)
NS05	Convert intersection to roundabout (from 2-way stop or Yield control)
NS05mr	Convert intersection to mini-roundabout
NS06	Install/upgrade larger or additional stop signs or other intersection warning/regulatorysigns
NS07	Upgrade intersection pavement markings (NS.I.)
NS08	Install Flashing Beacons at Stop-Controlled Intersections
NS09	Install flashing beacons as advance warning (NS.I.)
NS10	Install transverse rumble strips on approaches
NS11	Improve sight distance to intersection (Clear Sight Triangles)
NS12	Improve pavement friction (High Friction Surface Treatments)
NS13	Install splitter-islands on the minor road approaches
NS14	Install raised median on approaches (NS.I.)
NS15	Create directional median openings to allow (and restrict) left-turns and u-turns (NS.I.)
NS16	Reduced Left-Turn Conflict Intersections (NS.I.)
NS17	Install right-turn lane (NS.I.)
NS18	Install left-turn lane (where no left-turn lane exists)
NS19PB	Install raised medians (refuge islands)
NS20PB	Install pedestrian crossing at uncontrolled locations (signs and markings only)
NS21PB	Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)
NS22PB	Install Rectangular Rapid Flashing Beacon (RRFB)
NS23PB	Install Pedestrian Signal (including Pedestrian Hybrid Beacon (HAWK))

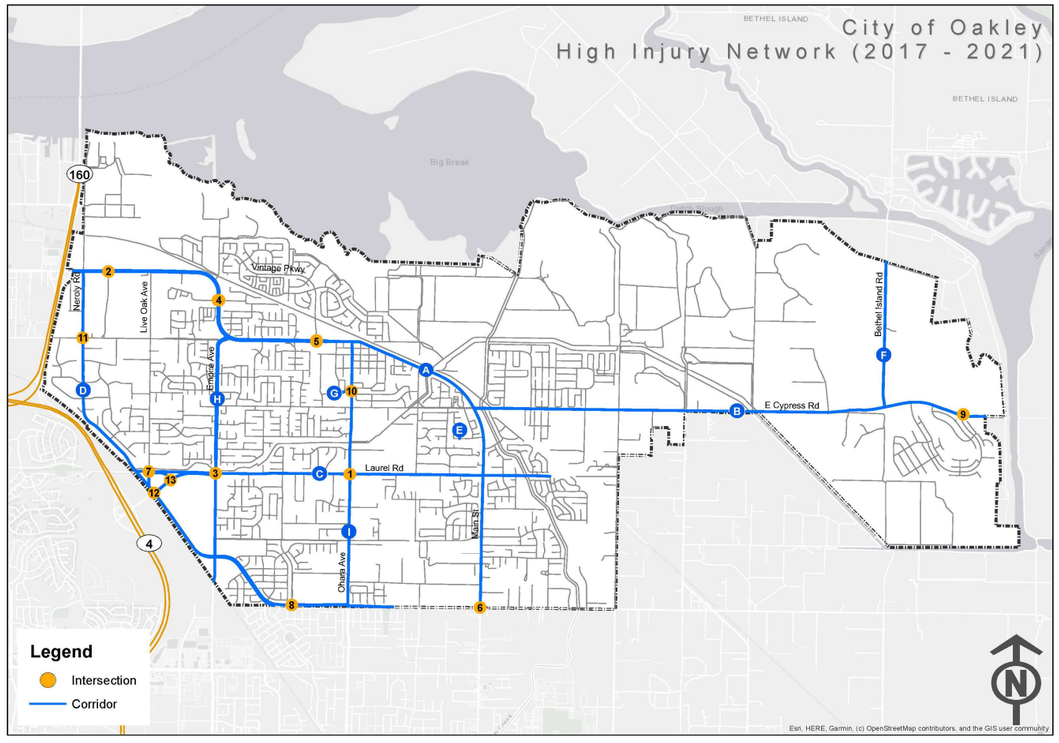


Table 4. High-risk Roadway Segments

ID	Roadway Segment	Consolidated CMs (HSIP-Eligible - Refer to LRSM* 2022)						Collision Info (2017-2022)	Additional CM (non-HSIP)**	EA - 1 Improve Intersection Safety			EA - 2 Address Rear-end collisions			EA - 3 Address Broadside collisions			EA - 4 Reduce Unsafe speed violations			EA - 5 Address Nighttime collisions			EA - 6 Address Head-on collisions		
		CM1	CM2	CM3	CM4	CM5	CM6			CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3	CM1	CM2	CM3
A	Main St: West City Limit to South City Limit	R22	R27	R26	R34PB	R32PB	R21	3 SI, 6 VI, 26 CoP, 18 rear end, 5 broadside, 4 hit object, 3 ped, 3 bike, 3 motorcycle, 13 unsafe speed, 5 improper turning, 4 wrong side, 3 DUI	From Nelroy to Live Oaks: R34PB, R32PB and restrict on-street parking, From Vintage Pkwy to 2nd St: Restrict On-street parking, reduce speed limit				R22	R27	R21				R26	R23		R22	R27		R08		
B	E Cypress Rd: Main St to East City Limit	R22	R27	R02	R08	R30		1 F, 2 SI, 3 VI, 9 CoP, 1 bike, 1 motorcycle, 7 rear end, 2 head-on, 6 unsafe speed, 3 wrong side, 3 nighttime	Wrong Way - Do not Enter' signs, Upgrade pavement markings				R22	R27					R26	R23	R24	R01			R08	R30	
C	Laurel Rd: West City Limit to Teton Rd	R22	R27					1 F, 1 SI, 1 VI, 9 CoP, 2 motorcycle, 6 rear end, 2 head-on, 2 broadside, 2 nighttime, 7 unsafe speed, 2 wrongside	'Wrong Way - Do not Enter' signs				R22	R27													
D	Neroly Rd: Main St to Silverspur Ln	R22	R27	R31	R02			1 SI, 4 VI, 4 CoP, 1 ped, 2 bike, 1 motorcycle, 3 hit object, 2 head on, 2 broadside, 1 nighttime, 4 wrong side	Wrong Way - Do not Enter' signs, Raised median at Oakley/Nelroy				R22	R27					R26	R23					R08	R31	
E	Beechnut Ln: Cashew Ln to Almondtree Cir	R22	R27	R28				1 SI, 1 hit object, 1 unsafe speed					R22	R27					R28								
F	Bethel Island Rd: E Cypress Rd to North City Limit (Sandmound Blvd)	R22	R27	R30				1 F, 1 CoP, 1 head-on, 1 sideswipe, 1 nightitme, 1 DUI, 1 unsafe lane change					R22	R27								R22	R27		R08	R30	
G	Francisco Villa Dr: O'Hara Ave to Cul-de-sac	R22	R27	R28				1 SI, 1 head on, 1 wrong side	Upgrade pavement markings and striping																R28		
H	Empire Ave: Main St to South City Limit	R22	R27					1 VI, 9 CoP, 5 rear end, 5 broadside, 3 improper turning, 2 DUI, 2 unsafe speed, 2 AutoROW					R22	R27													
I	O'Hara Ave: Main St to Nelroy Rd	R22	R27					1 SI, 1 VI, 3 CoP, 1 Head-on, rear-end, broadside, overturned, 2 unsafe	Wrong Way - Do not Enter' signs, Install Signal at Ohara Av & Covered Wagon Dr				R22	R27													

Code	Countermeasure Name
R01	Add Segment Lighting
R02	Remove or relocate fixed objects outside of Clear Recovery Zone
R03	Install Median Barrier
R04	Install Guardrail
R05	Install impact attenuators
R06	Flatten side slopes
R07	Flatten side slopes and remove guardrail
R08	Install raised median
R09	Install median (flush)
R10PB	Install pedestrian median fencing
R11	Install acceleration/ deceleration lanes
R12	Widen lane (initially less than 10 ft)
R13	Add two-way left-turn lane (without reducing travel lanes)
R14	Road Diet (Reduce travel lanes from 4 to 3 and add a two way left-turn and bike lanes)
R15	Widen shoulder
R16	Curve Shoulder widening (Outside Only)
R17	Improve horizontal alignment (flatten curves)
R18	Flatten crest vertical curve
R19	Improve curve superelevation
R20	Convert from two-way to one-way traffic
R21	Improve pavement friction (High Friction Surface Treatments)
R22	Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)
R23	Install chevron signs on horizontal curves
R24	Install curve advance warning signs
R25	Install curve advance warning signs (flashing beacon)
R26	Install dynamic/variable speed warning signs
R27	Install delineators, reflectors and/or object markers
R28	Install edge-lines and centerlines
R29	Install no-passing line
R30	Install centerline rumble strips/stripes
R31	Install edgeline rumble strips/stripes
R32PB	Install bike lanes
R33PB	Install Separated Bike Lanes
R34PB	Install sidewalk/pathway (to avoid walking along roadway)
R35PB	Install/upgrade pedestrian crossing (with enhanced safety features)
R36PB	Install raised pedestrian crossing
R37PB	Install Rectangular Rapid Flashing Beacon (RRFB)
R38	Install Animal Fencing

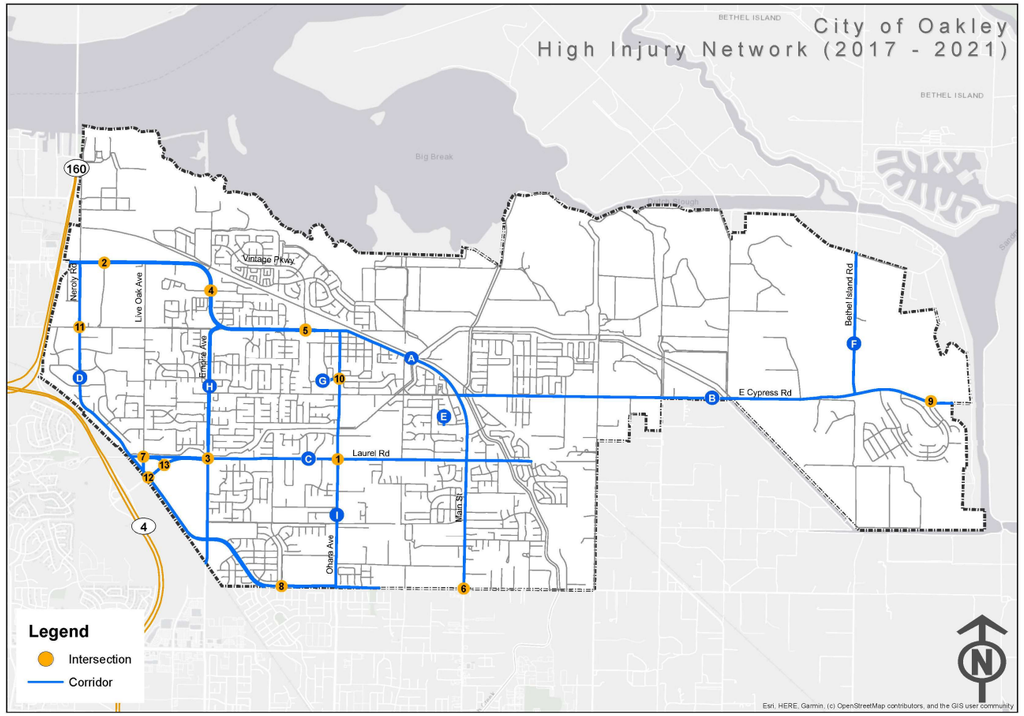


Table 5. Non-Engineering Countermeasures

	Strategy	Performance Measure	Organizations to be involved
Education	Conduct public information and education campaign for intersection safety laws, unsafe speeds, distracted driving, and driving under the influence.	Number of education campaigns	City/ School District/ Police Department
	Conduct pedestrian safety campaigns and outreach to raise their awareness of pedestrian safety needs through media outlets and social media.	Number of education campaigns	City/ School District/ Police Department
	Conduct bicycle safety campaigns and outreach to raise their awareness of bicycle safety needs through media outlets and social media.	Number of education campaigns	City/ School District/ Police Department
Enforcement	Targeted enforcement at high-risk locations.	Number of tickets issued.	Police Department
	Increase the number of personnel who have completed Advanced Roadside impaired Driving Enforcement (ARIDE) training	Number of personnel who have completed Advanced Roadside impaired Driving Enforcement (ARIDE) training	Police Department
Emergency Medical Services (EMS)	S05, Install emergency vehicle pre-emption systems	EMS vehicle response time.	Local Emergency Services Agency
	Increase the number of EMS/fire controll personnel taking Traffic Incident Managmenet Training	number of EMS/fire controll personnel taking Traffic Incident Managmenet Traising	Local Emergency Services Agency

Table 6. HSIP Eligible Countermeasures

City of Oakley LRSP

Countermeasures for Intersections

Signalized						
Sr. No.	**Code**	**Countermeasure Name**	**CM Description**	**CRF**	**Federal Funding**	**Systemic Approach Opportunity**
HSIP/Non-HSIP Code						
1	S01	Add intersection lighting	Provision of lighting at intersection.	40%	90%	Medium
2	S02	Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number	Includes New LED lighting, signal back plates, retro-reflective tape outlining the back plates, or visors to increase signal visibility, larger signal heads, relocation of the signal heads, or additional signal heads.	15%	90%	Very High
3	S03	Improve signal timing (coordination, phases, red, yellow, or operation)	Includes adding phases, lengthening clearance intervals, eliminating or restricting higher-risk movements, and coordinating signals at multiple locations.	15%	50%	Very High
5	S05	Install emergency vehicle pre-emption systems	Corridors that have a history of crashes involving emergency response vehicles. The target of this strategy is signalized intersections where normal traffic operations impede emergency vehicles and where traffic conditions create a potential for conflicts between emergency and nonemergency vehicles. These conflicts could lead to almost any type of crash, due to the potential for erratic maneuvers of vehicles moving out of the paths of emergency vehicles	70%	90%	High
6	S06	Install left-turn lane and add turn phase (signal has no left-turn lane or phase before)	Intersections that do not currently have a left turn lane or a related left-turn phase that are experiencing a large number of crashes. Many intersection safety problems can be traced to difficulties in accommodating left-turning vehicles, in particular where there is currently no accommodation for left turning traffic. A key strategy for minimizing collisions related to left-turning vehicles (angle, rear-end, sideswipe) is to provide exclusive left-turn lanes and the appropriate signal phasing, particularly on high-volume and high-speed major-road approaches.	55%	90%	Low
7	S07	Provide protected left turn phase (left turn lane already exists)	Left turns are widely recognized as the highest-risk movements at signalized intersections. Providing Protected left-turn phases for signalized intersections with existing left turn pockets significantly improve the safety for left-turn maneuvers by removing the need for the drivers to navigate through gaps in oncoming/opposing through vehicles	30%	90%	High
8	S08	Convert signal to mast arm (from pedestal-mounted)	Providing better visibility of intersection signs and signals aids the drivers' advance perception of the upcoming intersection. Visibility and clarity of the signal should be improved without creating additional confusion or distraction for drivers.	30%	90%	Medium
9	S09	Install raised pavement markers and striping (Through Intersection)	Adding clear pavement markings can guide motorists through complex intersections. When drivers approach and traverse through complex intersections, drivers may be required to perform unusual or unexpected maneuvers	10%	90%	Very High
10	S10	Install flashing beacons as advance warning (S.I.)	Increased driver awareness of an approaching signalized intersection and an increase in the driver's time to react.	30%	90%	Medium
11	S11	Improve pavement friction (High Friction Surface Treatments)	Improving the skid resistance at locations with high frequencies of wet road crashes and/or failure to stop crashes	55%	90%	Medium
12	S12	Install raised median on approaches (S.I.)	Raised medians next to left turn lanes at intersections offer a cost effective means for reducing crashes and improving operations at higher volume intersections	25%	90%	Medium
13	S13PB	Install pedestrian median fencing on approaches	Signalized Intersections with high pedestrian-generators nearby (e.g. transit stops) may experience a high volumes of pedestrians J-walking across the travel lanes at mid-block locations instead of walking to the intersection and waiting to cross during the walk-phase.	30%	90%	Low
14	S14	Create directional median openings to allow (and restrict) left-turns and U-turns (S.I.)	Crashes related to turning maneuvers include angle, rear-end, pedestrian, and sideswipe (involving opposing left turns) type crashes. If any of these crash types are an issue at an intersection, restriction or elimination of the turning maneuver may be the best way to improve the safety of the intersection	50%	90%	Medium
15	S15	Reduced Left-Turn Conflict Intersections (S.I.)	Reduced left-turn conflict intersections are geometric designs that alter how left-turn movements occur in order to simplify decisions and minimize the potential for related crashes. Two highly effective designs that rely on U-turns to complete certain left-turn movements are known as the restricted crossing U-turn (RCUT) and the median U-turn (MUT).	50%	90%	Medium
16	S16	Convert intersection to roundabout (from signal)	Signalized intersections that have a significant crash problem and the only alternative is to change the nature of the intersection itself. Roundabouts can also be very effective at intersections with complex geometry and intersections with frequent left-turn movements.	Varies	90%	Low
17	S17PB	Install pedestrian countdown signal heads	Signals that have signalized pedestrian crossing with walk/don't walk indicators and where there have been pedestrian vs. vehicle crashes.	25%	90%	Very High
18	S18PB	Install pedestrian crossing (S.I.)	Signalized Intersections with no marked crossing and pedestrian signal heads, where pedestrians are known to be crossing intersections that involve significant turning movements. They are especially important at intersections with (1) multiphase traffic signals, such as left-turn arrows and split phases, (2) school crossings, and (3) double-right or double-left turns. At signalized intersections, pedestrian crossings are often safer when the left turns have protected phases that do not overlap the pedestrian walk phase.	25%	90%	High

19	S19PB	Pedestrian Scramble	Pedestrian Scramble is a form of pedestrian "WALK" phase at a signalized intersection in which all vehicular traffic is required to stop, allowing pedestrians/bicyclists to safely cross through the intersection in any direction, including diagonally. Pedestrian Scramble may be considered at signalized intersections with very high pedestrian/bicycle volumes, e.g. in an urban business district.	40%	90%	High
20	S20PB	Install advance stop bar before crosswalk (Bicycle Box)	Signalized Intersections with a marked crossing, where significant bicycle and/or pedestrians volumes are known to occur.	15%	90%	Very High
21	S21PB	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	Addition of LPI gives pedestrians the opportunity to enter an intersection 3-7 seconds before vehicles are given a green indication; only minor signal timing alteration is required.	60%	90%	Very High

Unsignalized

Sr. No.	Code	Countermeasure Name	CM Description	CRF	Federal Funding	Systemic Approach Opportunity
1	NS01	Add intersection lighting (NS.I.)	Provision of lighting at intersection.	40%	90%	Medium
2	NS02	Convert to all-way STOP control (from 2-way or Yield control)	Unsignalized intersection locations that have a crash history and have no controls on the major roadway approaches. However, all-way stop control is suitable only at intersections with moderate,and relatively balanced volume levels on the intersection approaches. Under other conditions, the use of all-way stop control may create unnecessary delays and aggressive driver behavior.	50%	90%	High
3	NS03	Install Signals	Installation of traffic signals	25%	90%	Low
4	NS04	Convert intersection to roundabout (from all way stop)	Intersections that have a high frequency of right-angle and left-turn type crashes. Whether such intersections have existing crash patterns or not, a roundabout provides an alternative to signalization. The primary target locations for roundabouts should be moderate-volume unsignalized intersections.	Varies	90%	Low
5	NS05	Convert intersection to roundabout (from 2-way stop or Yield control)	Intersections that have a high frequency of right-angle and left-turn type crashes. Whether such intersections have existing crash patterns or not, a roundabout provides an alternative to signalization. The primary target locations for roundabouts should be moderate-volume unsignalized intersections.	Varies	90%	Low
6	NS05mr	Convert intersection to mini-roundabout	Mini-roundabouts are characterized by a small diameter (45-90 ft) and traversable islands (central island and splitter islands).	30%	90%	High
7	NS06	Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs	Additional regulatory and warning signs at or prior to intersections will help enhance the ability of approaching drivers to percieve them	15%	90%	Very High
8	NS07	Upgrade intersection pavement markings (NS.I.)	Typical improvements include "Stop Ahead" markings and the addition of centerlines and stop bars	25%	90%	Very High
9	NS08	Install Flashing Beacons at Stop-Controlled Intersections	Flashing beacons can reinforce driver awareness of the Non-Signalized intersection control and can help mitigate patterns of right-angle crashes related to stop sign violations. Post-mounted advanced flashing beacons or overhead flashing beacons can be used at stop-controlled intersections to supplement and call driver attention to stop signs.	15%	90%	High
10	NS09	Install flashing beacons as advance warning (NS.I.)	Installation of advance flashing beacoms to call drivers attention to intersection control signs	30%	90%	High
11	NS10	Install transverse rumble strips on approaches	Transverse rumble strips are installed in the travel lane for the purposes of providing an auditory and tactile sensation for each motorist approaching the intersection.	20%	90%	High
12	NS11	Improve sight distance to intersection (Clear Sight Triangles)	Unsignalized intersections with restricted sight distance and patterns of crashes related to lack of sight distance where sight distance can be improved by clearing roadside obstructions without major reconstruction of the roadway.	20%	90%	High
13	NS12	Improve pavement friction (High Friction Surface Treatments)	Non-signalized Intersections noted as having crashes on wet pavements or under dry conditions when the pavement friction available is significantly less than needed for the actual roadway approach speeds. This treatment is intended to target locations where skidding and failure to stop is determined to be a problem in wet or dry conditions and the target vehicle is unable to stop due to insufficient skid resistance.	55%	90%	Medium
14	NS13	Install splitter-islands on the minor road approaches	The installation of a splitter island allows for the addition of a stop sign in the median to make the intersection more conspicuous.	40%	90%	Medium
15	NS14	Install raised median on approaches (NS.I.)	Effective access management is key to improving safety at, and adjacent to, intersections. The number of intersection access points coupled with the speed differential between vehicles traveling along the roadway often contributes to crashes. Any access points within 250 feet upstream and downstream of an intersection are generally undesirable.	25%	90%	Medium
16	NS15	Create directional median openings to allow (and restrict) left-turns and u-turns (NS.I.)	Crashes related to turning maneuvers include angle, rear-end, pedestrian, and sideswipe (involving opposing left turns) type crashes. If any of these crash types are an issue at an intersection, restriction or elimination of the turning maneuver may be the best way to improve the safety of the intersection.	50%	90%	Medium
17	NS16	Reduced Left-Turn Conflict Intersections (NS.I.)	Reduced left-turn conflict intersections are geometric designs that alter how left-turn movements occur in order to simplify decisions and minimize the potential for related crashes.	50%	90%	Medium
18	NS17	Install right-turn lane (NS.I.)	Many collisions at unsignalized intersections are related to right-turn maneuvers. A key strategy for minimizing such collisions is to provide exclusive right-turn lanes, particularly on high-volume and high-speed major-road approaches. When considering new right-turn lanes, potential impacts to non-motorized users should be considered and mitigated as appropriate.	20%	90%	Low
19	NS18	Install left-turn lane (where no left-turn lane exists)	Many collisions at unsignalized intersections are related to left-turn maneuvers. A key strategy for minimizing such collisions is to provide exclusive left-turn lanes, particularly on high-volume and high-speed major-road approaches. When considering new left-turn lanes, potential impacts to non-motorized users should be considered and mitigated as appropriate.	35%	90%	Low

20	NS19PB	Install raised medians (refuge islands)	Intersections that have a long pedestrian crossing distance, a higher number of pedestrians, or a crash history. Raised medians decrease the level of exposure for pedestrians and allow pedestrians to concentrate on (or cross) only one direction of traffic at a time.	45%	90%	Medium
21	NS20PB	Install pedestrian crossing at uncontrolled locations (signs and markings only)	Non-signalized intersections without a marked crossing, where pedestrians are known to be crossing intersections that involve significant vehicular traffic. They are especially important at school crossings and intersections with right and/or left turns pockets. See Zegeer study (Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations) for additional guidance regarding when to install a marked crosswalk.	25%	90%	High
22	NS21PB	Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)	Non-signalized intersections where pedestrians are known to be crossing intersections that involve significant vehicular traffic. They are especially important at school crossings and intersections with turn pockets.flashing beacons, curb extensions, advanced "stop" or "yield" markings, and other safety features should be added to complement the standard crossing elements.	35%	90%	Medium
23	NS22PB	Install Rectangular Rapid Flashing Beacon (RRFB)	Rectangular Rapid Flashing Beacon (RRFB) includes pedestrian-activated flashing lights and additional signage that enhance the visibility of marked crosswalks and alert motorists to pedestrian crossings. It uses an irregular flash pattern that is similar to emergency flashers on police vehicles. RRFBs are installed at unsignalized intersections and mid-block pedestrian crossings.	35%	90%	Medium
24	NS23PB	Install Pedestrian Signal (including Pedestrian Hybrid Beacon (HAWK))	Intersections noted as having a history of pedestrian vs. vehicle crashes and in areas where the likelihood of the pedestrian presence is high. Corridors should also be assessed to determine if there are adequate safe opportunities for non-motorists to cross and if a pedestrian signal, or a Pedestrian Hybrid Beacon (PHB) (also called High-Intensity Activated crossWalK beacon (HAWK)) are needed to provide an active warning to motorists when a pedestrian is in the crosswalk.	55%	90%	Low

Countermeasures for Roadway Segments

Sr. No.	Code	Countermeasure Name	CM Description	CRF	Federal Funding	Systemic Approach Opportunity
1	R01	Add Segment Lighting	Provision of lighting along roadways.	35%	90%	Medium
2	R02	Remove or relocate fixed objects outside of Clear Recovery Zone	Known locations or roadway segments prone to collisions with fixed objects such as utility poles, drainage structures, trees, and other fixed objects, such as the outside of a curve, end of lane drops, and in traffic islands. A clear recovery zone should be developed on every roadway, as space is available. In situations where public right-of-way is limited, steps should be taken to request assistance from property owners, as appropriate.	35%	90%	High
3	R03	Install Median Barrier	Areas where crash history indicates drivers are unintentionally crossing the median and the cross-overs are resulting in high severity crashes. The installation of median barriers can increase the number of PDO and non-severe injuries. The net result in safety from this countermeasure is connected more to reducing the severity of crashes not the number of crashes.	25%	90%	Medium
4	R04	Install Guardrail	Guardrail is installed to reduce the severity of lane departure crashes. However, guardrail can reduce crash severity only for those conditions where striking the guardrail is less severe than going down an embankment or striking a fixed object. Guardrail should only be installed where it is clear that crash severity will be reduced, or there is a history of run-off-the-road crashes at a given location that have resulted in severe crashes.	25%	90%	High
5	R05	Install impact attenuators	Impact attenuators are typically used to shield rigid roadside objects such as concrete barrier ends, steel guardrail ends and bridge pillars from oncoming automobiles. Attenuators should only be installed where it is impractical for the objects to be removed.	25%	90%	High
6	R06	Flatten side slopes	Roadways experiencing frequent lane departure crashes that result in roll-over type crashes as a result of the roadway slope being so severe as to not accommodate a reasonable degree of driver correction. When there is a need to reduce the severity of lane departure crashes without installing a barrier system that could result in increased numbers of crashes.	30%	90%	Medium
7	R07	Flatten side slopes and remove guardrail	Locations where high number of crashes originate as a lane departure and result in collision with guardrail or a fixed object located on the side slope shielded by guardrail. The guardrail may or may not meet current standards. Even though guardrails are generally installed to reduce the severity of departure crashes, they still can result in severe crashes in some locations.	40%	90%	Medium
8	R08	Install raised median	Areas experiencing head-on collisions that may be affected by both the number of vehicles that cross the centerline and by the speed of oncoming vehicles. Installing a raised median is a more restrictive approach in that it represents a more rigid barrier between opposing traffic.	25%	90%	Medium
9	R09	Install median (flush)	Areas experiencing head-on collisions that may be affected by both the number of vehicles that cross the centerline and by the speed of oncoming vehicles. Roadways with oversized lanes offer an opportunity to restripe the roadway to reduce the lanes to standard widths and use the extra width for the median.	15%	90%	Medium
10	R10PB	Install pedestrian median fencing	Roadway segments with high pedestrian-generators and pedestrian-destinations nearby (e.g. transit stops) may experience a high volume of pedestrians J-walking across the travel lanes at mid-block locations instead of walking to the nearest intersection or designated mid-block crossing. When this safety issue cannot be mitigated with shoulder, sidewalk and/or crossing treatments, then installing a continuous pedestrian barrier in the median may be a viable solution.	35%	90%	Low

11	R11	Install acceleration/ deceleration lanes	Areas proven to have crashes that are the result of drivers not being able to turn onto a high speed roadway to accelerate until the desired roadway speed is reached and areas that do not provide the opportunity to safety decelerate to negotiate a turning movement.	25%	90%	Low
12	R12	Widen lane (initially less than 10 ft)	Horizontal curves or tangents and low speed or high speed roadways identified as having lane departure crashes, sideswipe or head-on crashes that can be attributed to an existing pavement width less than 10 feet.	25%	90%	Medium
13	R13	Add two-way left-turn lane (without reducing travel lanes)	Roadways having a high frequency of drivers being rear-ended while attempting to make a left turn across oncoming traffic. Also can be effective for drivers crossing the centerline of an undivided multilane roadway inadvertently.	30%	90%	Medium
14	R14	Road Diet (Reduce travel lanes from 4 to 3 and add a two way left-turn and bike lanes)	Areas noted as having a higher frequency of head-on, left-turn, and rear-end crashes with traffic volumes that can be handled by only 2 free flowing lanes. Using this strategy in locations with traffic volumes that are too high could result in diversion of traffic to routes less safe than the original four-lane design.	30%	90%	Medium
15	R15	Widen shoulder	Roadways that have a frequent incidence of vehicles leaving the travel lane resulting in an unsuccessful attempt to reenter the roadway. The probability of a safe recovery is increased if an errant vehicle is provided with an increased paved area in which to initiate such a recovery.	30%	90%	Medium
16	R16	Curve Shoulder widening (Outside Only)	Roadway curves noted as having frequent lane departure crashes due to inadequate or no shoulders, resulting in an unsuccessful attempt to reenter the roadway.	45%	90%	Medium
17	R17	Improve horizontal alignment (flatten curves)	Roadways with horizontal curves that have experienced lane departure crashes as a result of a roadway segment having compound curves or a severe radius. This strategy should generally be considered only when less expensive strategies involving clearing of specific sight obstructions or modifying traffic control devices have been tried and have failed to ameliorate the crash patterns.	50%	90%	Low
18	R18	Flatten crest vertical curve	The target for this strategy is usually unsignalized intersections with restricted sight distance due to vertical geometry and with patterns of crashes related to that lack of sight distance that cannot be ameliorated by less expensive methods. This strategy should generally be considered only when less expensive strategies involving clearing of specific sight obstructions or modifying traffic control devices have been tried and have failed to ameliorate the crash patterns.	25%	90%	Low
19	R19	Improve curve superelevation	Roadways noted as having frequent lane departure crashes and inadequate or no superelevation. Safety can be enhanced when the superelevation is improved or restored along curves where the actual superelevation is less than the optimal.	45%	90%	Medium
20	R20	Convert from two-way to one-way traffic	One-way streets can offer improved signal timing and accommodate odd-spaced signals. One-way streets can simplify crossings for pedestrians, who must look for traffic in only one direction. While studies have shown that conversion of two-way streets to one-way generally reduces pedestrian crashes and the number of conflict points, one-way streets tend to have higher speeds which creates new problems.	35%	90%	Medium
21	R21	Improve pavement friction (High Friction Surface Treatments)	Improving the skid resistance at locations with high frequencies of wet road crashes and/or failure to stop crashes	55%	90%	High
22	R22	Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)	Additional or new signage can address crashes caused by lack of driver awareness or complaince of roadway signing.	15%	90%	Very High
23	R23	Install chevron signs on horizontal curves	Roadways that have an unacceptable level of crashes on relatively sharp curves during periods of light and darkness.		90%	
24	R24	Install curve advance warning signs	Addition of advance curve warning signs; may also include horizontal alignment and/or advisory speed warning signs	25%	90%	Very High
25	R25	Install curve advance warning signs (flashing beacon)	Roadways that have an unacceptable level of crashes on relatively sharp curves. Flashing beacons in conjunction with warning signs should only be used on horizontal curves that have an established severe crash history to help maintain their effectiveness.	40%	90%	Very High
26	R26	Install dynamic/variable speed warning signs	Includes the addition of dynamic speed warning signs (also known as Radar Speed Feedback Signs)	30%	90%	High
27	R27	Install delineators, reflectors and/or object markers	Installation of delineators, reflectors and/or object markers are intended to warn drivers of an approaching curve or fixed object that cannot easily be removed.	15%	90%	Very High
28	R28	Install edge-lines and centerlines	Any road with a history of run-off-road right, head-on, opposite-direction-sideswipe, or run-off-road-left crashes is a candidate for this treatment -install where the existing lane delineation is not sufficient to assist the motorist in understanding the existing limits of the roadway. Depending on the width of the roadway, various combinations of edge line and/or center line pavement markings may be the most appropriate.	25%	90%	Very High
29	R29	Install no-passing line	Roadways that have a high percentage of head-on crashes suggesting that many head-on crashes may relate to failed passing maneuvers. No-passing lines should be installed where drivers "passing sight distance" is not available due to horizontal or vertical obstructions.	45%	90%	Very High
30	R30	Install centerline rumble strips/stripes	Center Line rumble strips/stripes can be used on virtually any roadway – especially those with a history of head-on crashes.	20%	90%	High
31	R31	Install edgeline rumble strips/stripes	Shoulder and edge line milled rumble strips/stripes should be used on roads with a history of roadway departure crashes.	15%	90%	High
32	R32PB	Install bike lanes	Roadway segments noted as having crashes between bicycles and vehicles or crashes that may be preventable with a buffer/shoulder.	35%	90%	High
33	R33PB	Install Separated Bike Lanes	Separated bikeways are most appropriate on streets with high volumes of bike traffic and/or high bike-vehicle collisions, presumably in an urban or suburban area. Separation types range from simple, painted buffers and flexible delineators, to more substantial separation measures including raised curbs, grade separation, bollards, planters, and parking lanes.	45%	90%	High
34	R34PB	Install sidewalk/pathway (to avoid walking along roadway)	Areas noted as not having adequate or no sidewalks and a history of walking along roadway pedestrian crashes. In rural areas asphalt curbs and/or separated walkways may be appropriate.	80%	90%	Medium
35	R35PB	Install/upgrade pedestrian crossing (with enhanced safety features)	Roadway segments with no controlled crossing for a significant distance in high-use midblock crossing areas and/or multilane roads locations. flashing beacons, curb extensions, medians and pedestrian crossing islands and/or other safety features should be added to complement the standard crossing elements.	35%	90%	Medium

36	R36PB	Install raised pedestrian crossing	On lower-speed roadways, where pedestrians are known to be crossing roadways that involve significant vehicular traffic.	35%	90%	Medium
37	R37PB	Install Rectangular Rapid Flashing Beacon (RRFB)	Rectangular Rapid Flashing Beacon (RRFB) includes pedestrian-activated flashing lights and additional signage that enhance the visibility of marked crosswalks and alert motorists to pedestrian crossings. It uses an irregular flash pattern that is similar to emergency flashers on police vehicles. RRFBs are installed at unsignalized intersections and mid-block pedestrian crossings	35%	90%	Medium
38	R38	Install Animal Fencing	At locations with high percent of vehicular/animal crashes (reactive) or where there is a known high percent of animals crossing due to migratory patterns (proactive).	80%	90%	Medium

APPENDIX E: HIGHWAY SAFETY IMPROVEMENT PROGRAM (HSIP) ANALYZER (B/C RATIO CALCULATIONS)

APPENDIX F: ONGOING/PROPOSED ROADWAY SAFETY-RELATED IMPROVEMENTS IN THE CITY OF OAKLEY

Ongoing or Proposed Roadway Safety related Improvements in the City of Oakley

Improvement	Description	Project Phase
FY 2022-23 Street Repair and Resurfacing Project	Citywide Street Repair and Resurfacing	Design
Main Street/Rose Avenue Intersection Improvement Project	Signalization and the reconfiguration of the Main Street/Rose Avenue Intersection	Pre-Planning
Sellers Avenue Widening and Improvement Project	This project will construct the section of Sellers Avenue from the intersection at Riverrock Drive, to the gate at the Oakley Regional Community Park site.	Planning
East Cypress Road Widening (Knightson Avenue to Jersey Island Road)	This project will install a signal at the intersection of East Cypress Road and Knightsen Avenue in addition to widening and improving this intersection and East Cypress Road.	Construction
Laurel Road Resurfacing Project (Empire Avenue to O'Hara Avenue)	This project will repair and resurface Laurel Road from O'Hara Avenue to Empire Avenue.	TBD
FY 2021/22 Traffic Calming Project	This project will construct traffic calming measures.	TBD
FY 2021/22 Traffic Signal Modernization Project	This project will rehabilitate existing traffic signals.	
O'Hara Avenue / Carpenter Road Intersection Improvement Project	This project will improve the traffic operations at this intersection by constructing dedicated left turn lanes on Carpenter Road on either side of O'Hara Avenue, installing video detection system and reconfiguring the striping at this intersection.	Design
Main Street / Cypress Road Intersection Improvement Project	The scope of this project include addition of a dedicated right turn lane from Main Street into East Cypress Road, asphalt resurfacing of the intersection and striping after the paving work has been completed.	TBD
Main Street / Delta Road Intersection Signalization Project	This project will install a traffic signal at Main Street / Delta Road intersection along with lane wideing and intercsetion improvements.	Design
Main Street / Brownstone Road Intersection Signalization Project	This project will install traffic signal at Main Street/Brownstone Road intersection.	Design

DATE: March 12, 2024

TO: Joshua McMurray, City Manager

FROM: Kevin Rohani, P.E., Public Works Director/City Engineer

Approved and Forwarded to the City Council

SUBJECT: Adopt a resolution Accepting the work associated with the Construction Contract to Sun Light & Power for the construction of the City Hall Rooftop Solar Power Project – Capital Improvement Project (CIP) Number 286

Background and Analysis

The City's adopted FY 2023/24 CIP Budget designates funding for various citywide infrastructure repair and replacement projects. This is consistent with the City's goals to improve the quality of the City's public infrastructure and to enhance the quality of life for Oakley residents.

The CIP 286 project included installation of solar panels on the roof of the City Hall buildings. The new solar power system for the City Hall buildings will offset 93% of electricity usage at City Hall. The project included extended inverter warranties (20 years) and six annual cleanings of the solar panels.

On September 13, 2022, the City Council awarded a contract to Sun Light & Power for the construction of the City Hall Rooftop Solar Power Project – CIP 286. This work has been successfully completed by Sun Light & Power and City Hall buildings are using solar power to generate electricity.

Consistency with the Oakley Strategic Plan 27+

This item is consistent with the Strategic Plan 27+ Community Health and Safety goals.

Fiscal Impact

The authorized budget for the construction of this project was $549,517. This project was completed on time and within the authorized budget for a complete total cost of $548,581.

Pursuant to the contract documents, 5% of the accrued costs were withheld from the amount paid to the contractor. These funds are called "retention," and are held until the end of the project to ensure that the contractor completes the project in a timely manner. Approval of this item will authorize the release of the retention payment to the contractor. The retention was already budgeted as part of the contract and change order approvals, so there is no additional fiscal impact associated with this action.

Staff Recommendation

Staff recommends that the City Council adopt the Resolution accepting Capital Improvement Project Number 286 – City Hall Rooftop Solar Power Project as constructed by Sun Light & Power to be complete, and to direct the City Clerk to file a Notice of Completion for the project with the County Recorder.

Attachments

1) Resolution
2) Notice of Completion

RESOLUTION NO. __-24

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF OAKLEY ACCEPTING THE WORK AS COMPLETE BY SUN LIGHT & POWER, FOR CAPITAL IMPROVEMENT PROJECT (CIP) NUMBER 286 – CITY HALL ROOFTOP SOLAR POWER PROJECT

WHEREAS, on September 13, 2022, by adopting Resolution No. 94-22, the City Council awarded a construction contract to Sun Light & Power, for the construction of the City Hall Rooftop Solar Power Project - CIP Number 286; and

WHEREAS, Sun Light & Power, has satisfied the contractual requirements necessary for the acceptance of the City Hall Rooftop Solar Power Project - CIP Number 286, and the project is now deemed complete in the amount of $548,581.

NOW, THEREFORE, BE IT RESOLVED, by the City Council of the City of Oakley that the City Hall Rooftop Solar Power Project - CIP Number 286 is hereby accepted as complete.

BE IT FURTHER RESOLVED AND ORDERED that the City Clerk is hereby directed to file a Notice of Completion for the City Hall Rooftop Solar Power Project - CIP Number 286 with the County Recorder.

PASSED AND ADOPTED by the City Council of the City of Oakley at a meeting held on the 12th of March 2024 by the following vote:

AYES:
NOES:
ABSENT:
ABSTENTIONS:

APPROVED:

_____
Anissa Williams, Mayor

ATTEST:

_____ _____
Libby Vreonis, City Clerk Date

PURSUANT TO GOVERNMENT CODE §6103 NO FEE IS REQUIRED FOR THE RECORDATION OF THIS DOCUMENT

WHEN RECORDED MAIL TO:
City Clerk
City Of Oakley
3231 Main Street
Oakley, CA 94561

RECORDING REQUESTED BY:
City Of Oakley
3231 Main Street
Oakley, CA 94561

SPACE ABOVE THIS LINE RESERVED FOR RECORDER'S USE

NOTICE OF COMPLETION
Capital Improvement Project Number 286 – City Hall Rooftop Solar Power Project

NOTICE IS HEREBY GIVEN THAT:

The CITY OF OAKLEY, a political subdivision of the State of California, did, on September 13, 2022, enter into an agreement with Sun Light & Power, for the construction of Capital Improvement Project (CIP) Number 286 – City Hall Rooftop Solar Power Project, with work located at 3231 Main Street in Oakley, CA.

The Owner's nature of interest or estate in the property described below is in fee.

The work described in the contract documents was to furnish all material, labor, and equipment necessary to complete CIP Number 286 – City Hall Rooftop Solar Power Project.

On March 12, 2024, said contract as a whole was completed and the work was accepted by the City Council of the City of Oakley.

VERIFICATION

I have read the foregoing NOTICE OF COMPLETION and know the contents thereof; the same is true of my knowledge. I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that this declaration was executed this 12th day of March 2024 at Oakley, California.

Date: _____

By: _____
Libby Vreonis, City Clerk
City of Oakley, California

DATE: March 12, 2024

Approved and Forwarded to the City Council

TO: Joshua McMurray, City Manager

FROM: Kevin Rohani, P.E., Public Works Director/City Engineer

SUBJECT: Adopt a resolution accepting the work associated withTNB Construction for the construction of Main Street Bridge Rehabilitation Project at Contra Costa Canal Project – Capital Improvement Project (CIP) Number 187

Background and Analysis

The City's adopted Fiscal Year 2023/24 CIP Budget designates funding for various citywide infrastructure repair and replacement projects. This is consistent with the City's goals to improve the quality of the City's public infrastructure and to enhance the quality of life for Oakley residents.

On October 10, 2023, the City Council awarded a contract to TNB Construction for the construction of the Main Street Bridge Rehabilitation Project at Contra Costa Canal Project – CIP 187.

The CIP Number 187 project filled the bridge surface cracks to protect the steel reinforcement, constructed new concrete barrier and chain-link fence, filled cracks in the bridge soffit, and treated the bridge deck per Caltrans recommendations with a methacrylate coating.

This work has now been successfully completed by TNB Construction and the bridge is back in service.

Consistency with the Oakley Strategic Plan 27+

This item is consistent with the Strategic Plan 27+ Community Health and Safety goals.

Fiscal Impact

The authorized budget for the construction of this project was $324,980.50. This project was completed on time and within the authorized budget for a complete total cost of $310,580.50.

Pursuant to the contract documents, 5% of the accrued costs were withheld from the amount paid to the contractor. These funds are called "retention," and are held until the end of the project to ensure that the contractor completes the project in a timely manner.

Approval of this item will authorize the release of the retention payment to the contractor. The retention was already budgeted as part of the contract and change order approvals, so there is no additional fiscal impact associated with this action.

Staff Recommendation

Staff recommends that the City Council adopt the Resolution accepting Capital Improvement Project Number 187 – Main Street Bridge Rehabilitation Project at Contra Costa Canal Project as constructed by TNB Construction to be complete, and to direct the City Clerk to file a Notice of Completion for the project with the County Recorder.

Attachments

1) Resolution
2) Notice of Completion

RESOLUTION NO. __-24

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF OAKLEY ACCEPTING THE WORK AS COMPLETE BY TNB CONSTRUCTION, FOR CAPITAL IMPROVEMENT PROJECT (CIP) NUMBER 187 – MAIN STREET BRIDGE REHABILITATION PROJECT AT CONTRA COSTA CANAL PROJECT

WHEREAS, on October 10, 2023, by adopting Resolution No. 100-23, the City Council awarded a construction contract to TNB Construction, for the construction of the Main Street Bridge Rehabilitation Project at Contra Costa Canal Project - CIP Number 187; and

WHEREAS, TNB Construction, has satisfied the contractual requirements necessary for the acceptance of the Main Street Bridge Rehabilitation Project at Contra Costa Canal Project - CIP Number 187, and the project is now deemed complete in the amount of $310,580.50.

NOW, THEREFORE, BE IT RESOLVED, by the City Council of the City of Oakley, that the Main Street Bridge Rehabilitation Project at Contra Costa Canal Project - CIP Number 187 is hereby accepted as complete.

BE IT FURTHER RESOLVED AND ORDERED that the City Clerk is hereby directed to file a Notice of Completion for the Main Street Bridge Rehabilitation Project at Contra Costa Canal Project - CIP Number 187 with the County Recorder.

PASSED AND ADOPTED by the City Council of the City of Oakley at a meeting held on the 12th of March 2024 by the following vote:

AYES:
NOES:
ABSENT:
ABSTENTIONS:

APPROVED:

_____
Anissa Williams, Mayor

ATTEST:

_____ _____
Libby Vreonis, City Clerk Date

PURSUANT TO GOVERNMENT CODE §6103 NO FEE IS REQUIRED FOR THE RECORDATION OF THIS DOCUMENT

WHEN RECORDED MAIL TO:
City Clerk
City Of Oakley
3231 Main Street
Oakley, CA 94561

RECORDING REQUESTED BY:
City Of Oakley
3231 Main Street
Oakley, CA 94561

SPACE ABOVE THIS LINE RESERVED FOR RECORDER'S USE

NOTICE OF COMPLETION

Capital Improvement Project Number 187 – Main Street Bridge Rehabilitation Project at Contra Costa Canal Project

NOTICE IS HEREBY GIVEN THAT:

The CITY OF OAKLEY, a political subdivision of the State of California, did, on October 10, 2023, enter into an agreement with TNB Construction, for the construction of Capital Improvement Project (CIP) Number 187 – Main Street Bridge Rehabilitation Project at Contra Costa Canal Project, with work located on Main Street near the intersection of Rose Avenue at the Contra Costa Canal.

The Owner's nature of interest or estate in the property described below is in fee.

The work described in the contract documents was to furnish all material, labor, and equipment necessary to complete CIP Number 187 – Main Street Bridge Rehabilitation Project at Contra Costa Canal Project.

On March 12, 2024, said contract as a whole was completed and the work was accepted by the City Council of the City of Oakley.

VERIFICATION

I have read the foregoing NOTICE OF COMPLETION and know the contents thereof; the same is true of my knowledge. I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct, and that this declaration was executed this 12th day of March 2024 at Oakley, California.

Date: _____

By: _____
Libby Vreonis, City Clerk
City of Oakley, California

DATE: March 12, 2024

Approved and Forwarded to the City Council

TO: Joshua McMurray, City Manager

FROM: Kevin Rohani, P.E., Public Works Director & City Engineer

SUBJECT: Adopt a Resolution accepting the subdivision improvements associated with the Pheasant Meadows Subdivision 8736 and Vintner View Subdivision 8836 located along the east side of O'Hara Avenue south of Grapevine Lane and west of the Cinnamon Ridge Subdivision

Background and Analysis

On May 8, 2006, the City of Oakley entered into a Subdivision Improvement Agreement with Forecast Land Investment, LLC., a California Liability Company, for the development of a residential subdivision, Subdivision 8736, known as Pheasant Meadows.

On May 24, 2016, the City of Oakley entered into a Subdivision Improvement Agreement with Forecast Land Investment, LLC, a California Limited Liability Company, for the development of a residential subdivision, Subdivision 8836, known as Vintner View.

On September 14, 2020, Discovery Builders, Inc. filed an application requesting Design Review approval for the project titles, "Pheasant Meadows (8736) and Vintner View (8836) Design Review (DR 07-20)." Final Maps for these subdivisions were recorded in 2006 and 2016. APNs: 034-580-001 through -042, and 034-590-028 through -036.

The City of Oakley Public Works and Engineering staff has inspected the Subdivision Improvements and have determined the Developer has since completed all of the required improvements for O'Hara Avenue, Grapevine Lane, Mira Vista Drive, Pheasant Meadows Drive, Adora Lane, and Eagle Nest Drive. At this time, the Developer has requested that the City accept the improvements for maintenance. The Public Works and Engineering staff has completed a final inspection for all public improvements and has found them to be in substantial compliance with the approved improvement plans.

Consistency with the Oakley Strategic Plan 27+

This item is consistent with the Strategic Plan 27+ Community Health and Safety goals under Community Health and Safety Goal to build safe streets and healthy neighborhoods.

Fiscal Impact

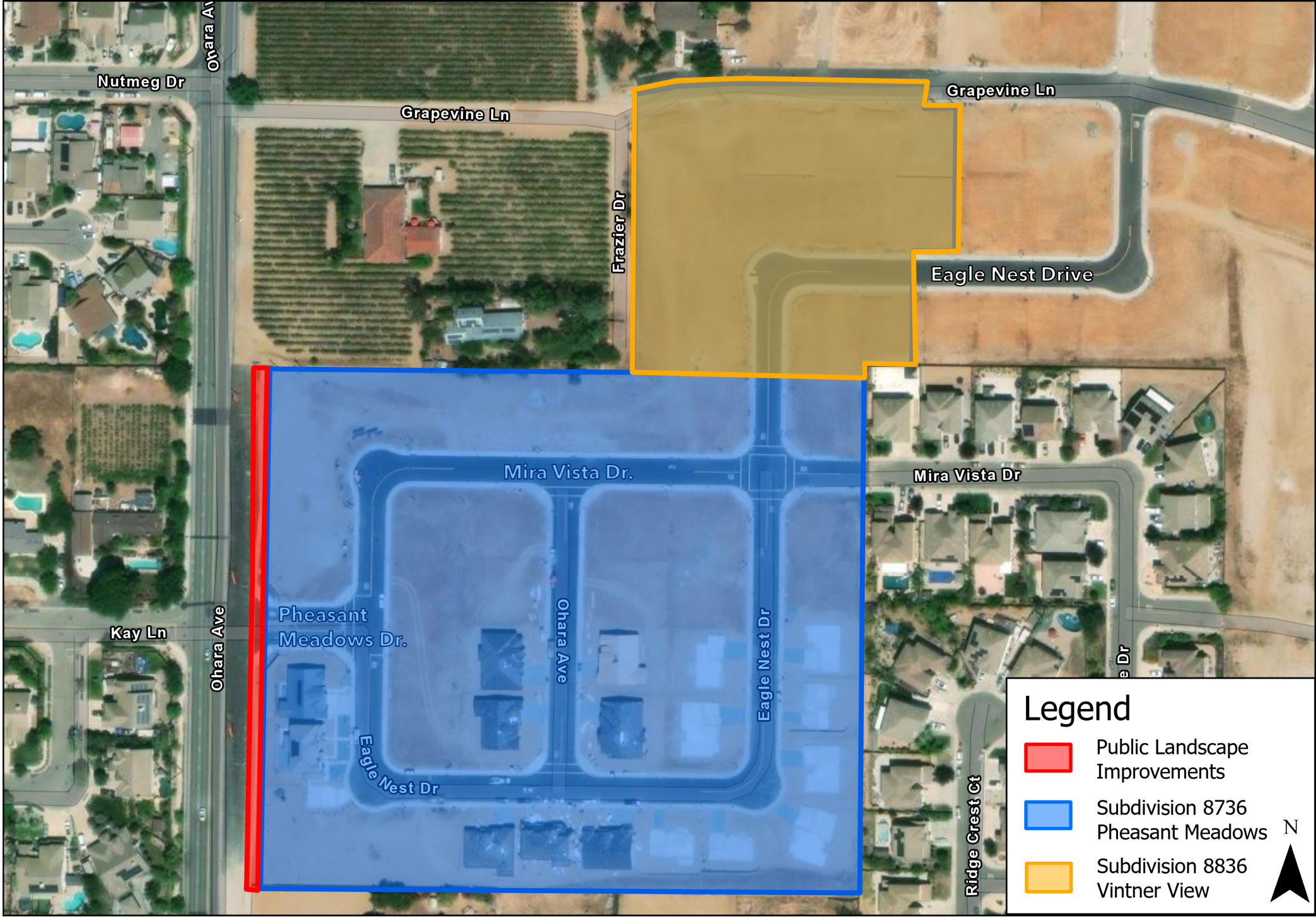
Upon acceptance of the improvements, the City will be obligated to maintain the public infrastructure. Preventative street maintenance for public roadway improvements will be funded using Gas Tax. Landscape improvements along O'Hara Avenue will be maintained with Landscape and Lighting District Zone 3-23.

Staff Recommendation

Staff recommends that the City Council adopt the Resolution accepting the subdivision improvements associated with the Pheasant Meadows and Vintner View Subdivisions and for the City to begin the maintenance of the public infrastructure for these subdivisions.

Attachments

1. Vicinity Map
2. Resolution



OAKLEY
CALIFORNIA

Vicinity Map
Subdivision 8736 & 8836
Pheasant Meadows & Vintner View

RESOLUTION NO. __-24

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF OAKLEY ACCEPTING THE SUBDIVISION IMPROVEMENTS ASSOCIATED WITH PHEASANT MEADOWS AND VINTNER VIEW SUBDIVISIONS 8736 AND 8836 LOCATED ALONG THE EAST SIDE OF O'HARA AVENUE, SOUTH OF GRAPEVINE LANE, AND WEST OF THE CINNAMON RIDGE SUBDIVISION

WHEREAS, On May 8, 2006, the City of Oakley entered into a Subdivision Improvement Agreement with Forecast Land Investment, LLC., a California Liability Company, for the development of a residential subdivision, Subdivision 8736, known as Pheasant Meadows; and

WHEREAS, On May 24, 2016, the Subdivision Improvement Agreement with Forecast Land Investment, LLC, a California Limited Liability Company, herein referred to as the (Developer), for the development of a residential subdivision, Subdivision 8836, known as Vintner View; and

WHEREAS, On September 14, 2020, Discovery Builders, Inc. filed an application requesting Design Review approval for the project titles, "Pheasant Meadows (8736) and Vintner View (8836) Design Review (DR 07-20)." Final Maps for these subdivisions were recorded in 2006 and 2016. APNs: 034-580-001 through -042, and 034-590-028 through -036; and

WHEREAS, the City of Oakley Public Works and Engineering staff has inspected the Subdivision Improvements and have determined the Developer has since completed all of the required improvements for O'Hara Avenue, Grapevine Lane, Mira Vista Drive, Pheasant Meadows Drive, Adora Lane, and Eagle Nest Drive. At this time, the Developer has requested that the City accept the improvements for maintenance. The Public Works and Engineering staff has completed a final inspection for all public improvements and has found them to be in substantial compliance with the approved improvement plans;

WHEREAS, staff recommends that the City Council adopt the Resolution accepting the subdivision improvements associated with the Pheasant Meadows and Vintner View Subdivisions and for the City to begin the maintenance of the public infrastructure for these subdivisions;

NOW, THEREFORE, BE IT RESOLVED AND ORDERED, by the City Council of the City of Oakley as follows:

a) Accept the dedication for Eagle Nest Drive and Grapevine Lane for public use as recorded in Subdivision Vintner View (8836) in Map Book 528, Page 46, and

b) Accept the dedication for O'Hara Avenue, Mira Vista Drive, Eagle Nest Drive Pheasant Meadows Drive, and Adora Lane for public use as recorded in Subdivision Pheasant Meadows (8736) in Map Book 490, Page 12, and

c) The roadway improvements for Grapevine Lane, Mira Vista Drive, Pheasant Meadows Drive, Adora Lane, and Eagle Nest Drive are accepted and begin the maintenance by the City, and

d) In accordance with the City Clerk's Statement on the Subdivision Final Map, this portion of the map related to these roads, avenues, drives, or easements and right of way dedications shown on the map as dedicated to public use are accepted.

PASSED, APROVED AND ADOPTED by the City Council of the City of Oakley at a meeting held on this 12th day of March, 2024 by the following vote:

AYES:
NOES:
ABSENT:
ABSTENTIONS:

APPROVED:

_____
Anissa Wiilliams, Mayor

ATTEST:

_____
Libby Vreonis, City Clerk

_____
Date

OAKLEY
CALIFORNIA

DATE: March 12, 2024

TO: Joshua McMurray, City Manager

FROM: Libby Vreonis, City Clerk

Approved and Forwarded to the City Council

SUBJECT: Adopt a resolution appointing Kai-Christian Torf to the Contra Costa Transportation Authority Citizens Advisory Committee for the Remainder of the Current Four-Year Term Expiring August 11, 2025

Background and Analysis

The Contra Costa Transportation Authority (CCTA) is a public agency formed by Contra Costa County voters in 1988 to manage the County's transportation sales tax program and to do County-wide transportation planning. The CCTA indicates it "works to plan, fund, and implement innovative transit programs that strengthen our diverse communities and improve the lives of residents." (https://ccta.net/about-us/what-we-do/)

The CCTA has a Citizens Advisory Committee (CAC) to provide citizen perspective, participation and involvement. The CAC is made up of members appointed by each city and town in Contra Costa County, a member from the County, and three "at-large" members.

Staff has advertised for the vacancy position since the former appointed CCTA-CAC representative for Oakley resigned in late August 2023. Kai-Christian Torf recently applied for the position (Attachment 1). If appointed, service on the CCTA-CAC would be for the remainder of the current four-year term expiring August 11, 2025.

Consistency with the Oakley Strategic Plan 27+

Appointment to the Commission is consistent with the City's Community and Collaborative Partnerships Goal.

Fiscal Impact

There is no fiscal impact.

Staff Recommendation

Adopt a resolution appointing Kai-Christian Torf to the Contra Costa Transportation Authority Citizens Advisory Committee for the remainder of the current four-year term expiring August 11, 2025.

Attachments

1. Application
2. Proposed Resolution

OAKLEY
CALIFORNIA

APPLICATION for APPOINTMENT for the CONTRA COSTA TRANSPORTATION AUTHORITY-CITIZENS ADVISORY COMMITTEE

Background Information

The Contra Costa Transportation Authority (CCTA) maintains a standing Citizens Advisory Committee (CAC) to provide citizen perspective, participation, and involvement in the CCTA's policies. To become a member of the CAC, you must reside within the City of Oakley, be at least 18 years of age, and the Oakley City Council must take formal action to confirm your membership on the Committee. Appointees serve at the will and pleasure of the Oakley City Council and are required to provide the Oakley City Council periodic updates, preferably during Council meetings. The appointee will serve the remainder of the current four-year term, expiring August 2025.

CAC meetings are typically scheduled for the fourth Wednesday of the month at 6:00 p.m. in the CCTA's Walnut Creek office located at 2999 Oak Road. Exceptions do apply and typically the November and December meetings are combined into one meeting held in mid-December due to the holidays. Meetings are currently being held remotely until further notice, although this may change, as determined by the Authority Board monthly. CAC members are appointed to serve without compensation. Members are required to complete trainings and comply with all State and local reporting requirements. More information regarding the CAC, transportation projects and programs can be found by visiting the CCTA website at www.ccta.net .

To apply, please visit the City's website, www.oakleyinfo.com or contact the City Clerk's Office at (925) 625-7013 or vreonis@ci.oakley.ca.us to obtain an application. Applications should be returned to the City Clerk's Office located at Oakley City Hall, 3231 Main Street, Oakley, California 94561. **The application period is open until filled. The Oakley City Council will consider applications during a regularly scheduled meeting beginning at 6:30 p.m. in the Oakley City Council Chamber located at 3231 Main Street, Oakley, California. Applicants are strongly encouraged to attend the meeting to be interviewed.**

Application

Please print clearly on this application and return it to the City Clerk's Office via email to vreonis@ci.oakley.ca.us or by mail or in person to 3231 Main Street, Oakley, California 94561.

All information contained in this application is public data and will be made available for public review and copying for anyone requesting it and may be posted on the website of the City of Oakley. All information in this application will be provided to the Oakley City Council in a public forum and will be reviewed in public. It will therefore be part of the public record. Although you are not legally required to provide any of the information requested in this application, the information may be used to determine your suitability for appointment to the committee.

1. **Applicant Name:** Kai-Christian Torf

2. **Home Address:** [redacted] Oakley, CA 94561

3. **Phone Number:** [redacted]

4. **E-Mail Address:** [redacted]

5. **How long have you lived in the City of Oakley?** 2 years.

6. **In 300 words or less, please explain why you would like to represent Oakley and serve on the Contra Costa Transportation Authority Citizens Advisory Committee.**

I believe that every citizen has a duty to their fellow neighbor to provide valuable insight that they've either gained throughout their career or through personal experiences to ensure that the community fosters. Everyday citizens have a unique perspective that often sometimes is overlooked by an individual who has all the bells and whistles at their disposal however may lack the everyday citizens point of view. As someone who has an inherent belief in that we are only as strong as the person next to us, I want to be the advocate for the city of Oakley leveraging not just my professional experience but my desire to see the city grow and prosper for my kids that I plan on raising in Oakley.

7. **In 300 words or less, describe your qualifications and educational, work and other experience which would make you a valuable addition to the Advisory Committee.**

I have a bachelor's in management information systems and a minor in Accounting as well as industry certifications in sustainability, high-tech, OEM and manufacturing. (Level 1 and 2.) I currently work at Oracle as an industry executive overseeing consumer product goods tailored around software solutions. My career revolves around providing optimal solutions to some of the biggest companies in the world working in tandem with their executive board members to arrive at solutions that not only impact their bottom line but the impact of the citizens in the respective cities they operate within'. For example, at Sunrun I helped spearhead a 52 warehouse roll-out with environmental impact analysis working with a variety of non-profits to review building plans and the employee turn-over rate for each location. This includes working with companies like Corsair (headquartered out of Fremont) to evaluate their logistic and transportation methodology and the amount of trucks they'd need to address their consumer buyer behavior per region, this resulted in a variety of changes such as the amount of discarded/excess and obsolete inventory that they'd incur per plant and how they'd work to remove that from their plant with a minimal impact on the local community.

8. **What do you feel are the most pressing matters for the Advisory Committee?**

As someone who recently purchased a home in the city of Oakley to begin building my family, I noticed there are a slew of new neighbors that have also moved into the neighborhood and it is clearly evident that Oakley is growing faster than time can keep up. Vasco is becoming a bottle neck for not just everyday commuters but anyone looking to visit their family, the addition to include the city of Antioch at the Laurel exit has created an influx of crime that wasn't prevalent until that connection was made. The lack of established centers creates a constant need to drive to various areas as opposed to accomplishing your shopping in a centralized area these are just some of the pressing matters that I think are prevalent to everyday citizens of Oakley.

9. **Please attach a current resume.**

Kai-Christian Torf

Oakley, California 94561 • [redacted]

Executive Summary

Experienced executive with deep vertical domain expertise in retail, manufacturing and utilities. A proven track record in solution selling across multiple horizontal business solutions such as; procurement, supply chain management and finance. Focused on closing transformative global solutions such as Lead to Cash Cloud-Platform, Mobile Supply Chain Optimization, AI/ML driven finance platform. A proven sales leader in managing global sales and service teams with revenues exceeding $40M USD. Collaboration driven solution selling approach, improving customer satisfaction, net promoter score, and ultimately improving the overall customer experience.

Professional Experience

Oracle, Redwood City, CA — **ERP, EPM, SCM, HCM, CX**
Industry Sales Executive – Consumer Goods, 07/2023-Present

Executive leadership for Coca-Cola, ASICS, Dole and numerous Fortune 500 companies.
Strategic account management with industry associations across CPG customers.
Drive sales growth through maximization of resources and execution of market segment strategies, supporting new product development point of views and pro-actively creating go to market plans.
Business process leader in multi-pillar solutions; ERP, EPM, SCM, HCM.
ILC certified in traceability and CPG.

Oracle, Redwood City, CA — **ERP, EPM, SCM, HCM, CX**
Senior Client Partner – High-Tech, 01/2022-06/2023

Speaker on PoVs for Oracle manufacturing led solutions around E&O and O2C; focused on partner rebate programs for high-tech companies.
Led program engagements for 2B+ Fortune 500 companies leveraging Big4 for commonality in data structures across non-Oracle systems and middleware technologies.
Responsible for 28 Oracle sales executives across North America – driving both software pipeline and consulting pipeline.
ICC certified for industries in High-Tech/Utilities/Manufacturing.

Oracle, Redwood City, CA — **ERP, EPM, SCM, HCM**
Application Sales Manager – Majors – High-Tech, 10/2019-01/2022

Multi on-premise to cloud ERP transformation for Fortune 500 companies (LegalZoom, Corsair, Tivo/Xperi.)
First Oracle AI/ML cross-functional win; ERP, SCM and HCM.
Hosted business value services keynote for application product strategy.

Customer key note with Steve Miranda on analytics.

Jade Global, San Jose, CA — **Procurement, SCM, Finance**
Rehired, Vice President – Business Development, 01/2019-10/2019 — **L2C Platform as a Service**

Develop next generation cloud L2C platform as a services solution
First customer win, resulting in user subscription increase of 500% for alpha customers (4x)
Coached and directed large scale international product development team

Nitor Infotech, San Jose, CA — **Procurement, SCM, Finance**
Vice President – Business Development, 11/2017-12/2018 — **Platform as a Service**

Built, recruited, hired and coached a solution selling focused business development team for North America. (US/CDN) and Europe, focused on Fortune 500 clients.
Cultivated business partnerships with Dell Boomi and Microsoft and developed successful alliance pipeline totaling $9M.
Built a successful pipeline of net new sales opportunities totaling $20M.
Implemented solution selling sales process and deal desk with Salesforce CRM.
Member of the executive team; focused on strategic direction, business development and overall strategy.
Regions: US, Canada, Europe.

Jade Global, San Jose, CA — **Procurement, SCM, Finance**
Promoted to, Director – Global Strategic Accounts, 04/2012-10/2017 — **L2C,P2P,O2C,R2R**

Managed companies top accounts, resulting in 50% of company's revenue.
Solution selling, focused on three major industry verticals; retail, manufacturing and utilities/energy.
Focused within' horizontal solutions on procurement, supply chain management and finance.
Time management-based account planning and strategy using solution selling to improve customer experience and net promoter score.
Managed a global team of marketing, sales, and technical resources.

Jade Global, San Jose, CA — **Procurement, SCM, Finance**
Promoted to, Business Development Director, 04/2012-10/2017 — **L2C,P2P,O2C,R2R**

Achieved 162% of Target. Target: $8 Million – Achieved: $13.3 Million.
First multi-year contract signed in company history, in Manufacturing vertical.
Focused on multi-tiered business process optimization, strategic planning with strategic customers for L2C, P2P, O2C and R2R.
Collaborated with other functional areas such as management, marketing and engineering to improve customer experience and satisfaction.

Jade Global, San Jose, CA — **Procurement, SCM, Finance**
Promoted to Business Development Senior Manager, 04/2012-10/2017 — **L2C,P2P,O2C,R2R**

Achieved 136% of Target. Target: $6 Million. Achieved: $8.2 Million.
Developed strategic alliances with Oracle, Adobe, Salesforce in order to penetrate new vertical accounts.
Focused on SaaS (Software-as-a-Service) and PaaS (Platform-as-a-Service) with proven track record of success.

Jade Global, San Jose, CA — **Procurement, SCM, Finance**
Promoted to Business Development Mgr, 04/2012-10/2017 — **L2C,P2P,O2C,R2R**

Achieved 150% of Target. Target: $4 Million. Achieved: $6.1 Million.
Horizontal solution selling approach utilizing procurement, supply chain management, finance and process standardization.
Developed vertical business, focused on Retail, Manufacturing and Utilities/Energy
Initiated, negotiated and closed strategic partnership deals with values exceeding $250,000 per average deal size, focused on SaaS/iPaaS solutions.

Jade Global, San Jose, CA — **Procurement, SCM, Finance**
Business Development Representative, 04/2012-10/2017

Qualified sales leads and build pipeline for 1 year, based on specific sales objectives.
Prospected into target organizations using cold-calling, networking and events.
Articulated company value proposition to decision-makers to assess prospect interest.

Convenos, Scotts Valley, CA — **Web-conferencing SaaS**
Account Executive, 04/2005-11/2009

- 100% SaaS contract renewal rate with customers.
- Coordinated with internal customer support teams to ensure quality of issue resolution.
- Trusted advisor to clients to ensure internal tools satisfy their needs.

Education

Management Information Systems (B.S.) (2014 - 2017)
Colorado State University, Denver, CO

Accounting (A.S.)
Cabrillo College, Aptos, CA

Economics (A.S.)
Cabrillo College, Aptos, CA

Achievements

Top Performer's Club - $1.9M SW ARR (06-2021-01-2022)

Top Performer's Club - $1.3M SW ARR (06-2020-05-2021)
Top Performer's Club - $1.7M SW ARR (06-2019-05-2020)
Top Performer's Club - $1.5M SW ARR (02-2019-05-2019)
President's Club – $13M (04/2016 – 04/2017)
Top Performer's Club - $8M (04/2015 – 04/2016)
Top Performer's Club - $6M (04/2014 – 04/2015)
Top Performer's Club - $3M (04/2013 – 04/2014)

Business Transformation & Technology

Cloud Computing (PaaS / SaaS), Advanced Analytics, Artificial Intelligence, Customer Experience (UX), Digital Marketing, Robotic Process Automation, Procurement, SCM, Finance, Process optimization P2P, L2C, O2C, R2R.

RESOLUTION NO. __-24

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF OAKLEY TO APPOINT KAI-CHRISTIAN TORF TO THE CONTRA COSTA TRANSPORTATION AUTHORITY CITIZENS ADVISORY COMMITTEE FOR THE REMAINDER OF THE CURRENT FOUR-YEAR TERM EXPIRING AUGUST 11, 2025

BE IT RESOLVED by the City Council of the City of Oakley that Kai-Christian Torf is hereby appointed to the Contra Costa Transportation Authority Citizens Advisory Committee for the remainder of the current four-year term expiring August 11, 2025.

PASSED, APPROVED AND ADOPTED this 12h day of March, 2024 by the following vote:

AYES:
NOES:
ABSTENTION:
ABSENT:

APPROVED:

_____
Anissa Williams, Mayor

ATTEST:

_____
Libby Vreonis, City Clerk

_____
Date

Approved and Forwarded to the City Council

DATE: March 12, 2024

TO: Joshua McMurray, City Manager

FROM: Kevin Rohani, P.E., Public Works Director/City Engineer

SUBJECT: Adopt a Resolution approving Contract Amendment Number 1 with HMH Engineers, Inc. for On-Call Consulting Services Related to Development Engineering Support Services for Fiscal Year 2023/24 and Award of Contract for Professional Services Agreement for On-Call Development Engineering Support Services with HMH Engineers, Inc for Fiscal Years (FY) 2024/25 and 2025/26

Background and Analysis

The City of Oakley utilizes a wide range of consultants and contractors across all departments to augment City staff as needed to accommodate the workload activities. One of the areas that this approach is used is in private development services. Since the volume of private development activity fluctuates with the overall economic climate of the region, the Community Development and Public Works Departments use staff augmentation as needed to process and manage the development project workloads.

The Public Works Department uses the services of a contract engineer to augment current staffing to provide expeditious service for private development projects. This approach gives the City flexibility and agility to adjust to the level of service needed by private developers.

HMH Engineers, Inc. started working with the City of Oakley performing staff augmentation, plan review services, engineering consultation, and land surveying services in July of 2019. In the years since, they have developed a great working relationship with City Engineering, Planning and Building Department Staff, and have a solid understanding of the City's processes and helping assist the City in the approval of many key development projects.

There has been an increase in the volume of both residential and commercial development activities in Oakley. This includes some of the largest private development projects along the East Cypress Road corridor. These are large complex projects and are on a fast track for review and processing to get them to the start of the construction phase.

HMH Engineers, Inc. have a specialized focus in the areas of residential and commercial private development engineering services. This firm has the proper staffing who will be able to provide City staff with timely and professional services in a cost-effective way. In addition, this firm is totally independent and has no affiliations with any of the development organizations and consultants who work within the City.

The services that HMH Engineers, Inc. will provide will include Development Plan review; Subdivision Improvement Agreement review, Review of Tentative and Final Maps and City Survey services; as well as the review of calculations and estimates for development projects.

On May 25, 2021, an agreement was executed between the City of Oakley and HMH Engineers, Inc. for on-call consulting services related to Development Engineering Support Services. The contract was limited to a not to exceed amount of $150,00 per fiscal year. Peer reviews of improvement plan design for private development projects have continued to increase, such as improvements within the East Cypress Corridor Specific Plan area. Staff have needed to increase the amount of work being performed by consultants for plan check services to meet development project timelines. As a result, staff are requesting an increase of $50,000 in the contract amount for FY 2023/24, for a total not-to-exceed contract amount of $200,000.

In addition, HMH Engineers, Inc. has provided their statement of qualifications and continues to be the preferred consultant to help assist staff for FY 2024/25 and FY 2025/26 with the option to extend the contract for an additional two years to 2028 if work is performed satisfactorily. This contract would be for a not-to-exceed amount of $200,000 per Fiscal Year. The award of the Agreement is exempt from competitive bidding under Section 3.6.010 of the Oakley Municipal Code paragraph 1) which provides an exception for competitive bidding on “Contracts involving the acquisition of professional or specialized services, such as, but not limited to, services rendered by architects, attorneys, engineers, and other specialized consultants”.

Consistency with the Oakley Strategic Plan 27+

Consistency with the Oakley Strategic Plan for community health and safety by ensuring engineering review of various projects are maintained to preserve safety for all. Contracting engineering services also maintains a sustainable organization from the demand of varying schedules of multiple projects.

Fiscal Impact

Approval of the resolution will increase the not-to-exceed contract amount by $150,000 for FY 2023/24 for a total amount of $200,000. Approval of the resolution will also authorize the City Manager to execute a professional services agreement with HMH Engineers, Inc. with a

not -to-exceed amount of $200,000 per fiscal year through June 30, 2026, with the option to extend the agreement until 2028 if work is performed satisfactorily. Private Development projects will fully fund the engineering support services cost on an as needed basis. This contract will not require funding from the City's General Fund.

Staff Recommendation

Staff recommends that the City Council adopt the resolution approving Amendment No. 1 to the On-Call services agreement with HMH Engineers, Inc. and authorize the City Manager to execute the agreement. Staff is also recommending that the City Council adopt the resolution authorizing the City Manager to execute an agreement with HMH Engineers, Inc. for private development engineering support services for a not-to-exceed amount of $200,000 per fiscal year through June 30, 2026, with the option of extending the agreement through June 30, 2028.

Attachments

1. Resolution
2. Amendment Agreement No.1 for FY 2023/24
3. HMH Engineers, Inc. Proposal for Contract FY 2024/25 and 2025/26

RESOLUTION NO. __-24

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF OAKLEY APPROVING CONTRACT AMENDMENT NUMBER 1 TO THE AGREEMENT WITH HMH ENGINEERS, INC. FOR ON-CALL ENGINEERING SUPPORT SERVICES RELATED TO PRIVATE DEVELOPMENT PROJECTS FOR FISCAL YEAR 2023/24 AND APPROVING A PROFESSIONAL SERVICES AGREEMENT WITH HMH ENGINEERS, INC. FOR ON-CALL PRIVATE DEVELOPMENT ENGINEERING SUPPORT SERVICES FOR FISCAL YEARS 2024/25 AND 2025/26 AND AUTHORIZING THE CITY MANAGER TO EXECUTE THESE AGREEMENTS

WHEREAS, on May 25, 2021, the City executed an agreement with HMH Engineers, Inc. for Engineering Support Services related to private development projects with a not to exceed amount of $150,000 per fiscal year; and

WHEREAS, after review of the expenditures to date for Fiscal Year (FY) 2023/24 and projecting costs for these services for the remaining months of the fiscal year with the various private development projects slated to start construction; staff has determined that the original not to exceed amount of $150,000 is not sufficient to cover the necessary support services for these projects; and

WHEREAS, staff is requesting an additional $50,000 be added to FY 2023/24 budget, for a total not-to-exceed amount of $200,000; and

WHEREAS, the City of Oakley utilizes the services of consultants to provide support services on a wide range of projects where the scope and magnitude for many of the tasks are larger than what City staff can perform; and

WHEREAS, HMH Engineers, Inc. has performed private development engineering support services for municipalities in the Bay Area in an exemplary way and can accommodate the City's service needs. HMH Engineers, Inc. has provided professional engineering and surveying services to the City of Oakley since July 2019; and

WHEREAS, the award of the agreement is exempt from competitive bidding under Section 3.6.010 of the Oakley Municipal Code paragraph 1) which provides an exception for competitive bidding on "Contracts involving the acquisition of professional or specialized services, such as, but not limited to, services rendered by architects, attorneys, engineers, and other specialized consultants".

NOW, THEREFORE, BE IT RESOLVED AND ORDERED, by the City Council of the City of Oakley that Contract Amendment Number 1 with HMH Engineers, Inc. is hereby approved for a not-to-exceed amount of $200,000 for FY 2023/24. A copy of the Contract Amendment is attached hereto as **Exhibit A**., and the On-Call Development Engineering Support Services proposal attached hereto as

Exhibit B with HMH Engineers, Inc. for an amount not-to-exceed amount of $200,000.00 per fiscal year for FY 2024/25 and 2025/26 is hereby approved and the City Manager is authorized to execute these agreements.

BE IT FURTHER RESOLVED AND ORDERED, if at the end of the term, the services have been performed satisfactorily, the City Manager has the discretion to approve an extension of the On-Call Services agreement to June 30, 2028, under the same terms as the original agreement.

PASSED AND ADOPTED by the City Council of the City of Oakley at a meeting held on March 12, 2024, by the following vote:

AYES:
NOES:
ABSENT:
ABSTENTIONS:

APPROVED:

_____
Anissa Williams, Mayor

ATTEST:

_____ _____
Libby Vreonis, City Clerk Date

AMENDMENT NUMBER 1 TO THE AGREEMENT BETWEEN THE CITY OF OAKLEY AND HMH ENGINEERS, INC. FOR ON-CALL SERVICES RELATED TO DEVELOPMENT ENGINEERING SUPPORT SERVICES FOR PRIVATE DEVELOPMENT PRJOJECTS FOR FISCAL YEAR 2023/24

This Amendment is entered into by and between the CITY OF OAKLEY, a municipal corporation (hereinafter referred to as "City"), and HMH ENGINEERS, INC., a California Corporation (hereinafter referred to as "Contractor"), effective as of the 12TH day of March 2024.

RECITALS

A. On MAY 25, 2021, City and Consultant executed an Agreement for on-call consulting services related to private development project Engineering Support Services (hereinafter referred to as the "Agreement") in the amount of $150,000 per fiscal year; and,

B. City and Consultant now desire that the following amendment be made to the Consultant services for FY 2023/2024: increase of $50,000 to the not-to-exceed contract amount from $150,000 per fiscal year to $200,000 for Fiscal Year 2023/24 to hereby be approved by the City Manager; and,

C. Except as provided herein, all other terms and provisions of the Agreement shall remain in full force and effect.

AGREEMENT

IN WITNESS WHEREOF, the City of Oakley, a municipal corporation in the State of California, has authorized the execution of this Amendment in duplicate by its City Manager, Approved to as Form by the City Attorney and attested by its City Clerk as of the 12th day of March 2024, and the parties have caused this Amendment to be executed in duplicate.

City	Consultant
City of Oakley, a municipal corporation	HMH Engineers, Inc., a California Corporation
By: _____	By: _____
Joshua McMurray, City Manager	David Wilson, President

ATTEST:

_____
Libby Vreonis, City Clerk

APPROVED AS TO FORM:

_____
Derek P. Cole, City Attorney

FEBRUARY 28, 2024

submitted to OAKLEY CALIFORNIA

prepared by HMH

CITY OF OAKLEY
STATEMENT OF QUALIFICATIONS

SUCCESS BUILT ON SERVICE, QUALITY, & COMMITMENT SINCE 1976

February 28, 2024

Kevin Rohani, P.E.
Director of Public Works/City Engineer
City of Oakley, Public Works & Engineering Department
3231 Main Street
Oakley, CA 94561

Re: Fiscal Year 2023/2024 On-Call Agreement between the City of Oakley and HMH Engineers, Inc., Contract Amendment Request

Dear Mr. Rohani:

As we enter the second half of the fiscal year, several larger projects such as Grand Cypress Preserve, Summer Lake North, and the Bridgehead Industrial Project will continue to have significant document preparation and review requirements, including increased City Surveyor responsibilities. In addition, ongoing coordination meetings are expected to continue as these projects are entitled, move into construction document phases, and ultimately continue to construction. If the current pace of development activity continues, we will exceed the initial $150,000 contract amount.

We estimate that an amendment to the amount of $50,000 will provide the additional budget needed to cover the increased workload.

Should you have any questions, please contact me directly at your convenience.

Sincerely,

HMH

Stephan Kuehn, P.E.
Vice President, Civil Engineering Manager

SUCCESS BUILT ON SERVICE, QUALITY, & COMMITMENT SINCE 1976

February 28, 2024

Kevin Rohani, P.E.
Director of Public Works/City Engineer
City of Oakley, Public Works & Engineering Department
3231 Main Street
Oakley, CA 94561

Re: FY 2024/2025 On-Call Agreement between the City of Oakley and HMH Engineers, Inc.

Dear Mr. Rohani:

HMH Engineers started working with the City of Oakley performing staff augmentation, plan review services, engineering consultation, and land surveying services in July of 2019. In the years since, we have developed a great working relationship with City Engineering, Planning and Building Department Staff, a solid understanding of the City's processes, and have helped assist the City in the approval of many key development projects. Looking forward to fiscal year 2024/2025, we are prepared to continue in this effort. We are pleased to present the following Statement of Qualifications for your review and consideration. It is anticipated there will be a continued increased push from the development community for entitlement and construction document processing, and construction of significant portions of the East Cypress Corridor Specific Plan area.

HMH has added several key senior staff to assist with the anticipated workload and is prepared to help the City in meeting its review and delivery targets. The HMH staff included in the attached SOQ will be available as needed, their efforts coordinated directly by Stephan Kuehn, project manager for HMH.

Please review the enclosed material and feel free to reach out to me directly with any questions.

Sincerely,

HMH

Stephan Kuehn, P.E.
Vice President, Civil Engineering Manager

Encl: HMH Statement of Qualifications

addressed to...

Kevin Rohani, PE, Public Works Director/City Engineer
Public Works and Engineering Department
3231 Main Street, Oakley, CA 94510

DEAR KEVIN,

HMH is pleased to provide our Statement of Qualifications (SOQ) to the City of Oakley for on-call civil engineering review, survey & mapping review, stormwater control plan review, landscape architecture review, and staff augmentation services. HMH has a successful history of providing services to municipal clients throughout both the Bay Area and the Contra Costa County region since 1976.

» AWARD-WINNING PROJECTS & EFFICIENT MULTI-DISCIPLINARY TEAMS

Approximately half of our Bay Area projects belong to public agencies. HMH currently holds on-call contracts with several cities, counties, and transportation agencies including the City and County of Santa Clara, VTA, Midpeninsula Open Space District, and City of Livermore.

With a permanent staff of approximately 80 engineers, surveyors, and landscape architects, HMH has the staff availability and multi-disciplinary resources to handle projects with aggressive schedules and budgets. Our in-house staff will approach the projects with a strong commitment to meet each milestone as planned efficiently and expediently. The numbers prove it. Our approach has resulted over 3,500+ projects completed to date with multiple public and private projects winning awards. Our success is best reflected from 85% of our client base being returning clients.

Our staff has extensive experience and knowledge of municipal codes, the subdivision map act, master plan implementation, civil engineering design, construction document preparation and the permitting processing with public agencies. We have a thorough understanding of the local conditions, gained through research and coordination with local stakeholders. Our long-term relationships with local agency staff provide an advantage in navigating the complex permitting process.

» LOCAL PROJECT MANAGEMENT EXPERTISE

A strong dedicated Project Manager (PM) is a prerequisite to coordinate effectively with the many stakeholders affected by the project and manage the team to deliver all phases of complex projects. Principal Stephan Kuehn, PE, will serve as HMH's PM and is authorized to negotiate and execute a contract with the City on HMH's behalf. Stephan has over 25 years of experience as the lead engineer and project manager for large master-planned residential communities, retail centers, industrial and institutional developments throughout the Bay Area. His detail-oriented approach provides practical solutions for project design from concept to construction. Stephan currently manages the Land Development Engineering group at HMH and is responsible for engineering design, client and governmental agency coordination, quality control, scheduling, and budgeting. Recently, Stephan has worked with the City of Oakley to provide staff augmentation and plan review services and has become familiar with the City's application and review process which makes him ideally positioned to provide continued support. Through his work on other agency projects, Stephan has demonstrated his ability to implement complex projects and lead engineering teams in dynamic environments. Stephan's style of Project Management is rooted in trust. He trusts his partners, his team and his staff to give their best and to be honest and pragmatic.

The additional members of HMH staff augmentation team consists of Surveying Manager Tracy Giorgetti, PLS/PE, Senior Civil Engineer Ryan Fong, PE, Civil Engineering Manager and Stormwater Professional, Alan Le, PE, QSD/P, CPSWQ, CPESC,and Civil Engineering Manager Joey Covey, PE.

» PROJECT SCOPE AND DELIVERY:

We anticipate performing the required services primarily from our office in San Jose. HMH Staff will be available to meet with City of Oakley Staff as needed on a project-by-project basis, or for important stakeholder meetings. Field meetings and visits will be accommodated as requested.

In general, the following scope of services are anticipated:

1. Review of Planning Applications, including Tentative Maps, for Engineering compliance.
2. Prepare project Conditions of Approval for Engineering.
3. Subdivision Development Grading and Improvement Plan Review.
4. Onsite and off-site public improvement plan review.
5. Review of calculations and other documents provided by applicants for submitted projects.
6. Review project Engineering Estimate for Bonding and Fee calculations purposes.
7. Assist in the preparation of project Subdivision Improvement Agreements.
8. Assist in the review of project material submittals for conformance with City of Oakley Standard Details and Specifications.
9. Participate in project meetings as request by City staff.
10. Perform Final Map, Plat & Legal Description, and other survey document review and act as City Surveyor for the City of Oakley.

Our HMH team is truly excited to be considered by the City of Oakley for this contract. Should you have any questions about our qualifications, please do not hesitate to contact me. Thank you for the opportunity to present our statement of qualifications.

Stephan Kuehn, PE
Vice President/CFO/Principal, Land Development Manager
skuehn@hmhca.com | 408.857.9410

PRINCIPAL, LAND DEVELOPMENT

STEPHAN KUEHN, PE

Civil Engineer California #57808 · Building Industry Association · American Council of Engineering Companies · United States Green Building Council · Bay Area Certified Green Business

B.S. Civil Engineering, California Polytechnic State University, San Luis Obispo

- principal engineer for multiple large master planned residential communities, retail centers, industrial and institutional developments; responsible for design oversight, quality control, scheduling & budgeting.
- detail-oriented approach provides practical solutions for project design and management from concept to construction, especially in high density and urban infill developments.
- understands the inherent competition for space among project elements—emphasizes collaboration and coordination between consultants, agency staff, building officials and public works staff for effective negotiation and timely processing to gain approvals.

30 YEARS OF EXPERIENCE | with HMH: 27 YEARS

THE RELEVANT PROJECTS

- **City of Oakley Development Review,** Oakley, CA
  Stephan leads our City of Oakley Development Review consulting services throughout the planning and development processes. He assists during the entitlement process, from reviewing preliminary engineering designs and preparing conditions of approval to the engineering process, reviewing private and public improvement plans, grading plans, and final maps, to job-site construction meetings and coordination. Stephan's experience with a variety of projects both public and private and knowledge of the industry help the City navigate any challenges that may come their way.

- **237 Industrial Center,** San Jose, CA
  Stephan is leading the 50 MW Data Center and Light Industrial Project on 65 acres in North San Jose/Alviso. This new facility, to be built in phases, is adjacent to Coyote Creek, Highway 237, and the San Jose Regional Wastewater Facility.

- **Communications Hill Residential Project Specific Plan,** San Jose, CA
  HMH is providing complete services that include conceptual site and grading plans; land use entitlement management and processing; preliminary and final design for roadway and utility infrastructure; analysis and coordination with the City of San Jose for multi-modal transportation improvements; feasibility studies, and design for required off-site improvements; design and integration of regional stormwater mitigation facilities; Landscape Architectural design for residential neighborhoods; topographic surveys, mapping, and construction staking; and coordination between owner, agencies and developers.

- **Tesla,** Palo Alto, CA
  Stephan led the facility upgrades including parking lots, outbound logistics facility, and Free Trade Zone improvements in support of upcoming Tesla Model 3 production and delivery.

- **I-280/Wolfe Road Interchange Improvement,** Cupertino, CA
  Stephan is providing quality control and quality assurance for the civil engineering services for the project. The I-280/ Wolfe Road interchange is the primary point of access for the Apple Park Campus and Vallco Shopping Center, serving also as the gateway to the City of Cupertino. Working closely with the City and VTA, HMH will be seamlessly implementing complete streets elements and thorough consideration of the bicycle and pedestrian user experiences critical to the long-term success of the project.

- **87/Capitol Expressway Interchange Improvement,** San Jose, CA
  Stephan is providing quality control and quality assurance for the civil engineering services for the project. The 87/ Capitol Expressway interchange will improve vehicular access between northbound State Route 87 and Capitol Expressway, providing high-quality, convenient and comfortable accommodations for active transportation (bikes and pedestrians) and provide seamless connections between all modes of transportation.

CIVIL ENGINEERING MANAGER

ALAN LE, PE, QSD/P, CPSWQ, CPSEC

Civil Engineer California #72243 · Certified Professional in Erosion and Sediment Control (CPESC) #5177 · Qualified SWPPP Developer (QSD) & Qualified SWPPP Practitioner #20397 · California Stormwater Quality Association (CASQA) · CASQA BMP Subcommittee Envirocert International Inc. (EIC)

B.S. Civil Engineering,
San Jose State University

- senior designer on a variety of projects including single and multi-family residential, roadway improvements, traffic calming, storm drainage systems, domestic water systems, sanitary sewer systems, public park grading and drainage.
- designer and engineer, and prepares the SWPPP for many of the same projects.

22 YEARS OF EXPERIENCE | with HMH: 20 YEARS

THE RELEVANT PROJECTS

- **South of Forest Neighborhood Improvements,** San Jose, CA
  Alan was the design engineer for the South of Forest Neighborhood Improvements project that was awarded the 2012 Project of the Year from the Silicon Valley Chapter of the American Public Works Association (APWA) in the category of Transportation Projects less than $5 million. The project consists of reconstruction of paved areas, curb and gutter, sidewalks, driveways, ADA ramps, traffic calming devices upgrading over 11,000 LF of the existing deteriorated streets to current City standards.

- **Capitol Improvement Projects,** Menlo Park, CA
  Alan's experience also includes two years working for the City of Menlo Park Engineering Department where he gained valuable experience working on a variety of capital improvement projects including streetscape, traffic calming, traffic analysis, and street resurfacing. An example of Alan's professional work involved the evaluation of the traffic calming devices from design through installation to implementation for the Santa Cruz Avenue Trial Traffic Calming Project.

- **Niles Boulevard Street & Utility Replacement,** Fremont, CA
  Alan provided stormwater solutions for the project. As part of the project, Alameda County Water District and Union Sanitary District upgraded the water and sewer mains within the roadway. HMH prepared the water main relocation plans, including contractor staging and laydown areas that will be subject to construction runoff controls.

- **Nuevo (Lawrence Station),** Santa Clara, CA
  Alan is currently the design manager for the Lawrence Station project. This 29-acre project is a part of the 65 acres Lawrence Station Area Plan that consists of 988 residential units with 35,000 square feet of retail space and 3.3 acres of public parks and open spaces. The public parks and open spaces area were maximized with the use of over 21,000 square feet of Silva Cell as the stormwater treatment facility to treat both public and private stormwater.

- **Agrihood,** Santa Clara, CA
  Alan managed and oversaw the design of the site improvements for this 5.80 acre mixed-use/residential and urban agriculture project includes 160 mixed-income apartments, 165 affordable senior apartments, 36 townhomes and approximately 1.5 acres of agricultural open space with rain harvesting system as a part of the stormwater quality solution.

- **Westfield Valley Fair Mall,** San Jose/Santa Clara, CA
  Alan managed and oversaw the design of the site improvements for the $1.1 billion revitalization work of the existing Valley Fair mall. This multi-phase mall expansion consists of 650,000 square feet of retail area addition and 3 parking garage structures which will provide 93,000 square feet of parking area. A combination of biotreatment facilities and 232,000 gallon stormwater harvesting system were used as the project stormwater quality solution to preserve the mall retail area as well as comply with the C.3 requirements.

CIVIL ENGINEERING MANAGER

JOEY COVEY, PE

Civil Engineer California #85020

- main designs include hillside subdivisions, residential, commercial, mixed-use communities and road improvements.
- expertise includes street geometric improvements, stormwater management, underground utilities and site grading.
- experience consists of both large and small-scale projects throughout Northern California

B.S. Civil Engineering, Fresno State University

11 YEARS OF EXPERIENCE | with HMH: 11 YEARS

THE RELEVANT PROJECTS

- **Market Park,** San Jose, CA
  Joey has provided engineering support for the 120-acre transit village project that includes 2,800 urban residential units (ranging from single family detached to high rise towers), mixed use and commercial developments (~300,000 square feet) regional trails, a public school, and riparian open space along both Coyote and Penitencia Creeks. Joey is supporting the design of on-site and off-site infrastructure as required including reconstruction and widening Berryessa Road into a 6-lane arterial roadway, vehicular bridge over Penitencia Creek, complete storm drain system with regional solution for stormwater runoff mitigation, major sanitary sewer diversion pipeline, offsetting improvements to surrounding roadways, and undergrounding existing overhead utilities.

- **Rancho Calera,** Chowchilla, CA
  Joey is overseeing the design of public and private infrastructure for a large specfic plan project located in Chowchilla, CA. He performed a detailed utility investigation and coordinated utility points of connection with the City of Chowchilla. The project consists of a mixture of residential, commercial, and civic land uses with a projected build-out population of approximately 6,000 residents. Rancho Calera spans 576 acres with 2,042 residential units and approximately 308,405 square feet of commercial space.

- **Castellina,** Madera County, CA
  Joey is leading the engineering design efforts for this project. Castellina is a master-planned community located on approximately 792 acres about one mile north of the City of Madera in Madera County. The project area is located approximately three miles east of Highway 99 and is adjacent to the proposed high-speed rail.

- **Belmont Residential Project,** San Jose, CA
  Joey was responsible for designing the earthwork, public infrastructure, and private improvement plans for a 2.8-acre, 33 lot residential infill project located in San Jose. The detached single family homes front private streets along Edenvale Avenue. The project involved challenging perimeter conform designs, public street dedication and improvement, and an underground storm runoff detention vault.

- **Tesla,** Palo Alto, CA
  Joey provided civil engineering design and coordination services for the Tesla Model 3 Outbound Logistics Facility at the Tesla Plant in Fremont, CA. The project included new car staging areas, truck delivery lanes, free-trade zone improvements, and stormwater treatment facilities. This new facility will support Tesla's Model 3 national production and delivery efforts.

- **Britton Middle School,** Morgan Hill, CA
  Joey is overseeing the coordination of civil engineering logistics across multiple teams for the Britton Middle School expansion project. Such items include ADA compliance, grading and drainage, and utility coordination.

- **Fresno State Student Union Building,** Fresno, CA
  Joey is responsible for the grading and drainage design for the new Fresno State Student Union building. It included the demolition of the existing amphitheater and earthwork studies to balance the site. He coordinated several items with the project team, such as rerouting existing utilities, ADA compliance, and stormwater runoff mitigation.

PRINCIPAL, SURVEY MANAGER

TRACY GIORGETTI, PE/PLS

Professional Land Surveyor California #8720 · Civil Engineer California #63214 · California Land Surveyors Association

B.S. Civil Engineering, Santa Clara University

» civil engineering graduate who gained surveying experience early in her professional career--earned professional licenses in both disciplines making her unique and highly-valuable.

» focuses on the oversight of all survey mapping including preparation of tract maps, ALTA/ASCM surveys, corner records, record of surveys, condominium plans and plat maps and legal descriptions.

26 YEARS OF EXPERIENCE | with HMH: 26 YEARS

THE RELEVANT PROJECTS

- **City Of Oakley Development Review**, Oakley, CA
  Tracy led the survey teams on setting numerous control points, coordinating various offset stakes references, and conducting as-built utility surveys for the City Of Oakley Development Review. The team assisted during the entitlement process, from reviewing preliminary engineering designs and preparing conditions of approval to the engineering process, reviewing private and public improvement plans, grading plans, and final maps, to job-site construction meetings and coordination. In addition, the team augmented city field and office surveying staff.

- **Arroyo Road Trail,** Livermore, CA
  Tracy supervised topographic field surveys and coordinated pothole and as-built utility surveys for the Arroyo Road Trail project. The new trail alignment would run in general between the existing vineyard rows and Wente Road and on existing vineyard maintenance access roads. The southernly trail segment beginning at Dry Creek would continue to run south for about 3/4 mile, align with the existing unpaved trail path inside Sycamore Grove Regional Park and connect to the existing Arroyo Del Valle Regional Trail.

- **Market Park**, San Jose, CA
  Tracy was the Senior Land Surveyor for the multiphase Market Park project, which includes a proposed 3,000 housing units, two million square feet of office space, 110,000 square feet of retail space, new infrastructure, two public parks, connections to regional trails, pedestrian greenways and improved roads, all clustered near a new Bay Area Rapid Transit train stop.

- **Ohlone**, San Jose, CA
  Tracy managed the land surveying efforts for Ohlone. Located between downtown San Jose and Santana Row, Silver at Ohlone is a multi-family residential project that is part of the Transit Oriented Development project called Ohlone. The overall TOD project aims to include up to 800 residential units and over 0.27 acres of retail. The project is also ideally located along West San Carlos Street, which is a street that has been designated a TOD corridor and a planned bus rapid transit line by the City of San Jose and the Valley Transportation Authority. In addition to the development, The Ohlone will also deliver a 4-acre park to the City of San Jose that will include a picnic area, dog park, and more.

- **VTA On-Call**, San Jose, Milpitas, CA
  Tracy was the Senior Land Surveyor and now Survey Manager for HMH's VTA on-call within San Jose and Milpitas, performing various survey functions on several projects through Task Orders issued on an "on-call" contract. Survey prepared and performed construction surveys, construction verifications, right-of-way staking, finalization of appraisal maps, GPS control surveys, and topographic design surveys. Additional surveying services included preparing exhibits as well as plat and legal descriptions.

SENIOR CIVIL ENGINEER

RYAN FONG, PE

Civil Engineer California #85420

» land development and surveying experience includes thirteen years with the County of Santa Clara's Surveyors' Office and Land Development Engineering.

» also spent over a year with the Town of Los Gatos, Parks and Public Works Department.

B.S. Civil Engineering,
San Jose State University

20 YEARS OF EXPERIENCE | with HMH: 7 YEARS

THE RELEVANT PROJECTS

- **Castellina**, Madera, CA
  Ryan provided civil engineering support for the Castellina project alongside the survey crew. Castellina is a master-planned community located on approximately 792 acres about one mile north of the City of Madera in Madera County. The project area is located approximately three miles east of Highway 99 and is adjacent to the proposed high-speed rail.

- **Coyote Creek Trail - Singleton Road Fish Barrier, Stream Restoration, and Pedestrian Bridge**, San Jose, CA
  Ryan provided civil engineering support of the trail at the grade crossing, 1,000 feet of Coyote Creek, and 600 feet of Singleton Road. The surveys were performed conventionally because an aerial topographic survey would not provide the necessary data due to heavy vegetation in and around the creek. The survey was performed based on NAVD88 vertical datum and NAD83 horizontal datum. Additional tasks completed for the project included surveying potholed utilities after they had been exposed by others, surveying and tagging trees in the project area, and researching the existing utilities and surveyed visible utilities in the project area.

- **Bay Area Projects**, Bay Area, CA
  Ryan's completed assignments at the County of Santa Clara include grading ordinance revisions, standard detail update, review of grading and drainage plans, retaining wall review and drainage calculation evaluation. Ryan has been involved with the conditional review and approval of a wide range of projects including single family homes, subdivisions, and commercial projects. Specific project experience includes: Stanford Concert Hall, Stanford Engineering Quad, and the Castro Valley Ranch Subdivision.

  While Ryan was with the Town of Los Gatos, Parks and Public Works Department, he was involved with conditional review and approval of private land development projects. Projects included single family homes, subdivisions and mixed use projects. Ryan represented Parks and Public Works at Staff Technical Review, Development Review Committee and Planning Commission Meetings. Specific project experience includes: Los Gatos Luxury Cars and Sorellas by Summerhill Homes.

- **VTA On-Call**, Santa Clara, CA
  Ryan completed survey assignments for the VTA On-Call Surveying Services. The Santa Clara Valley Transportation Authority engaged HMH Engineers to perform various survey functions on several VTA projects through Task Orders issued on an "on-call" contract. For the Capitol Light Rail project, the team performed construction surveys, construction verifications, finalization of appraisal maps, GPS control survey, Record of Survey of final monumentation of the project, plat and legal descriptions for right-of-way acquisition, temporary construction easements, utility easement acquisitions, and topographic design surveys.

CHARGE RATE SCHEDULE

Professional & Office

	Per Hour
Principal	$270
Civil Engineering, Land Surveying or Landscape Architect Manager	$214
Senior Civil Engineer, Land Surveyor, or Landscape Architect	$198
Project Civil Engineer, Land Surveyor, or Landscape Architect	$182
Engineer, Planner, Surveyor, or Landscape Designer	$174

Printing, Reproductions & Materials at Cost, Plus 20%
Transportation at Cost, including mileage based upon IRS rates
Other Outside Services & Subconsultants at Cost, Plus 20%
Rates are subject to Adjustment July 1, 2024

1570 OAKLAND ROAD
SAN JOSE, CA 95131

hmhca.com

LAND PLANNING

LAND DEVELOPMENT

LAND SURVEYING

CIVIL ENGINEERING

PUBLIC WORKS

LANDSCAPE ARCHITECTURE

ARBORICULTURE

LAND USE ENTITLEMENTS

STORMWATER COMPLIANCE

Approved and Forwarded to the City Council

DATE: March 12, 2024

TO: Joshua McMurray, City Manager

FROM: Kevin Rohani, P.E., Public Works Director/City Engineer

SUBJECT: Adopt a resolution approving Contract Amendment Number 1 with Park Engineering, Inc. for On-Call Consulting Services Related to Inspection Support Services for Fiscal Year (FY) 2023/24 and Award of Contract for Professional Services Agreement for On-Call Inspection Support Services with Park Engineering, Inc for Fiscal Years 2024/25 and 2025/26

Background and Analysis

The City of Oakley utilizes a wide range of consultants and contractors across all departments to augment City staff as needed to accommodate the workload activities. One of the areas that this approach is used is in private development services. Since the volume of private development activity fluctuates with the overall economic climate of the region, the Community Development and Public Works Departments use staff augmentation as needed to process and manage the development project workloads.

The Public Works Department uses the services of a contract inspector to augment current staffing to provide expeditious service for private development projects. This approach gives the City flexibility and agility to adjust to the level of service needed by private developers.

Park Engineering, Inc. has provided construction management and inspections specifically for development projects for both residential and commercial projects since 2021. Staff have worked collaboratively with the assigned inspector to streamline inspection services for various projects. Park Engineering, Inc. is committed to the City to provide the resources needed to ensure that the development projects are constructed to the satisfaction of the City.

On September 28, 2021, an agreement was executed between the City of Oakley and Park Engineering, Inc. for on-call consulting services related to Inspection Support Services. The contract was limited to a not-to-exceed amount of $200,00 per fiscal year. Peer reviews of improvement plan design for private development projects have continued to increase, such as improvements within the East Cypress Corridor Specific Plan area. Staff have needed to increase the amount of work being performed by consultants for inspection services to meet development project timelines. As a

result, staff are requesting an increase of $50,000 in the contract amount for FY 2023/24, for a total not-to-exceed contract amount of $250,000.

In addition, Park Engineering, Inc. has provided their statement of qualifications and continues to be the preferred consultant to help assist staff for FY 2024/25 and FY 2025/26 with the option to extend the contract for an additional two years to 2028 if work is performed satisfactorily. This contract would be for a not-to-exceed amount of $250,000 per Fiscal Year. The award of the Agreement is exempt from competitive bidding under Section 3.6.010 of the Oakley Municipal Code paragraph 1) which provides an exception for competitive bidding on “Contracts involving the acquisition of professional or specialized services, such as, but not limited to, services rendered by architects, attorneys, engineers, and other specialized consultants”.

Consistency with the Oakley Strategic Plan 27+

Consistency with the Oakley Strategic Plan for community health and safety by ensuring engineering review of various projects are maintained to preserve safety for all. Contracting engineering services also maintains a sustainable organization from the demand of varying schedules of multiple projects.

Fiscal Impact

Approval of the resolution will increase the not-to-exceed contract amount by $50,000 for FY 2023/24 for a total amount of $250,000. Approval of the resolution will also authorize the City Manager to execute a professional services agreement with Park Engineering, Inc. with a not -to-exceed amount of $250,000 per fiscal year through June 30, 2026, with the option to extend the agreement until 2028 if work is performed satisfactorily. Private Development projects will fully fund the engineering support services cost on an as needed basis. This contract will not require funding from the City’s General Fund.

Staff Recommendation

Staff recommends that the City Council adopt the resolution approving Amendment No. 1 to the On-Call services agreement with Park Engineering, Inc. for FY 2023/24 and authorize the City Manager to execute the agreement. Staff is also recommending that the City Council adopt the resolution authorizing the City Manager to execute an agreement with Park Engineering, Inc. for private development engineering support services for a not-to-exceed amount of $250,000 per fiscal year through June 30, 2026, with the option of extending the agreement through June 30, 2028.

Attachments

1. Resolution
2. Amendment Agreement No.1 for FY 2023/24
3. Park Engineering, Inc. Proposal for Contract FY 2024/25 and 2025/26

RESOLUTION NO. __-24

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF OAKLEY APPROVING CONTRACT AMENDMENT NUMBER 1 TO THE AGREEMENT WITH PARK ENGINEERING, INC. FOR ON-CALL ENGINEERING SUPPORT SERVICES RELATED TO PRIVATE DEVELOPMENT PROJECTS FOR FISCAL YEAR 2023/24 AND APPROVING A PROFESSIONAL SERVICES AGREEMENT WITH PARK ENGINEERING, INC. FOR ON-CALL PRIVATE DEVELOPMENT ENGINEERING SUPPORT SERVICES FOR FISCAL YEARS 2024/25 AND 2025/26 AND AUTHORIZING THE CITY MANAGER TO EXECUTE THESE AGREEMENTS

WHEREAS, on September 28, 2021, the City executed an agreement with Park Engineering, Inc. for Inspection Support Services related to private development projects with a not to exceed amount of $200,000 per fiscal year; and

WHEREAS, after review of the expenditures to date for Fiscal Year (FY) 2023/24 and projecting costs for these services for the remaining months of the fiscal year with the various private development projects slated to start construction; staff has determined that the original not to exceed amount of $200,000 is not sufficient to cover the necessary support services for these projects; and

WHEREAS, staff is requesting an additional $50,000 be added to FY 2023/24 budget, for a total not-to-exceed amount of $250,000; and

WHEREAS, the City of Oakley utilizes the services of consultants to provide support services on a wide range of projects where the scope and magnitude for many of the tasks are larger than what City staff can perform; and

WHEREAS, Park Engineering, Inc. has performed private development inspection support services for municipalities in the Bay Area in an exemplary way and can accommodate the City's service needs. Park Engineering, Inc. has provided professional inspection services to the City of Oakley since September 2021; and

WHEREAS, the award of the agreement is exempt from competitive bidding under Section 3.6.010 of the Oakley Municipal Code paragraph 1) which provides an exception for competitive bidding on "Contracts involving the acquisition of professional or specialized services, such as, but not limited to, services rendered by architects, attorneys, engineers, and other specialized consultants".

NOW, THEREFORE, BE IT RESOLVED AND ORDERED, by the City Council of the City of Oakley that Contract Amendment Number 1 with Park Engineering, Inc. is hereby approved for a not-to-exceed amount of $250,000 for FY 2023/24. A copy of the Contract Amendment is attached hereto as **Exhibit A**., and the On-Call Development Engineering Support Services proposal attached hereto as **Exhibit B** with Park Engineering, Inc. for an amount not-to-exceed amount of

$250,000.00 per fiscal year for FY 2024/25 and 2025/26 is hereby approved and the City Manager is authorized to execute these agreements.

BE IT FURTHER RESOLVED AND ORDERED, if at the end of the term, the services have been performed satisfactorily, the City Manager has the discretion to approve an extension of the On-Call Services agreement to June 30, 2028, under the same terms as the original agreement.

PASSED AND ADOPTED by the City Council of the City of Oakley at a meeting held on March 12, 2024, by the following vote:

AYES:
NOES:
ABSENT:
ABSTENTIONS:

APPROVED:

_____
Anissa Williams, Mayor

ATTEST:

_____
Libby Vreonis, City Clerk

_____
Date

AMENDMENT NUMBER 1 TO THE AGREEMENT BETWEEN THE CITY OF OAKLEY AND PARK ENGINEERING, INC. FOR ON-CALL SERVICES RELATED TO DEVELOPMENT ENGINEERING SUPPORT SERVICES FOR PRIVATE DEVELOPMENT PRJOJECTS FOR FISCAL YEAR 2023/24

This Amendment is entered into by and between the CITY OF OAKLEY, a municipal corporation (hereinafter referred to as "City"), and Park Engineering, Inc., a California Corporation (hereinafter referred to as "Contractor"), effective as of the 12TH day of March 2024.

RECITALS

A. On September 28, 2021, City and Consultant executed an Agreement for on-call consulting services related to private development project Inspection Support Services (hereinafter referred to as the "Agreement") in the amount of $200,000 per fiscal year; and,

B. City and Consultant now desire that the following amendment be made to the Consultant services for FY 2023/2024: increase of $50,000 to the not-to-exceed contract amount from $200,000 per fiscal year to $250,000 for Fiscal Year 2023/24 to hereby be approved by the City Manager; and,

C. Except as provided herein, all other terms and provisions of the Agreement shall remain in full force and effect.

AGREEMENT

IN WITNESS WHEREOF, the City of Oakley, a municipal corporation in the State of California, has authorized the execution of this Amendment in duplicate by its City Manager, Approved to as Form by the City Attorney and attested by its City Clerk as of the 12th day of March 2024, and the parties have caused this Amendment to be executed in duplicate.

City	Consultant
City of Oakley, a municipal corporation	Park Engineering, Inc., a California Corporation
By: _____	By: _____
Joshua McMurray, City Manager	Jaemin Park, President

ATTEST:

_____
Libby Vreonis, City Clerk

APPROVED AS TO FORM:

_____
Derek P. Cole, City Attorney

PARK
ENGINEERING

March 4, 2024

Mr. Kevin Rohani, PE
Public Works Director/ City Engineer
Public Works Department
City of Oakley
3231 Main Street
Oakley, CA 94561

RE: Proposal to Provide City of Oakley As-Needed Construction Management and Inspection Services for Private Development Projects

Dear Kevin:

Park Engineering, Inc. is very pleased to provide this proposal for As-Needed Construction Management and Inspection Services to the City of Oakley to oversee Private Development construction projects.

As discussed, we will provide construction management and inspector specifically for development projects, continuing with services that we have been performing for that past three years. We are committed to the City to provide the resources needed to ensure that the development projects are constructed to the satisfaction of the City.

James Beauchamp will be our primary Construction Manager for this project. James has been involved with the development for this contract and will continue reporting to you to complete the requested work.

As principal in charge, I will be responsible of any contractual issues and supporting the City and the project team where needed.

We are very excited to be working the City. If you have any questions or need additional information, please do not hesitate to contact me. I can be reached anytime on my mobile number at (925) 818-3756 or by E-mail at jpark@park-eng.com.

Sincerely,

Jaemin Park, PE
President

Orinda Office
372 Village Square
Orinda, CA 94563
Tel: 925-257-2508
Fax: 925-401-7030

Emeryville Office
3960 Adeline Street, #3
Emeryville, CA 94608
Tel: 925-257-2508
Fax: 925-401-7030

Park Engineering will perform all the duties required the City needs to ensure that the development construction work meets the City's standards and those of regulatory agencies. We will be reporting to the City and representing the City on the project and to the public. Some of the tasks that we will be performing include but are not limited to:

CONSTRUCTION PHASE

- Represent the City as the single point of contact for all communications and coordination between the developer, utility companies, regulatory agencies, local businesses and residents, and the testing firm.
- Report to the City's Project Manager, including sharing all correspondence, to ensure that the City is kept up to date on all project matters.
- Manage submittals from the contractor and review for compliance with City requirements.
- Coordinate, manage and respond to Requests for Information (RFI's) submitted by the contractor where City response is needed. Keep track of any responses between contractor and designer to ensure that the City is kept up to date on any issues or changes.
- Coordinate and conduct meetings with the contractor, designer and oversight agencies for RFI's, when appropriate to resolve and clarify complex issues.
- Schedule necessary quality assurance sampling and testing of materials for the project to ensure quality of materials meets the City standards.
- Answer questions from the public concerning the project work and schedule.
- Our resident engineers and construction inspectors will be available to answer questions on an ongoing basis. They will report the current status of the project's schedule to the City on a daily, weekly and monthly basis, as needed or requested.
- Support all project work with documentation to meet the contract requirements for acceptance.
- Review contractor's planned schedule for conformance with the specifications and for reasonableness of the sequence and duration of the activities.
- Review work progress as compared to the planned schedule and notify contractor and City Project Manager of schedule slippage.
- Identify actual and potential problems associated with the construction project and recommend sound engineering solutions.
- Inspect the construction elements of the project as required by the construction contract plans and specifications.
  - ✓ Perform all field inspection activities to monitor compliance with the contract plans and specifications. Record all items of work, materials incorporated, materials tested, and any other pertinent information in a daily diary for permanent record of events.
  - ✓ Project photographs and video documentation of project progress and major work components will be done on a weekly basis and kept for permanent records to support disputes and verify quality for acceptance.
  - ✓ Schedule necessary quality assurance sampling and testing of materials for the project to verify compliance with the specifications.

- ✓ Arrange for specialty inspection, such as welding inspection or source inspection of materials when needed to verify compliance with the contract.

- Make arrangements to perform necessary quality assurance sampling and testing when needed.
- Analyze records of materials used in the project in accordance with ASTM and California Standard Test Methods.
- Review test data and materials certifications submitted by the contractor and suppliers for compliance with the contract requirements.

POST-CONSTRUCTION PHASE

- Conduct, review, and follow up on inspection work to assure completion of the contract including any punch list items of work.
- Inspect work as it is completed. Develop and issue punch list for any needed corrections as the work progresses.
- Perform final inspection of all work for acceptance.
- Review as-built drawings, report of completion and all required documents for project close-out for the City.
- Prepare and transition official construction records, record drawing and project files to the City.

LEVEL OF EFFORT

Based on the information that we have gathered to date; the construction management team will start with one construction manager/resident engineer with support from two construction inspectors. Staffing levels will be adjusted to match the workload and the City's requests. Below is a range of standard billing rates for the specific staff level.

SCHEDULE OF STANDARD BILLING RATES

Construction Manager/ Inspector $152.98 Per hour effective July 1, 2024

**3% escalation per calendar year in January 1.*

PROJECT TEAM

James Beauchamp, EIT, Construction Manager/Sr. Construction Inspector
James has spent over 25 years in construction management and worked on major development projects including Dougherty Velley Development. James was involved with the parks, and schools at Dougherty in addition to the bridges, utilities, mass grading and roads. James has also worked on levees, creeks, trails and many other types of projects throughout the Bay Area.

City of Oakley

Various Development Projects

Cost Estimate for Construction Management/Inspection Services

Fiscal Year 2024-2025: July 1 - December 31 (Full Time 8 Hours per Day)					
Name/Classification	Rates		Total Regular Hours	Total Overtime Hours	Cost
	Regular Rate	Overtime Rate			
James Beauchamp, EIT CM/ Sr. Const. Inspector	$ 152.98	$ 229.47	1000	0	$ 152,980.00
				Subtotal (July 1 - December 31) =	**$ 152,980.00**
Fiscal Year 2024-2025: January 1 - June 30 (Full Time 8 Hours per Day)					
Name/Classification	Rates		Total Regular Hours	Total Overtime Hours	Cost
	Regular Rate	Overtime Rate			
James Beauchamp, EIT CM/ Sr. Const. Inspector	$ 157.97	$ 236.96	1000	0	$ 157,970.00
				Subtotal (January 1 - June 30) =	**$ 157,970.00**
				TOTAL (Fiscal Year 2024-2025) =	**$ 310,950.00**

NOTE: 3% RATE INCREASE ON JANUARY 1ST

Fiscal Year 2025-2026: July 1 - December 31 (Full Time 8 Hours per Day)					
Name/Classification	Rates		Total Regular Hours	Total Overtime Hours	Cost
	Regular Rate	Overtime Rate			
James Beauchamp, EIT CM/ Sr. Const. Inspector	$ 157.97	$ 236.96	1000	0	$ 157,970.00
				Subtotal (July 1 - December 31) =	**$ 157,970.00**
Fiscal Year 2025-2026: January 1 - June 30 (Full Time 8 Hours per Day)					
Name/Classification	Rates		Total Regular Hours	Total Overtime Hours	Cost
	Regular Rate	Overtime Rate			
James Beauchamp, EIT CM/ Sr. Const. Inspector	$ 162.71	$ 244.07	1000	0	$ 162,710.00
				Subtotal (January 1 - June 30) =	**$ 162,710.00**
				TOTAL (Fiscal Year 2025-2026) =	**$ 320,680.00**

NOTE: 3% RATE INCREASE ON JANUARY 1ST

JAMES BEAUCHAMP, EIT

CONSTRUCTION ENGINEER/ASSISTANT RESIDENT ENGINEER/CONSTRUCTION INSPECTOR

Years of Experience
25

Education
B.S. Civil Engineering, Cal Poly San Luis Obispo, 1999

Certifications and Training

Engineer in Training (EIT) #646, Jan-2006
Class 1 Operator – Water Treatment
Confined Space Certified
40-Hour HazMat Certified
Class 2 Operator – Water Distribution

Key Qualifications
James Beauchamp has spent over 25 years in the construction industry working as a construction inspector for Caltrans and other public and transit agencies on public works and highway construction projects. He is proficient in the execution of construction contracts, as well as construction inspection at the city, state and federal levels. His experience includes oversight for projects that include concrete bridges, pipeline, water and sewer, water treatment, roadway and freeway AC installation, pile driving, new and existing city intersection and streetscape construction/rehabilitation, and utilities. James believes in giving his best to his work, and works diligently to complete projects successfully, on time and within budget. He can work independently with the contractor and as a member of a team to get the project to a successful completion.

Project Experience

- **Various Development and Capital Projects 2021-2024, City of Oakley**
  James served as the Construction Inspector for multiple development, capital improvement and permit inspection projects. Projects included new housing developments; new City infrastructure – streets, curb/gutter/sidewalk, underground utilities, signalized intersections and street lighting; new commercial developments including new City infrastructure; and capital improvements projects including roadways, drainage systems, and signals & lighting.
- **Buchanan Field Airport Runway 14L-32R Rehabilitation Project, Contra Costa County**
  James served as the Construction Manager/Construction Observer for this $5.5M FAA funded airport runway rehabilitation project. The work consists of rehabilitating asphalt concrete pavement, full width, on Runway 14L-32R, with the exception of the Runway 1L-19R intersection. Work included Cold milling, Crack repair, Full depth asphalt and PCC pavement removal, Earthwork/Grading, Asphalt surface course, P-401, Application of asphalt surface treatment, P-608, Runway grooving, Application of new pavement markings, P-620, Taxiway lighting and signage modifications. Additional work consisted of the removal and replacement of the Runway 14L-32R Medium Intensity Runway Lighting System including new conduit, base cans, pull boxes, cable, and LED fixtures, modifications to existing runway exit and distance remaining signs and a new constant current regulator, Portland Cement Concrete (PCC) joint, crack, and spall repairs and replacement of the pavement markings within the PCC runway ends on Runway 14L-32R and 1L-19R.
- **San Rafael Street Resurfacing 2018-2019, City of San Rafael, CA - $2.8M**
  James is the Construction Inspector on this project that includes installation of hot mix asphalt and/or micro-surfacing treatments at various locations throughout the City. This project also includes installation of ADA compliant curb ramps, curb, gutter, and sidewalk.
- **Measure Q Pavement Repair Project 8, City of Concord, CA - $1.3M**
  James was the Construction Inspector on this locally funded street improvement project that resurfaced multiple local roads, along with installation of replacement pavement delineation. Work also included new concrete curb & gutter, ADA compliant curb ramps and cross stree valley gutters.

James worked closely with the City and construction contractor to keep the public informed of the upcoming work to minimize No Parking impacts.

- **2017 Storm Damage Slide Repair Projects, City of San Rafael, CA - $1.8M (combined)**
  James was the Construction Inspector on three simultaneous slide repair projects, resulting from the heavy rains of the 2016/17 winter months. These FEMA funded slide repair projects include the installation of soil nail/tie-back retaining walls and regrading of adjacent slopes at three private property locations. Work also includes drainage improvements, slope stabilization and roadway restoration above and/or below the slide areas. James is working closely with City staff on this high public interest projects, especially the residents directly impacted by the slides.
- **Chilco Street Utility Undergrounding, City of Menlo Park, CA – private development (Facebook)**
  James was the Construction Inspector for the City on the developer permit project that replaced existing storm drain, domestic water system, reclaimed water systems and sewer related to the Facebook Campus development. James was the full-time inspector to ensure contract compliance by the developer's contractor building the facilities that the City took over upon completion.
- **2017 Annual and Measure J & L Paving Rehabilitation Project, City of Orinda, CA - $10M**
  James was the Assistant Resident Engineer/Construction Inspector on this citywide pavement rehabilation proejct. The project work consisted of improvements occurring on 65 different streets within the City. Roadway rehabilitation was primarily through Full Depth Reclamation (FDR) with an HMA overlay, extensive drainage and concrete curb & gutter replacement work. Other work consisted of utility adjustments, replacement of HMA dikes & swales and roadway delineation. The project was locally funded with the use of both City funds and Contra Costa County Measure funds.
- **Moraga Road Utility Undergrounding, Sidewalks & Pavement Resurfacing Projects, Town of Moraga, CA - $2.7M**
  James was the Assistant Resident Engineer/Construction Inspector on these three projects for the Town of Moraga that were construction simultaneously.

  ✓ **Utility Undergrounding, $1.7M**
  A Rule 20A project with PG&E for the Town to convert existing overhead utilities to new underground facilities along one of the main roadways for the Town. Work consisted of extensive daily traffic control for vehicles and pedestrians to perform the installation of new joint trench and utility vault systems. Work performed not only for PG&E, but also AT&T and Comcast relocation to underground facilities. Close coordination with utility crews was also necessary for each utility performing their conversion work to underground, while maintaining service to the existing residents along Moraga Road. The project also required coordination with other Town construction projects along Moraga Road and for projects utilizing Moraga Road as their project's detour.

  ✓ **Bicycle & Pedestrian Improvements, $160k**
  A federally funded project to construct about 300 LF of sidewalk to connect two critical side streets along Moraga Road. Project required reconstruction of residential driveways, coordination with the local post office and the Town's concurrent Utility Undergrounding Project.

  ✓ **Resurfacing Project, $800k**
  A federally funded project that will remove and replace the top 3-inches of existing Moraga Road from St. Mary's Road to Draeger Road. With the majority of the project consisting of only a 2-lane road, daily one-way traffic control will be required to complete the contract work on one of the Town's busiest roadways. Advance notice and monitoring of traffic control will be critical to the community outreach on the project. Concrete curb ramps, base failure repairs, slurry seal and final pavement delineation will also be a part of the contract work. This project is anticipated to start in early spring of 2017.

- **California Avenue Streetscape Project, City of Palo Alto, CA - $6.9M**
  James was the Assistant Resident Engineer/Construction Inspector on this streetscape and street improvement project, which included the widening of sidewalks, creation of two new plazas near Park Avenue and Birch Street, a new fountain near the Caltrain station, new street furniture, new streetlights and landscape elements and a reduction of lanes from four to two. The work also involved the replacement of an of an old water main under California Avenue.

- **San Francisco International Airport Runway Safety Area Program, San Francisco, CA - $223M**
  James was the Assistant Resident Engineer/Construction Inspector on this federally mandated runway safety area program at San Francisco International Airport constructed in two phases, that involved the lengthening of runways, installing Engineered Material Arresting System (EMAS) and installing new runway lights. The project works included demolition, excavation, grading, PCC and HMA paving, electrical and lighting and installing engineered material arresting system. Coordination with operations and traffic control tower to ensure that all work is completed without disrupting airport operations. Because SFO is essentially landlocked, construction options were limited. The airport's four intersecting runways are sandwiched between the San Francisco Bay on the right and Highway 101 on the left. Extensions sufficed for the airport's two longest runways, known as the 10-28s. But improving its North-South runways, 1R-19L and 1L-19R, involved installing an Engineered Material Arresting System (EMAS) from Zodiac Aerospace on both ends of both runways. Each is a bed of crushable concrete material similar to those used for runaway truck ramps on highways. James provided day to day inspection of contractor's work, documenting all work in daily reports including photos, measuring and verifying quantities, scheduling materials testing, and coordinating with airport operations. He also supported responses to RFI's, Contra Change Orders, submittals, and project schedules.

- **Oakland International Airport Taxiway Project, CA - $25M**
  James was the Assistant Resident Engineer/Construction Inspector on this taxiway improvement project at Oakland International Airport. The project was part of the Port's preparatory work for the federally mandated Runway Safety Area Program. Project work included demolition, excavation, grading, and PCC and HMA paving. Coordination with airport operations, and adjacent contractors for the BART Oakland Airport Connector Project was required. James provided day to day inspection of contractor operations, preparing daily reports, scheduling materials testing, project documentation and filing, correspondence, responding to RFI's and CCO requests, and providing oversite to BART contractors representing the Port.

- **VTA Freight Rail Relocation, Santa Clara Valley Transportation Authority, San Jose, CA - $35M**
  James was the Assistant Resident Engineer/ Construction Inspector on this project to relocate Union Pacific freight rail lines in the Cities of Fremont and Milpitas. This project consists of relocating freight rail tracks to clear UPRR right of way purchased by the VTA. This work includes the relocation of Kinder Morgan and Chevron petroleum pipelines by means of horizontal directional drilling under existing roadways and creeks. The bores are up to 6000 lineal feet in length and up to 130 feet in depth. This contract also includes the relocation of fiber optic lines for MCI, Verizon, Sprint, AT&T, Quest, and Level 3 by means of horizontal directional drilling and installation of joint trenches. It also includes $30M of improvements, including the construction of box culverts at four creeks, demolition of two existing railroad bridges, seismic retrofit of the Able Street Bridge, modification to existing grade crossings at Kato and Dixon Landing roads, construction of new embankment and trackway for new freight rail tracks. This project also requires close permit coordination with the City of Fremont, City of Milpitas, Santa Clara Valley Water District, Department of Fish and Game, Army Corp of Engineers, Regional Water Quality Control Board.

- **Roadway Realignment, Town of Tiburon, CA**

James was Resident Engineer for roadway and median realignment of Tiburon Boulevard. His duties included management of the contract according to the State of California Standard Specifications; including Caltrans ROW permitting, design plan review, tracking of quantities, progress payments and change order review.

- **On-Call Construction Management and Inspection (Dougherty Valley Development), Contra Costa County, San Ramon, CA,**
  James was Resident Engineer for County Public Works on a variety of projects ranging in construction cost between $100,000 and $20,000,000. These were federally funded projects and developer funded projects and consisted of County oversight and inspection of brand new city roadways, traffic signal installations, various types of box culvert construction, concrete box girder bridge construction, parks, schools, storm drain and new utility installations. Some specialty projects included the construction new schools (K-12), high school artificial turf soccer field, and parks. Responsibilities also included overseeing day to day construction activities, supervising both County and consultant inspectors, and coordination with developers, utility companies, local City representatives, and closeout acceptance with the Town of San Ramon and Contra Costa County.

  - ✓ **North Dougherty Road Bridge, Contra Costa County, CA**
    James served as the Resident Engineer for a CIP 310'L X 129.5'W box girder bridge supported by, 5 – 72" columns cast on 78"X 140' CIDH Piles, and abutments. James' duties included coordinating with all parties, including the Town of San Ramon Public Works, the developer, the contractor, County engineering, Fish and Game, and other creek protection and utility agencies. Duties also included providing direct supervision over County and consultant inspectors, inspecting the project according to plans, incorporating the State of California Standard Plans and Specifications dated July 2002 and special provisions, determining/verifying grades utilizing 4-scale drawings, observing fully-cased CIDH excavating operation (oscillator/excavating crane method), observing reinforcing steel (verifying size, grade, spacing and clearance), observing concrete placement, and sampling / casting compressive strength test specimens according to Caltrans testing methods 539/540, as well as pile driving operations at the abutments and verifying blow counts, and observing erection of falsework and earthwork (including grading of creek and rock slope protection installation) and SWPPP management.

  - ✓ **South Dougherty Road Bridge, Contra Costa County, CA**
    James served as the Resident Engineer for this CIP 295'L X 123'W box girder bridge supported by, 8 – 60" columns cast on 66"X 110' CIDH Piles, and abutments. James' duties included coordinating with all parties, including the Town of San Ramon Public Works, the developer, the contractor, County engineering, Fish & Game, and other creek protection and utility agencies. Duties also included providing direct supervision over County and consultant inspectors, inspecting the project according to plans, incorporating the State of California Standard Plans and Specifications dated July 2002 and special provisions, determining/verifying grades utilizing 4-scale drawings, observing fully cased CIDH excavating operation (oscillator/excavating crane method), observing reinforcing steel (verifying size, grade, spacing and clearance), observing concrete placement, and sampling / casting compressive strength test specimens according to Caltrans testing methods 539/540, as well as pile driving operations at the abutments and verifying blow counts, and observing erection of false work and earthwork (including grading of creek and rock slope protection installation) and SWPPP management.

- **South Trunk Sewer Line: Forensic Exploration and Rehabilitation, City of Dixon Public Works, Dixon, CA – $2 M**

James was the construction inspector for the City of Dixon's project to excavate and evaluate the reasons their 3- year- old, 1 million dollar 42" VCP sewer main was never used. The main was found to have an influx of ground water 10 times over acceptable rates. James was responsible for overseeing the replacement construction of all (30 each at approximately 20' deep) manholes, which were cast in place bases with 60"/84" to 36" pre-cast, T-lock lined segment towers, as well as localized segment linings and pressurized joint grouting. Work was conducted throughout the winter, thereby requiring a massive dewatering effort and SWPPP management. Included in the project was the coordination of all third party individuals (involved with the original construction) interested in observing the excavation, forensics and testing of the original system. James was requested to give a deposition on the forensic results determined from the excavation and removal of the existing system and he participated in the resulting court proceedings as an expert witness for the City of Dixon. Major efforts were conducted to project endangered species on or adjacent to this project.

- **Fairmont Ave Construction and Rehabilitation, City of El Cerrito Public Works, CA - $2 M**
  James was the primary construction inspector for the rehabilitation and beautification of 6 blocks of Fairmont Avenue from San Pablo Avenue to Coronado Street. This project included the realignment of sidewalks, curbs and gutters, lane modifications, new street lighting, new signal installation and irrigation. Fairmont Avenue is an urban artery in the downtown area of the city and one of James' daily focus points was moving traffic through and around the construction areas with little disruption. His inspection services entailed verifying all street cuts, demolitions, and excavations, installations of the underground systems and inlets, and all materials used in this project. This was a highly visible project, with intense vehicle and pedestrian control, including a local school for the blind, active local businesses, a shopping mall and a BART station that all had to work smoothly during construction.

- **Manganese Water Treatment Facility Construction, City of Lathrop Public Works, CA - $2.8 M**
  This project involved the construction of a Well #21 Manganese Water Treatment Facility for the City of Lathrop. It was one of three new facilities being constructed to accommodate the massive area population growth. This site consisted of a double Manganese Tank – water filtration system, external back flush tank and pond with a main Control Building. James was responsible for the implementation of all design standards during construction, negotiations with the contractor and the city, as well all material testing, construction, system flushing and final water quality testing. He was also responsible for SWPPP management and water quality testing.

- **Mokelumne No.3 Aqueduct Seismic Upgrades, East Bay Municipal Utility District (EBMUD), Holt, CA - $30 M**
  James was a construction inspector for the Seismic upgrading on the No. 3 - 10 ft. diameter, above-ground Mokelumne pipeline, which was the largest of three pipelines that transported water from the Pardee Dam across the San Francisco Bay Delta wetlands. James performed field inspections and negotiated pile acceptance for the 60'x 12" steel 'H' pile driving operations to reinforce the existing pile caps, the construction review of the expanding pile caps, as well field support for the installation of new seismic cross bracing and dampener systems. He was also responsible for SWPPP management. Major efforts were conducted to project endangered species on or adjacent to this project.

- **I-880 at U.S. 101 Widening Project, Valley Transportation Authority (VTA), Santa Clara, CA**
  James was the construction inspector responsible for segments of the final paving on the Highway 880 widening project. He was responsible for inspecting and documenting the construction of the newly aligned on and off ramps, AC mainline freeway paving of additional new lanes and final overlays of the entire freeway sections. Highway 880 was closed in one direction or completely during the work that was performed at night. James reported directly to Caltrans during this time. Safety was a vital issue with the freeway closures as well as construction alongside active traffic.

- **U.S. 101 / Bailey Ave Interchange Improvements, VTA, San Jose, CA - $23.6 M**
  James assisted the Resident Engineer in the administration of this project, which involved the construction of a new freeway interchange to connect Bailey Avenue with Route 101 in the city of San Jose and County of Santa Clara. It included entrance and exit ramps, an over-crossing structure and a bridge over Coyote Creek. He performed field inspection, checked the contractor's work for compliance with the plans and specifications, documented contractor activity in daily reports and prepared calculations and documentation of pay quantities for work performed by contractors. Coordination with various regulatory agencies was also necessary for the work involving the Coyote Creek. He was also responsible for SWPPP management. Major efforts were conducted to project endangered species on or adjacent to this project.

- **Bay Meadows Mix-Use Facility Construction, City of San Mateo Public Works- $28 M**
  James was the construction inspector for the developer- built, Bay Meadows Mixed–Use Facility as well as various other public works construction projects throughout the City of San Mateo. Reporting directly to the City's construction manager, James provided inspection, project documentation and reporting for city encroachment permit work, street resurfacing, sewer main installation, city roadways and intersection realignment, traffic signal installations, relocation of underground utilities, and permit inspection.

- **Bay Area Rapid Transit (BART) Fiber Optic System and Cell Tower Network, $30K to $4.5M**
  James was a construction inspector and civil engineer for BART Telecom Revenue Division.
  He helped design cable structure above ground and through tunnel sections, which included multiple access points for 3rd party customers at city train stations and along the ROW. The engineering and designs were tricky because the cable systems needed to weave through an electrified (64K Volts) train system that was designed to run people and trains only. This was a new fiber system that had to find a continuously protected path through the maze of existing utilities, 70 mph trains and the flow of pedestrians. James helped manage the sub-contracting crews and contracts, inspected the construction of track line fiber-optic artery systems and cell towers within the BART ROW.

- **Field Superintendent, MFSNT Communications, Adesta, CA**
  Mr. Beauchamp supervised a crew of field engineers overseeing construction crews, with regard to the design engineering; city, state and federal permitting; traffic control; construction and closeout of an 8-duct fiber-optic system through 17 Bay Area cities, stretching from San Francisco to San Jose.

- **Contracts Manager, MFSNT Communications, Adesta, CA**
  James oversaw most aspects of the project finances, schedule and monthly progress payments of sub-contractors and suppliers. Work consisted of constructing fiber-optic network loops all around the San Francisco Bay Area. James was also responsible for reporting finances and work progress directly to the owners such as: MCI, WorldCom, Level 3, Williams, BART, Sprint, and AT&T.

- **Field Engineer, Caltrans District 5, Monterey, CA**
  James monitored and inspected the seismic retrofit of three 1930's concrete arch bridges along Highway 1. He also participated in the emergency erosion control of landslides south of Lake Tahoe, California. James was responsible for all aspects of the project including contract administration, coordinating construction staking and materials testing, coordinating with utility companies and other agencies. He was responsible for document control, coordinating with various agencies, coordinating construction inspection, and providing as needed construction inspection.

- **Field Superintendent, Metropolitan Fiber Systems. Peter Kiewit Telecom Division**

James, with a small team of field engineers, engineered and surveyed a 1,000-mile fiber-optic system route for the Alyeska Pipeline Company during his pursuit of his Civil Engineering degree. He supervised multiple crews of sub-contractors for the construction of the 200-mile Southern leg of the system. Work in the Alaskan outback was arduous and included river boring, trenching, plowing, rock cutting, and cliff rock mounting of fiber optic conduits, State and Federal permitting, private and public relations, bartering of property rights, field reporting; quantities, T&M, production, accidents. James was the sole field contact and personally responsible within his sector for all construction, accidents, environmental restrictions and safety while along the pipeline.

Approved and Forwarded to the City Council

DATE: March 12, 2024

TO: Joshua McMurray, City Manager

FROM: Kevin Rohani, P.E., Public Works Director/City Engineer

SUBJECT: Adopt a Resolution Awarding a Construction Contract to R&R Pacific Construction Inc. for the construction of Fiscal Year 2023/24 Curb, Gutter & Sidewalk Repair and Replacement Project, Capital Improvement Project Number 295

Background and Analysis

The City's adopted Fiscal Year (FY) 2023/24 Capital Improvement Program (CIP) Budget designates funding for various infrastructure repair and replacement projects. This is consistent with the City of Oakley's Strategic Plan to improve the quality of the City's public infrastructure and to enhance the quality of life for our residents.

CIP No. 295 includes the repair and replacement of damaged and uplifted sidewalks or curb and gutter throughout the City of Oakley. The project is done annually to eliminate trip and fall hazards, and to provide safe streets and sidewalks for pedestrians in the community. Tree roots are a major cause of sidewalk uplifts, and this project is targeting some of the worst areas in the City where tree roots have damaged the concrete beyond any temporary repair.

Additionally, this project will work in coordination with the adopted 50-50 Concrete Repair Cost Share Program that helps the property owners in dealing with concrete curb, gutter, and sidewalk related problems, such as uplifts from tree root overgrowth. The 50-50 Concrete Repair Cost Share Program provides the City assistance in managing the repair and replacement contract, as well as sharing the cost with the property owners. This project will help in providing safe pedestrian facilities and reduce liability and claims for trip and fall accidents.

On March 5, 2024, ten (10) total bids were received for this project. Staff reviewed the bids and determined that R&R Pacific Construction, Inc. was the lowest responsible bidder for the project at a cost of $99,031.00.

Consistency with the Oakley Strategic Plan 27+

This item is consistent with the Strategic Plan 27+ Community Health and Safety goals.

Fiscal Impact

The FY 2023/24 CIP budget has allocated funding from the RMRA fund for this project, which will fully fund the project construction.

Staff Recommendation

Staff recommends that the City Council adopt the resolution approving a construction agreement with R&R Pacific Construction, Inc. for an amount not to exceed $99,031.00, and to authorize the City Manager to execute said agreement.

Attachments

1. Resolution
2. Bid Summary

RESOLUTION NO. XX-24

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF OAKLEY APPROVING AN AGREEMENT WITH R&R PACIFIC CONSTRUCTION, INC. FOR THE CONSTRUCTION OF FISCAL YEAR 2023/24 CURB, GUTTER, & SIDEWALK REPAIR AND REPLACEMENT PROJECT – CAPITAL IMPROVEMENT PROJECT NUMBER 295

WHEREAS, City Staff prepared the plans, specifications, and estimates for the construction of Capital Improvement Project (CIP) No. 295 - Curb, Gutter, & Sidewalk Repair and Replacement Project which includes curb, gutter, sidewalk repairs, grinding, and other related work; and

WHEREAS, the plans, specifications and special provisions were publicly advertised for bidding, with the bid period closing at 2:00 P.M. on Tuesday, March 5, 2024; and

WHEREAS, ten (10) bids were received prior to the close of the bidding process; and

WHEREAS, R&R Pacific Construction, Inc. submitted the lowest responsible bid for a total cost of $99,031.00 for the work; and

NOW, THEREFORE, BE IT RESOLVED, by the City Council of the City of Oakley that the Agreement with R&R Pacific Construction, Inc. for the construction of the Fiscal Year 2023/24 Curb, Gutter, & Sidewalk Repair and Replacement Project - CIP 295, for an amount not to exceed $99,031.00 is approved, and the City Manager is hereby authorized to execute said Agreement. The bid results are attached hereto as Exhibit A.

PASSED AND ADOPTED by the City Council of the City of Oakley at a meeting held on the 12th of March 2024 by the following vote:

AYES:
NOES:
ABSENT:
ABSTENTIONS:

APPROVED:

_____
Anissa Williams, Mayor

ATTEST:

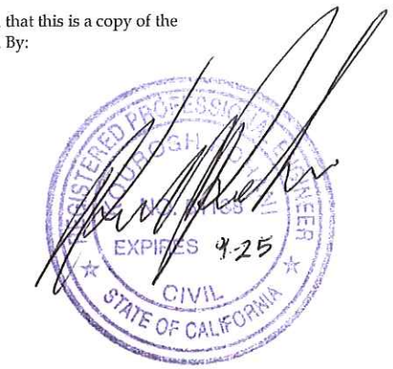
_____
Libby Vreonis, City Clerk

_____
Date

City of Oakley Public Works Department
CIP No. 295 - FY 2023/24 Curb, Gutter, & Sidewalk Repair and Reconstruction Project
Certified Bid Tabulation Bid opening: March 5, 2024 at 2:00 P.M. at the Civic Center

				Engineers Estimate		R&R Pacific Construction P.O. Box 1029 Woodland, CA. 95776		Cowan & Thompson, Inc. P.O. Box 1514 Martinez, CA 94553		FJ&I Engineering Inc. 1981 21st Street San Pablo, CA 94806		Sandstone Engineering Inc. 3140 Anderson Lane Oakley, CA 94561		MCE Corporation 4000 Industrial Way Concord, CA 94520		Swisher Cement Conc. 2620 E. 18th Street Antioch, CA 94509		Kerex Engineering 4941 Pacheco Blvd. Martinez, CA 94553		B&M Builders, Inc. 11330 Sunrise Park Drive Suite C Rancho Cordova, CA 95742		Luma Enginering Inc. 370 Myrtle Lane Oakley, CA 94561		FBD Vanguard Const. Inc. 550 Greenville Road Livermore, CA. 94550	
Item No.	*Description*	*Quantity*	*Unit*	*Unit Price*	*Item Cost*	*Unit Price*	*Item Cost*	*Unit Price*	*Item Cost*	*Unit Price*	*Item Cost*	*Unit Price*	*Item Cost*	*Unit Price*	*Item Cost*	*Unit Price*	*Item Cost*	*Unit Price*	*Item Cost*	*Unit Price*	*Item Cost*	*Unit Price*	*Item Cost*	*Unit Price*	*Item Cost*	*Unit Price*	*Item Cost*
1	R&R Sidewalk	4,374	SF	20.00	$87,480.00	19.00	83,106.00	17.64	77,157.36	21.00	91,854.00	22.00	96,228.00	21.00	91,854.00	23.50	102,789.00	34.00	148,716.00	35.00	153,090.00	38.47	168,267.78	44.00	192,456.00
2	R&R Curb and Gutter	325	LF	40.00	$13,000.00	49.00	15,925.00	70.00	22,750.00	75.00	24,375.00	85.00	27,625.00	98.50	32,012.50	70.00	22,750.00	125.00	40,625.00	110.00	35,750.00	79.79	25,931.75	143.00	46,475.00
					$100,480.00		$ 99,031.00		$ 99,907.36		$ 116,229.00		$ 123,853.00		$ 123,866.50		$ 125,539.00		$ 189,341.00		$ 188,840.00		$ 194,199.53		$ 238,931.00

This certifies that all bids were received and opened on March 5, 2024, and that this is a copy of the bid tabulation with bids corrected for errors in addition and multiplication. By:



DATE: March 12, 2024

Approved and Forwarded to the City Council

TO: Joshua McMurray, City Manager

FROM: Jeri Tejeda, Administrative Services Director
Troy Faulk, Recreation Manager

SUBJECT: Approval of the Special Event Beverage Concessions Non-Profit Selection and Vendor Selection Criteria

Background and Analysis

Each year the Recreation Division hosts special events throughout the year that are designed to bring residents and visitors to Oakley and activate our downtown area. Those events include Concerts in the Park in partnership with Foodie Crew on June 7th, August 2nd, September 6th, and October 4th, 25th Anniversary Birthday Party on May 4th, Summerfest on June 29th, Heart of Oakley on September 21st, and Oaktoberfest on October 26th.

On January 18, 2024, a Request for Proposal for Beer and Wine Concessions was released for non-profit organizations to submit their proposals. The proposal was advertised on social media including Facebook and Instagram as well as included in the Oakley eNews. All non-profits who had previously submitted a proposal in 2023 were also contacted via email. The deadline for nonprofit organizations to submit their proposals was February 14, 2024. Staff received five proposals from organizations including:

- Adventure Therapy Foundation
- Be Exceptional
- East County All Star Fundraising
- Pillars of Hope
- Rotary Club of Oakley

The applicants who were selected will be required to submit a report following the event they are selected for, and those reports will be presented to the City Council in January of 2025.

Additionally, vendors and non-profit groups are selected to table at various City events including Juneteenth, Summerfest, Heart of Oakley and Oaktoberfest. The Recreation Staff has reviewed the selection process used to select vendors and non-profits to participate in these City events with the goal of creating a more fair and transparent system for choosing these groups. This was a new concept that was

presented last year, and staff found a few areas in which we could improve the process.

Consistency with Oakley Strategic Plan 27+

The Oakley Strategic Plan 27+ highlights that community and collaborative partnerships are a primary goal. Partnering with non-government organizations, the RFP provided the City of Oakley the opportunity to foster and maintain strong relationships with these types of groups and to assist them in their community efforts. Additionally, the Strategic Plan 27+ goal of providing our residents, businesses, and visitors with an opportunity to recreate and relax which is also reflected in the goals of the events offered.

Fiscal Impact

There is no fiscal impact associated with the selection of the non-profit organizations.

Staff Recommendation

Staff recommends dividing the events in order to offer all non-profit organizations that submitted an RFP an opportunity to fundraise for their organization.

Staff reviewed the submissions and assessed them in three categories: Demonstration of experience selling beer/wine at large scale events, demonstration of the staff/volunteer capacity, and demonstration of alignment with Strategic Plan 27+. Staff also considered how each proposal best aligned to the various events.

Based on the assessment staff recommends the assignment of organizations to the events below:

25th Anniversary Birthday Party: Rotary Club of Oakley
June Concert: Be Exceptional
Summerfest: Rotary Club of Oakley
August Concert: Pillars of Hope
September Concert/Who Wants to be a Millionaire Event: Be Exceptional
October Concert: Pillars of Hope
Heart of Oakley: East County All Stars
Oaktoberfest: Adventure Therapy

Staff also recommends updating our selection process for tabling at City Events, removing subjective criteria and replacing it with measurable standards. The recommended selection tool is attached for review.

Attachments

1. Events Beverage Concession Request for Proposal
2. Adventure Therapy Foundation Proposal
3. Be Exceptional Proposal
4. East County All Star Fundraising Proposal
5. Pillars of Hope Proposal
6. Rotary Club of Oakley Proposal
7. Internal Selection Criteria - Vendors

REQUEST FOR PROPOSALS

Event Beverage Concessions Services 2024

SECTION I

GENERAL INFORMATION

Introduction

The City of Oakley (City) is soliciting proposals from qualified non-profit organizations to operate an alcoholic event beverage concession at the 25th Anniversary Birthday Party, Oakley Summer Fest, Heart of Oakley Festival, Oaktober Festival and Concerts in the Park, using a California Department of Alcoholic Beverage Control Daily Beer and Wine license (only beer and wine may be sold), which is to be secured by the Concessionaire, in the Concessionaire's name.

Background

The 25th Anniversary Birthday Party is a new event this year to commemorate our City's incorporation in 1999. The event will feature live music, food trucks, activities, raffles, and the screening of a movie from 1999. This event is scheduled for May 4, 2024.

The City of Oakley introduced the Oakley Summer Fest in 2022. This annual event is scheduled for Saturday, June 29, 2024 and will include a parade to kick off the day followed by the larger event from 11am-5pm on Main Street between Norcross Lane and Vintage Parkway that includes live entertainment, food and craft vendors, beer and wine, a children's area, cornhole and more. 7,000 attendees participate annually.

The City of Oakley began hosting the Heart of Oakley Festival in 2013 and the event has continued to grow since. The last event was held in September 2023 with an estimated attendance of over 5,000. The event includes approximately 50 retail and informational vendors, food vendors, performances, kid's activities and beer and wine sales. The 2024 Heart of Oakley Festival is scheduled for Saturday, September 21st on Main Street between Vintage Parkway and Norcross Lane.

The 2024 Oaktober Festival is scheduled for October 26th, at Oakley Civic Center Plaza. This event includes a fun fall theme schedule of events including a pie walk, pumpkin decorating, costume parade, food and craft vendors and more. Typical attendance at this event is around 1,500.

The Oakley Concerts in the Park event series consists of live bands playing from the stage in Civic Center Plaza. This event is run in conjunction with the Foodie Crew's Friday Night Bites program providing food trucks for these events. The 2024 events will take place on the following Fridays from 5pm-9pm: June 7th, August 2nd, September 6th, and October 4th. 1,500 people typically attend each event.

For Heart of Oakley the Non-Profit would be expected to provide a minimum of 5 craft beers and two wines in order to provide attendees with a beer garden experience. The beer and wine selection must be agreed upon with Recreation staff a minimum of two weeks before the event.

The City will provide a sectioned space, decorations, tables and chairs for the beer garden. This space is anticipated to be larger than the typical booth space provided at the event and will allow for people to sit at a table, enjoy the music, as well as allow for multiple areas to stand and gather with friends.

A non-profit interested in hosting this event will need to ensure they have sufficient volunteers to staff a much larger vendor space. If necessary, to provide the desired beer garden experience, multiple Non-Profit groups could choose to partner. However, this would have to be a separate agreement between the Non-Profit organizations. Only one lead Non-Profit would be selected for the event and would be listed on the California ABC license.

As this is a new type of event for the City there will be some logistics that will need to be worked out. We ask that the Non-Profit selected for this event be available to partner with the City, when needed, on ideas and set up in order to ensure a true beer garden experience for those attending. The Non-Profit selected for this event would also be required to meet with Recreation Staff in person to review the event space at least one week prior to the event.

If you would like to inquire further about this new event, please contact Alicia O'Leary at the contact below prior to the deadline to submit.

For all other events the non-profit would be expected to provide a minimum of two craft beers and two wines. The non-profit is required to serve beer and wine in cups, not cans, or bottles.

SECTION II

OBJECTIVE

The City of Oakley is requesting proposals from qualified non-profit organizations to supply beer and wine beverage concession at the above listed events.

Ideally, one or more organizations will be selected to be responsible for providing all staff, beer, wine, and any other supplies and equipment necessary for the concession operations for all 2024 event listed above. This concessions agreement is only for beer and wine no additional concessions are included.

1. The Concessionaire will be responsible for providing all staff, beer, wine, and any other supplies and equipment necessary for the concession operations for the 2024 events listed above. The City will provide a small storage area for limited non-alcoholic inventory and equipment storage at the Civic Center Snack Shack. Risk of loss for items stored shall be at Concessionaire's sole risk.

2. Concessionaire must be able to properly staff all tents simultaneously, as required by the Event Coordinator.

3. The City retains the right to serve, independent of the Concessionaire, non-alcoholic beverages (i.e. water, punch, coffee, cider & soft drinks).

4. Concessionaire will be required to sign a standard agreement and meet the City minimum insurance requirements listing the City as additionally insured.

5. The Concessionaire will be required to work in cooperation with the City of Oakley. A minimum of two pre-planning meetings are required before the event.

5. All staff or volunteers shall be required to wear clothing appropriate to the event and have some indicator of their non-profit organization affiliation such as a pin, banner, tablecloth or tent.

6. Members of your organization are not permitted to consume alcoholic beverages while volunteering/working at the event.

7. Provide a copy of the approved ABC Daily Permit, and proof of valid certified Responsible Beverage Service servers a minimum of one week in advance of the event.

8. Comply with all regulations of the California Department of Alcoholic Beverage Control.

9. Within 10 business days of the event conclusion, the selected non-profit organization must submit a written report detailing the total sales, profit and how the organization plans to use the profit made to give back to the Oakley community. These numbers will be used to provide estimates to the non-profit selected for future years. Additionally, by the end of January 2025 a summary of the information provided will be presented to the City Council by staff and organizations are encouraged to attend the meeting if available.

SECTION III

PROPOSAL FORM AND CONTENT

To speed and simplify evaluation and to assure that each receives the same orderly consideration, all submittals must follow the format described in this section. Respondents are encouraged to submit concise and clear responses to the RFP.

Deadline for Submission

Proposal submission via email is preferred. Proposals shall be submitted in PDF format and e-mailed to: oleary@ci.oakley.ca.us . Proposals must be received before 9:00 A.M., on February 14th and referenced as Event Beverage Concession Services RFP. Proposals received after the deadline will not be considered and will be disqualified. (The City of Oakley will not be responsible for any errors or omissions in the proposals or any delay in email service).

Proposal Form and Content

All pages of the proposal must be numbered consecutively. The proposal shall not exceed five (5) pages in length, NOT including appendices. The proposal must be organized in accordance with the parts outlined in this Section.

Proposals should be emailed to oleary@ci.oakley.ca.us or hand-delivered to the receptionist (please note City Hall closes at Noon):

CITY OF OAKLEY

“Event Beverage Concession Services RFP”

3231 Main Street

Oakley, California 94561

PART 1: Letter of Transmittal

Include a brief letter of transmittal signed by an authorized representative. The cover letter must include the name, address, telephone number and e-mail address of the proposing entity nonprofits proposal. In addition, include the name, title, address, telephone number and e-mail address of the main point of contact for the proposing non-profit.

PART 2: Proposal Summary

Within less than two (2) pages briefly describe your proposal for facilitating beer and wine sales at the events or indicate if you are only applying for a single event. This description should include all the relevant components of the proposal, including a summary review of your organization's qualifications, relevant experience, organizational capacity and how your organization would use the funds raised to benefit the Oakley community. Clearly outline the delivery schedule, permit application and your staffing/volunteer plan for set up and clean up for each event.

PART 3: Background and Experience

Provide relevant information that explains your organization's background, experience, and overall capacity to successfully follow through with your proposal. You may want to include specific examples of previous events or programs specifically obtaining ABC licensing and volunteer scheduling.

PART 4: References

Provide contact information for three references. Please include the contact person's name, relationship, phone, and email address.

PART 5: Additional Information

Feel free to include any other information that you may assist the City in considering your proposal. You may use this section to address those aspects you feel will further distinguish your proposal from others.

SECTION IV

GENERAL INFORMATION

RFP Point of Contact

Questions regarding the RFP should be directed VIA EMAIL ONLY to: Alicia O'Leary at oleary@ci.oakley.ca.us.

Incurred Costs

The City of Oakley is not liable for any costs incurred by the proposer in the preparation and/or presentation of the proposal.

Equal Opportunity

The City of Oakley requires all proposers to comply with equal opportunity policies. The City of Oakley's programs, services, employment opportunities, and volunteer positions and contracts are open to all

persons without regard to race, religion, color, national origin, sex, age, marital status, disability, or political affiliation.

Method of Selection

Members of City Staff will review the proposals and provide comments and recommendations to the City Council -- who will also review the submitted proposals and finalize decisions. All applicants will be notified of the date of the Council meeting.

Agreement

A contract between the City of Oakley and the selected business, group, organization, or individual will define the extent of services to be rendered.

Adventure Therapy Foundation
EIN: 61-1896557
1156 Lake Park Dr
Oakley, CA 94561
925-724-9319
Lauren@adventurefound.org

To Whom it May Concern,

Enclosed in the accompanying document are the specifics of Adventure Therapy Foundation's proposition to manage an alcoholic event beverage concession, with a preference for serving at the Oakley Summer Fest, Heart of Oakley Festival, and Oaktober Festival.

Adventure Therapy Foundation, a nonprofit based in Oakley, is dedicated to supporting cancer survivors in their emotional recovery through diverse platforms and programs. Funding is crucial to sustaining these initiatives, contributing to the enhancement of our community by alleviating burdens and assisting survivors and their families in leading more gratifying lives.

We are grateful for the chance to present this proposal and look forward to your response.

Sincerely,

Contact:
Lauren Huffmaster
Director

Created With Tiny Scanner

Proposal Summary

Since its founding in 2018, *Adventure Therapy Foundation*, a 501(c)(3) nonprofit, has created life-changing programs that aid survivors in emotional recovery from cancer. *ATF* establishes the tools to eliminate fear, isolation, and broken identity after a diagnosis. Without clarity, these "emotional side effects" will continue unnecessarily during early survivorship. Our goal is to reduce the time cancer negatively affects emotional health and limit unnecessary suffering by clarifying the emotional aspect of cancer.

The lack of understanding of the emotional response to cancer leads to confusion, shame, additional fear, and extended healing time. Creating and developing educational materials and support programs to define these typical responses will guide survivors and their loved ones to awareness and allow them to shift an often-daunting perspective.

We have spent years developing our retreats, educational philosophy, and online learning platforms. All of our programs are created to work together, and now they can do so. Our Kinship Program systematically incorporates each of our programs into monthly gatherings where we offer our tools in various modalities to produce the most significant impact possible.

Some of our programs include virtual coaching, virtual education, and community retreats. The Kinship Program is designed to combine these individual programs into a year-long all-encompassing experience for survivors and their families. The funds raised at the Oakley Summer Fest, Heart of Oakley Festival, and Oaktober Festival would enhance the quality of our retreats, helping our Kinship Program gain momentum, and strengthen the lives of those who are going through the cancer experience.

We participated in this program in 2023 and have come to understand the needs and systems of providing alcohol for local events. This year, our Board will work to establish a delivery schedule and create a volunteer plan for these community events. At the monthly events, we found a good balance of volunteers and alcohol to service the needs of the customers. We successfully served Oakley without incidence at multiple events last

Created With Tiny Scanner

year. We believe at this time we are equipped to serve at bigger events in 2024. We understand the timeline for applying for the ABC permit, registering our request with the Oakley police department and submitting this information to the City of Oakley. In addition to the permits necessary, our Marketing team will push the event out on social media, our website, and in our newsletter. Though we never had an issue finding volunteers last year, we have increased our list of volunteers significantly this year and will be prepared for each event with ease.

Background and Experience

For five, *ATF* has participated in events that benefit nonprofits. Our committed staff and dedicated volunteers have been successful in working to support the Oakley community. Our volunteer scheduling experience includes participation at farmers' markets, retreats, one-day events, wellness checks, virtual support, and oncology conferences. For three years, we have hosted an Art Walk at local wineries, which serves guests wine and food while selling art, raffle tickets, and swag. These events require more than 30 volunteers to ensure the event runs smoothly. Our Programs Director utilizes local volunteers and the families we serve to cover all scheduling needs.

As mentioned before, last year, we successfully ran the alcohol booth at multiple Concert in the Park events, which required us to obtain all the necessary licenses, permissions, and planning. Each time we carried out the responsibility without requiring additional support from the City of Oakley. Through our dedication to the events last year, we learned a lot about how to run a successful booth. We hope to apply this knowledge to engaging in larger events this year.

Created With Tiny Scanner

References

Maria Esposito

Oakley Resident who is a Co-Survivor of Cancer

James Creston

Board Member
Oakley Resident impacted by Cancer

Angela Castillo

Oakley Family Impacted by Cancer

Created With Tiny Scanner

1265 Dainty Ave Brentwood, CA 94513
Phone: (925) 978 4161
Email: Beexceptionalprograms@gmail.com
Website: Beexceptionalprograms.com

To Whom It Mat Concern:

Be Exceptional would like to enter this proposal to the City of Oakley for being the Event Beverage Concession Services RFP at some of their events during the 2024 year. I, Joseph Ogo Be Exceptional's Director/CFO, am the contact regarding this proposal and reside at 400 H St. Antioch CA, 94509, and can be contacted by phone at with any questions or concerns in regard to this proposal.

Joey Ogo

Joseph Ogo 02/08/2024

1265 Dainty Ave Brentwood, CA 94513
Phone: (925) 978 4161
Email: Beexceptionalprograms@gmail.com
Website: Beexceptionalprograms.com

This proposal is for Be Exceptional to be responsible for providing all staff, beer, wine, and any other supplies and equipment necessary for the concession operations for the event or events we are chosen for. We would appreciate consideration for 2 events. Be Exceptional will facilitate the beer and wine sales at events by first consulting with the city of Oakley in at least two preplanning meetings to figure out the appropriate amount of beer and wine to purchase, the number of booths wanted, and how many staff members need to be in attendance. We will provide a minimum of two craft beers and two wines and would serve beer and wine in cups, not cans or bottles. We will make sure we purchase and have the beer and wine on hand at least one week prior to the event. Be Exceptional will have the permits (a copy of the approved ABC Daily Permit, and proof of valid certified Responsible Beverage Service) that are required on hand 2 weeks prior to the event. Be Exceptional already works with the City of Oakley Parks and Recreation and has insurance in place. Our staff will have Be Exceptional shirts on and will follow all policies in place. We would set up and clean up for the event appropriately. We have done booths at events in the past, so we have tables, an awning, and promotional stuff for our organization. Within 10 business days of the event conclusion, Be Exceptional will submit a written report detailing the total sales and profit. Be Exceptional's goal is to use the funds that we earn to continue to provide inclusive recreational classes and social events for people of all abilities to people within the Oakley area. We are qualified to provide services at the events because of the experience we have had in coordinating several events throughout the years.

1265 Dainty Ave Brentwood, CA 94513
Phone: (925) 978 4161
Email: Beexceptionalprograms@gmail.com
Website: Beexceptionalprograms.com

Be Exceptional has been involved in many community events and is excited to use our experience with the City of Oakley to provide the beer and wine at events. We have put on many recitals throughout the years which has allowed to us learn how to handle volunteer/staff coordination, working with the event hosts, providing food and beverages to purchase during intermission, and providing an inclusive environment to all. We have worked at local wineries and other community events in the past to help provide support (pour beer and wine) to other non-profits when they had fundraisers there. Be Exceptional worked the city of Oakley to do concessions last year at a concert in the park. Be Exceptional appreciates the opportunity to work with the City of Oakley again to provide the beer and wine at some of their events.

References:

Elite Dance Studio-

NHS Skateboard Company

Special Haven

Louise Green -

Lee Charron-

David Chuey-

A PROPOSAL BY

EAST COUNTY ALL STAR FUNDRAISING

EVENT BEVERAGE CONCESSION SERVICES RFP

LETTER OF TRANSMITTAL

East County All Star Fundraising
501c
84-2010921
44 Kay Ct. Oakley CA 94561
925-915-0259
eastcountyallstarfundraising@gmail.com

January 25 2024

Please find our proposal for East County All Star Fundraising, a registered 501c entity with the state of California. Our address, email, and phone is the same for both the non profit and the main point of contact for this proposal, Anissa Williams.

Sincerely,

Anissa Williams

Anissa Williams
President, East County All Star Fundraising

ORGANIZATION SUMMARY

East County All Star Fundraising is an Oakley based non profit, dedicated to improving the life of local youth through fundraising efforts that go towards the often overwhelming expenses associated with extra curricular activities. Our membership is open to families / caregivers throughout East County, but more than half of our membership resides in Oakley. The success of our organization stems from caregiver participation, and the youth participate in many local Oakley organizations - including Oakley Youth Soccer Club, Prodigy Cheer, Happy Trails Riding Academy. East County Little League, and many more! Funds raised directly benefit the participating families, and we have also been able to sponsor foster youth, a practice we hope to continue with more funding. Our latest partnership efforts include working with Hijas del Campos to sponsor farmworker families.

SCOPE OF SERVICES

- EAST COUNTY ALL STAR FUNDRAISING (HERE IN AFTER REFRENCED TO AS ECASF) IS RESPONSIBLE FOR SERVING BEER AND WINE AT MULTIPLE VENUES THROUGHOUT THE BAY AREA INCLUDING CONCORD PAVILLION AND LEVI'S STADIUM
- ALL VOLUNTEERS HAVE BOTH A FOOD HANDLERS CARD (THROUGH SERV-SAFE) AND THEIR ALCOHOL LICENSE ISSUED BY ABC
- OUR VOLUNTEER BASE INCLUDES MORE THAN 50 ACTIVE PARTICIPANTS, SO WE HAVE EXTENSIVE EXPERIENCE WITH SCHEDULING AND MANAGING SHIFTS AT VARIOUS VENUES - WITH SUCH A LARGE GROUP, SET UP, CLEAN UP, AND SERVING WILL BE BROKEN UP INTO MULTIPLE 5-6 HOUR SHIFTS
- OUR PRESIDENT HAS RUN MANY RESTAURANTS, AND HAS EXPERIENCE WITH OBTAING TEMPORARY PERMITS, AS WELL AS CATERING SPECIAL EVENT LICENSES. ALL PERMITS WILL BE OBTAINED AT LEAST 14 DAYS BEFORE ANY EVENTS WE ARE AWARDED
- WE UTILIZE SQUARE, SO THE REPORTING IS VERY CLEAR AND EASY TO TRANMIT WITHIN 10 DAYS OF THE EVENT CLOSE
- WE HAD A VERY SUCCESFUL OPERATION AT OUR AWARDED 2023 FESTIVAL - THE HEART OF OAKLEY. WE RECIEVED NUMEROUS COMMENTS FROM GUESTS THAT WE WERE EXTREMELY EFFECIANT WITH EACH TRANSACTION, AND THEY ALL APPRECIATED THE INNOVATION OF HAVING A WINE SLUSHIE
- WE ARE GRATEFUL FOR ANY EVENTS YOU WANT US TO SERVE; WE LOVED HEART OF OAKLY AND WOULD LOVE TO HOST THE BEER GARDEN, BUT OPEN TO ANY!

REFERENCES

Our board of directors can all provide references for our organization, and we will also provide outside references.

Amber Brown, Vice President,
Crystal Jessup, Treasurer,
Krystyna Rakow, Public Relations Manager,
Monica Loza, Project Coordinator,

Contacts from Concord Pavillion:
Tracy Smiljanic, TEAM Coordinator,

Contacts from Levi's Stadium
Lisa Leong, Assistant Director of Operations,

February 12, 2024

City of Oakley
Event Beverage Concession Services RFP
3231 Main Street
Oakley, CA 94561

Dear Ms. Alicia O'Leary,

In response to the City of Oakley's invitation for nonprofit organizations to apply for the opportunity to participate in the city's festivals and events as an alcoholic beverage concessionaire, Pillars of Hope, Inc. is once again excited to submit the required proposal in anticipation of obtaining approval. Attached is Pillars' proposal summarizing the qualifications, experience, organizational capacity, use of funds raised, references, and additional comments.

Pillars is confident in the ability to carry out the responsibilities of a beer and wine concessionaire as demonstrated last year. Since its inception, Pillars has been active in planning and running fundraising events…from Black Tie Dinners to golf tournaments. Pillars offers a level of participation that brings commitment to the events with a fun-loving approach. An opportunity to serve in this position at one or more of the festivals/events in 2024 will be an incredible opportunity and a blessing for Pillars to raise funding and to introduce Pillars to those who have yet to meet the people behind the nonprofit.

This proposal was prepared on behalf of Pillars of Hope, Inc by Debra Brown, Executive Director, and Cathy Seleska, Treasurer. Contact information is noted below.

Pillars of Hope, Inc.	**Debra Brown**	**Cathy Seleska**
Oakley, CA 94561	Oakley, CA 94561	Oakley, CA 94561
Cell: Email: Website: pillarsofhope.us	Cell: Email:	Cell: Email:

Pillars of Hope thanks you for this opportunity to serve Oakley once again to raise funds for Pillars of Hope. We were very pleased with the turnout and support received from the City of Oakley and those in attendance on June 2, 2023's event. Pillars looks forward to serving again this year and we anticipate the opportunity to possibly serve at more than one event.

Sincerely,

Pillars of Hope, Inc.
Debra Brown, Executive Director
Cathy Seleska, Treasurer

EVENT BEVERAGE CONCESSION SERVICES

Part 2: Proposal Summary

Pillars of Hope, Inc. strives to make each fundraising event successful for both Pillars and for all in attendance. Impeccable detail is given to all parts of the event…from planning them to the final clean-up. Volunteers and staff step up to represent Pillars in the positive light that it deserves. Pillars' 2nd annual golf tournament held in September 2023 was a huge success which netted our nonprofit over $35,000. Pillars of Hope has a dedicated board of directors and has over 30 volunteers who play a very active role in fundraising and advancing our mission to help those exploited by human traffickers. Our Executive Director, Debra Brown, exudes determination. That determination is what Pillars brings to all events; and it will be there for Oakley too.

Pillars of Hope has had relevant experience handling alcohol at many of the fundraising events held since becoming a 501(c)(3) organization in 2011. Pillars was issued a daily ABC license annually from 2013 to 2019 for events such as crab feeds and tri-tip and prawn dinners. We also held a license for the City of Oakley's Concert in the Park event last June. There have never been any issues at any of these events. Pillars of Hope's staff and volunteers uphold excellent ethics and maturity, all while having a great time.

Regarding Pillars of Hope's organizational capacity, resources are generated through grant writing efforts and monthly, individual, corporate, and business donations. Brentwood and Oakley Rotary, as well as the Soroptimist International Organization, have contributed to Pillars of Hope's in a variety of capacities.

Pillars of Hope's business infrastructure includes two part-time staff members, six board members, two of which reside in Oakley, and ten advisory board members that include a district attorney, victim advocate, three police officers, an investigator, a therapist, a survivor, a financial advisor, and a lawyer. Pillars currently has 32 volunteers that serve in a variety of ways. Everyone in the Pillars of Hope's organization has taken training classes on the impact of human trafficking. Many have taken specialized classes such as trauma informed, de-escalation, and self-care training.

Regarding Pillars of Hope's culture and climate, the board, staff, and volunteers share in strong work ethics, adhere to policies and procedures, and possess the ability to adapt to change.

Regarding engagements and partnerships, Pillars has several Memorandums of Understanding with organizations, both locally and statewide, as well as one with a rescue organization in Atlanta, Georgia. Pillars was the proud recipient of the "Making a Difference" award in 2020, sponsored through the Contra Costa County District Attorney's office.

The funds received through the opportunity to be a concessionaire of beer and wine at Oakley's 2024 festivals are what Pillars of Hope needs to provide educational presentations and training to city personnel, the Oakley Unified School District board, teachers, and students in grades four through twelve. Pillars is proficient in knowing what human trafficking looks like and how the perpetrators behave and groom a young person to gain their trust. This is where it all begins…and this is where it needs to stop. Social media is a major channel that perpetrators use. To prevent their children from becoming victims, children and parents must learn how to recognize the behavior and signs of a perpetrator. Currently, training presentations are held at the Laurel Ridge Church in Oakley. Speakers are engaged to offer their expertise in varied subjects surrounding human trafficking. As a small city experiencing the exponential growth it has in recent years, Oakley is being subjected to the same issues that haunt larger cities. Last year Pillars of Hope helped a trafficked individual from Oakley and was able to get her returned safely to her family.

Upon your approval of Pillars of Hope as a designated concessionaire of a beer and wine booth for Oakley's 2024 festivals, Pillars will coordinate with the Hop Asylum in Brentwood for confirmation of beer and wine, as we did last year. Hop Asylum will be the supplier of the required amount of craft beers and wine and will be instrumental in gauging the required amount necessary to fulfill the agreement with the City of Oakley. Several wineries, mostly local, support Pillars and will be providers of two additional selections of wines. Pillars of Hope will have at least two volunteers who will have a valid Responsible Beverage Service Certificate at the event(s) we are chosen for. All required permits and licenses will be procured within 30 days of the event. Pillars of Hope's staffing/volunteer plans for set up and clean up for each event will be coordinated as such: the setup team will arrive two hours prior to the start of the event (in accordance with the City of Oakley's requirements); a second team will work a three to four hour shift; and the third team will work the remainder of the event, including clean up and tear down. Executive Director, Debra Brown, and Treasurer, Cathy Seleska, will always be available during the entire event with at least one of us in the booth.

Part 3: Background and Experience

Pillars of Hope, Inc. was established on September 17th, 2010, and has been a 501c3 nonprofit since April 2011. Pillars of Hope, a Bay Area non-profit organization, is based in Oakley and has been active throughout the Bay Area since 2013, providing presentations and training to educate the public about human trafficking and the tactics of exploiters who prey upon the young women and children. Since 2015, the Street Outreach Program has been reaching out to potential victims within the Contra Costa and Solano counties to let them know there is a way out of the life they are ensnared in. In 2019, Pillars of Hope started their Victim & Survivor Assistance Program helping human trafficking victims obtain financial help to flee their trafficker and get into a restorative program. The most common expenses associated with rescuing a victim are for travel, clothing, food, new burner phone, and a brief hotel stay until a program can be located for them. There are other services that are required when rescuing a victim, or assisting survivors, such as medicine, dental/medical care, removal of tattoos used by their traffickers to brand them, etc. In 2023, Pillars helped 218 individuals with financial assistance to get rescued or transported to programs. The Contra Costa and Alameda County District Attorney offices, as well as two rescue organizations and a street outreach partner, work closely with Pillars.

Pillars of Hope has held annual fundraisers since 2011 for which daily ABC licenses were required. These eight events, seven which included crab feeds and prawns and tri-tip fundraisers, were held at the Pittsburg Senior Center from 2013 through 2019. Pillars of Hope held the City of Oakley Concert in the Park event on June 2nd last year. Several other events, the Black-Tie Dinner Fundraisers at the Oakhurst Country Club in Clayton, and Pillars' first and second annual golf tournament in 2022 and 2023 held at the Lone Tree Golf & Event Center in Antioch, were held at facilities where alcohol was served under their licenses. All events were without any incidents.

Pillars of Hope's staff and volunteers are committed to bringing strong work ethics and morally upstanding behavior to the City of Oakley's festivals and events in 2024.

Pillars of Hope was very pleased with the turnout and support received from the City of Oakley and those in attendance on June 2nd's event. Pillars looks forward to serving again this year and we anticipate the opportunity to serve at two events.

Part 4: References:

Mary Knox, Contra Costa County Deputy District Attorney; Pillars of Hope's Advisory Board Member

Phone: Email:

Chuck Blazer, Human Trafficking Investigator, Contra Costa County District Attorney's office, Pillars of Hope's Advisory Board Member

Phone: Email:

Louise Reeves, Inspector II - Alameda County District Attorney's office; Pillars of Hope's Advisory Board Member

Phone: Email:

Part 5: Additional Information:

Pillars of Hope is working to increase awareness about human trafficking in Contra Costa County and in its community. Pillars is excited to be a prominent fixture at the Oakley festivals. Oakley's residents will be able to meet the people behind Pillars and get a greater understanding of what it is all about. Pillars' goal is to provide a rescue facility in Contra Costa County providing restoration and healing to human-trafficking victims, and with the grace of God this will happen.

Event Beverage Concession Services RFP

Part 1: Letter of Transmittal

The Rotary Club of Oakley submits this Letter of Transmittal for the Event Beverage Concession Services RFP. As a 501c3 Non-Profit organization (Appendix A), we meet weekly every Thursday at 7:30 am at Black Bear Diner. Our mailing address is listed below. Our main point of contact is Vera Martinez, Club Secretary. Her contact information is listed below as well.

Rotary Club of Oakley
P.O. Box 435
Oakley, CA 94561
(925) 639-9194

Vera Martinez

Brentwood, CA 94513

Vera Martinez

Part 2: Proposal Summary

The Rotary Club of Oakley is pleased to submit this "Event Beverage Concession Service" proposal in order to support the alcohol event beverage concession at one or all of the events planned by the City of Oakley, including the 25th Anniversary Birthday Party, Oakley Summer Fest, Heart of Oakley Festival, Oaktober Festival and Concerts in the Park, using a California Department of Alcoholic Beverage Control Daily Beer and Wine license. As a non-profit organization, The Rotary Club of Oakley embraces this opportunity to actively engage with our community and generate funds for impactful community service projects.

Qualifications

Rotary is primarily a leadership organization and encourages members to come forward with hands-on community service project proposals that will enhance the quality of life in the Oakley community. The opportunity to lead each event will rotate among our membership. The majority of Rotary members are small business owners or come from management level public sector positions with strong administrative skills. These qualities contribute to the Club having been voted the top non-profit in Oakley for the readers of the Oakley Press newspaper for each of the last 4 years.

Organizational Capacity

Oakley Rotary currently has 28 members and continues to add new members. We also enjoy a strong relationship with our sponsoring Rotary Club in Brentwood. It is common for members from both clubs to volunteer to staff each other's events be they fundraisers or community service projects. Also, Rotary is a "family-friendly" service club and it is common for family members to accompany Rotarians at its community service projects and/or fundraisers.

Experience

In the nearly 5 years the club has existed (having chartered on May 29, 2019) Oakley Rotarians have completed over 130 community service projects including multiple fundraisers. From painting 35' wide maps of the United States on Oakley elementary school playgrounds to partnering with the Friends of Oakley to provide food to over 200 families and toys to over 500 children at Christmas, our club works tirelessly to support the Oakley community. Each project required varying amounts of planning including face-to-face and online meetings, signup sheets, budgeting, marketing, permitting and post-event critiques. Details for a few major projects are found in Part 3: Background and Experience, below.

Revenue from the beverage concession(s) will allow us to continue to fund:

- The distribution of 600+ personal dictionaries to all Oakley Union Elementary School District (OUESD) and Knighten Elementary School District 3rd graders

- Four (4) $1,000 scholarships to Freedom High School graduating seniors.
- Providing minor repair and home maintenance to our Oakley senior citizens through our Rotary Home Team.
- The collection and disposal of trash from a 1+ mile stretch of Main Street (Adopt-A-Street).
- The packaging of food for school children in developing countries (Kids Against Hunger).
- Sponsoring two Freedom HS students at Camp Royal, a week-long leadership summer camp and/or sponsoring two Freedom High School students to Camp Venture, an entrepreneur summer camp.
- Repainting scale maps of the USA on school grounds of all elementary schools in Oakley (initially painted by Brentwood Rotary several years ago) and painting new USA maps on elementary schools needing new maps (Summer Lake and Oakley Elementary).
- Purchase, build and fly kite kits for children participating in the City of Oakley Science Week "Take Flight, Build a Kite" event.
- Continuing the financial and staffing support for the Oakley Christmas Basket Program.
- Building and Installing ten (10) Little Free Libraries throughout the community in partnership with the Contra Costa County Office of Education, Oakley Union Elementary School District, and The City of Oakley.

Regarding **delivery schedule** and staffing for beer and wine concession(s); thirty days prior to each event, we will obtain the needed Oakley Police Department Permit and California Department of Alcoholic Beverage Control Daily Beer and Wine license and the needed insurance policy. We will obtain all beer and wine and essential equipment such as beer and wine cups the week of the event. Beer will be obtained the morning of the event, along with appropriate equipment such as one or more jockey boxes or a mobile beer trailer.

Rotarians will work 3 – 4-hour shifts including a set-up and clean-up schedule. We already have a 10' x 10' branded canopy, plus folding tables, chairs, and Rotary-branded banners, that will be required for our booth and the volunteers to set up and clean up for each event as needed.

Part 3: Background and Experience

In 2022 the Oakley Rotary Club provided beer and wine concession services for seven (7) City of Oakley events and every Friday Night Bites. In 2023, we were awarded Summerfest and were asked to help with two Friday Night Bites.

In 2022, using funds from the payment of annual dues from club members, we purchased a commercial grade beer dispensing unit referred to as a "jockey' box plus equipment and supplies to provide concession services including two branded 10' x 10' canopies, folding tables and chairs, cash box, Square credit card processing appliances, rubber floor mats, 100 qt ice

chest, outdoor lighting strands, portable power supply, multiple 44 qt. keg tubs, wooden tokens, colorful table covers, wrist bands, combination hand truck and wheeled cart. All equipment is stored in a donated local storage facility. We are already looking into the steps needed to acquire or rent a multiple beer tap system if we are fortunate to be offered the Heart of Oakley event.

For each of our events, we are fortunate to have roughly a dozen Oakley Rotarians, including family members, sign up to staff each event in 3–4-hour time blocks including set up and take down. Club members, wearing Rotary-branded apparel, enjoy the fellowship and sense of service in providing an important element to each of the City events. Members take turns pouring beer and wine, chatting with customers, selling tokens, or changing out spent beer kegs and wine bottles. Oakley Rotary is also fortunate to have the owner of Oakley's Grocery Outlet as a member of the Club. Matt Amaro and his wife Karen generously allow the club to use their walk-in refrigerator to store beer kegs, a critical need when going through 6-8 kegs of beer on a blistering hot Oakley afternoon.

For each event we apply for and obtain a California Department of Alcoholic Beverage Control Daily Beer and Wine license as well as a permit from the Oakley Police Department. The U.S. Rotary Club and District Liability Insurance Program ("Program") provides general liability insurance coverage to all active U.S. Rotary clubs and districts and Rotaract clubs for their liability arising out of bodily injury and property damage to a third party, subject to policy terms and conditions. An overview of the general liability insurance provided by the Program as detailed in Appendix B.

Additionally, Oakley Rotary has three (3) members who have successfully completed the California Responsible Beverage Service Training Course. One of these three members is always on premises during beer and wine concession services.

We have also partnered with Freedom High School Boosters to help run the concession stand at home games where we sell tri-tip sandwiches, hot dogs, nachos, snacks, and beverages. Rotarians are also part of the set-up and clean-up for each of these events. With this event, Rotarians sign up for two-hour shifts but in the end, most Rotarians stay for the entire time because they enjoy the interaction with the parents and high school students. We normally use sign-up sheets to let Rotarians pick the time that will work best for their schedule and ensure a commitment on their part. Oakley Rotarians love to engage with our community, and we have no issues getting volunteers to work at an event.

Part 4: References

Greg Robinson
Publisher – Brentwood Press Publications
Member of the Rotary Club of Brentwood

Joseph Nardone
Brentwood Craft Beer and Cider, Owner
Member of the Rotary Club of Brentwood

Derrick Augustine
Black Bear Diner Oakley, Co-Owner

Part 5: Additional Information

Rotary is a global network of 1.4 million neighbors, friends, leaders, and problem-solvers who see a world where people unite and take action to create lasting change – across the globe, in our communities, and in ourselves.

The mission of the Rotary Club of Oakley is to provide service to others through our fellowship of business, professional, and community leaders. We support organizations, projects and other initiatives that promote education and community service and that exemplify the object of Rotary International - to encourage and foster the ideal of service as a basis of worthy enterprise.

OAKLEY
CALIFORNIA

Vendor Selection Criteria				
	3	2	1	0
Organization	Submits application complete, on time, has a website and has at least 500 followers on one of Facebook, Instagram or X.	Submits application complete and on time plus has a website and provides a description of items for sale.	Submits application complete and on time and includes description of items for sale.	Submits application complete and on time.
Past Performance	Have served as a vendor w/o issues or have never been a vendor previously.	N/A	N/A	Have served as a vendor in the past but had issues with timelines, customer service, following instructions or safety protocols for an event, or no-showed for event after being selected.
Community	Is an Oakley based business with an Oakley mailing address.	Business based outside of Oakley City limits but with a mailing address within a 20-mile radius of Oakley.	Business with mailing address in Contra Costa County.	A business not based in Oakley or Contra Costa County.
Business License	Business possesses a current and up to date Oakley Business License.			Business does not possess a current and up to date Oakley Business License.
Craftsmanship	Items handmade by vendor, original pieces of artistry.	Items that are mass produced but made by vendor or Oakley based service business.	Items that are mass produced, purchased and resold by vendor, or non-Oakley based service businesses.	N/A

Non-Profit Selection Criteria				
	3	2	1	0
Community Partner Status	Written agreement for non-profit grant.	Other agreement for partnership such as joint use.	City does not have written agreement.	City has previously terminated partnership.
Community	Is an Oakley based non-profit with an Oakley mailing address.	Non-profit based outside of Oakley but with a mailing address within a 20-mile radius of Oakley	Non-profit with mailing address in Contra Costa County.	A non-profit not based in Oakley or Contra Costa County.
Organization	Submits application complete and on time, has a website and has at least 100 followers on one of Facebook, Instagram or X.	Submits application complete and on time plus has a website.	Submits application complete and on time.	N/A
Participant Interaction	Booth includes interactive activity that community can take part in.	Booth includes a free item handout.	Booth includes informational handout.	Nothing is available for for participants to do or take home.

DATE: March 12, 2024

Approved and Forwarded to the City Council

TO: Joshua McMurray, City Manager

FROM: Ken Strelo, Planning Manager

SUBJECT: The Village at 2092 Oakley Road Subdivision 9634 (GPA 01-22, RZ 03-22, FDP 02-22, TM 04-22, DR 07-22) – Request for approval of a General Plan Amendment, Rezone, Final Development Plan, Tentative Map, and Design Review for a 9.99 acre, 83 unit single family residential subdivision project. APN 037-110-031.

Summary

This is an application by Owen Poole and Dan Cosgrove ("Applicant") requesting approval of 1) a General Plan Amendment (GPA 01-22) to redesignate 9.99 acres from Commercial (CO) to Residential Medium (RM); 2) a Rezone (RZ 03-22) of 9.99 acres from C (General Commercial) District to P-1 (Planned Unit Development) District; 3) a Final Development Plan (FDP 02-22) for development of the 9.99 acres site; 4) a Tentative Map (TM 04-22) to subdivide 9.99 acres into 83 single family residential lots, additional on-site parking, a toddler park, community gathering areas, and other improvements; and 5) a Design Review (DR 07-22) for floor plans and architecture of three home types with three elevations and three color schemes, and landscaping and other improvements throughout the project ("Project"). This project includes compliance with the California Environmental Quality Act ("CEQA") and adoption of a Mitigated Negative Declaration is proposed. The site is located at 2092 Oakley Road and is zoned C (General Commercial) District. APN 037-110-031.

Background

GENERAL PLAN

Existing Land Use Designation

- Commercial ("CO") – The CO designation allows for a broad range of commercial uses typically found adjacent to residential neighborhoods, downtowns, and freeways.

Proposed Land Use Designation

- Residential Medium ("RM") – The RM designation provides for more affordable, small lot development and to increase the availability of rental or entry-level housing.

ZONING

Current Zoning District

- C (General Commercial) District – The purpose of the C District is to create and maintain major commercial centers accommodating a broad range of commercial uses (e.g., office, retail, and personal services) of community-wide or regional significance typically found adjacent to or along major travel corridors, such as Main Street, O'Hara Avenue, Laurel Avenue and Empire Avenue.

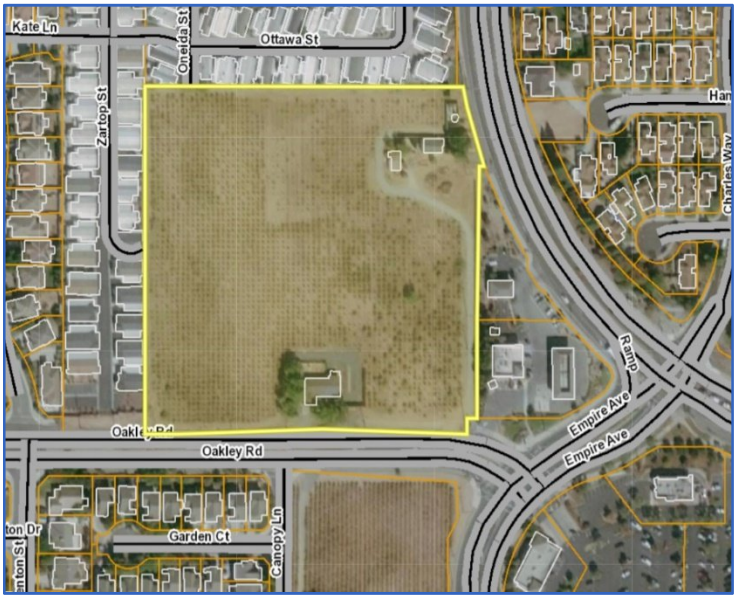
Proposed Zoning District

- P-1 (Planned Unit Development) District – The purpose of the P-1 District is to allow diversification in the relationship of various uses, buildings, structures, lot sizes and open spaces, ensure compatibility with surrounding land uses, and to ensure substantial compliance with the General Plan and the intent of the Municipal Code in requiring adequate standards necessary to satisfy the requirements of the public health, safety and general welfare.

SITE CONDITIONS AND SURROUNDING LAND USES

The subject property is a rectangular shaped site with an approximately 625-foot frontage along Oakley Road, and an approximately 120-foot frontage along Main Street in the northeast corner (See Figure 1. Aerial of Project Site).

Figure 1. Aerial of Project Site



The property has two existing single-family residences: one along Oakley Road, and another near the existing wireless communication facility.

There is also an existing mobile home community known as the Eagle City Mobile Home Park located to the north and west of the site. These parcels are designated Residential Mobile Home ("RMH") within Oakley's General Plan. The parcels to the southwest contain existing single-family residences and are designated as Residential Medium ("RM"). Directly to the east of the site are the Valvoline Instant Oil Change service station and the 7-11 gas station.

PRELIMINARY GENERAL PLAN AMENDMENT WORK SESSION

On March 22, 2022, the City Council held a Preliminary General Plan Amendment Work Session (Planning Application PA 0-21) to discuss the merits of this potential project. The applicant presented three separate concepts for the site to help visualize how a project under the Residential Medium ("RM") designation may look. After receiving Staff's Report and comments from the applicant, the City Council opened the Work Session up for public comments and followed with their own questions and comments to the Applicant. Feedback from the City Council ranged from questions on the commercial viability of the site to potential amenities in a future project. An excerpt from the adopted minutes is included as an attachment to this Staff Report.

PLANNING COMMISSION PUBLIC HEARING (FEBRUARY 6, 2024)

The City of Oakley Planning Commission held a public hearing on the proposed project at a regular scheduled meeting on February 6, 2024. During that meeting, the role of the Planning Commission was to receive the presentation and testimony by the applicant and public, deliberate, and eventually render a decision on a recommendation to the City Council on the environmental findings and whether to approve, approve with conditions, or deny the project, including any recommended modifications to the project. No public comments were received on the project. After deliberations, the Planning Commission unanimously adopted Resolution No. 2-24 recommending the City Council make findings and adopt the Mitigated Negative Declaration, Ordinance, and Resolution approving the project, as conditioned. A copy of the adopted meeting minutes and Planning Commission Resolution No. 2-24 are attached to this Staff Report.

Planning Commission Resolution No. 2-24 included several conditions of approval that required modification to the project and associated plans prior to presentation to the City Council. Some of those modifications included: clarifying development standards on the Final Development Plan; including an 8-foot tall decorative, split-face CMU between the project and commercial development to the east of the project; inclusion of regulations or prohibitions of accessory structures on the Final Development Plan; and revisions to home architecture to include false shutters as appropriate and a different garage door design for each architectural type.

Project Description

The proposed project would include amending the General Plan Land Use Designation of an underutilized commercial site currently occupied by two homes and a vineyard to a fully developed single-family residential subdivision operated by a homeowner's association. Other related entitlements associated with this application include a Rezone, Final Development Plan, Tentative Map, and Design

Review. All homes are proposed as two-story structures with front porches loaded onto landscaped pedestrian pathways and rear garages loaded onto the neighborhood's streets. Fourteen of the homes are proposed to have their porches front onto Oakley Road. Those home's garages would also be at the rear of the homes and accessed from the interior street. Each of the proposed entitlements is further described in the following subsections:

GENERAL PLAN AMENDMENT (GPA 01-22)

The project includes a request to amend the General Plan Land Use Designation on the 9.99-acre site from Commercial ("CO") to Residential Medium ("RM"). The RM designation allows for single family and multi-family residential construction at a density between 5.5 and 9.6 dwelling units per gross acre. The project is proposed at 8.3 dwelling units per gross acre. Approval of this General Plan Amendment allows the other associated entitlements to be consistent with the underlying General Plan Land Use Designation. The requested General Plan Amendment and associated project entitlements may be simultaneously analyzed and considered for approval as one project application.

REZONE (RZ 03-22)

The project application includes a request for approval of a Rezone from C (General Commercial) District to P-1 (Planned Unit Development) District that is tied to the proposed Final Development Plan and Tentative Map. The proposed P-1 District would allow for the unique project design that includes private, HOA-maintained road, rear garages, and pedestrian oriented fronts to the homes. A P-1 District has no impact on the allowable density of the underlying General Plan Land Use Designation. Table 1 provides a summary of the P-1 District's proposed Development Regulations.

Table 1. P-1 District's Proposed Development Regulations

	Min. Lot Size (sf.)	Front Yard Setback (ft.)	Side Yard Setback (ft.)	Corner Side Yard Setback (ft.) per Plan	Garage/Rear Yard Setback (ft.)
Project's P-1 District	2,920	9	4	7 (entry way) 4 (parking areas) 13 (interior roads)	5

FINAL DEVELOPMENT PLAN (FDP 02-22)

A Final Development Plan ("FDP") is a component of a P-1 District. The applicant is choosing to combine the FDP application with the Rezone application, which is allowed per the "Planned Unit Development (P-1)" section of the Oakley Municipal Code (Section 9.1.1002). The FDP includes the information provided on the Vesting Tentative Map and its related plans, as well as other information such as details on housing or elevations and heights of non-residential buildings. When FDPs are processed after a P-1 District

is formed, the P-1 District will usually include a Preliminary Development Plan; however, an applicant may submit a FDP with a P-1 District rezone application so that it may be considered in conjunction with the rest of the project entitlements, such as what has occurred with this application. The proposed FDP will approve the general layout design, number of lots, types of residential structures, etc. Any requested change to the approved FDP would be reviewed by the Planning Commission/City Council where that body would determine whether the change is substantial enough to warrant a public hearing in order to further review the request.

TENTATIVE MAP (TM 04-22)

The proposed project would result in the subdivision of approximately 9.99 acres into a new single-family residential subdivision of 83 lots, including additional on-site parking, a toddler park, and community gathering areas. Other improvements will include frontage dedication and improvements along Oakley Road, internal private street network, pedestrian access to the front porches of the interior lots, and stormwater detention/bioretention areas. The development will be managed and maintained by a homeowner's association; however, due to the proximity to Oakley Road and Empire Avenue intersection, it will not include vehicle gates at the entry. As proposed, the gross density (includes all area before right of way dedication, parks, landscaping, etc.) is 8.3 dwelling units per gross acre (du/ga). Residential lot sizes ranging between 2,920 and 3,790 square feet (sf), and an average residential lot size of 2,986 sf. Most lots have a 40-foot wide frontage.

Access, Circulation and Parking

Access to the neighborhood streets would by a main entrance off of Oakley Road (See Figure 2. Rendering of Neighborhood Entrance). A secondary, 21-foot wide emergency vehicle access ("EVA") will connect to Main Street in the northwest corner of the project. The EVA would be blocked to vehicular traffic by removable bollards; however, it will be open to pedestrians and connect direct to Main Street and connect indirectly to Main Street further to the north via an ADA accessible pedestrian pathway. The internal street network is laid out in a grid pattern. A total of 120 on-street parking spaces are proposed as 90-degree spaces along the two east/west-oriented streets, and the north/south oriented street adjacent to the commercial properties to the east. Parallel parking along all internal streets would be prohibited by the HOA. All internal streets provide access to the two-car garages located at the rear of the homes. Off-street parking is limited to garages as there is not sufficient private driveway length to accommodate vehicle parking.

Figure 2. Rendering of Neighborhood Entrance

Oakley Road/Main Street Dedication and Improvements

The project is conditioned to dedicate approximately 20 additional feet of right of way along the Oakley Road property line for a total right of way half-width of 55 feet. Improvements within that area would include additional street pavement, new curb and gutter, 6.5 feet of new landscaping, and 6.5 feet of sidewalk. The back of sidewalk would align with the future front property lines of the 14 lots that will front Oakley Road. Additional right of way is not required to be dedicated along Main Street, but the project is conditioned to install new curb and gutter, 6.5 feet of landscaping, and 4 feet of sidewalk. The applicant would also improve the Oakley Road center median to its full width, some of which may be available for fee credits. Due to the proximity to the Oakley Road/Empire Avenue intersection, the project entry will be right in/right out only.

Proposed Landscape Plans

The proposed landscape plans are included as Sheets L-1.1 through L-12. The information on those plans provides an Illustrative Overall Plan that shows all proposed tree locations and landscaped areas overlaid onto an aerial of the site and surrounding properties, and a Preliminary Landscape Plan that calls out different areas on the site plan and acts as a key for the other included details. Other sheets provide Wall and Fence Plan and Details, Typical House Cluster Enlargement, Open Space Enlargement, Parking Area Concept, Project Entry Enlargement, the Plant Palette, Site Amenities such as the playground furniture and equipment and open space structures, and construction and irrigation details.

Figure 3. Low Picket Fence Along Oakley Road

Fencing throughout the site will consist of 6-foot tall board on board wood fencing. Exterior property lines shared with the mobile home park will be completely solid while fencing protecting private side yards of the lots will have 1-foot of lattice at the top. Wooden entry gates to the private yards will match the fencing, including the lattice top. The 14 lots that front Oakley Road will have a low picket fence at the back of sidewalk (See Figure 3. Low Picket Fence Along Oakley Road). There is an existing slatted chain link fence between a portion of the existing commercial businesses to the east and the project site. The remaining portion of that boundary has no fencing. The proposed plans include installation of an 8-foot tall decorative, split-face CMU wall between the existing commercial properties to the east and the proposed development, as well as between Main Street and the proposed development. The exact location of this wall between the adjacent commercial properties and development may need to be coordinated with the adjacent land owners to ensure installation of the wall does not result in unseen areas that may attract trash or other public nuisances. Final location will be subject to Staff approval.

One component related to the site landscaping is the Arborist Report that identifies all existing trees on site and discloses if any are classified as “Protected Trees” pursuant to the City’s Heritage and Protected Trees ordinance (Oakley Municipal Code Section 9.1.1120). The project’s arborist report was prepared by Atlas Tree Service and is dated September 15, 2022. In summary, the report identified 16 living trees on the property, none of which classified as “Protected Trees;” however, there are two non-native pine trees located near the border of the site with Main Street. The project applicant has shown these two trees as remaining as part of the project design.

DESIGN REVIEW (DR 07-22)

As part of the Design Review application, the applicant is proposing house floor plans, architecture, color and material schemes, landscaping plans (including conceptual street tree layout and park equipment), and fence plans. Since the landscaping was covered in the Tentative Map project description, this section will focus on the homes. There are three different floor plans ranging from 1,848 sf. to 2,236 sf. of livable area. All plans are two story homes with two-car garages. Table 2 provides a summary of the proposed floor plans.

Table 2. Summary of Proposed Floor Plans

	Livable Area SF	1st Story / 2nd Story SF	Bedrooms	Bathrooms	Garage SF/cars
Plan 1	1,848	892 / 956	4 bedrooms	3	429 / 2
Plan 2	2,083	1,006 / 1,077	4 bedrooms	3	441 / 2
Plan 3	2,236	1,095 / 1,141	5 bedrooms or 4 w/ opt. loft	3	420 / 2

In addition to the three floor plans are three architectural styles, referred to as Spanish, Farmhouse, and Bungalow. Each of the three architectural styles has three color and material themes tied specifically to that style. Figure 4 shows the conceptual streetscape at the project entry.

Figure 4. Conceptual Streetscape at the Project Entry

Environmental Review

CALIFORNIA ENVIRONMENTAL QUALITY ACT COMPLIANCE

An Initial Study ("IS") and Mitigated Negative Declaration ("MND") have been prepared for this project pursuant to the California Environmental Quality Act ("CEQA"). Raney Planning and Management conducted the CEQA analysis survey on behalf of the City of Oakley. The Notice of Intent ("NOI") to Adopt an MND and IS was circulated for public review and comment from November 16, 2023 to December 18, 2023. It was filed with the County Clerk and Governor's Office of Planning and Research ("OPR"), distributed to over 60 public agencies and parties requesting such notice, and posted in the same manner as a Notice of Public hearing, which is at locations throughout the City and at the project site. The NOI provided a summary of the project as well as methods to access the IS/MND for review and comment. No comments were received by the City within the commenting period for the NOI, nor were any comment letters received after the commenting period for the NOI.

Analysis in the IS found eight (8) of the 21 impact categories require mitigation to reduce potential impacts to a less than significant level. All other 13 impact categories

were found to have either no impacts or less than significant impacts. A summary of the mitigation measures can be found in the Mitigation Monitoring Program, included as Exhibit "A" to the Proposed Resolution attached to this Staff Report.

Since the Planning Commission is making recommendations to the City Council on the entitlements associated with this application, they will also make a recommendation for adoption of the MND to the City Council. Recommendation for adoption of the MND is included in the proposed resolution for recommendation for approval of the other entitlements associated with the project. The NOI and IS/MND are included as attachments to this Staff Report.

HABITAT CONSERVATION PLAN/NATURAL COMMUNITY CONSERVATION PLAN

This project is subject to the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan ("HCP/NCCP" or "HCP Plan"). Projects that are subject to the HCP Plan are required to submit a Planning Survey Report ("PSR") as part of the project application. The contents of the PSR help guide the project through compliance with both the California and Federal Endangered Species Act by assuming presence of certain plant and animal species and requiring additional surveys to be done prior to any ground disturbance. In addition, whether species are found or not, the project must pay development impact fees for each acre, or fraction thereof, of disturbed land not already considered "urban" under the HCP Plan. Those development impact fees are used to help create, install, and maintain habitat outside of the Urban Limit Line, as well as administer the HCP Plan. The project would contribute $198,520.38 to the HCP/NCCP program under the impact fees current as of the date of this staff report.

Analysis

GENERAL PLAN AMENDMENT

Requests for amendments to the underlying General Plan land use designation on a property should be considered with respect to surrounding uses and their respective land use designations. The 9.99-acre project site is bordered on the west and north by an existing residential mobile home park to the south by Oakley Road with existing residential uses and a vacant Commercially designated site beyond, and to the east by a gas station with convenience store and drive-through oil change facility. Commercial adjacent to residential is common and in most cases a commercially designated area will eventually border a residentially designated area. With proper design the two land uses can co-exist adjacent to each other.

Amending the General Plan Land Use designation to Residential Medium ("RM") would make the property more consistent with surrounding residential uses, but less consistent with the adjacent commercial uses. However, since this property is not

located on a major arterial roadway, the amendment will allow for additional infill housing that will be located near public transit and existing commercial uses. The project design and conditions of approval will minimize the potential issues that could arise with residential and commercial adjacent to teach other.

Staff recommends City Council approval of the proposed General Plan Amendment.

REZONE/FINAL DEVELOPMENT PLAN

When rendering a decision on approval of a Rezone to P-1 District and approval of a Final Development Plan, the City Council shall be satisfied that the following are true (summarized from OMC section 9.1.1002):

- The applicant intends to start construction within two years from the effective date of the zoning change;
- The development is consistent with the General Plan;
- If residential, it has sustained desirability and stability, and is in harmony with the character of surrounding neighborhoods; and
- The development of a harmonious, integrated plan justifies exceptions from the normal application of the OMC.

The Applicant has stated they are unsure if they will function as developer or sell the property or rights to develop the property; however, construction within two years is reasonable with either option, depending on market conditions. The density and type of development is consistent with the General Plan, and the project integrates pedestrian connectivity to Main Street and nearby commercial developments. Vehicular transportation will have almost immediate access to major arterials such as Empire Avenue and Main Street. The type of development is expected to be desirable in that it includes a variety of homes sizes on smaller lots with an HOA which can appeal to those less interested in large private yards that require maintenance and that may value nearby access to public transportation and walkable amenities. The other HOA amenities such as the park and public gathering areas are additional attractions for the project. The development will be a harmonious and integrated plan that includes exceptions from the normal application of the Oakley Municipal Code due to the number and size of amenities usually found in larger subdivisions, such as a park, public gathering areas, and pedestrian-only entries to front porches. The P-1 District is justified to allow for project-specific development regulations in order to design a feasible project within the allowable range of the General Plan Land Use Designation of RM.

Staff recommends City Council approval of the proposed Rezone and Final Development Plan.

TENTATIVE MAP

The Tentative Map ("TM") has been reviewed against all applicable codes including the Subdivision Map Act, General Plan, and the Zoning Ordinance. The TM's gross density (approximately 8.3 du/ga) falls within the gross density range of the Residential Medium (RM) General Plan Land Use Designation of 5.5-9.6 du/ga. The TM is tied to a P-1 District, which has proposed project-specific development regulations, such as required yard setbacks and minimum lot sizes.

The site is physically suitable for the project in that: it is accessible; not physically constrained other than by the reduction in net developable acres due to frontage right of way dedication, onsite stormwater detention and treatment, in-tract park, and in-tract public gathering areas; is similar to surrounding residentially developed projects; and it is also able to accommodate the proposed density of development in a manner consistent with the underlying land use designation of RM. The subdivision is not expected to result in any serious public health problems. Public improvements are proposed and conditioned to occur as a result of the subdivision, which is a benefit to the public and surrounding residents and property owners of the vicinity. One such improvement will be the dedication and frontage improvements along Oakley Road, which currently lacks any sort of curb, gutter, or sidewalk for pedestrian or bicycle safety.

Staff recommends City Council approval of the proposed Tentative Map.

DESIGN REVIEW

Analysis for Design Review refers to the Standards for Review as laid out in OMC section 9.1.1604(f), which focuses on site planning, architecture, landscaping and site elements, and streetscapes. With these standards in mind, the proposed plans were analyzed for consistency with the adopted City of Oakley Residential Guidelines ("Guidelines").

Neighborhood Layout and Design

The project has been designed so that all streets will function as residential streets that provide access to the rear garages for each home. This is a unique and new design for development in Oakley and will add to the product mix available to first-time homebuyers and those looking to move into a newer or larger home that does not require as much outdoor space maintenance while still including outdoor spaces such as the proposed park and public gathering areas. Also, the front doors will be accessible by pedestrian walkways that run through landscaped corridors. The nearby public transportation on Main Street and commercial shopping center nearly adjacent to

the project or within one-half mile will provide additional amenities to residents without the need to drive to the location.

Residential Siting and Lot Design

The applicant has designed the homes so that nearly every lot has the same setback to the respective garage and porch area. This is typically not ideal when homes are plotted on public streets and include larger yard spaces; however, this is a unique project given the attention to pedestrian paseos running along the front of the homes. Figure 5 shows the illustration of the view from one of the paseos to the entry of the pedestrian pathway connections to the front of the homes.

Figure 5. Paseo and Pedestrian Pathway

Building mass is an element of lot siting and design and can affect the aesthetics of the overall neighborhood. For the proposed project, changes in roof materials and design among the same floor plan assist in giving the overall neighborhood more visual variety. Some changes are to the main roof line, while others focus on the projecting elements such as porches.

Two common Oakley Design Guidelines look for new single family residential to achieve a minimum of 20% single-story homes and that at least 50% of all corner lots be single-story homes, and another is to maintain at least a 15-foot setback between adjacent second story elements. Often with P-1 District developments the lot sizes are reduced in both size and width which leads to architects needing to design a two-story home in order to achieve the desirable square footage of the market in a manner that meets the developer's criteria as well. A single-story home is more feasible when lots are closer to 5,000 square feet or more, leaving room for the square footage of the home to take up a larger footprint. For the density and lot size of this project, single-story homes are not feasible.

Architectural Character

The architectural character and design of the proposed homes meets several of the design guidelines. There is variation in materials between architectural styles, such as roofing, veneer, and siding. The three color schemes for each architectural style complement each other while allowing for uniqueness to any given home with the eyesight of another. In addition to colors and materials, each architectural style is tied to a specific garage door and exterior lighting design.

The Planning Commission required specific architectural modifications for better implementation of the design guidelines as summarized below. The current plans include all of these changes.

- Exterior lighting specific to each architectural type and/or theme lighting for pedestrian paseo areas to be shown on the proposed elevations;
- Integration of false shutters on the front and rear elevations as feasible and in tune with the respective architectural styles;
- The use of different garage door designs for each architectural style including integration of garage windows, if feasible.

Staff recommends City Council approval of the proposed Design Review.

Findings

Draft findings can be found in the proposed resolution.

Consistency with the Oakley Strategic Plan 27+

Approval of this application would be consistent with the goals in the section of the Oakley Strategic Plan 27+ entitled, “Community and Economic Development Goal”. Reviewing applications for compliance with Oakley’s development standards ensures strategic and thoughtful growth.

Fiscal Impact

The approval of these entitlements will not impact the General Fund. This is a developer funded account. All Staff time and City of Oakley generated materials are charged to the account and paid for by the developer.

Staff Recommendation

Staff recommends the City Council adopt a Mitigated Negative Declaration and approve the project titled, “The Village at 2092 Oakley Road Subdivision 9634 (GPA 01-22, RZ 03-22, FDP 02-22, TM 04-22, DR 07-22)” as conditioned.

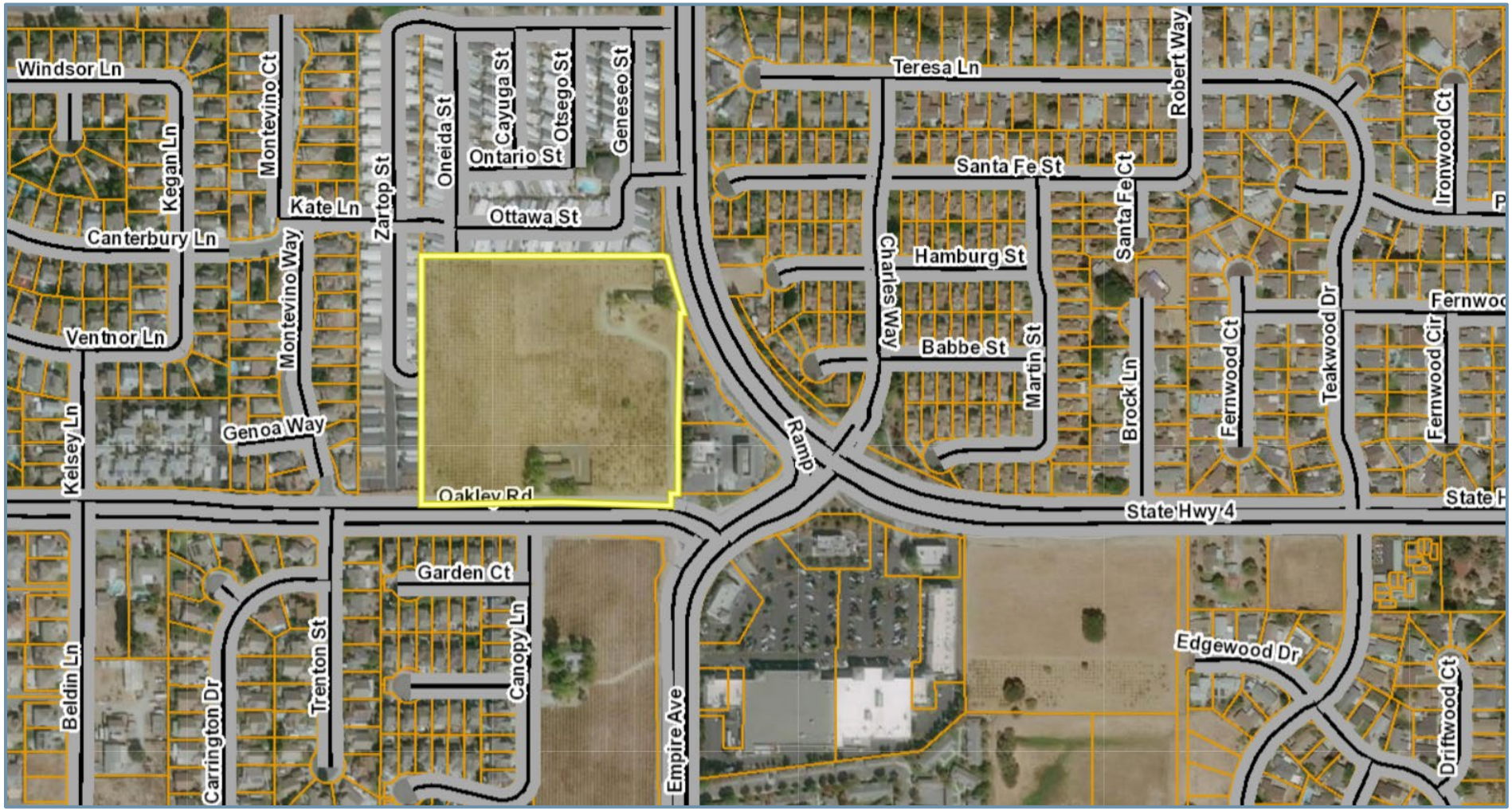
Attachments

1. Vicinity Map
2. Notice of Public Hearing

3. Applicant's Plans
4. City Council Minutes from March 22, 2022 - Excerpt of Project's Preliminary General Plan Amendment Work Session (Item 7.2)
5. Planning Commission Staff Report from February 6, 2024
6. Planning Commission Minutes from February 6, 2024
7. Planning Commission Resolution No. 2-24
8. Notice of Intent to Adopt a Mitigated Negative Declaration
9. Initial Study/Mitigated Negative Declaration
10. Proposed Ordinance (Rezone)
11. Proposed Resolution (General Plan Amendment)
12. Proposed Resolution (Final Development Plan, Tentative Map, Design Review) with Exhibit "A" Mitigation Monitoring Program

Vicinity Map

The Village at 2092 Oakley Road Subdivision 9634 (GPA 01-22, RZ 03-22, FDP 02-22, TM 04-22, DR 07-22)
2092 Oakley Road, Oakley, CA 94561 APN: 037-110-031



OAKLEY
CALIFORNIA

NOTICE OF PUBLIC HEARING

Notice is hereby given that on **March 12, 2024** at 6:30 p.m., or as soon thereafter as the matter may be heard, the City Council of the City of Oakley will hold a Public Hearing at the Council Chambers located at 3231 Main Street, Oakley, CA 94561 for the purposes of considering an application for a project as described below:

Project Name: The Village at 2092 Oakley Road Subdivision 9634 (GPA 01-22, RZ 03-22, FDP 02-22, TM 04-22, DR 07-22).

Project Location: 2092 Oakley Road, Oakley, CA 94561. APN 037-110-031.

Applicant: Owen Poole, 151 Spyrock Court, Walnut Creek, CA 94595.

Request: Application by Owen Poole ("Applicant") requesting approval of 1) a General Plan Amendment (GPA 01-22) to redesignate 9.99 acres from Commercial (CO) to Residential Medium (RM); 2) a Rezone (RZ 03-22) of 9.99 acres from C (General Commercial) District to P-1 (Planned Unit Development) District; 3) a Final Development Plan (FDP 02-22) for development of the 9.99 acres site; 4) a Tentative Map (TM 04-22) to subdivide 9.99 acres into 83 single family residential lots, additional on-site parking, a toddler park, community gathering areas, and other improvements; and 5) a Design Review (DR 07-22) for floor plans and architecture of three homes types with three elevations and three color schemes, and landscaping and other improvements throughout the project ("Project"). This project includes compliance with the California Environmental Quality Act ("CEQA") and adoption of a Mitigated Negative Declaration is proposed. The site is located at 2092 Oakley Road and is zoned "C" (General Commercial) District. APN 037-110-031.

How to Review: The Staff Report and its attachments will be available for public review, on or before **March 7, 2024** at City Hall, 3231 Main Street, Oakley, CA 94561 or online at www.ci.oakley.ca.us/agendas-minutes-videos-archive/ by navigating to the **March 12, 2024** City Council agenda and clicking the project title link. (Note: City Hall is closed on the 1st and 3rd Fridays of each month). Interested persons are invited to submit written comments prior to and may testify at the public hearing. Written comments may be submitted to Ken Strelo, Planning Manager at the City of Oakley, 3231 Main Street, Oakley, CA 94561 or by email to strelo@ci.oakley.ca.us.

NOTICE IS ALSO GIVEN pursuant to Government Code Section 65009(b) that, if this matter is subsequently challenged in Court by you or others, you may be limited to raising only those issues you or someone else has raised at a Public Hearing described in this notice or in written correspondence delivered to the City of Oakley City Clerk at, or prior to, the Public Hearing.

THE VILLAGE AT 2092 OAKLEY ROAD

OAKLEY, CA

FEBRUARY 28, 2024

SHEET INDEX

SHEET TITLE	SHEET NUMBER
DRB	
COVER SHEET	CS
DEVELOPMENT PLAN	1
COVER SHEET - CIVIL	1
EXISTING CONDITIONS AND CONSTRAINTS MAP	2
TYPICAL STREET SECTIONS - PRIVATE	3
TYPICAL STREET SECTIONS - PUBLIC	4
SITE PLAN	5
GRADING AND DRAINAGE PLAN	6
GRADING SECTIONS	7
GRADING SECTIONS	8
OFFISTE WORK	9
STORMWATER CONTROL PLAN	10
ILLUSTRATIVE OVERALL PLAN	L-1.1
PRELIMINARY LANDSCAPE PLAN	L-1.2
WALL AND FENCE PLAN	L-2.1
WALL AND FENCE DETAILS	L-2.2
WALL AND FENCE DETAILS	L-2.3
TYPICAL HOUSE CLUSTER ENLARGEMENT	L-3
HOUSE CLUSTER AND OPEN SPACE ENLARGEMENT	L-4
TYPICAL TREE PLANTING AT PARKING AREA CONCEPT	L-5
OPEN SPACE ENLARGEMENT	L-6
PROJECT ENTRY ENLARGEMENT	L-7
PROPOSED PLANT PALETTE	L-8
SITE AMENITIES	L-9.1
SITE AMENITIES	L-9.2
CONSTRUCTION DETAILS	L-10
IRRIGATION DETAILS	L-11.1
IRRIGATION DETAILS	L-11.2
PLANTING DETAILS	L-12
CONCEPTUAL OAKLEY ROAD PERSPECTIVE	A00
CONCEPTUAL STREETSCENE	A0.1
CONCEPTUAL PERSPECTIVES	A0.2
PLAN 1 FRONT ELEVATIONS	A01
PLAN 1 SPANISH EXTERIOR ELEVATIONS	A02
PLAN 1 SPANISH FLOOR PLANS	A03
PLAN 1 SPANISH ROOF PLAN	A04
PLAN 1 BUNGALOW EXTERIOR ELEVATIONS	A05
PLAN 1 BUNGALOW FLOOR PLANS	A06
PLAN 1 BUNGALOW ROOF PLAN	A07
PLAN 1 FARMHOUSE EXTERIOR ELEVATIONS	A08
PLAN 1 FARMHOUSE FLOOR PLANS	A09
PLAN 1 FARMHOUSE ROOF PLAN	A10
PLAN 2 FRONT ELEVATIONS	A11
PLAN 2 SPANISH EXTERIOR ELEVATIONS	A12
PLAN 2 SPANISH FLOOR PLANS	A13
PLAN 2 SPANISH ROOF PLAN	A14
PLAN 2 BUNGALOW EXTERIOR ELEVATIONS	A15
PLAN 2 BUNGALOW FLOOR PLANS	A16
PLAN 2 BUNGALOW ROOF PLAN	A17
PLAN 2 FARMHOUSE EXTERIOR ELEVATIONS	A18
PLAN 2 FARMHOUSE FLOOR PLANS	A19
PLAN 2 FARMHOUSE ROOF PLAN	A20
PLAN 3 FRONT ELEVATIONS	A21
PLAN 3 SPANISH EXTERIOR ELEVATIONS	A22
PLAN 3 SPANISH FLOOR PLANS	A23
PLAN 3 SPANISH ROOF PLAN	A24
PLAN 3 BUNGALOW EXTERIOR ELEVATIONS	A25
PLAN 3 BUNGALOW FLOOR PLANS	A26
PLAN 3 BUNGALOW ROOF PLAN	A27
PLAN 3 FARMHOUSE EXTERIOR ELEVATIONS	A28
PLAN 3 FARMHOUSE FLOOR PLANS	A29
PLAN 3 FARMHOUSE ROOF PLAN	A30
SAMPLE ENHANCED ELEVATIONS	A31
SAMPLE ENHANCED ELEVATIONS	A32
SITE ACCESS EXHIBIT	A33
SPANISH COLOR SCHEMES	A34
BUNGALOW COLOR SCHEMES	A35
FARMHOUSE COLOR SCHEMES	A36

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

COVER SHEET
CS

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

V:\399203_Oakley Road\03_CAD\399203104_Sheets\DRB\CS COVER SHEET.dwg, 2/28/2024 11:20:55 AM, TTillett

THE VILLAGE AT 2092 OAKLEY ROAD
DEVELOPMENT PLAN

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

FEBRUARY 28, 2024 SCALE: 1"=30'

LEGEND

- BOUNDARY LINE
- LOT LINE
- CURB
- RIGHT-OF-WAY LINE
- 1'-2' RETAINING WALL/CURB
- ASPHALT CONCRETE PAVEMENT
- PARK AREA
- PROPOSED BIORETENTION BASIN
- PROPOSED SIDEWALK
- ADA PATH OF TRAVEL

MINIMUM SETBACK	
FRONT	9'
GARAGE/REAR	5'
SIDE	4'

N

30 15 0 30 60 90
SCALE IN FEET
GRAPHIC SCALE: 1"=30'

Bellecci
Intelligent Infrastructure
925 • 685 • 4569 bellecci.com

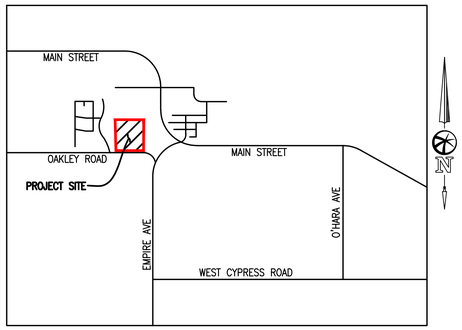
SHEET 1 OF 1
JOB NO. 220056

SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
COVER SHEET

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

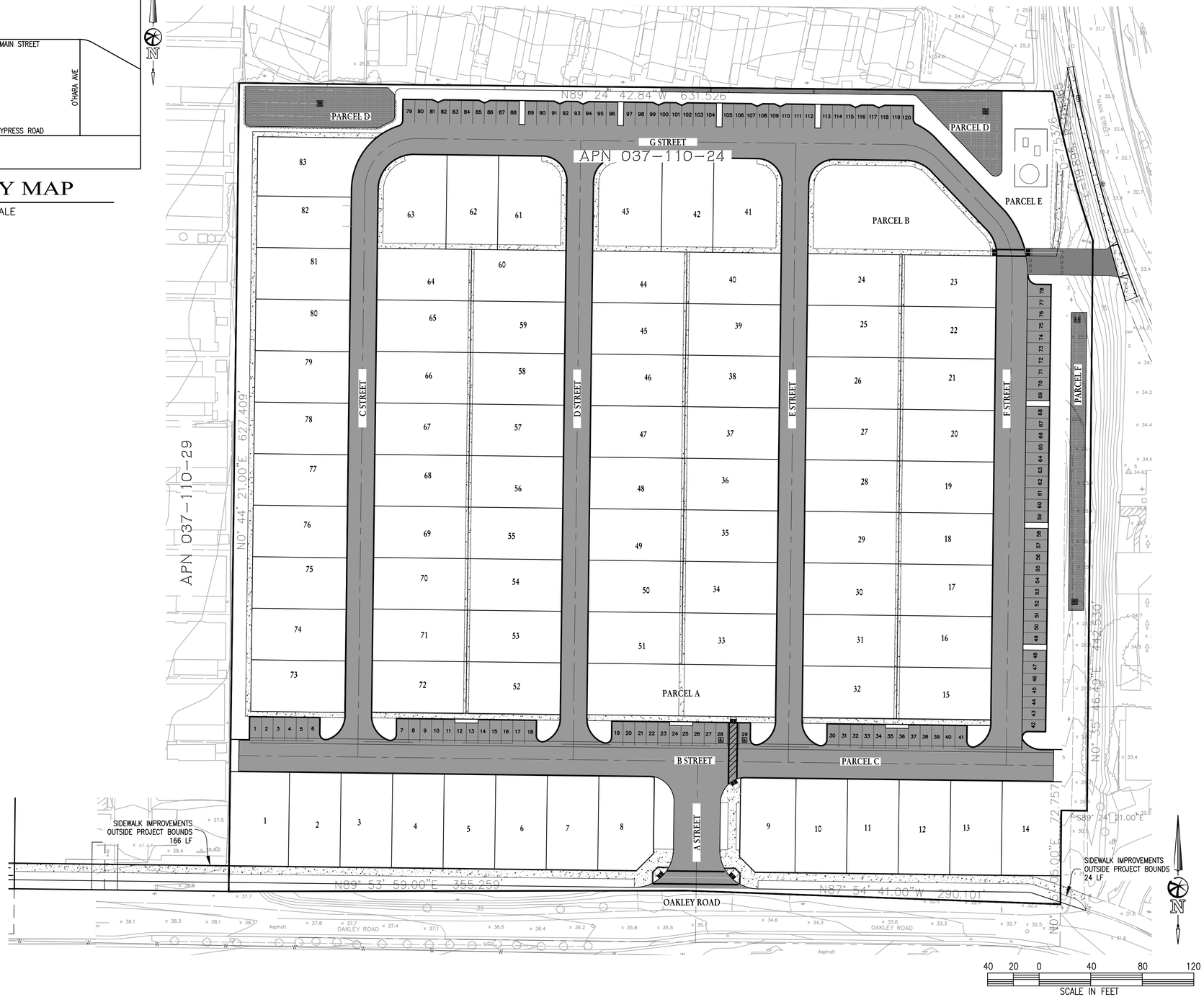
BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

FEBRUARY 28, 2024 SCALE: 1"=40'



VICINITY MAP

NO SCALE



SHEET INDEX

1. COVER SHEET
2. EXISTING CONDITIONS AND CONSTRAINTS MAP
3. TYPICAL STREET SECTIONS –PRIVATE
4. TYPICAL STREET SECTIONS –PUBLIC
5. PRELIMINARY SITE PLAN
6. PRELIMINARY GRADING AND DRAINAGE PLAN
7. GRADING SECTIONS
8. GRADING SECTIONS
9. OFFSITE WORK
10. STORMWATER CONTROL PLAN

TOTAL PROPOSED LOTS	83

PARCEL NAME	AREA (SF)	USAGE	HOA MAINTAINED
PARCEL A	5840	PARK	YES
PARCEL B	8730	PARK	YES
PARCEL C	80698	PRIVATE STREETS	YES
PARCEL D	7070	BIORETENTION	YES
PARCEL E	60725	EX OPEN SPACE & EASEMENTS	YES
PARCEL F	1611	BIORETENTION	YES

GENERAL NOTES

OWNER/DEVELOPER:	JOHN D'AMBROSIO DAN COSGROVE – MANAGING PARTNER LLC APPLIED 3130 BALFOUR ROAD SUITE D #269 BRENTWOOD, CA 94513 (925)–325–9247
ENGINEER:	BELLECCI & ASSOCIATES, INC. 2290 DIAMOND BLVD #100 CONCORD, CA 94520 (925)–685–4569
A.P.N.:	037–110–031
SITE AREA:	9.99 ACRES
SMALLEST LOT SIZE:	2920 SF
LARGEST LOT SIZE:	3790 SF
AVERAGE LOT SIZE:	2986 SF
DENSITY:	8.3 DU/AC
EXISTING GENERAL PLAN:	COMMERCIAL
PROPOSED GENERAL PLAN:	RESIDENTIAL: MEDIUM
EXISTING ZONING:	C
PROPOSED ZONING:	P–1
EXISTING USE:	VACANT
PROPOSED USE:	SINGLE FAMILY RESIDENTIAL
SERVICES: WATER SUPPLY– SANITARY SEWER– STORM DRAIN– GAS & ELECTRIC– FIRE– TELEPHONE– CABLE TV–	 DIABLO WATER DISTRICT IRONHOUSE SANITARY DISTRICT CITY OF OAKLEY PACIFIC GAS & ELECTRIC EAST CONTRA COSTA FIRE PROTECTION DISTRICT AT&T COMCAST
FLOODING:	SITE FALLS WITHIN FIRM PANEL NUMBERS 06013C 0355G, AREA OF MINIMAL FLOOD HAZARD – DATED MARCH 21, 2017
TOPOGRAPHY:	AERIAL TOPOGRAPHY PROVIDED BY: 360 AERIAL SURVEYS DATED JUNE 10, 2022
BASIS OF ELEVATION:	ELEVATIONS SHOWN ARE BASED 1988 NAVD
BASIS OF BEARINGS:	CALIFORNIA COORDINATE SYSTEM, ZONE III (NAD 83).

NOTES:

THE OWNER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS ON THE LANDS SHOWN ON THIS MAP

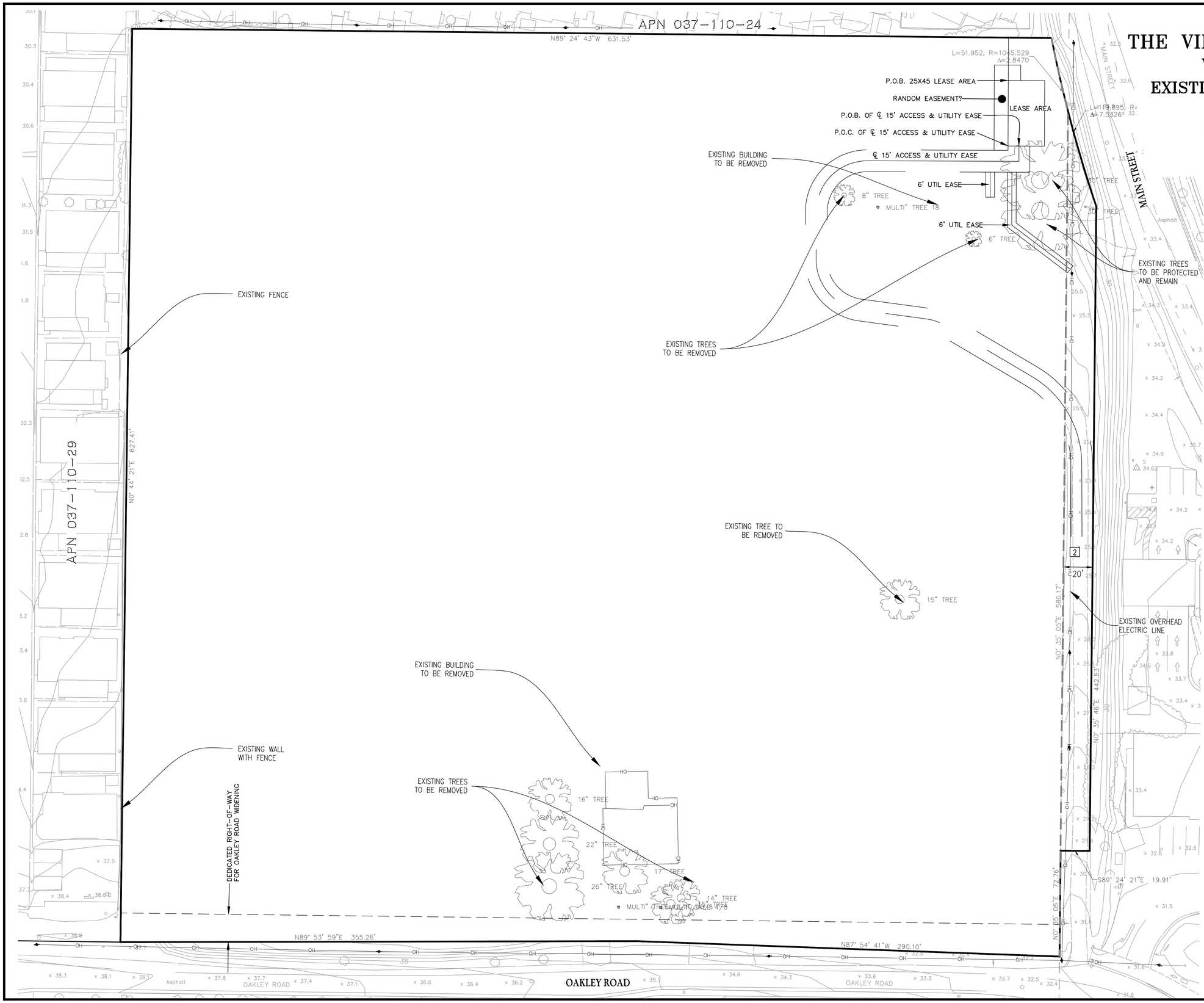
AT THIS POINT THERE IS NO PLANNED PHASES BUT THE OWNER STILL HAS DISCRETION TO PHASE THE PROJECT AS NECESSARY

SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
EXISTING CONDITIONS AND CONSTRAINTS

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

FEBRUARY 28, 2024 SCALE: 1"=30'



NOTES:

1. THE OWNER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS ON THE LANDS SHOWN ON THIS MAP
2. FORMER CALTRANS ROW ABANDONED PER CALTRANS RELINQUISHMENT 6489 OR 102

LEGEND

- PREVIOUS BOUNDARY
- NEW BOUNDARY
- EX. OH POWER LINES
- EX. JOINT POLES

N

30 15 0 30 60 90
SCALE IN FEET
GRAPHIC SCALE: 1"=30'

Bellecci
Intelligent Infrastructure
925 • 685 • 4569 bellecci.com

SHEET 2 OF 10
JOB NO. 220056

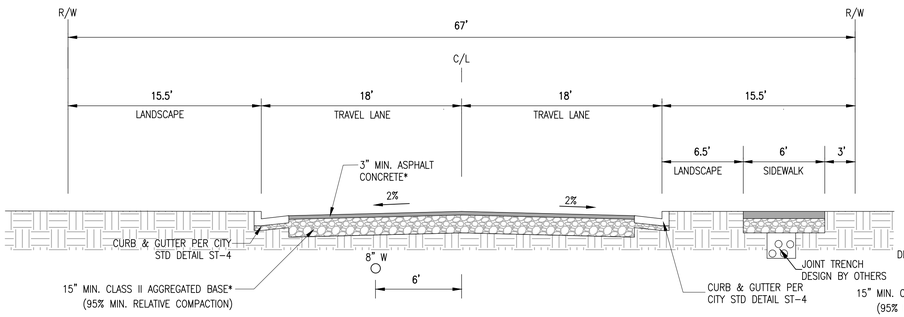
SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
TYPICAL STREET SECTIONS

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

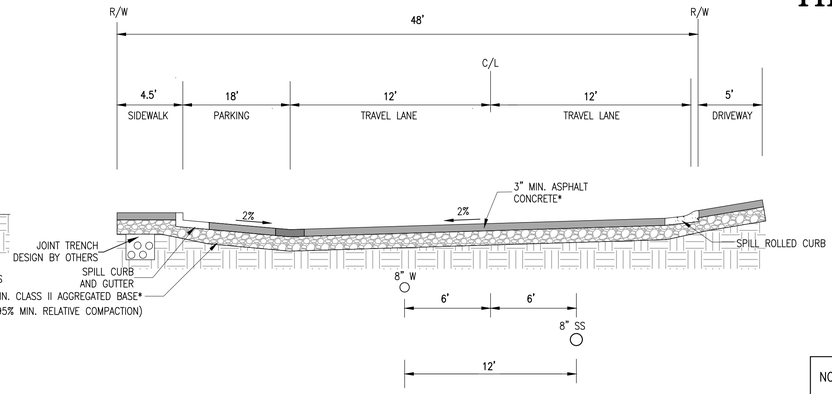
BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

FEBRUARY 28, 2024

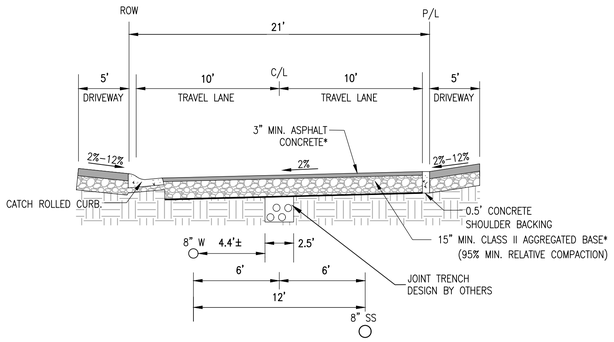
NOTES:
THE OWNER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS ON THE LANDS SHOWN ON THIS MAP



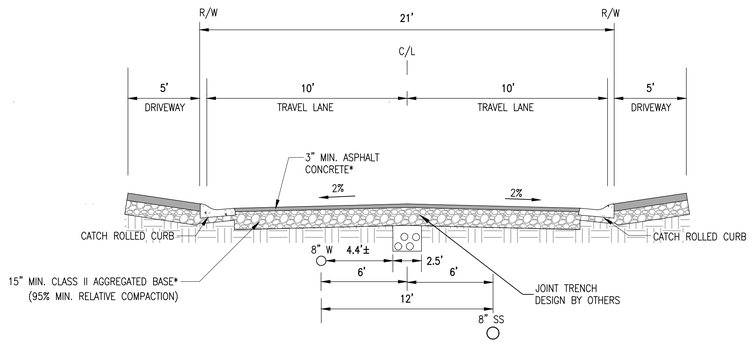
A STREET (PRIVATE)
NOT TO SCALE



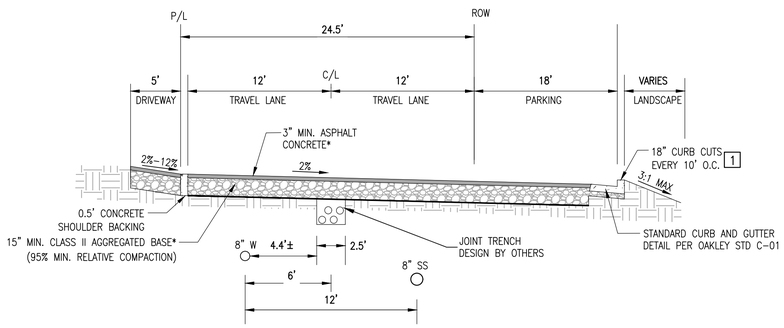
B STREET (PRIVATE)
NOT TO SCALE



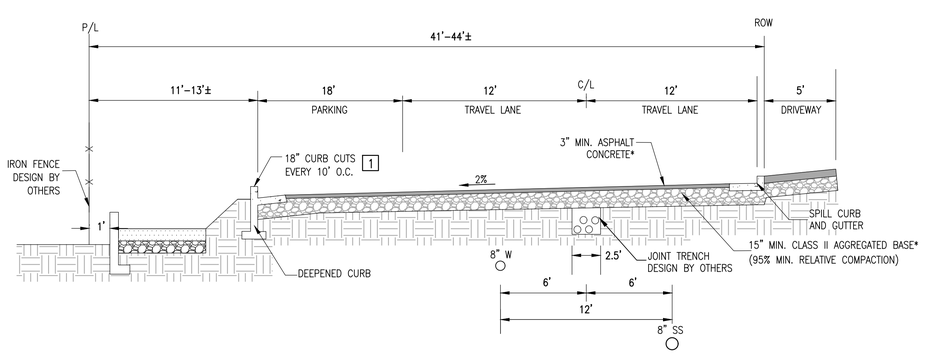
C STREET (PRIVATE)
NOT TO SCALE



D & E STREET (PRIVATE)
NOT TO SCALE



F STREET (PRIVATE)
NOT TO SCALE



G STREET (PRIVATE)
NOT TO SCALE

NOTES:

* = AC AND AB SECTIONS TO BE BASED ON ROADWAY AND R VALUES

1. RIP RAP OR SPLASH BLOCK TO BE USED ALONG WATER PATH OF TRAVEL

SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
TYPICAL STREET SECTIONS

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

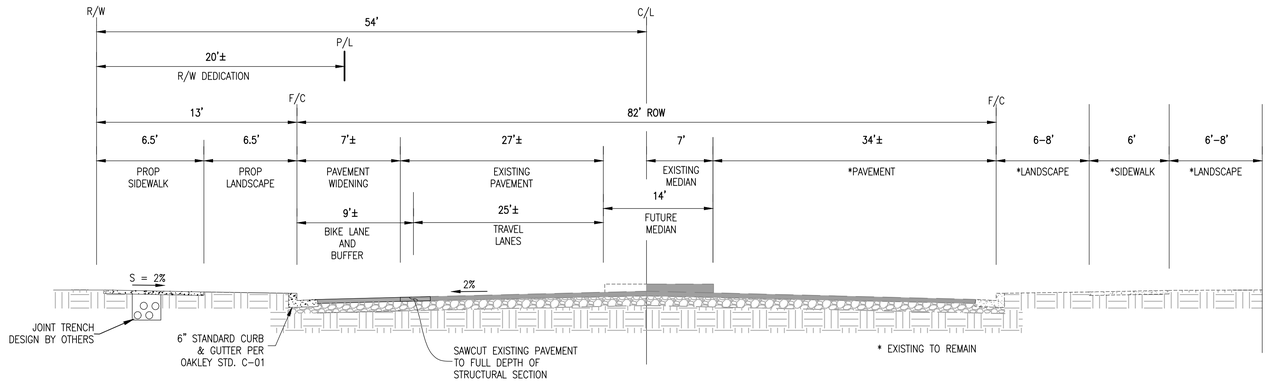
BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

FEBRUARY 28, 2024

NOTES:
THE OWNER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS ON THE LANDS SHOWN ON THIS MAP

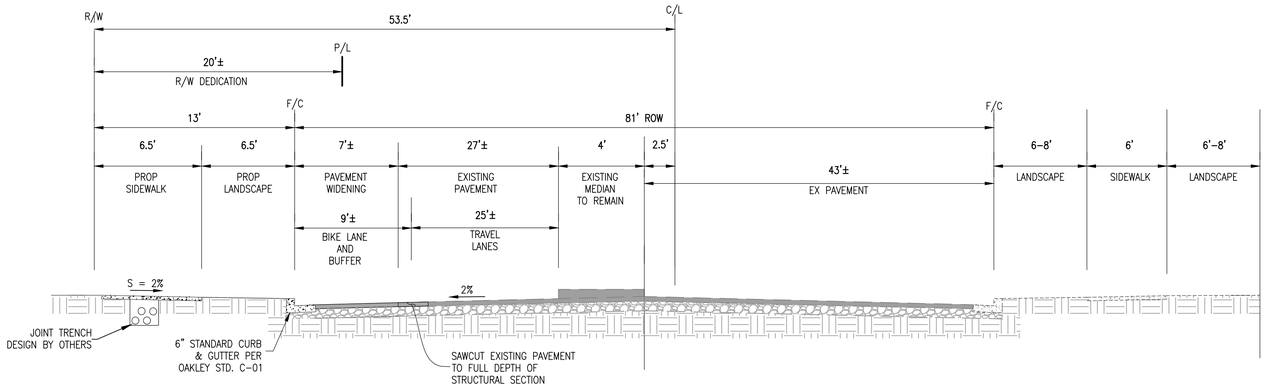
LEGEND

- IMPROVEMENTS BY PROJECT
- EXISTING CONDITIONS
- FUTIRE IMPROVEMENTS BY OTHERS



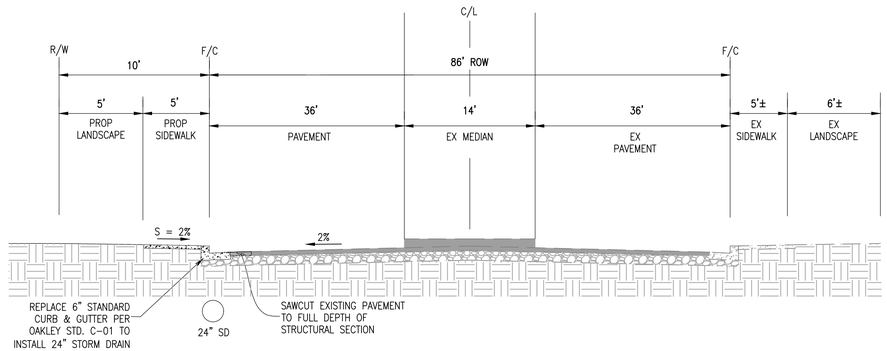
OAKLEY ROAD (PUBLIC)

WEST OF CANOPY LANE
NOT TO SCALE



OAKLEY ROAD (PUBLIC)

EAST OF CANOPY LANE
NOT TO SCALE



MAIN STREET (PUBLIC)

NOT TO SCALE

Bellecci
Intelligent Infrastructure
925 • 685 • 4569 bellecci.com

SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
SITE PLAN

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

FEBRUARY 28, 2024 SCALE: 1"=30'

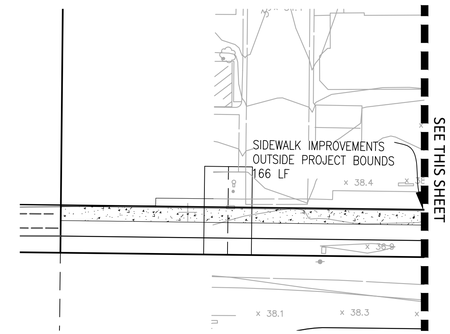
NOTES:
THE OWNER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS ON THE LANDS SHOWN ON THIS MAP

N

30 15 0 30 60 90
SCALE IN FEET
GRAPHIC SCALE: 1"=30'

LEGEND

PROPOSED	DESCRIPTION
— — —	SUBDIVISION BOUNDARY
———	LOT LINE
1	LOT NUMBER
3,000 SF±	LOT AREA IN SQUARE FEET



SIDEWALK IMPROVEMETS

SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
GRADING & UTILITY PLAN

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

FEBRUARY 28, 2024 SCALE: 1"=30'

NOTES:
THE OWNER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS ON THE LANDS SHOWN ON THIS MAP

30 15 0 30 60 90
SCALE IN FEET
GRAPHIC SCALE: 1"=30'

LEGEND

EXISTING	PROPOSED	DESCRIPTION
		SUBDIVISION BOUNDARY
		CENTERLINE
W EX W W	W W	WATER MAIN
SS EX SS SS	SS SS	SANITARY SEWER PIPE
		SANITARY SEWER MANHOLE
EX SD	SD	STORM DRAIN PIPE
		STORM DRAIN MANHOLE
		STORM DRAIN CATCH BASIN
JT JT	JT JT	JOINT TRENCH
		OVERLAND RELEASE

NOTES

1. ALL STREET GRADES TO BE 0.75% MINIMUM
2. EXISTING TOPOGRAPHIC INFORMATION SHOWN IS BASED ON A TOPOGRAPHIC SURVEY IN 2022
3. ALL ELEVATIONS ARE BASED ON 1988 NAVD
4. GRADING QUANTITIES CALCULATIONS ARE IN PROGRESS

APN 037-110-24
APN 037-110-29
PARCEL D
PARCEL B
PARCEL E
PARCEL A
PARCEL C
PARCEL F
G STREET
C STREET
D STREET
E STREET
F STREET
A STREET
B STREET
MAIN STREET
OAKLEY ROAD
18" CURB CUTS EVERY 10' O.C.
SEE DETAIL A ON SHEET 8 FOR OFFSITE STORM DRAIN IMPROVEMENTS ALONG MAIN STREET
SEE DETAIL B ON SHEET 8 FOR OFFSITE WATER IMPROVEMENTS ALONG MAIN STREET

Bellecci
Intelligent Infrastructure
925 • 685 • 4569 bellecci.com

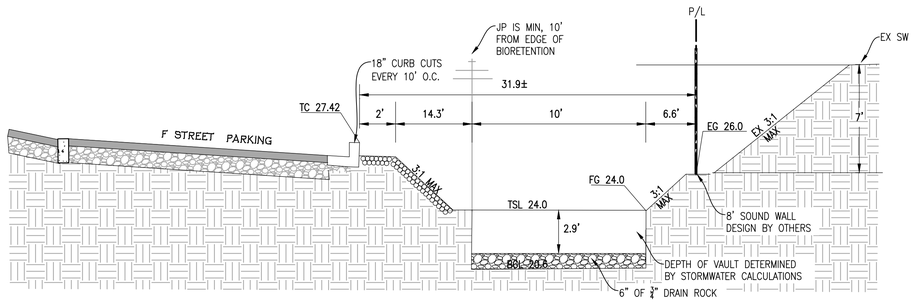
SHEET 6 OF 10
JOB NO. 220056

SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
GRADING SECTIONS

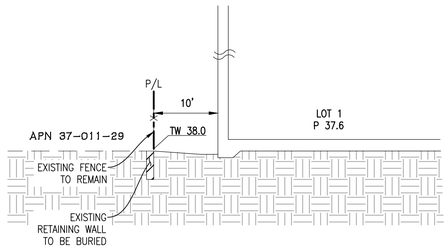
CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

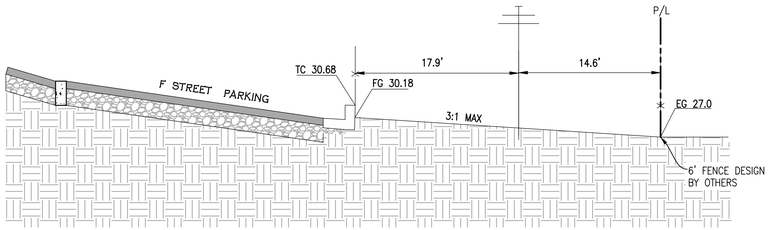
FEBRUARY 28, 2024



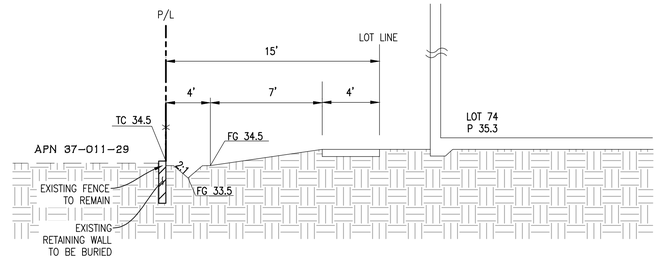
SECTION A–A
N.T.S.



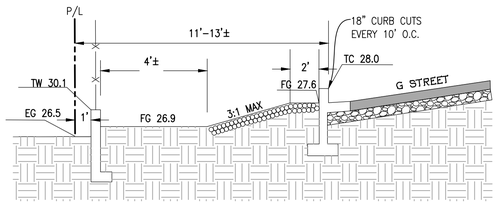
SECTION D–D
N.T.S.



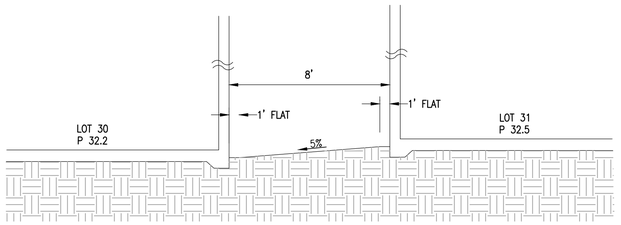
SECTION B–B
N.T.S.



SECTION E–E
N.T.S.



SECTION F–F
N.T.S.



SECTION H–H
N.T.S.

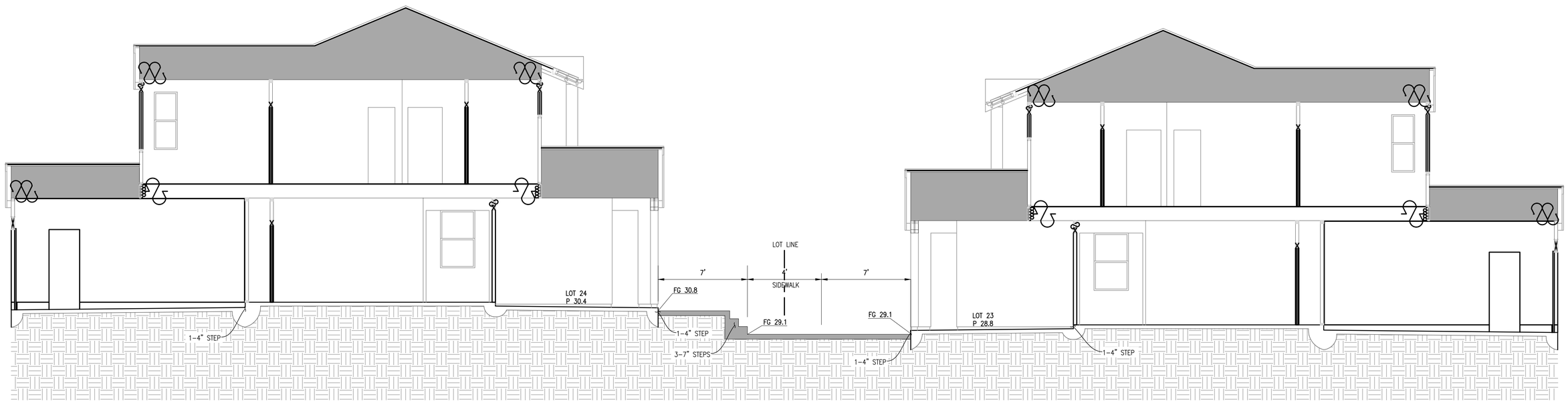
SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
GRADING SECTIONS

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

FEBRUARY 28, 2024

SECTION C-C
N.T.S.



SECTION G-G
N.T.S.

SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
OFFSITE WORK

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

FEBRUARY 28, 2024 SCALE: 1"=30'

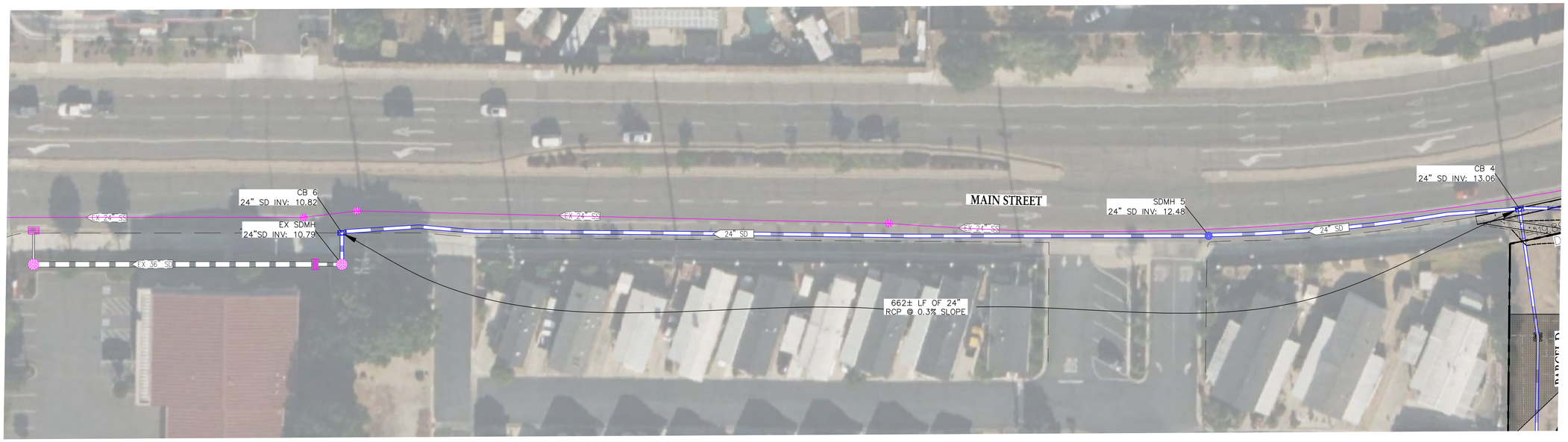
NOTES:

THE OWNER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS ON THE LANDS SHOWN ON THIS MAP

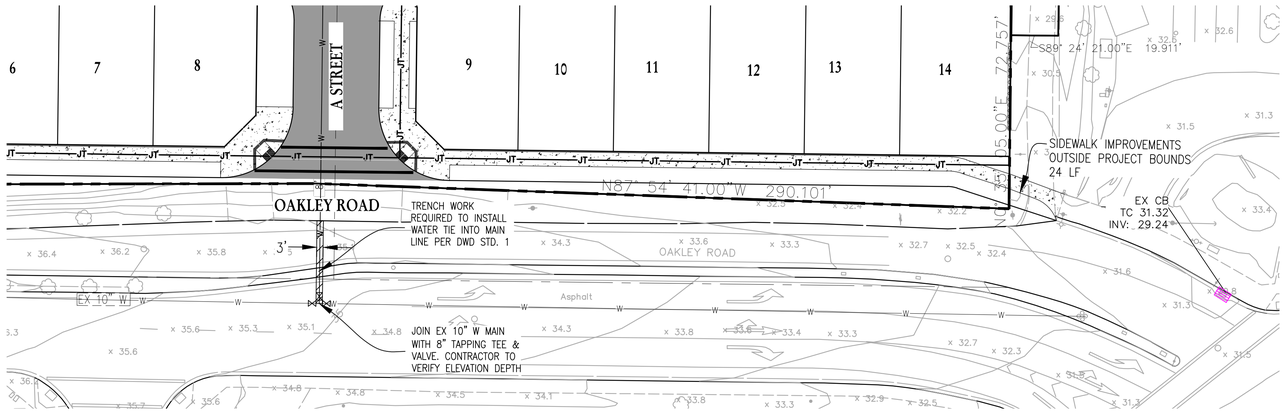
LEGEND

EXISTING	PROPOSED	DESCRIPTION
		SUBDIVISION BOUNDARY
		CENTERLINE
W EX W W	W W	WATER MAIN
SS EX SS SS	SS SS	SANITARY SEWER PIPE
		SANITARY SEWER MANHOLE
EX SD	SD	STORM DRAIN PIPE
		STORM DRAIN MANHOLE
		STORM DRAIN CATCH BASIN

30 15 0 30 60 90
SCALE IN FEET
GRAPHIC SCALE: 1"=30'



DETAIL A. OFFSITE STORM DRAIN CONNECTION



30 15 0 30 60 90
SCALE IN FEET
GRAPHIC SCALE: 1"=30'

DETAIL B. OFFSITE WATER CONNECTION

Bellecci
Intelligent Infrastructure
925 • 685 • 4569 bellecci.com

SHEET 9 OF 10
JOB NO. 220056

SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
STORM WATER CONTROL PLAN EXHIBIT

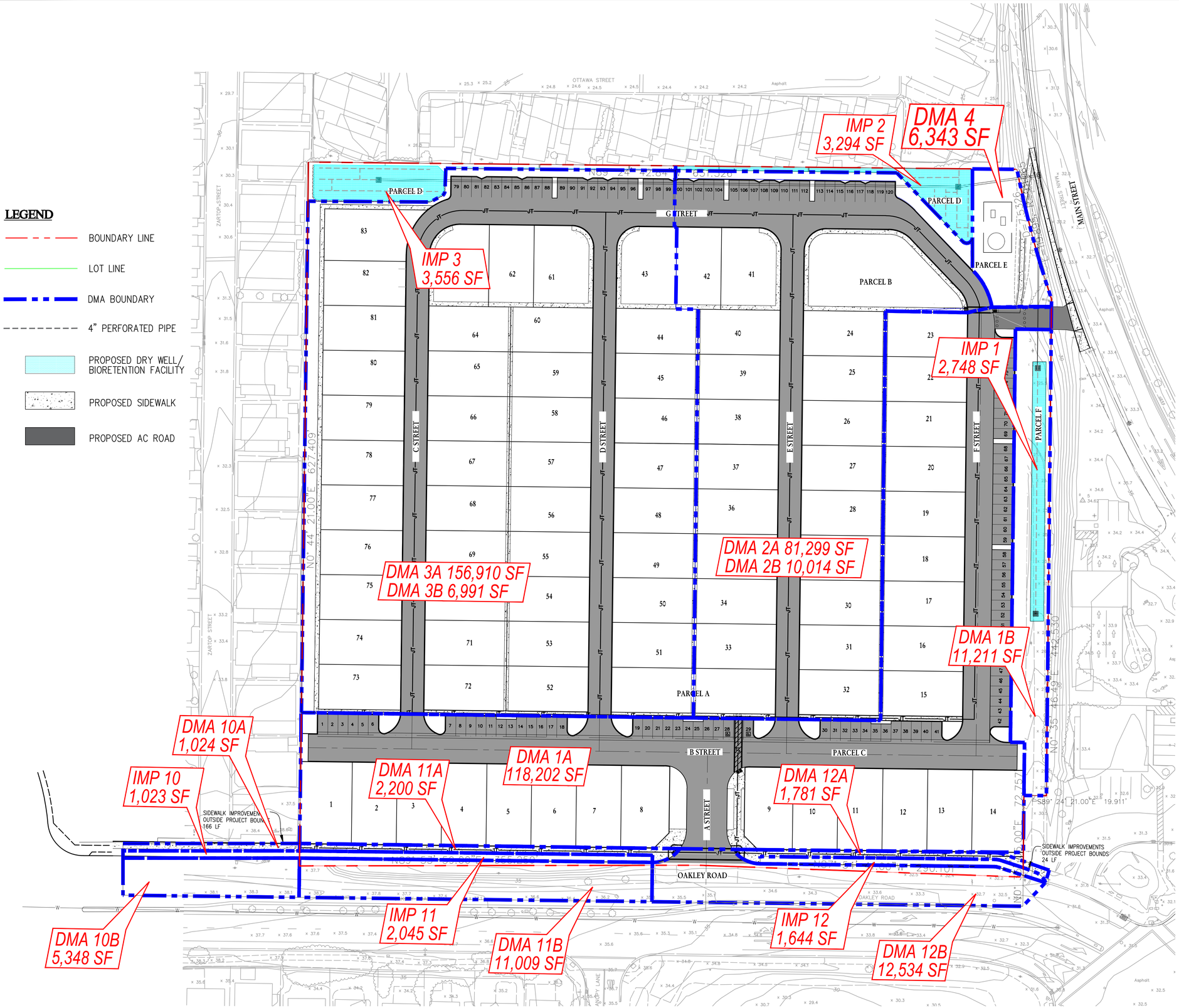
CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

FEBRUARY 28, 2024 SCALE: 1"=30'

LEGEND

- BOUNDARY LINE
- LOT LINE
- DMA BOUNDARY
- 4" PERFORATED PIPE
- PROPOSED DRY WELL/ BIORETENTION FACILITY
- PROPOSED SIDEWALK
- PROPOSED AC ROAD



I. Self-Treating Areas

DMA Name	Area (sq ft)
DMA 4	6343

IV. Areas Draining to IMPs

IMP Name: IMP1 (Soil Type: A)
IMP Type: Dry Well
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA 1A	118,202	Concrete or Asphalt	1.00	118,202				
DMA 1B	11,211	Landscape	0.10	1,121				
		Total		119,323				
					Area	0.020	1.000	2,386	2,748
					Volume	0.068	1.000	8,114	8,244

IMP Name: IMP2 (Soil Type: A)
IMP Type: Bioretention Facility
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA 2A	81,299	Concrete or Asphalt	1.00	81,299				
DMA 2B	10,014	Landscape	0.10	1,001				
		Total		82,300				
					Area	0.040	1.000	3,292	3,294

IMP Name: IMP3 (Soil Type: A)
IMP Type: Dry Well
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA 3A	156,910	Concrete or Asphalt	1.00	156,910				
DMA 3B	6,991	Landscape	0.10	699				
		Total		157,609				
					Area	0.020	1.000	3,152	3,556
					Volume	0.068	1.000	10,717	11,024

IMP Name: DMA10 (Soil Type: A)
IMP Type: Dry Well
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA 10A	1,024	Concrete or Asphalt	1.00	1,024				
DMA 10B	5,348	Concrete or Asphalt	1.00	5,348				
		Total		6,372				
					Area	0.020	1.000	127	1,023
					Volume	0.068	1.000	433	511

IMP Name: DMA11 (Soil Type: A)
IMP Type: Dry Well
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA11A	2,200	Concrete or Asphalt	1.00	2,200				
DMA11B	11,009	Concrete or Asphalt	1.00	11,009				
		Total		13,209				
					Area	0.020	1.000	264	2,045
					Volume	0.068	1.000	898	1,022

IMP Name: DMA12 (Soil Type: A)
IMP Type: Dry Well
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA12A	1,781	Concrete or Asphalt	1.00	1,781				
DMA12B	12,534	Concrete or Asphalt	1.00	12,534				
		Total		14,315				
					Area	0.020	1.000	286	1,644
					Volume	0.068	1.000	973	986

30 15 0 30 60 90
SCALE IN FEET
GRAPHIC SCALE: 1"=30'

Bellecci
Intelligent Infrastructure
925 • 685 • 4569 bellecci.com

SHEET 10 OF 10
JOB NO. 200056

Illustrative Overall Plan

L-1.1

THE VILLAGE AT 2092 OAKLEY ROAD Oakley, California

FEBRUARY 28, 2024

R3 STUDIOS

WATER TREATMENT PLANTING: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

FLOWERING DROUGHT-TOLERANT SHRUBS AND GROUNCOVER: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

4'-0" WIDE CONCRETE WALKWAY: REFER TO DETAIL 1 SHEET L-10

HOMEOWNER PRIVATE YARD (TYPICAL)

SCREEN TREE: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

CONCRETE DRIVEWAY: REFER TO PLANS PREPARED BY BELLECCI CIVIL ENGINEERS

TYPICAL HOUSE CLUSTER ENLARGEMENT:
REFER TO SHEET L-3

STREET TREE: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

HOUSE CLUSTER AND OPEN SPACE ENLARGEMENT:
REFER TO SHEET L-4

OAKLEY ROAD STREET TREE: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

FLOWERING DROUGHT-TOLERANT GROUNDCOVER: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

OPEN SPACE ENLARGEMENT:
REFER TO SHEET L-6

EMERGENCY VEHICLE ACCESS: REFER TO PLANS PREPARED BY BELLECCI CIVIL ENGINEERS

TREES UNDER POWER LINES: MAXIMUM HEIGHT OF 25'-0", REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

DRY WELL: REFER TO PLANS PREPARED BY BELLECCI CIVIL ENGINEERS

DROUGHT-TOLERANT SHRUBS AND GROUNCOVER ON SLOPES: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

TYPICAL TREE PLANTING AT PARKING AREA CONCEPT:
REFER TO SHEET L-5

PROJECT ENTRY ENLARGEMENT:
REFER TO SHEET L-7

PLAN VIEW
Scale: 1"=40'-0"

0' 20' 40' 80'

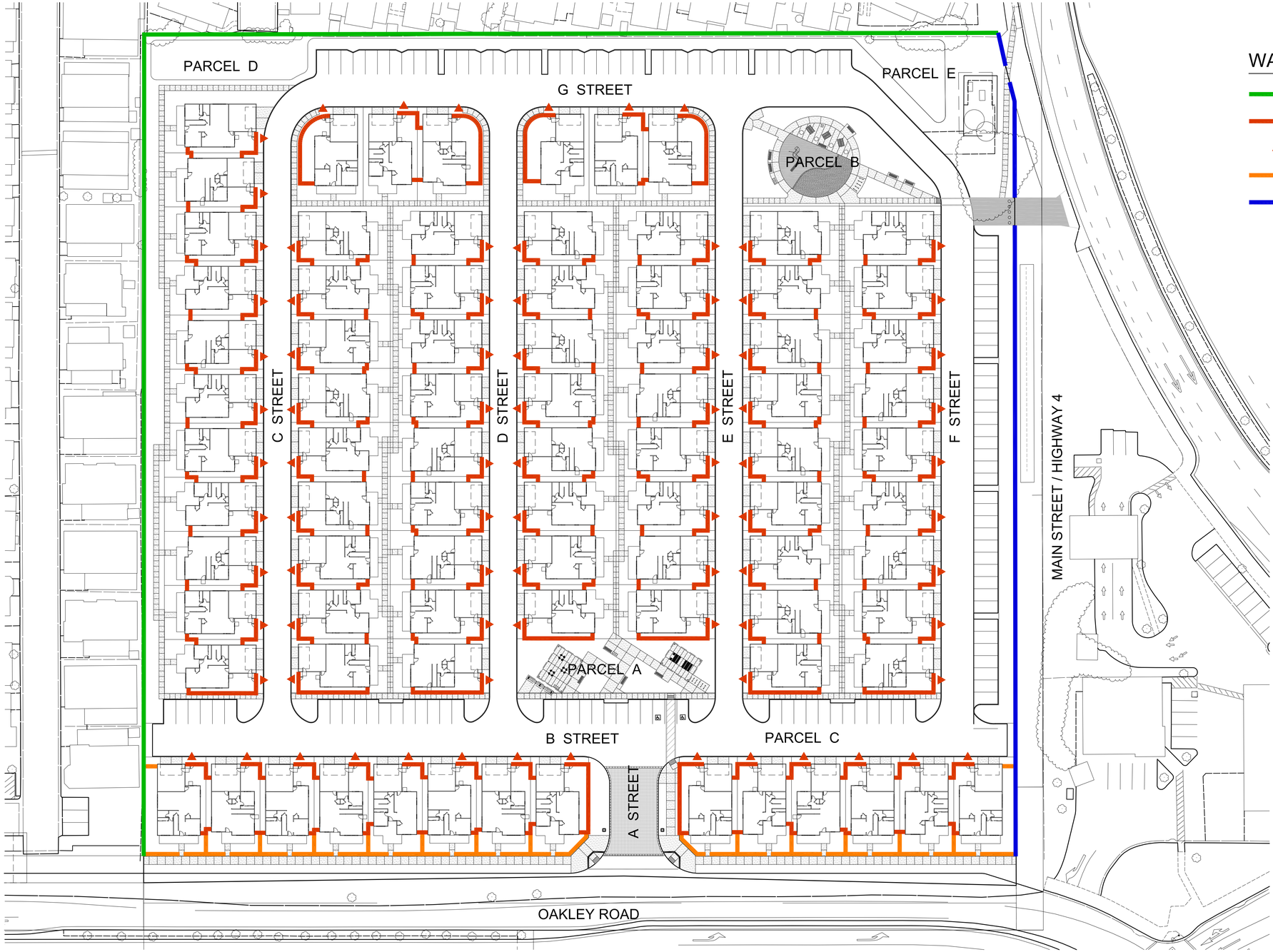
Preliminary Landscape Plan

L-1.2

THE VILLAGE AT 2092 OAKLEY ROAD Oakley, California

FEBRUARY 28, 2024

R3 STUDIOS



WALL & FENCE SCHEDULE

- WOOD FENCE (6'-0" TALL): REFER TO DETAIL/IMAGE 1 SHEET L-2.2
- WOOD FENCE WITH LATTICE (6'-0" TALL): REFER TO DETAIL/IMAGE 2 SHEET L-2.2
- WOOD GATE WITH LATTICE (6'-0" TALL): REFER TO DETAIL/IMAGE 3 SHEET L-2.2
- LOW PICKET FENCE AND GATE: REFER TO IMAGE 4 SHEET L-2.2
- 8'-0" HIGH CMU WALL - EXACT LOCATION TO BE DETERMINED PRIOR TO CONSTRUCTION - REFER TO IMAGE 5 SHEET L-2.2

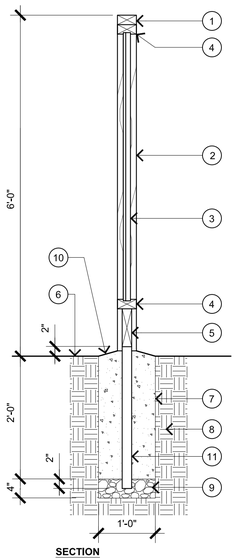
PLAN VIEW
Scale: 1"=40'-0"

0' 20' 40' 80'

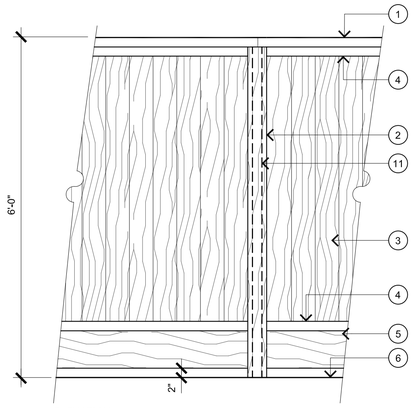
Wall and Fence Plan

L-2.1

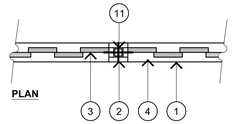
R3 STUDIOS



SECTION



ELEVATION



PLAN

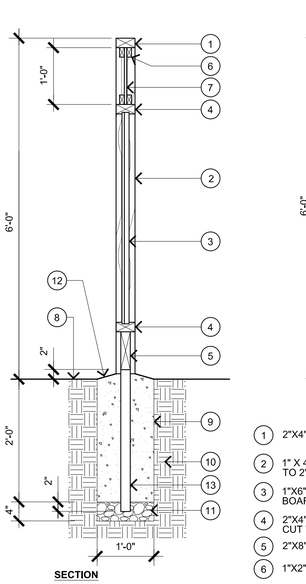
1. 2"X4" TOP CAP
2. 1" X 4" CLADDING AND 1" X 4" (RIPPED TO 2") CLADDING EDGE
3. 1"X6" FENCE BOARDS, BOARD ON BOARD
4. 2"X4" TOP AND BOTTOM RAILS RABBET CUT TO RECEIVE FENCE BOARDS
5. 2"X8" KICKER BOARD
6. FINISH GRADE, GRADE TO SLOPE AWAY FROM FENCE
7. CONCRETE FOOTING
8. COMPACTED SUBGRADE OR ENGINEERED FILL PER SOILS REPORT
9. CLASS II AGGREGATE SUB BASE
10. SLOPE TOP OF FOOTING TO DRAIN AT GRADE
11. SCHEDULE 2" SQUARE GALVANIZED STEEL PIPE, 8' LENGTH @ 8' O.C.

NOTES:

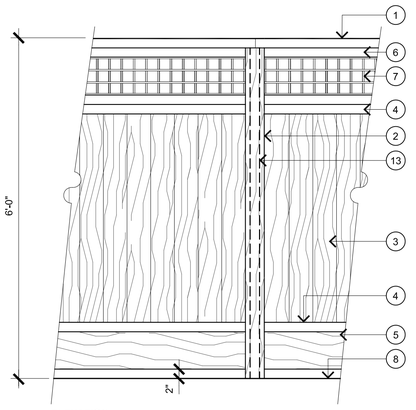
- ALL POSTS & KICKER SHALL BE PRESSURE TREATED CEDARTONE. ALL OTHER WOOD SHALL BE CONSTRUCTION HEART REDWOOD OR RED CEDAR AS SELECTED BY OWNER.
- ALL SCREWS SHALL BE HOT DIPPED GALVANIZED

SCALE : 3/4"=1'-0"

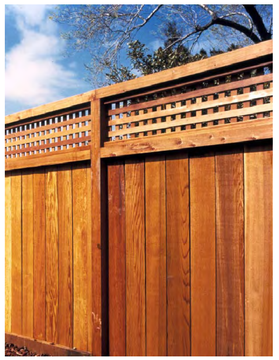
1 WOOD FENCE

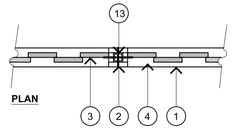


SECTION



ELEVATION





PLAN

1. 2"X4" TOP CAP
2. 1" X 4" CLADDING AND 1" X 4" (RIPPED TO 2") CLADDING EDGE
3. 1"X6" FENCE BOARDS, BOARD ON BOARD
4. 2"X4" TOP AND BOTTOM RAILS RABBET CUT TO RECEIVE FENCE BOARDS
5. 2"X8" KICKER BOARD
6. 1"X2" NAILER
7. HORIZONTAL WOOD PRIVACY LATTICE
8. FINISH GRADE, GRADE TO SLOPE AWAY FROM FENCE
9. CONCRETE FOOTING
10. COMPACTED SUBGRADE OR ENGINEERED FILL PER SOILS REPORT
11. CLASS II AGGREGATE SUB BASE
12. SLOPE TOP OF FOOTING TO DRAIN AT GRADE
13. SCHEDULE 2" SQUARE GALVANIZED STEEL PIPE, 8' LENGTH @ 8' O.C.

NOTES:

- ALL POSTS & KICKER SHALL BE PRESSURE TREATED CEDARTONE. ALL OTHER WOOD SHALL BE CONSTRUCTION HEART REDWOOD OR RED CEDAR AS SELECTED BY OWNER.
- ALL SCREWS SHALL BE HOT DIPPED GALVANIZED.

SCALE : 3/4"=1'-0"

2 WOOD FENCE WITH LATTICE

SECTION/ELEVATION

1. 2"X4" TOP CAP
2. 1" X 4" CLADDING AND 1" X 4" (RIPPED TO 2") CLADDING EDGE
3. 1"X6" FENCE BOARDS, BOARD ON BOARD
4. 2"X4" TOP AND BOTTOM RAILS RABBET CUT TO RECEIVE FENCE BOARDS
5. 2"X8" KICKER BOARD
6. 1"X2" NAILER
7. HORIZONTAL WOOD PRIVACY LATTICE
8. FINISH GRADE, GRADE TO SLOPE AWAY FROM FENCE
9. CONCRETE FOOTING
10. COMPACTED SUBGRADE OR ENGINEERED FILL PER SOILS REPORT
11. CLASS II AGGREGATE SUB BASE
12. SLOPE TOP OF FOOTING TO DRAIN AT GRADE
13. HEAVY DUTY SELF-CLOSING HINGE (TYPICAL OF 3)
14. GATE LATCH
15. 2"X4" GATE FRAME AROUND AND ACROSS. CROSS TO BE LOCATED ON INSIDE (HOMEOWNER SIDE) OF GATE
16. SCHEDULE 2" SQUARE GALVANIZED STEEL PIPE, 8' LENGTH @ 8' O.C.

NOTES:

- ALL POSTS & KICKER SHALL BE PRESSURE TREATED CEDARTONE. ALL OTHER WOOD SHALL BE CONSTRUCTION HEART REDWOOD OR RED CEDAR AS SELECTED BY OWNER.
- ALL SCREWS SHALL BE HOT DIPPED GALVANIZED.
- METAL HARDWARE TO BE ZINC-PLATED STEEL, BLACK ENAMEL FINISH OR APPROVED EQUAL.
- CONTRACTOR TO PROVIDE CUT SHEETS FOR GATE HARDWARE (LATCH AND HINGES) TO OWNER FOR APPROVAL.

SCALE : 3/4"=1'-0"

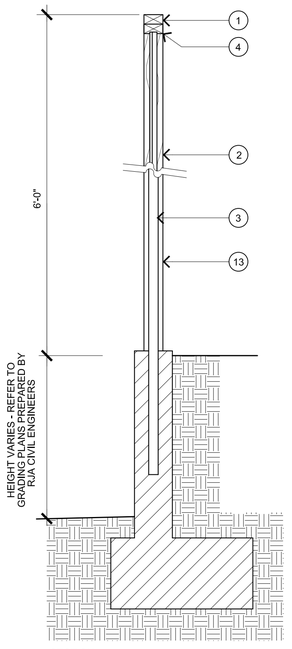
3 WOOD GATE WITH LATTICE

4 LOW PICKET FENCE

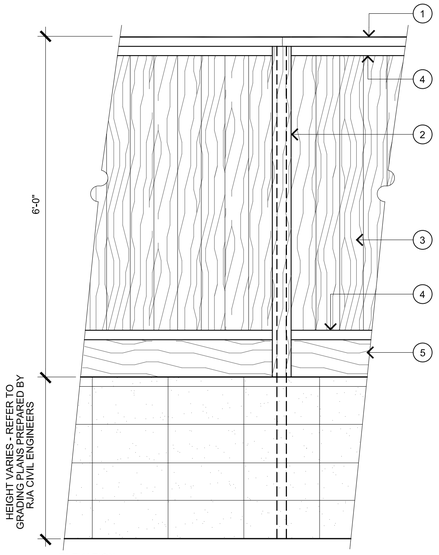
5 8'-0" HIGH CMU WALL

Wall and Fence Details

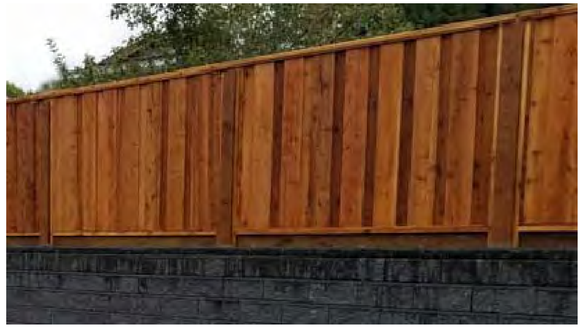
L-2.2

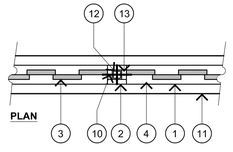


SECTION



ELEVATION





PLAN

BLOCK RETAINING WALL:

- SIZE TO BE 8X8X16 BLOCKS WITH 2X8X16 CAP
- FINISH TO BE SHOT BLAST
- COLOR TO BE 101

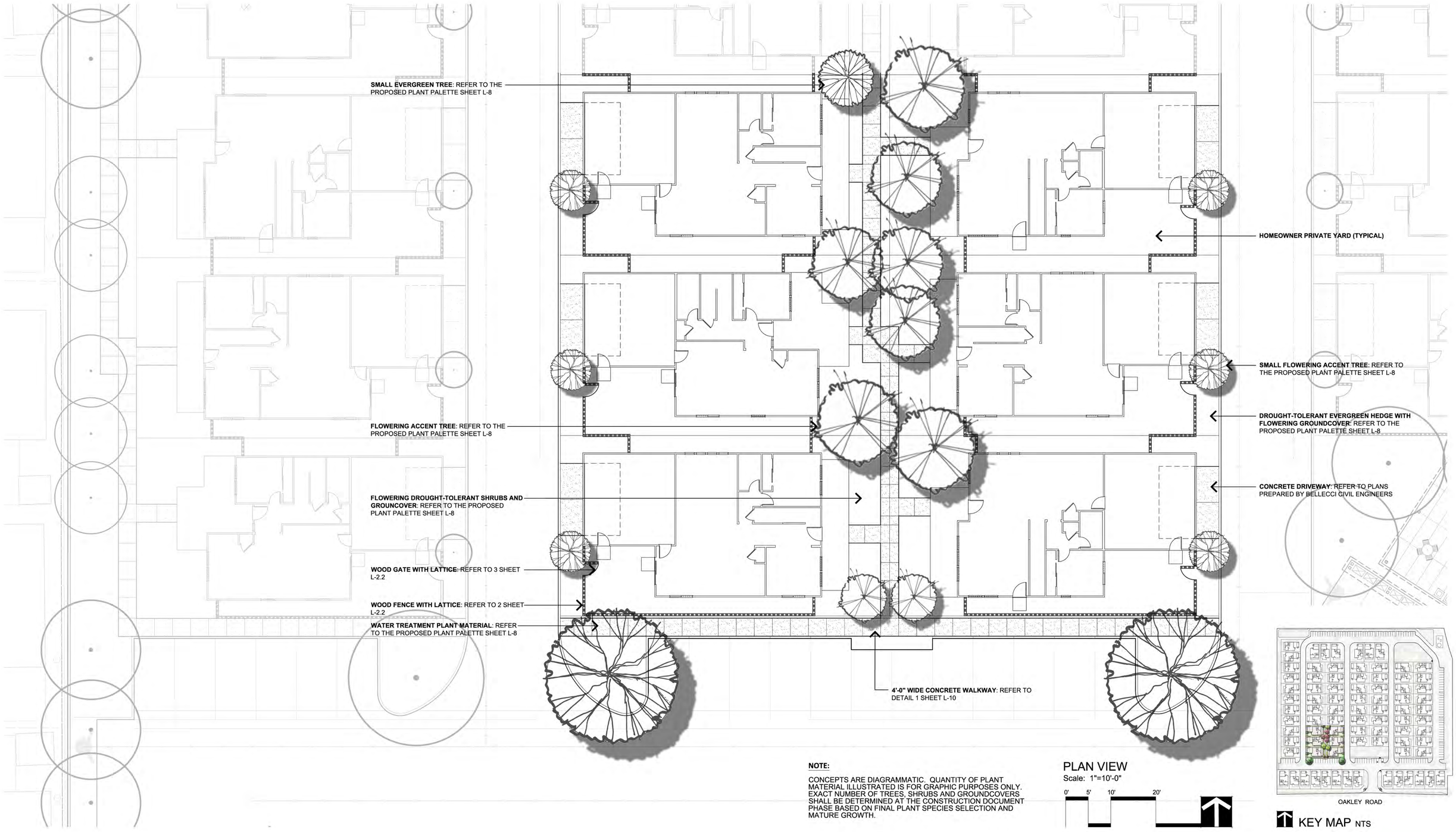
1. 2"X4" TOP CAP
2. 1" X 4" CLADDING
3. 1"X6" FENCE BOARDS, BOARD ON BOARD
4. 2"X4" TOP AND BOTTOM RAILS RABBET CUT TO RECEIVE FENCE BOARDS
5. 2"X8" KICKER BOARD
6. FINISH GRADE, GRADE TO SLOPE AWAY FROM FENCE
7. CONCRETE FOOTING
8. COMPACTED SUBGRADE OR ENGINEERED FILL PER SOILS REPORT
9. CLASS II AGGREGATE SUB BASE
10. 1/2" CARRIAGE BOLT, WASHER AND NUT THROUGH BOTH CLADDING BOARDS AND PIPE. 18" O.C. BOTH WAYS
11. BLOCK RETAINING WALL- REFER TO PLANS PREPARED BY BELLECCI CIVIL ENGINEERS
12. SCHEDULE 2" SQUARE GALVANIZED STEEL PIPE, 8' LENGTH @ 8' O.C.
13. 1" X 4" (RIPPED TO 2") CLADDING EDGE

NOTES:

- ALL POSTS & KICKER SHALL BE PRESSURE TREATED CEDARTONE. ALL OTHER WOOD SHALL BE CONSTRUCTION HEART REDWOOD OR RED CEDAR AS SELECTED BY OWNER.
- ALL SCREWS SHALL BE HOT DIPPED GALVANIZED
- GRADE CHANGES SHALL OCCUR AT POSTS

4 WOOD FENCE OVER RETAINING WALL (IF REQUIRED)

SCALE : 3/4"=1'-0"



NOTE:

CONCEPTS ARE DIAGRAMMATIC. QUANTITY OF PLANT MATERIAL ILLUSTRATED IS FOR GRAPHIC PURPOSES ONLY. EXACT NUMBER OF TREES, SHRUBS AND GROUNDCOVERS SHALL BE DETERMINED AT THE CONSTRUCTION DOCUMENT PHASE BASED ON FINAL PLANT SPECIES SELECTION AND MATURE GROWTH.

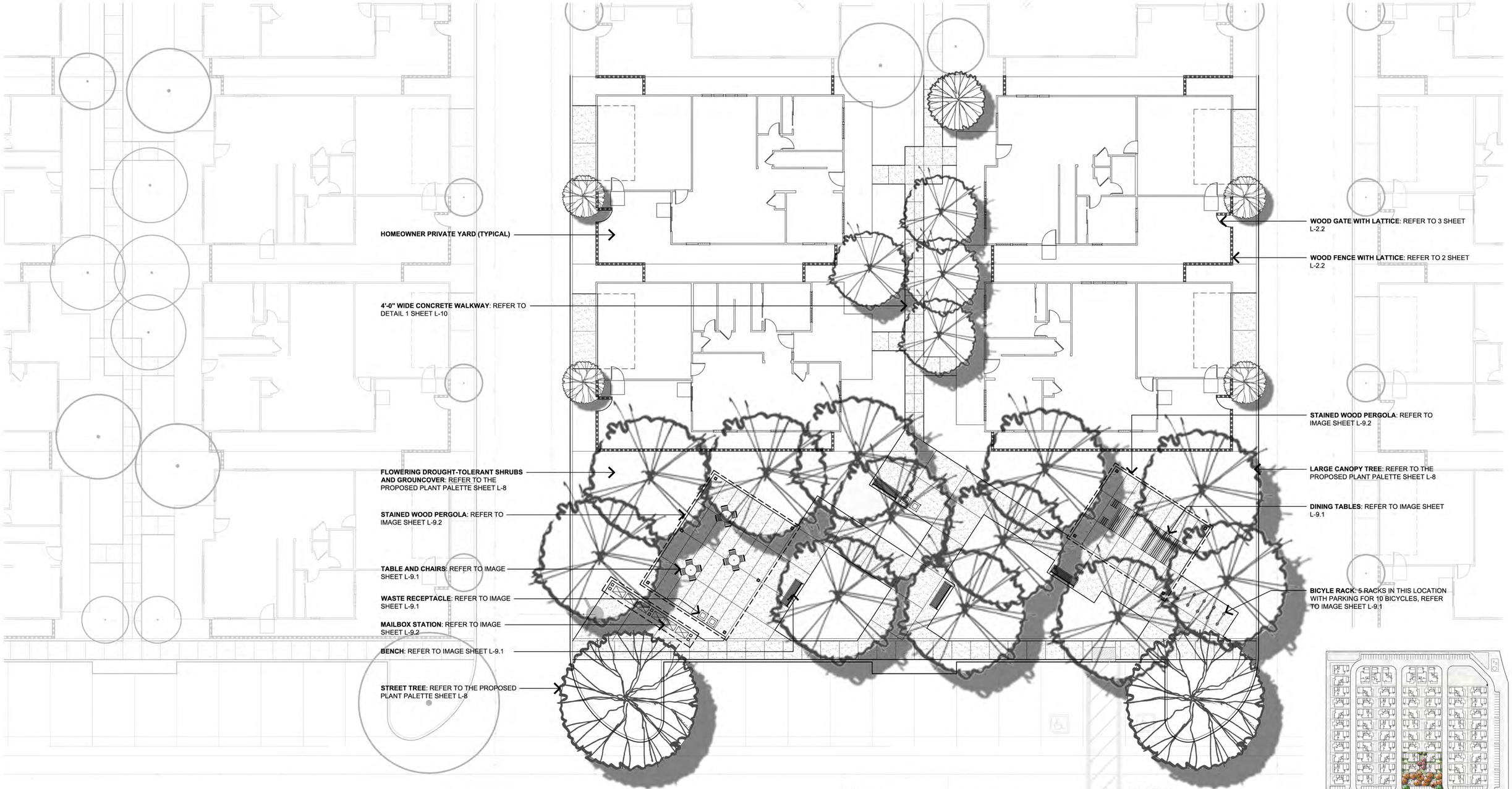
PLAN VIEW
Scale: 1"=10'-0"

0' 5' 10' 20'

KEY MAP NTS

Typical House Cluster Enlargement

L-3



NOTE:

CONCEPTS ARE DIAGRAMMATIC. QUANTITY OF PLANT MATERIAL ILLUSTRATED IS FOR GRAPHIC PURPOSES ONLY. EXACT NUMBER OF TREES, SHRUBS AND GROUNDCOVERS SHALL BE DETERMINED AT THE CONSTRUCTION DOCUMENT PHASE BASED ON FINAL PLANT SPECIES SELECTION AND MATURE GROWTH.

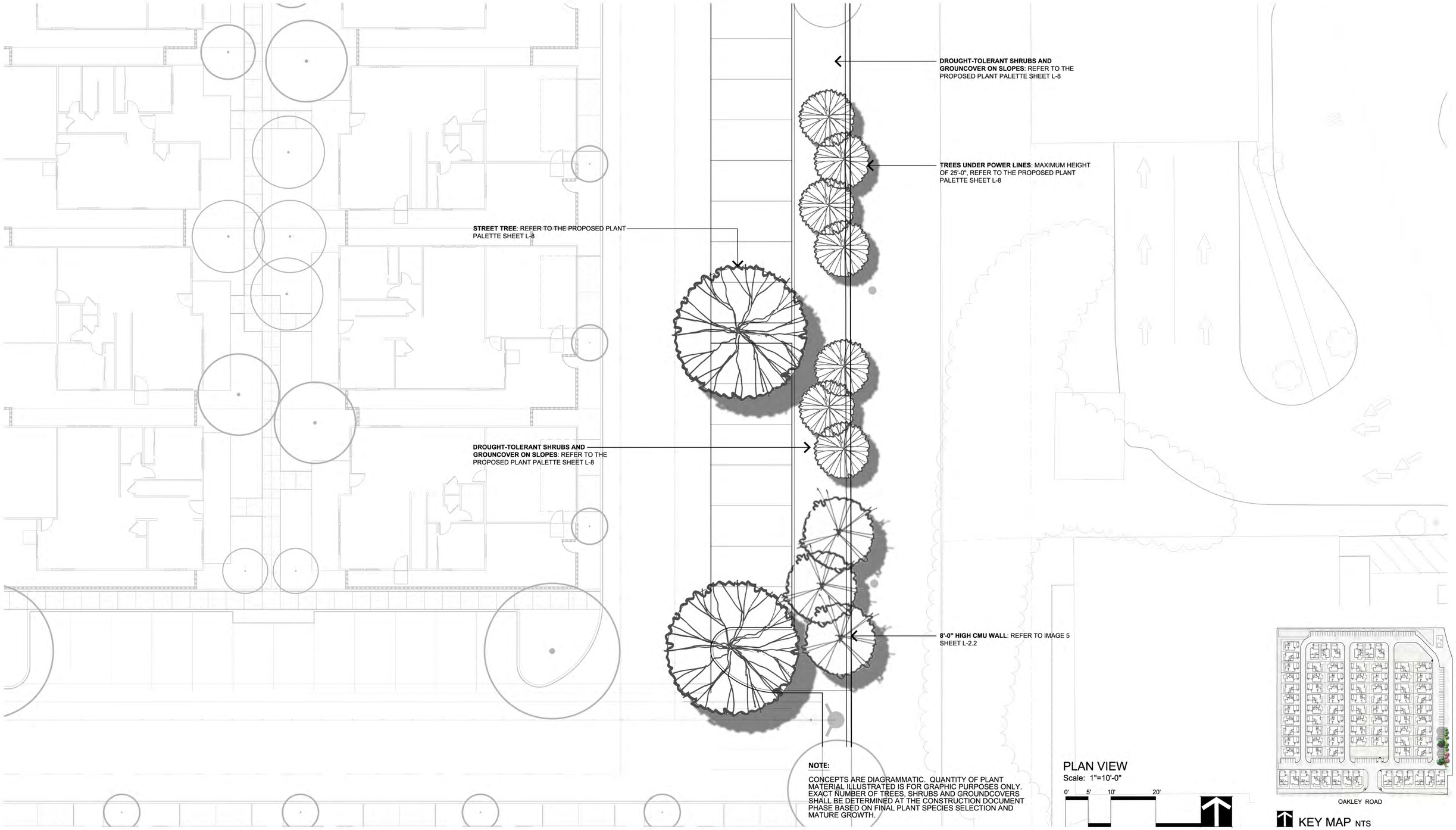
PLAN VIEW
Scale: 1"=10'-0"

0' 5' 10' 20'

KEY MAP NTS

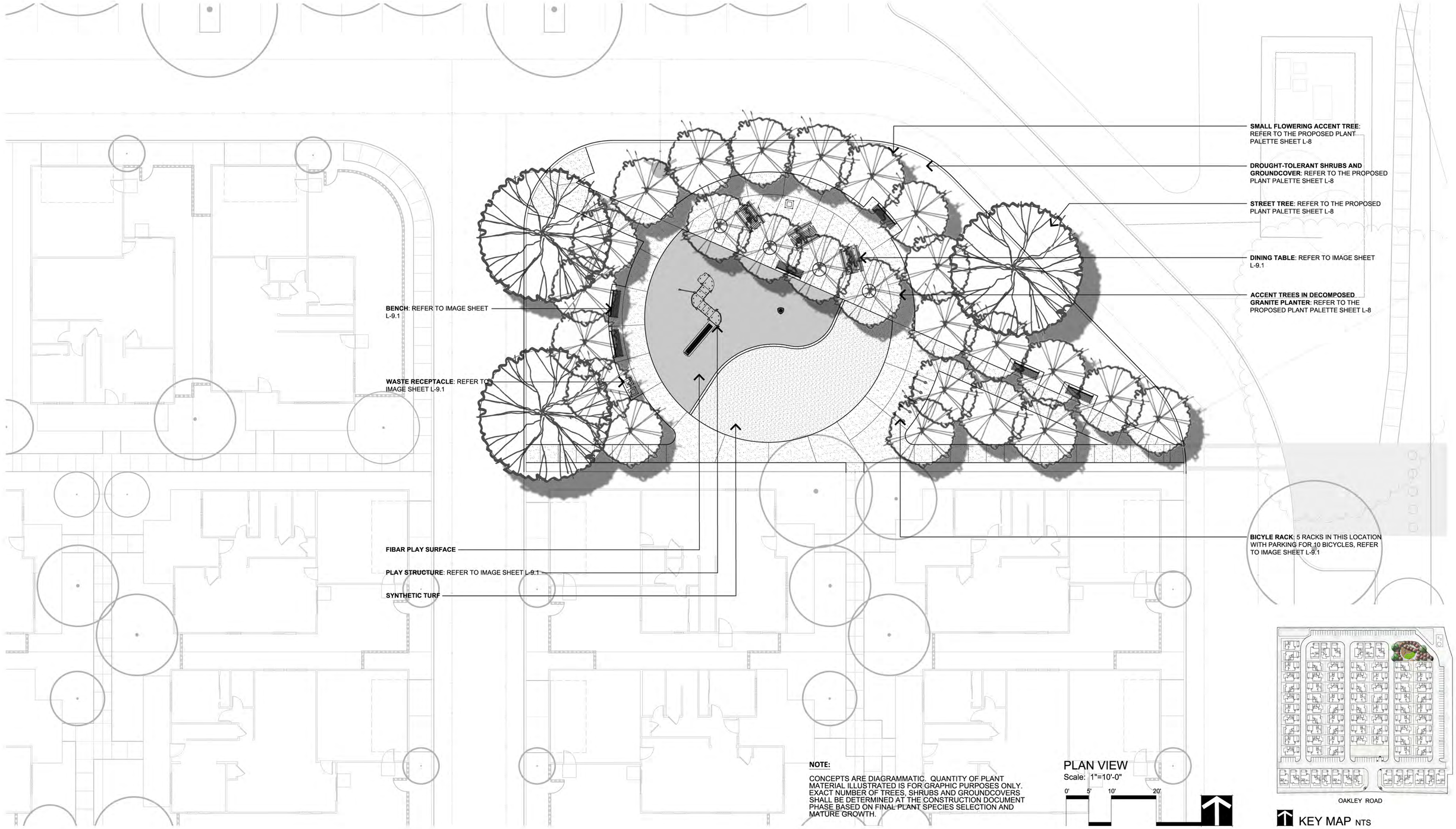
House Cluster and Open Space Enlargement

L-4



Typical Tree Planting at Parking Area Concept

L-5



NOTE:

CONCEPTS ARE DIAGRAMMATIC. QUANTITY OF PLANT MATERIAL ILLUSTRATED IS FOR GRAPHIC PURPOSES ONLY. EXACT NUMBER OF TREES, SHRUBS AND GROUNDCOVERS SHALL BE DETERMINED AT THE CONSTRUCTION DOCUMENT PHASE BASED ON FINAL PLANT SPECIES SELECTION AND MATURE GROWTH.

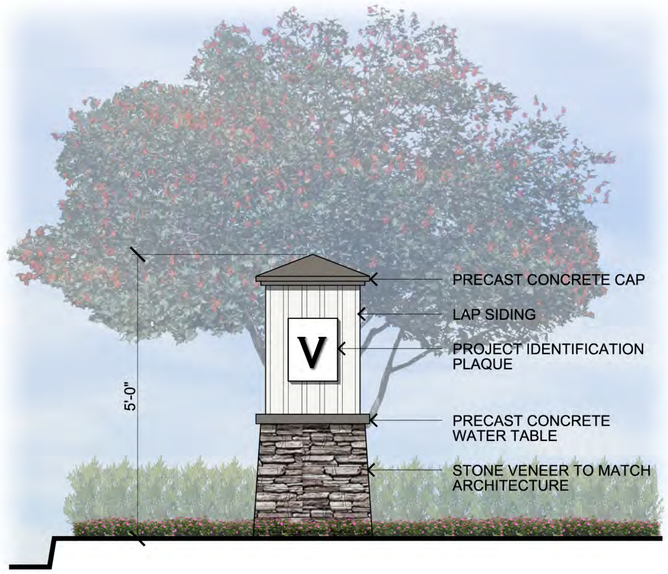
PLAN VIEW
Scale: 1"=10'-0"

0' 5' 10' 20'

KEY MAP NTS

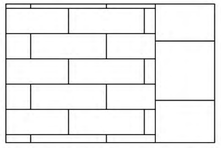
Open Space Enlargement

L-6



ENTRY MONUMENT

SCALE: 3/4" = 1'-0"



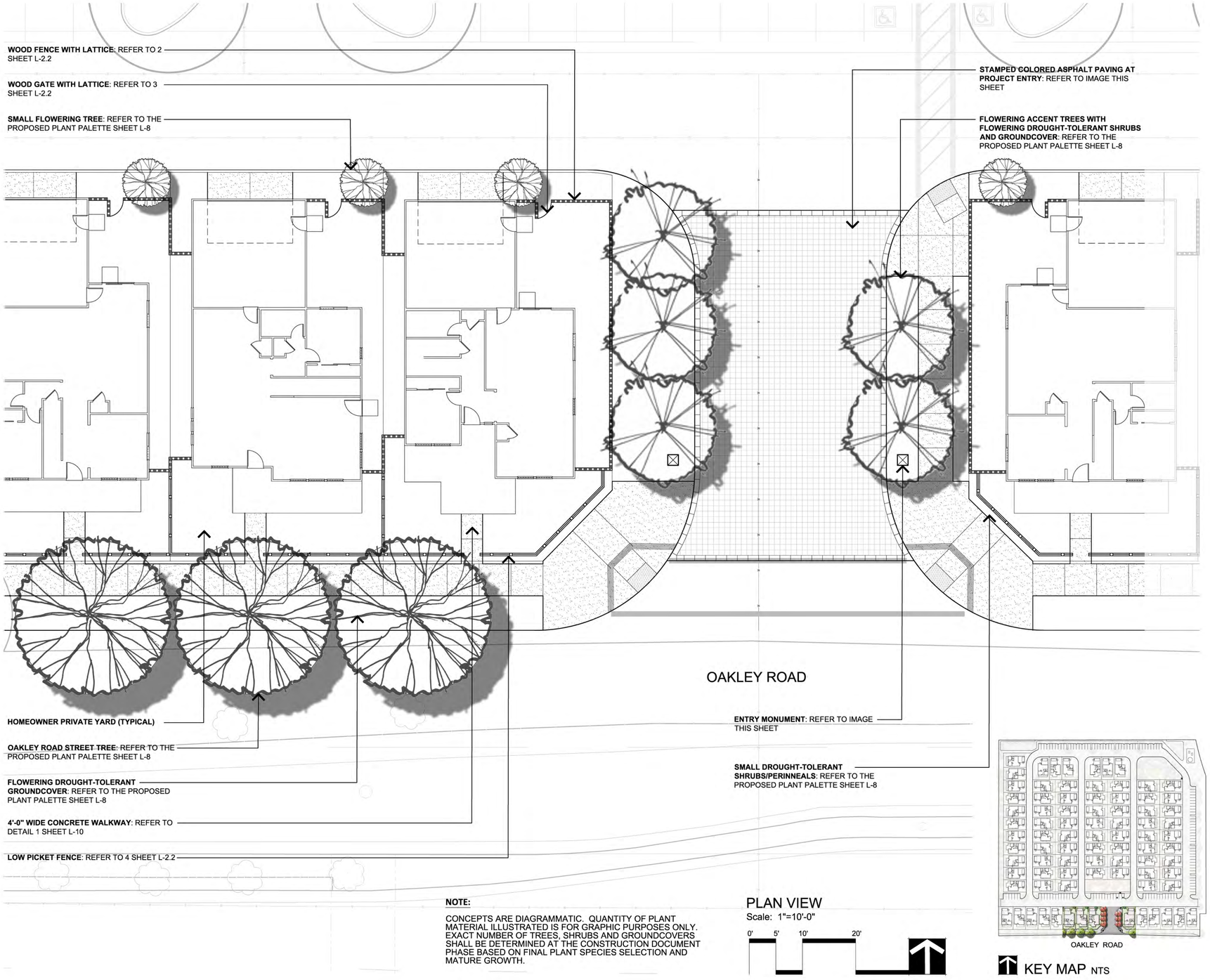
FIELD PRINT: RUNNING BOND
BORDER PRINT: STACKED BRICK

FIELD COLOR: GRANITE

BORDER COLOR: SANDSTONE

STAMPED COLORED ASPHALT AT PROJECT ENTRY

CONCEPT - FINAL COLORS TO BE DETERMINED PRIOR TO CONSTRUCTION



NOTE:

CONCEPTS ARE DIAGRAMMATIC. QUANTITY OF PLANT MATERIAL ILLUSTRATED IS FOR GRAPHIC PURPOSES ONLY. EXACT NUMBER OF TREES, SHRUBS AND GROUNDCOVERS SHALL BE DETERMINED AT THE CONSTRUCTION DOCUMENT PHASE BASED ON FINAL PLANT SPECIES SELECTION AND MATURE GROWTH.

PLAN VIEW
Scale: 1"=10'-0"

0' 5' 10' 20'

KEY MAP NTS

Project Entry Enlargement

L-7

PROPOSED PLANT PALETTE

BOTANICAL NAME	COMMON NAME	MINIMUM CONTAINER SIZE	SPACING	WULCOLS
OAKLEY ROAD STREET TREE:				
QUERCUS SUBER	CORK OAK	24" BOX	N/A	M
EVERGREEN TREES:				
GEIJERA PARVIFLORA	AUSTRALIAN WILLOW	24" BOX	N/A	M
LAURUS NOBILIS 'SARATOGA'	SARATOGA BAY LAUREL	24" BOX	N/A	L
MAGNOLIA 'BRACKEN'S BROWN BEAUTY'	MAGNOLIA	24" BOX	N/A	M
PRUNUS CAROLINIANA	NCN	24" BOX	N/A	L
RHAPHIOLEPIS INDICA 'MAGNIFICENT'	PINK INDIAN HAWTHORNE	24" BOX	N/A	L
ACCENT TREES:				
X CHITALPIA TASHKENTENSIS 'PINK DAWN'	PINK DAWN CHITALPA	24" BOX	N/A	M
CERCIS CANADENSIS SPECIES	EASTERN REDBUD	24" BOX	N/A	M
CHIONANTHUS RETUSUS	FRINGE TREE	24" BOX	N/A	M
LAGERSTROEMIA FAUREI SPECIES	CRAPE MYRTLE	24" BOX	N/A	L
MALUS SPECIES	FLOWERING CRAB APPLE	24" BOX	N/A	M
PRUNUS SPECIES	FLOWERING PLUM/CHERRY	24" BOX	N/A	L
BACKGROUND/FOUNDATION SHRUB A:				
ARCTOSTAPHYLOS SPECIES	MANZANITA	5 GALLON	3' O.C.	L
BACCHARIS SPECIES	COYOTE BRUSH	5 GALLON	3' O.C.	L
BUXUS SPECIES	BOXWOOD	5 GALLON	3' O.C.	M
CALLISTEMON 'BETTER JOHN'	DWARF BOTTLBRUSH	5 GALLON	3' O.C.	L
CISTUS SPECIES	ROCKROSE	5 GALLON	4'-6" O.C.	L
COPROSMA SPECIES	NCN	5 GALLON	4' O.C.	L
ESCALLONIA SPECIES	ESCALLONIA	5 GALLON	3' O.C.	M
HESPERALOE SPECIES	NCN	5 GALLON	2' O.C.	L
LEUCOPHYLLUM SPECIES	NCN	5 GALLON	2' O.C.	L
LIGUSTRUM TEXANUM	WAXLEAF PRIVET	5 GALLON	2' O.C.	M
PHLOMIS FRUTICOSA	JERUSALEM SAGE	5 GALLON	3' O.C.	L
PITTOSPORUM SPECIES	NCN	5 GALLON	3' O.C.	L
RHAPHIOLEPIS SPECIES	INDIAN HAWTHORNE	5 GALLON	3'-5' O.C.	M
ROSMARINUS SPECIES	ROSEMARY	5 GALLON	3' O.C.	L
INTERMEDIATE SHRUB B:				
ABELIA 'KALEIDISCOPE'	ABELIA	1 GALLON	3'-6" O.C.	L
COLEONEMA PULLCHELLUM 'SUNSET GOLD'	GOLDEN BREATH OF HEAVEN	1 GALLON	4' O.C.	M
CORREA SPECIES	AUSTRALIAN FUCHSIA	1 GALLON	3' O.C.	L
DIETES SPECIES	FORTNIGHT LILY	1 GALLON	3' O.C.	L
GALVEZIA 'FIRECRACKER'	NCN	1 GALLON	3' O.C.	L
LAVANDULA SPECIES	LAVENDER	1 GALLON	3' O.C.	L
LIRIOPE GIGANTEA	LILY TURF	1 GALLON	2' O.C.	M
LOMANDRA SPECIES	NCN	1 GALLON	VARIES	L
MUHLENBERGIA SPECIES	DEER GRASS	1 GALLON	4' O.C.	L
NANDINA SPECIES	HEAVENLY BAMBOO	1 GALLON	2' O.C.	L
PITTOSPORUM SPECIES	NCN	1 GALLON	2' O.C.	L
PENNISETUM SPECIES	FOUNTAIN GRASS	1 GALLON	3' O.C.	L
POLYGALA FRUTICOSA 'PETITE BUTTERFLY'	COMPACT SWEET PEA	5 GALLON	30" O.C.	L
ROSA SPECIES	SHRUB ROSE	1 GALLON	3' O.C.	M
SALVIA GREGGII SPECIES	SAGE	1 GALLON	3' O.C.	L
YUCCA SPECIES	YUCCA	1 GALLON	3' O.C.	L
FOREGROUND SHRUB C:				
AGAPHANTHUS SPECIES	LILY OF THE NILE	1 GALLON	VARIES	M
CALLANDRINIA 'JAZZ TIME'	NCN	1 GALLON	30" O.C.	L
DIANELLA SPECIES	FLAX LILY	1 GALLON	30" O.C.	L
GREVILLEA SPECIES	GRELLIVEA	1 GALLON	2' O.C.	L
HEMEROCALLIS SPECIES	EVERGREEN DAYLILY	1 GALLON	2' O.C.	M
LAVANDULA SPECIES	LAVENDER	1 GALLON	3' O.C.	L
LIRIOPE SPECIES	LILY TURF	1 GALLON	2' O.C.	M
NANDINA SPECIES	HEAVENLY BAMBOO	1 GALLON	3' O.C.	L
TEUCRIUM SPECIES	GERMANDER	1 GALLON	2' O.C.	L
ZAUSCHNERIA CALIFORNICA	CALIFORNIA FUCHSIA	1 GALLON	VARIES	L

BOTANICAL NAME	COMMON NAME	MINIMUM CONTAINER SIZE	SPACING	PLANTING ZONE	WULCOLS
GROUNDCOVER D:					
ARCTOSTAPHYLOS UVA-URSI	BEARBERRY	1 GALLON	3' O.C.		L
CEANATHUS SPECIES	WILD LILAC	1 GALLON	18" O.C.		L
CISTUS SALVIIFOLIUS	ROCKROSE	1 GALLON	2' O.C.		L
CONVOLVULUS SABATIUS	GROUND MORNING GLORY	1 GALLON	3' O.C.		L
COPROSMA KIRKII SPECIES	NCN	1 GALLON	18" O.C.		L
COTONEASTER SPECIES	COTONEASTER	1 GALLON	18" O.C.		L
EREMOPHILA SPECIES	EMU BUSH	1 GALLON	2' O.C.		L
LANTANA SPECIES	LANTANA	1 GALLON	4' O.C.		L
ROSA SPECIES	GROUNDCOVER ROSE	2 GALLON	2' O.C.		L
TEUCRIUM SPECIES	GERMANDER	1 GALLON	2' O.C.		L
WESTRINGIA SPECIES	WESTRINGIA	1 GALLON	VARIES		L
ZAUSCHNERIA CANUM 'EVERETT'S CHOICE'	EVERETT'S CALIFORNIA FUCHSIA	1 GALLON	VARIES		L
STORM WATER TREATMENT SHRUBS AND GRASSES E:					
CHONDROPETALUM SPECIES	NCN	1 GALLON	MIX EVENLY	BASIN FLOOR	L
JUNCUS PATENS	RUSH	1 GALLON	MIX EVENLY	BASIN FLOOR	L
LEYMUS SPECIES	NCN	1 GALLON	MIX EVENLY	BASIN FLOOR	L
MIMULUS AURANTIACUS	MONKEY FLOWER	1 GALLON	MIX EVENLY	BASIN FLOOR	L
MUHLENBERGIA RIGENS	DEER GRASS	1 GALLON	MIX EVENLY	BASIN FLOOR	L
STORM WATER TREATMENT PLANTING NOTES:					
STORM WATER TREATMENT SHRUBS AND GRASSES APPROVED PER THE C.3 HANDBOOK APPENDIX D PLANT LIST.					
PG&E APPROVED TREES WITHIN DISTRIBUTION LINE F: (NO TREES TO BE PLANTED WITHING 10' OF POWER POLE BASE)					
AESCULUS CALIFORNICA	BUCKEYE	15 GALLON	N/A		L
CALLISTEMON SPECIES	BOTTLEBRUSH	15 GALLON	N/A		L
ERIOBOTRYA SPECIES	LOQUAT	15 GALLON	N/A		L
LAGERSTROEMIA SPECIES	CRAPE MYRTLE	15 GALLON	N/A		M
PRUNUS CERASIFERA 'KRAUTER VESUVIUS'	PURPLE LEAF PLUM	15 GALLON	N/A		L

NOTES

WATER CONSERVATION STATEMENT:

PLANT MATERIAL HAS BEEN CHOSEN FOR WATER CONSERVING AND REDUCED MAINTENANCE CHARACTERISTICS. A MAXIMUM OF 25% OF NON-TURF PLANS WILL HAVE A MODERATE IRRIGATION WATER REQUIREMENT AND A MINIMUM OF 50% OF NON-TURF PLANTS WILL HAVE A LOW TO VERY LOW IRRIGATION WATER REQUIREMENT.

I HAVE COMPLIED WITH THE CRITERIA OF CITY OF OAKLEY WATER EFFICIENT LANDSCAPE ORDINANCE AND APPLIED THEM FOR THE EFFICIENT USE OF WATER IN THE LANDSCAPE AND IRRIGATION DESIGN PLAN.

IRRIGATION NOTE:

A FULLY AUTOMATIC IRRIGATION SYSTEM SHALL BE PROPOSED FOR THE PROJECT UTILIZING WATER CONSERVING METHODS. IRRIGATION SHALL BE INSTALLED THROUGHOUT THE BIO-RETENTION AREAS TO PROVIDE SUPPLEMENTAL IRRIGATION IN THE DRY MONTHS WITH REDUCED IRRIGATION DURING SEASONAL RAINFALL OR WET MONTHS.

MINIMUM TREE CLEARANCE NOTE:

1. SMALL TREES (15' TALL/WIDE) SHALL BE PLACED A MINIMUM OF 6' FROM BUILDINGS AND A MINIMUM OF 2' FROM EDGES OF PAVING, CURBS OR WALLS.
2. MEDIUM TREES (25' TALL/WIDE) SHALL BE PLACED A MINIMUM OF 10' FROM BUILDINGS AND A MINIMUM OF 3' FROM PAVING, CURBS OR WALLS.
3. LARGE TREES (ABOVE 25' TALL/WIDE) SHALL BE PLACED A MINIMUM OF 15' FROM BUILDINGS AND A MINIMUM OF 3' FROM PAVING, CURBS OR WALLS.
4. 5' MINIMUM FROM JOINT TRENCH, WATER LINES, WATER METERS AND FIRE HYDRANTS.
5. 8' MINIMUM FROM SANITARY SEWER AND STORM DRAINS.
6. ALL TREES PLANTED WITHIN 5'-0" OF FUTURE CURBS, SIDEWALK, WALLS AND ALL UTILITIES, SHALL INCLUDE A ROOT BARRIER.

LANDSCAPE NOTES:

PLANT PALETTE IS FOR REFERENCE ONLY, NOT ALL TREES, SHRUBS, GRASSES, AND GROUNDCOVER LISTED WILL BE UTILIZED IN THE PREPARATION OF CONSTRUCTION DOCUMENTS. ADDITIONAL PLANTS MAY BE SUBSTITUTED DUE TO AVAILABILITY AND CONTAINER SIZE. PLANT MATERIAL SHALL BE SELECTED AT THE DESCRETION OF THE LANDSCAPE ARCHITECT.

PLACE 3" OF COMPOSTED NON-FLOATABLE MULCH IN AREAS BETWEEN STORM WATER PLANTINGS AND SIDE SLOPES.

A WEED BARRIER (2 OZ. POLYSPUN WEED BARRIER FABRIC AVAILABLE FROM PRO FABRIC SUPPLY, WWW.PROFABRICSUPPLY.COM, OR APPROVED EQUAL) SHALL BE INSTALLED AS A WARNING BARRIER TO PREVENT ALTERATION TO THE SILVA CELLS, INSTALL DIRECTLY ON TOP OF THE SILVA CELL LIMITS.

LANDSCAPING SHALL BE OF THE TYPE AND SITUATED IN LOCATIONS TO MAXIMIZE OBSERVATION WHILE PROVIDING THE DESIRED DEGREE OF AESTHETICS. LANDSCAPING SHOULD BE TRIMMED SO AS NOT TO PROVIDE CONCEALMENT OPPORTUNITIES OR MEANS TO ACCESS ROOF. SECURITY PLANTING MATERIALS ARE ENCOURAGED ALONG PROPERTY LINE AND UNDER VULNERABLE WINDOWS.

ALL TRANSFORMERS AND UTILITY BOXES TO BE SCREENED WITH EVERGREEN SHRUBS.

BENCH

FINISH TO BE BRONZE

WASTE RECEPTACLE

FINISH TO BE BRONZE

BICYCLE RACK

FINISH TO BE BRONZE

DINING TABLE

FINISH TO BE BRONZE

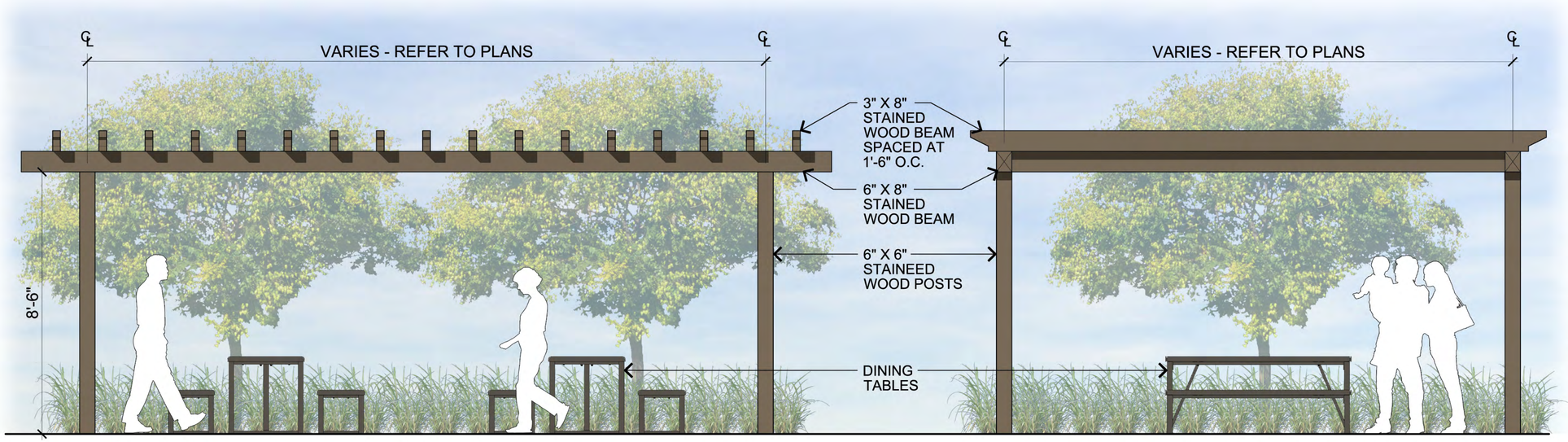
TABLES AND CHAIRS

FINISH TO BE BRONZE

PLAY STRUCTURE

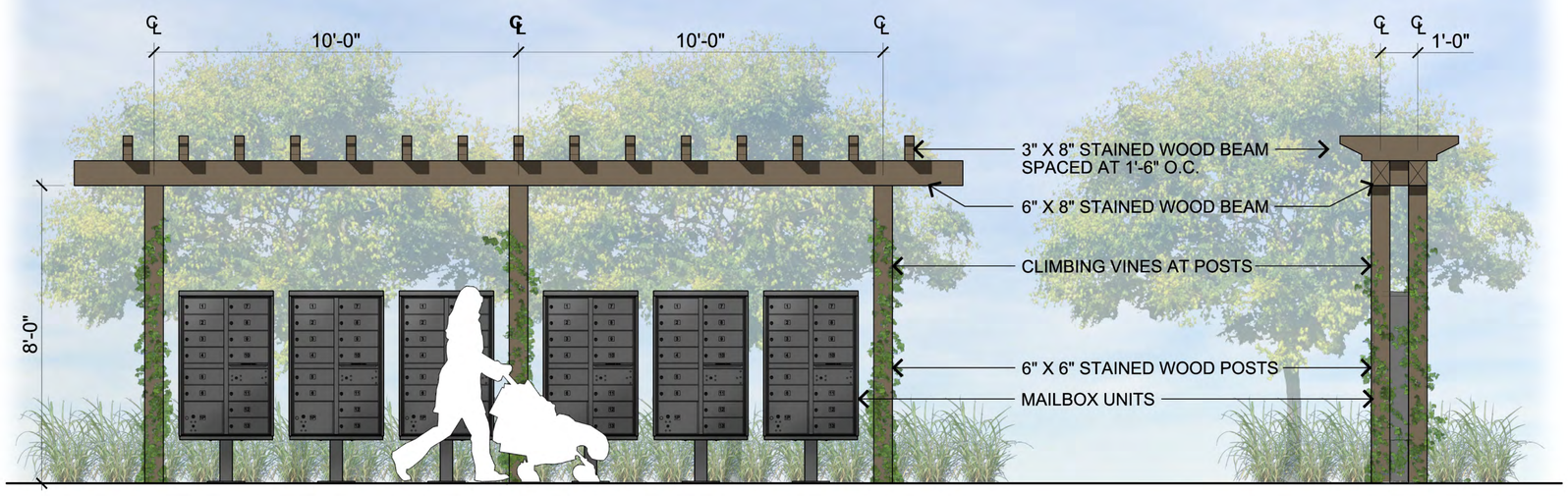
Site Amenities

L-9.1



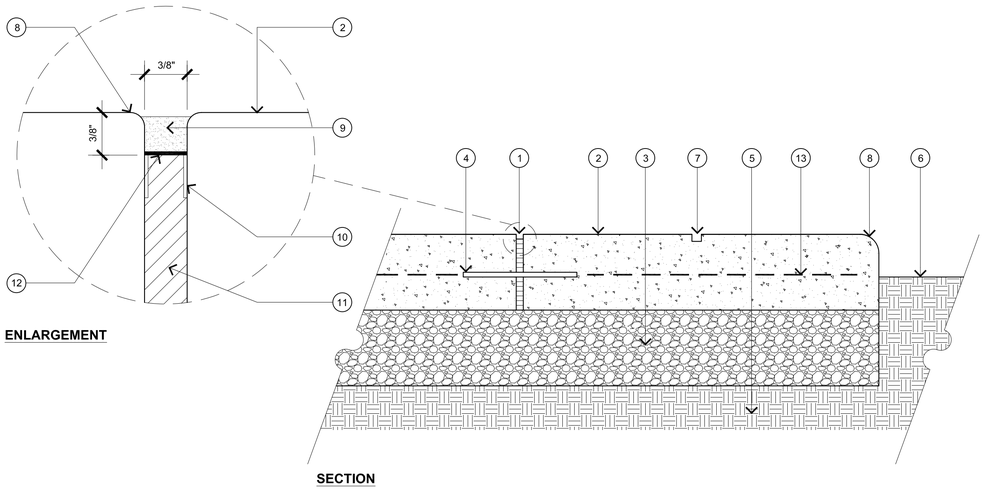
STAINED WOOD PERGOLA

SCALE: 1/2" - 1'-0"



MAILBOX STATION

SCALE: 1/2" - 1'-0"



ENLARGEMENT

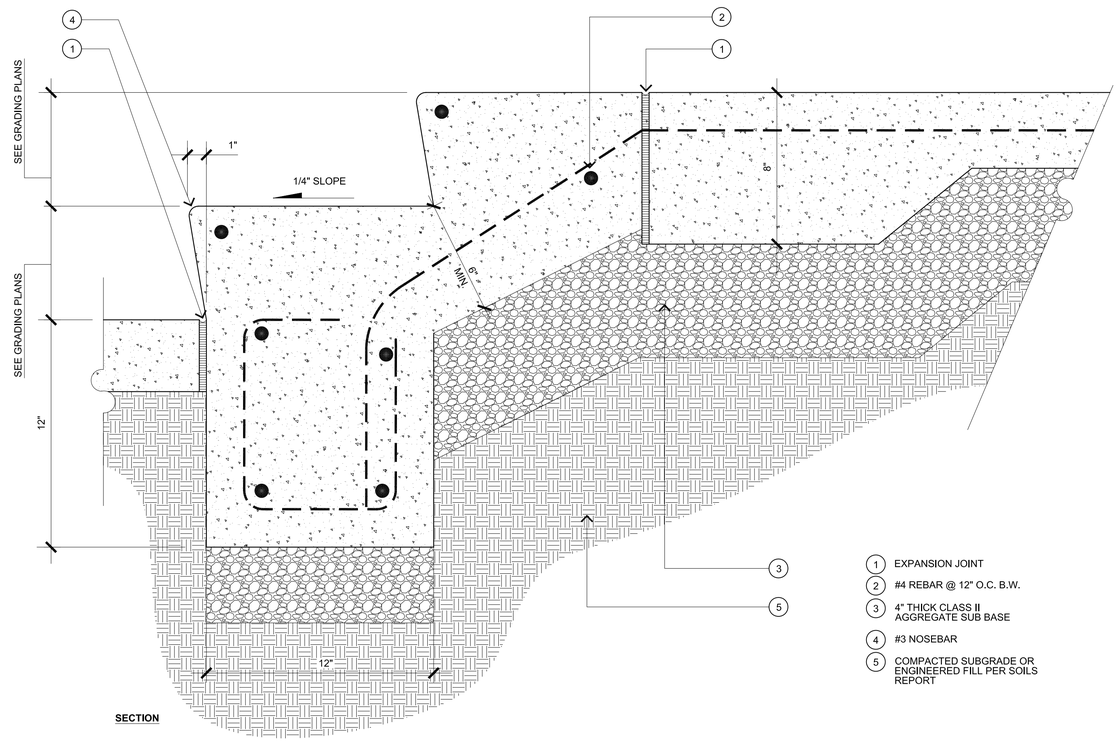
SECTION

1. 3/8" EXPANSION JOINT WITH SEALANT & BACKER ROD. EXPANSION JOINTS SHALL OCCUR EVERY 25' C.C. EACH WAY- REFER TO PLAN FOR LOCATIONS
2. 4" THICK CONCRETE PAVING
3. 4" THICK CLASS II AGGREGATE SUB BASE
4. #4 X 24" LONG DOWELS @ 24" O.C.
5. 90% COMPACTED SUB GRADE
6. FINISH GRADE AT PLANTING AREA 1" BELOW AT TURF AREAS, 2" AT SHRUB AND GROUNDCOVER AREAS
7. SCORED JOINT- 1" DEEP X 1/8" WIDE SAWCUT @ 12"C.C. EACH WAY, REFER TO PLANS FOR LOCATIONS (TYP.)
8. RADIUSED EDGE
9. SEALANT - ALSO INSTALL WHERE PAVING ABUTS TO BUILDING FOUNDATIONS
10. PVC CAP
11. EXPANSION MATERIAL
12. BOND BREAKER TAPE
13. #3 REBAR @ 18" O.C. BOTH WAYS

NOTE:
CONCRETE MIX SHALL BE LOW SHRINK.

1 CONCRETE PAVING

SCALE : 3"=1'-0"

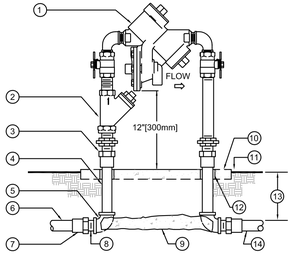


SECTION

1. EXPANSION JOINT
2. #4 REBAR @ 12" O.C. B.W.
3. 4" THICK CLASS II AGGREGATE SUB BASE
4. #3 NOSEBAR
5. COMPACTED SUBGRADE OR ENGINEERED FILL PER SOILS REPORT

2 CONCRETE STEPS (AS NEEDED)

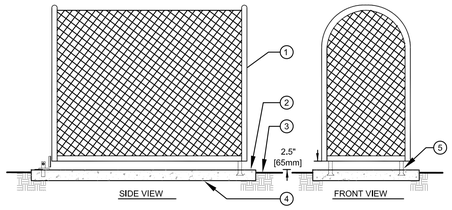
SCALE : 3"=1'-0"



1. REDUCED PRESSURE BACKFLOW ASSEMBLY.
2. YB "Y" STRAINER SYSTEM (AS REQUIRED).
3. WROUGHT COPPER MALE ADAPTER-2 TOTAL (SOLDER x THREAD CONNECTION).
4. COPPER TYPE "K" PIPE (LENGTH AS REQUIRED).
5. WROUGHT COPPER 90° ELBOW-2 TOTAL (SOLDER x THREAD CONNECTION).
6. PVC MAIN LINE TO POINT OF CONNECTION.
7. BUSH AS NECESSARY FOR SIZE TRANSITION.
8. SCHEDULE 40 PVC MALE ADAPTER-2 TOTAL.
9. CONCRETE SUPPORT BLOCK.
10. CONCRETE PAD-SEE ENCLOSURE DETAIL.
11. FINISH GRADE.
12. PVC SLEEVE BOTH SIDES.
13. REFER TO IRRIGATION LEGEND
14. PVC MAIN LINE TO IRRIGATION SYSTEM.

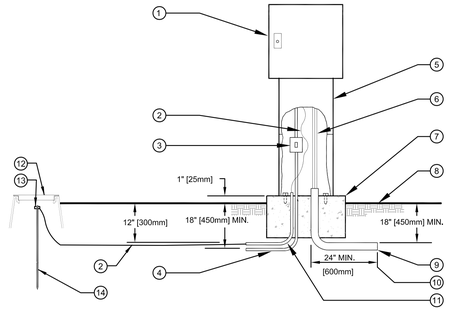
NOTES:
1. INSTALL A FREEZE PREVENTATIVE BLANKET AROUND BACKFLOW ASSEMBLY. BLANKET SHALL BE GREEN.
2. DO NOT SOLDER CONNECT FITTINGS WHILE THREADED INTO BACKFLOW ASSEMBLY. THIS MAY CAUSE DAMAGE TO DEVICE.
3. NIPPLES AND FITTINGS TO BE SAME IPT SIZE AS BACKFLOW ASSEMBLY.
4. PROVIDE A STAINLESS STEEL ENCLOSURE TO COMPLETELY ENCLOSE DEVICE. INSTALL ENCLOSURE TO CONCRETE BASE AS DIRECTED BY MANUFACTURER.

1 REDUCED PRESSURE BACKFLOW ASSEMBLY
SCALE: NONE



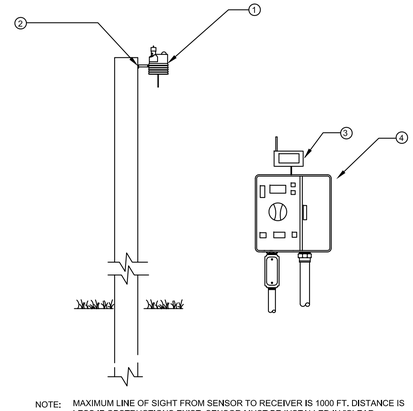
1. STAINLESS STEEL ENCLOSURE TO COMPLETELY ENCLOSE DEVICE
2. SET PAD 1/2" [13MM] ABOVE FINISH GRADE
3. FINISH GRADE
4. 6" [150mm] THICK CONCRETE PAD FOR ENCLOSURE SUPPORT TO EXTEND 6" [150mm] BEYOND ENCLOSURE ON ALL SIDES. CONCRETE TO HAVE MEDIUM BROOM FINISH.
5. MOUNTING BRACKETS (STANDARD WITH ENCLOSURE) TO BE SET INTO CONCRETE PAD. PROVIDE LOCKING TAB TO ACCEPT PADLOCK PER MANUFACTURER'S INSTRUCTION.

2 BACKFLOW ASSEMBLY ENCLOSURE
SCALE: NONE



1. IRRIGATION CONTROLLER.
2. #6 BARE COPPER GROUND WIRE.
3. 120 VOLT LOCKABLE WEATHERPROOF ON/OFF SWITCH PROVIDED UNDER IRRIGATION CONTRACT.
4. 120 VOLT A.C. ELECTRICAL SERVICE FROM SOURCE TO CONTROLLER LOCATION PROVIDED BY CONTRACTOR. IRRIGATION CONTRACTOR TO PROVIDE RIGID STEEL CONDUIT FROM SERVICE STUB-OUT TO CONTROLLER GCFI SWITCH AND COMPLETE ELECTRICAL SERVICE TO CONTROLLER.
5. PEDESTAL ENCLOSURE.
6. LOW VOLTAGE CONTROL WIRING.
7. CONCRETE PAD-6" [150mm] THICK (MIN.) EXTEND 6" [150mm] BEYOND EACH SIDE AND BACK, 24" [600mm] IN FRONT AND 1" [25mm] ABOVE FINISH GRADE.
8. FINISH GRADE.
9. SCHEDULE 40 GREY PVC ELECTRICAL CONDUIT WITH SWEEP ELL FOR LOW VOLTAGE WIRE.
10. 24" MIN. [600mm] AND OR 12" [300mm] BEYOND HARDSCAPE.
11. 1 1/2" [40mm] PVC SWEEP ELL FOR GROUND WIRE.
12. 6" ROUND BLACK PLASTIC BOX WITH T-LID FOR GROUND ROD.
13. CADWELD CONNECTIONS
14. 8' LONG COPPER GROUND ROD. LOCATE A MINIMUM OF 10' AWAY FROM CONTROLLER.

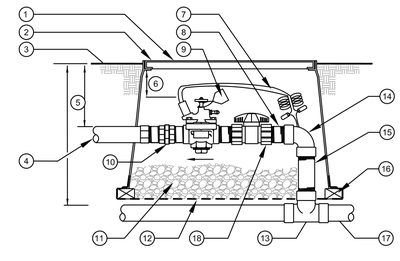
3 CONTROLLER - PEDESTAL MOUNT
SCALE: NONE



NOTE: MAXIMUM LINE OF SIGHT FROM SENSOR TO RECEIVER IS 1000 FT. DISTANCE IS LESS IF OBSTRUCTIONS EXIST, SENSOR MUST BE INSTALLED IN "CLEAR SPACE" WHERE IT IS EXPOSED TO UNOBSTRUCTED RAINFALL AND IS CLEAR OF IRRIGATION SPRAY.

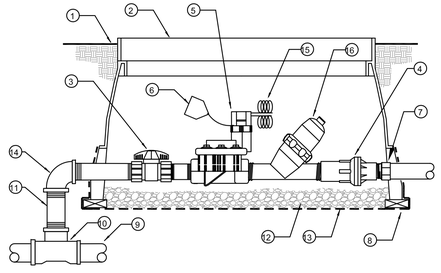
1. WIRELESS CLIMATE SENSOR TRANSMITTER
2. SUITABLE POST, POLE, OR GUTTER MOUNT. MOUNT IN LOCATION WHERE SENSOR CAN RECEIVE FULL SUN, IS OPEN TO RAINFALL AND OUT OF SPRINKLER SPRAY PATTERN
3. SENSOR RECEIVER
4. CONTROLLER

4 WIRELESS WEATHER SENSOR
SCALE: NONE



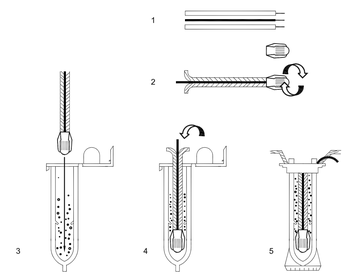
1. REMOTE CONTROL VALVE WITH FLOW CONTROL AND MANUAL BLEED (PRESSURE REGULATOR WHERE SHOWN ON PLANS).
2. USE A 14" X 19" RECTANGULAR PLASTIC VALVE BOX WITH BOLT DOWN LID FOR 1" VALVES. FOR 1.5" AND LARGER VALVES INSTALL BALL VALVE WITHIN A SEPARATE 10" ROUND BOX OR ONE BALL VALVE PER MANIFOLD OF VALVES, GATE VALVE SIZE SHALL BE SAME AS LARGEST VALVE WITHIN MANIFOLD. ONE VALVE PER BOX- NO EXCEPTIONS. INSTALL BOX AS SHOWN IN BOX INSTALLATION DETAIL.
3. FINISH GRADE.
4. PVC LATERAL LINE.
5. REFER TO IRRIGATION SPECS.
6. 3" [75mm] MIN. 6" [150mm] MAX.
7. VALVE CONTROL WIRE- PROVIDE SEAL PACKS AT ALL SPLICES AND 3' [1m] OF EXCESS UF WIRE IN A 1" [25mm] DIAMETER COIL.
8. SCHEDULE 80 PVC NIPPLE (4 TOTAL).
9. VALVE I.D. TAG (CONTROLLER AND STATION NUMBER).
10. SCHEDULE 80 PVC THREADED UNION.
11. PEA GRAVEL OR 3/4" DRAIN ROCK- 4" [100mm] DEEP BELOW VALVE (NO SOIL IN VALVE BOX).
12. 19 GAUGE 1/2" [12mm] SQUARE WIRE MESH.
13. UPC APPROVED SCHEDULE 40 PVC TEE.
14. SCHEDULE 80 PVC 90° ELBOW (TxT).
15. SCHEDULE 80 PVC NIPPLE- LENGTH AS REQUIRED.
16. BRICK-1 EACH CORNER.
17. PVC MAIN LINE.
18. SCHEDULE 80 PVC UNION BALL VALVE (ONE PER VALVE).

5 REMOTE CONTROL VALVE
SCALE: NONE



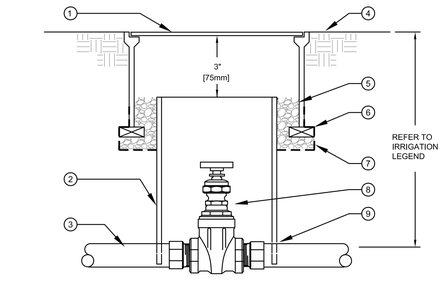
1. FINISH GRADE
2. JUMBO RECTANGULAR PLASTIC VALVE BOX WITH BOLT DOWN LID. ONE VALVE PER BOX- NO EXCEPTIONS. INSTALL BOX AS SHOWN IN BOX INSTALLATION DETAIL.
3. SCHEDULE 80 PVC UNION BALL VALVE (ONE PER VALVE)
4. PRESSURE REGULATOR (INCLUDED IN DRIP ZONE KIT)
5. REMOTE CONTROL VALVE DRIP ZONE KIT. (SHALL INCLUDE VALVE, FILTER AND A 40 PSI PRESSURE REDUCING VALVE)
6. VALVE I.D. TAG (CONTROLLER AND STATION NUMBER).
7. SCHEDULE 40 MALE ADAPTER
8. BRICK-1 EACH CORNER.
9. PVC MAIN LINE.
10. UPC APPROVED SCHEDULE 40 PVC TEE.
11. SCHEDULE 80 PVC NIPPLE-(4-TOTAL) LENGTH AS REQUIRED.
12. PEA GRAVEL OR 3/4" [20mm] DRAIN ROCK - 4" [102mm] DEEP BELOW VALVE (NO SOIL IN VALVE BOX).
13. 19 GAUGE 1/2" [13mm] SQUARE WIRE MESH.
14. SCHEDULE 80 PVC 90° ELBOW (TxT).
15. VALVE CONTROL WIRE- PROVIDE 3M-DBY SEAL PACKS AT ALL SPLICES AND 3' [1m] OF EXCESS UF WIRE IN A 1" [25mm] DIAMETER COIL.
16. Y-FILTER (INCLUDED IN DRIP ZONE KIT)

6 REMOTE CONTROL VALVE (DRIPZONE)
SCALE: NONE



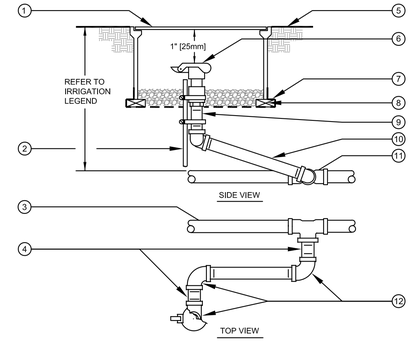
INSTRUCTIONS:
1. STRIP WIRES APPROXIMATELY 1/2" (13 mm) TO EXPOSE WIRE.
2. TWIST CONNECTOR AROUND WIRES CLOCKWISE UNTIL HAND TIGHT, DO NOT OVERTIGHTEN.
3. INSERT WIRE ASSEMBLY INTO PLASTIC TUBE UNTIL WIRE CONNECTOR SNAPS PAST LIP IN BOTTOM OF TUBE.
4. PLACE WIRES WHICH EXIT TUBE IN WIRE EXIT HOLES AND CLOSE CAP UNTIL IT SNAPS.
5. INSPECT FINAL SPLICE ASSEMBLY TO BE SECURE AND FINISHED.

7 WEATHERPROOF WIRE SPLICE ASSEMBLY
SCALE: NONE



1. 10" ROUND PLASTIC VALVE BOX WITH BOLT DOWN LID.
2. 8" [200mm] CLASS 160 OR SCHEDULE 40 PVC PIPE (NOTCH TO FIT OVER MAIN LINE PIPE).
3. PVC MAIN LINE.
4. FINISH GRADE.
5. PEA GRAVEL OR 3/4" [20mm] DRAIN ROCK - 4" [100mm] DEEP (NO SOIL IN VALVE BOX).
6. BRICK-2 TOTAL.
7. 19 GAUGE 1/2" [13mm] SQUARE WIRE MESH.
8. GATE VALVE.
9. MALE ADAPTER. REFER TO LEGEND FOR FITTING TYPE.

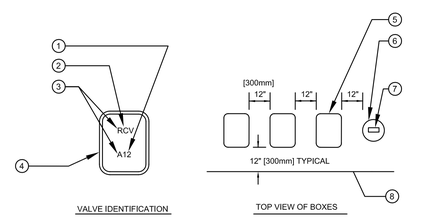
8 GATE VALVE
SCALE: NONE



1. 10" ROUND PLASTIC VALVE BOX WITH BOLT DOWN LID.
2. 1 1/4" x 1 1/4" x 3/16" [30mm x 30mm x 5mm] ANGLE IRON 30" [760mm] LONG W/2 STAINLESS STEEL STRAPS (ONE AROUND QCV).
3. PVC MAIN LINE.
4. 3" [75mm] LONG SCHEDULE 80 PVC THREADED NIPPLE.
5. FINISH GRADE.
6. QUICK COUPLING VALVE.
7. 19 GAUGE 1/2" [13mm] SQUARE WIRE MESH.
8. BRICK - 2 TOTAL.
9. SCHEDULE 80 PVC THREADED NIPPLE.
10. 10" [250mm] LONG SCHEDULE 80 PVC THREADED NIPPLE.
11. UPC APPROVED SCHEDULE 40 PVC TEE OR ELBOW.
12. SCHEDULE 80 PVC THREADED 90° ELL.

NOTE:
NIPPLES AND FITTINGS TO BE SAME SIZE AS VALVE IPT INLET THREAD SIZE.

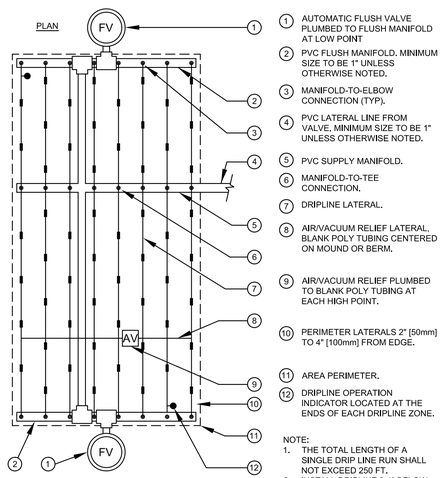
9 QUICK COUPLING VALVE
SCALE: NONE



1. CONTROLLER AND STATION
2. VALVE TYPE
3. HEAT BRAND LETTERS AND NUMBERS INTO LID.
4. VALVE BOX COVER
5. RECTANGULAR VALVE BOX
6. ROUND VALVE BOX FOR QCV AND GATE VALVE.
7. HEAT BRAND LETTERS AND NUMBERS INTO LID (TYPICAL).
8. EDGE OF LAWN, WALK, FENCE, CURB, ETC.

INSTRUCTIONS:
1. CENTER VALVE BOX OVER REMOTE CONTROL VALVE TO FACILITATE SERVICING VALVE.
2. SET BOXES 1" [25mm] ABOVE FINISH GRADE OR MULCH COVER IN GROUND COVER/SHRUB AREA AND FLUSH WITH FINISH GRADE IN TURF AREA.
3. SET RCV AND VALVE BOX ASSEMBLY IN GROUND COVER/SHRUB AREA WHERE POSSIBLE. INSTALL IN LAWN ONLY IF GROUND COVER DOES NOT EXIST ADJACENT TO LAWN.
4. SET BOXES PARALLEL TO EACH OTHER AND PERPENDICULAR TO EDGE OF LAWN, WALK, FENCE, CURB, ETC.
5. AVOID HEAVILY COMPACTING SOIL AROUND VALVE BOXES TO PREVENT COLLAPSE AND DEFORMATION OF VALVE BOX SIDES.
6. INSTALL EXTENSION BY VALVE BOX MANUFACTURER AS REQUIRED TO COMPLETELY ENCLOSE ASSEMBLY FOR EASY ACCESS.

10 VALVE BOX INSTALLATION
SCALE: NONE

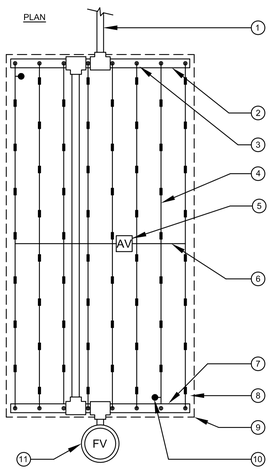


1. AUTOMATIC FLUSH VALVE PLUMBED TO FLUSH MANIFOLD AT LOW POINT
2. PVC FLUSH MANIFOLD. MINIMUM SIZE TO BE 1" UNLESS OTHERWISE NOTED.
3. MANIFOLD-TO-ELBOW CONNECTION (TYP).
4. PVC LATERAL LINE FROM VALVE. MINIMUM SIZE TO BE 1" UNLESS OTHERWISE NOTED.
5. PVC SUPPLY MANIFOLD.
6. MANIFOLD-TO-TEE CONNECTION.
7. DRIPLINE LATERAL.
8. AIR/VACUUM RELIEF LATERAL, BLANK POLY TUBING CENTERED ON MOUND OR BERM.
9. AIR/VACUUM RELIEF PLUMBED TO BLANK POLY TUBING AT EACH HIGH POINT.
10. PERIMETER LATERALS 2" [50mm] TO 4" [100mm] FROM EDGE.
11. AREA PERIMETER.
12. DRIPLINE OPERATION INDICATOR LOCATED AT THE ENDS OF EACH DRIPLINE ZONE.

NOTE:
1. THE TOTAL LENGTH OF A SINGLE DRIP LINE RUN SHALL NOT EXCEED 250 FT.
2. INSTALL DRIPLINE 2-4" BELOW GRADE AND STAKE DOWN EVERY 4' OR AS REQUIRED.

1 TORO DL 2000 CENTER FEED LAYOUT

SCALE: NONE

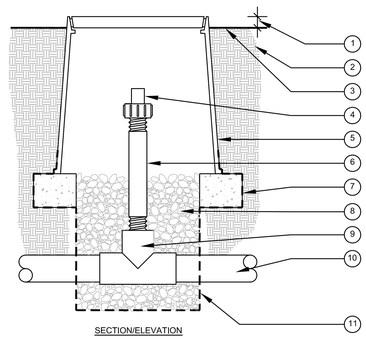


1. PVC LATERAL LINE FROM VALVE. MINIMUM SIZE TO BE 1" UNLESS OTHERWISE NOTED.
2. PVC FLUSH MANIFOLD. MINIMUM SIZE TO BE 1" UNLESS OTHERWISE NOTED.
3. MANIFOLD-TO-ELBOW CONNECTION (TYP).
4. DRIPLINE LATERAL.
5. AIR/VACUUM RELIEF VALVE PLUMBED TO BLANK 5/8" [16mm] TUBING AT EACH HIGH POINT.
6. AIR/VACUUM RELIEF LATERAL, BLANK 5/8" [16mm] POLY TUBING CENTERED ON MOUND OR BERM.
7. PVC FLUSH MANIFOLD.
8. PERIMETER LATERALS 2" [50mm] TO 4" [100mm] FROM EDGE.
9. AREA PERIMETER.
10. DRIP OPERATION INDICATOR LOCATED AT THE ENDS OF EACH DRIPLINE ZONES.
11. AUTOMATIC FLUSH VALVE PLUMBED TO FLUSH MANIFOLD AT LOW POINT.

NOTE:
1. THE TOTAL LENGTH OF A SINGLE DRIP LINE RUN SHALL NOT EXCEED 250 FT.
2. INSTALL DRIPLINE 2-4" BELOW GRADE AND STAKE DOWN EVERY 4' OR AS REQUIRED.

2 TORO DL 2000 END FEED LAYOUT

SCALE: NONE



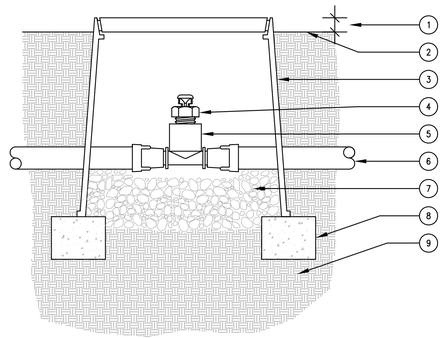
SECTION/ELEVATION

1. 1" [25mm] ABOVE FINISH GRADE.
2. NATIVE SOIL.
3. FINISH GRADE.
4. FLUSH VALVE.
5. ROUND PLASTIC VALVE BOX. REFER TO IRRIGATION SPECS FOR BOX SIZE. HEAT BRAND "FV" ON LID IN 2" [50mm] HIGH CHARACTERS.
6. 3/4" [20mm] SCH 80 PVC NIPPLE (LENGTH AS REQUIRED).
7. BRICK - 2 TOTAL
8. PEA GRAVEL 18" (450mm) DEEP.
9. PVC TEE (SxSxT) WITH 3/4" [20mm] THREADED OUTLET.
10. PVC PIPING.
11. 19 GAUGE 1/2" [13mm] SQUARE WIRE MESH.

NOTE:
USE ONE FLUSH VALVE FOR EVERY 7 GPM PER ZONE. LOCATE AT LOW POINTS. FLUSH RATE IS 0.8 GPM. FLUSH PRESSURE IS 2 PSI.

3 TORO DL 2000 FLUSH VALVE (PVC TEE)

SCALE: NONE



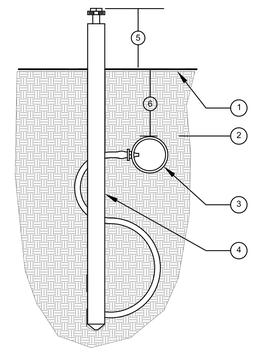
SECTION/ELEVATION

1. 1" ABOVE FINISH GRADE.
2. FINISH GRADE.
3. 6" ROUND PLASTIC VALVE BOX. HEAT BRAND "AR" ON LID IN 1" HIGH CHARACTERS.
4. TORO DL2000 AIR/VACUUM RELIEF VALVE (YD-500-34).
5. TORO LOC-EZE X 1/2" FPT TEE (FTF16).
6. TORO DL2000 TUBING (RGP-XX-XXX) OR TORO BLUE STRIPE POLY TUBING (EHD1645-XXX) AIR-RELIEF LATERAL.
7. PEA GRAVEL SUMP (6" DEEP).
8. BRICK SUPPORTS (2 COMMON BRICKS REQUIRED).
9. NATIVE SOIL PER SPECIFICATIONS.

NOTE:
USE ONE AIR/RELIEF VALVE FOR EVERY 7 GPM PER ZONE. LOCATE AT HIGH POINTS.

4 TORO DL 2000 AIR VACUUM RELIEF VALVE

SCALE: NONE

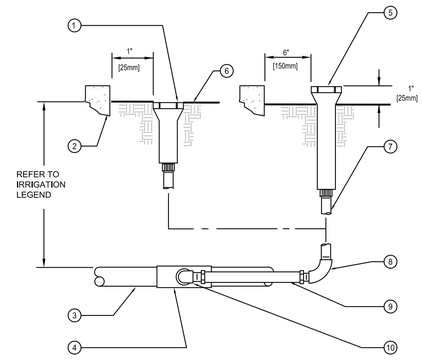


SECTION/ELEVATION

1. FINISH GRADE.
2. SOIL BACKFILL.
3. DRIPLINE.
4. OPERATION INDICATOR. USE ONE PER ZONE AND LOCATED AT FLUSH END OF ZONE.
5. 2"-3" [50mm - 75mm] ABOVE FINISH GRADE.
6. REFER TO IRRIGATION LEGEND.

5 TORO DL 2000 OPERATION INDICATOR

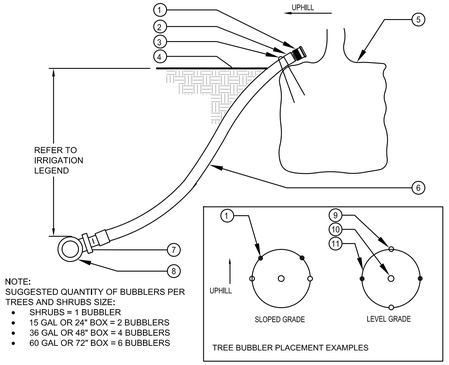
SCALE: NONE



1. POP-UP LAWN SPRAY SPRINKLER
2. WALL, WALK, CURB OR BUILDING
3. PVC LATERAL LINE
4. UPC APPROVED SCHEDULE 40 PVC TEE OR ELBOW
5. POP-UP SHRUB SPRAY SPRINKLER OR BUBBLER
6. FINISH GRADE
7. 1/2" [13mm] SCHEDULE 80 PVC THREADED NIPPLE (LENGTH AS REQUIRED).
8. 1/2" [13mm] SCHEDULE 40 PVC THREADED 90° ELL.
9. 1/2" [13mm] FLEXIBLE IPS HOSE 6" [150mm] LONG WITH MALE ADAPTERS OR 1/2" [13mm] FLEXIBLE SWING JOINT (1/2" x 6") [13mm x 150mm] WITH A MINIMUM PRESSURE RATING OF 100 PSI [690kPa].
10. 1/2" [13mm] SCHEDULE 40 PVC STREET ELL.

6 POP-UP SPRAY SPRINKLER RISER

SCALE: NONE



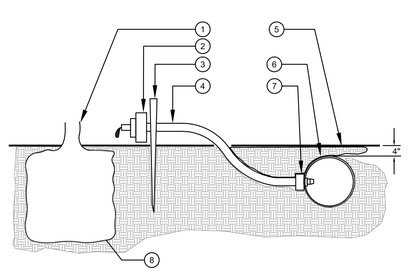
TREE BUBBLER PLACEMENT EXAMPLES

NOTE:
SUGGESTED QUANTITY OF BUBBLERS PER TREES AND SHRUBS SIZE:
- SHRUBS = 1 BUBBLER
- 15 GAL OR 24" BOX = 2 BUBBLERS
- 36 GAL OR 48" BOX = 4 BUBBLERS
- 60 GAL OR 72" BOX = 6 BUBBLERS

1. BUBBLER (TO BE INSTALLED ON TOP OF ROOTBALL).
2. 1/2" [13mm] SCH. 40 MALE ADAPTER.
3. 6" [150mm] STEEL STAPLE.
4. FINISH GRADE.
5. TREE OR SHRUB ROOTBALL.
6. 1/2" [13mm] IPS FLEXIBLE PVC.
7. PVC TEE (SST), ELBOW (ST) OR FEMALE ADAPTER.
8. PVC LATERAL LINE.
9. TREE STAKES.
10. TREE OR SHRUB.
11. EDGE OF ROOTBALL (TYPICAL).

7 TREE AND SHRUB BUBBLER

SCALE: NONE

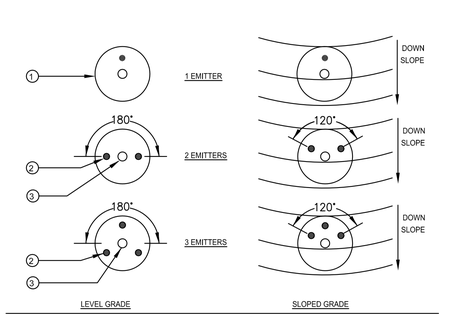


NOTE:
TO INSERT BARBED CONNECTOR INTO POLYETHYLENE TUBING, USE INSERTION TOOL. WHERE POLYETHYENE TUBING CAN BE PLACED ADJACENT TO SHRUB ROOTBALL, A BARBED EMITTER MAY BE INSTALLED DIRECTLY INTO POLYETHYENE TUBING AND DISTRIBUTION TUBING ELIMINATED. POINT OF WATER EMISSION FROM BARBED EMITTER MUST DRIP WATER DIRECTLY ON ROOTBALL.

1. SHRUB STEM.
2. EMITTER REFER TO EMITTER SCHEDULE FOR QUANTITY OF EMITTERS PER PLANT.
3. TUBING SUPPORT STAKE (SALCO DTS-200-400)
4. 1/4" TUBING DO NOT EXCEED 3' [1m] IN LENGTH.
5. FINISH GRADE.
6. SALCO PVC FLEX HOSE. INSTALL 4" [100mm] BELOW FINISH GRADE.
7. BARBED MALE ADAPTER.
8. EDGE OF ROOTBALL.

8 SALCO FLEX TUBING EMITTER PLACEMENT

SCALE: NONE



1. EDGE OF ROOTBALL (TYPICAL)
2. EMITTER OR DISTRIBUTION TUBE OUTLET (TYPICAL)
3. SHRUB STEM (TYPICAL)

EMITTER SCHEDULE

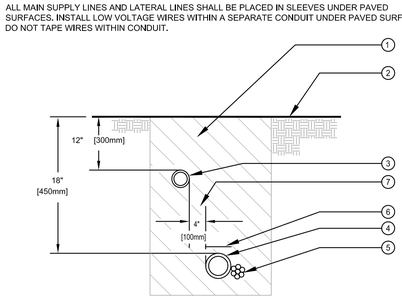
PLANT SIZE	EMITTER SPECIFACATION	FLOW (GPH)/PER EMITTER OR OUTLET	QUANTITY OF EMITTERS PER SHRUB/TREE
1 GALLON SHRUBS	USE SLV-PS-CV-1	1 GPH	2
5 GALLON SHRUBS	USE SLV-PS-CV-2	2 GPH	2
15 GALLON	USE SLV-PS-CV-2	2 GPH	3

MAXIMUM AMOUNT OF FLOW PER DRIP TUBING RUN IS 240 GPH

9 SALCO EMITTER PLACEMENT AND

SCALE: NONE

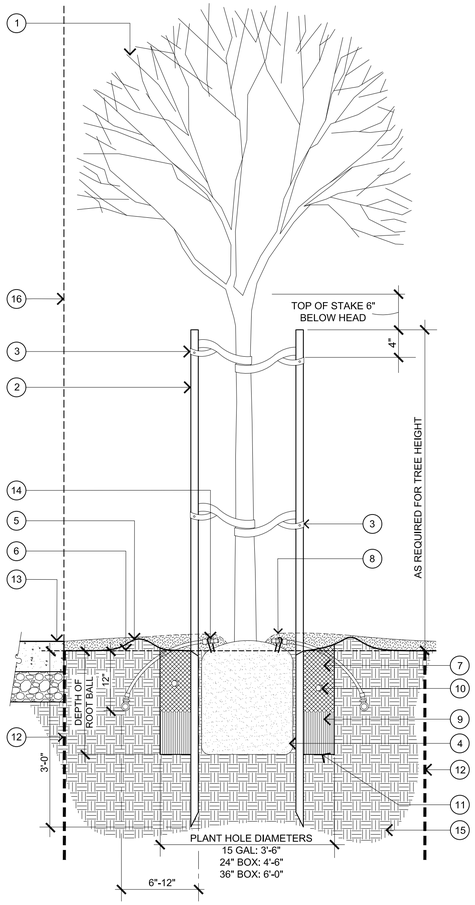
NOTES:
1. ALL MAIN SUPPLY LINES AND LATERAL LINES SHALL BE PLACED IN SLEEVES UNDER PAVED SURFACES. INSTALL LOW VOLTAGE WIRES WITHIN A SEPARATE CONDUIT UNDER PAVED SURFACES. DO NOT TAPE WIRES WITHIN CONDUIT.



1. CLEAN BACKFILL MATERIAL.
2. FINISH GRADE.
3. LATERAL LINE.
4. MAIN LINE.
5. LOW VOLTAGE CONTROL WIRE, TAPE AND BUNDLE TUBING OR WIRING AT 10 FT. INTERVALS. WIRING SHALL BE LAID OUT LOOSELY IN THE TRENCH.
6. DETECTABLE WARNING TAPE OVER MAIN LINE - 3" [75mm] ABOVE PIPE.
7. TYPICAL DISTANCE BETWEEN PIPES.

10 TRENCHING

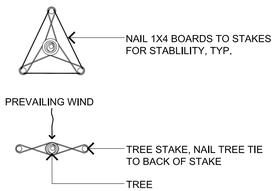
SCALE: NONE



1. TREE: REFER TO PLANTING PLAN FOR LOCATION AND PLANTING LEGEND FOR SPECIES
2. LODGE POLE PINE TREE STAKES: 3"X10' LONG TREE STAKES FOR WINDY CONDITIONS AND 36" BOX AND LARGER TREES
3. TREE TIE: WONDER TREE-TIE(800-910-2810) MODEL# W14-46, W24-84 OR APPROVED EQUAL. LOOP IN A FIGURE EIGHT AND NAIL TO BACK OF STAKE WITH GALVANIZED THREADED NAILS. ALLOW 3" OF MOVEMENT OF TREE IN ALL DIRECTIONS.
4. TREE ROOTBALL SET ON 12" LAYER UNDISTURBED NATIVE SOIL, DO NOT PENETRATE ROOTBALL WITH STAKES. TAMP SOIL TO 85% RELATIVE COMPACTION. SET CROWN OF ROOTBALL 2" ABOVE FINISH GRADE.
5. 3" EARTH BERM FOR WATER BASIN
6. FINISH GRADE, SET 1" BELOW AT TURF AREAS AND 2" AT SHRUB AND GROUNDCOVER AREAS
7. BACK FILL MIX: (TOP 12 INCHES ONLY): 70% PULVERIZED NATIVE SOIL, 30% NITROGEN FORTIFIED FIR OR REDWOOD SAWDUST.
8. BARK MULCH: 3" DEPTH, KEEP CLEAR FROM TRUNK OF TREE
9. PULVERIZED NATIVE SOIL
10. FERTILIZER TABS (21 GRAM, 20-10-5):
    - 15 GAL: 6 TABS
    - 24" BOX: 8 TABS
    - 36" BOX: 12 TABS
11. PLANTING HOLE, PULVERIZED NATIVE SOIL BELOW 12" FROM FINISHED GRADE; SCARIFY WALLS
12. ROOT BARRIER(AS NEEDED): REFER TO PLANTING NOTES AND SPECIFICATIONS
13. PAVING: REFER TO PLAN
14. 1/4 GPM IRRIGATION BUBBLER, OFFSET FROM TREE TUCKED TO ROOTBALL
15. COMPACTED SUBGRADE OR ENGINEERED FILL PER SOILS REPORT
16. BUILDING OR WALL

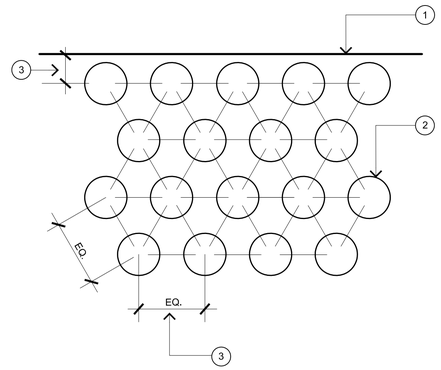
NOTES:

ALL PLANTING AREAS TO BE TREATED WITH PRE-EMERGENT.



1 TREE STAKING

N.T.S.



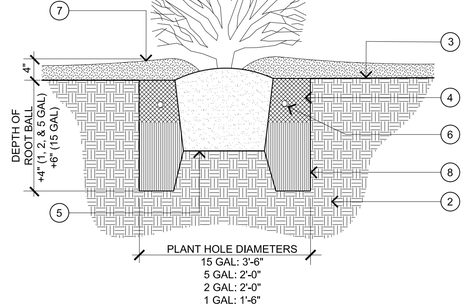
1. EDGE OF PAVING, HEADER, FACE OF BUILDING, WALL, ETC.
2. GROUNDCOVER OR SHRUB: REFER TO PLANTING PLAN FOR LOCATION AND PLANTING LEGEND FOR SPECIES
3. GROUNDCOVER AND SHRUB SPACING PER PLANTING PLAN AND LEGEND

NOTES:

- ALL PLANTS SHALL BE PLANTED AT EQUAL SPACING (TRIANGULAR) UNLESS OTHERWISE SPECIFIED ON THE PLANS
- CENTERLINE OF PLANTS SHALL BE 1/2 OF EQUAL SPACING MINIMUM FROM EDGE OF PLANTING AREA
- INFILL PLANTS AS REQUIRED TO MAINTAIN SPACING AT IRREGULAR EDGES
- KEEP MULCH CLEAR OF PLANT BASE
- ALL PLANTING AREAS TO BE TREATED WITH PRE-EMERGENT

2 GROUNDCOVER PLANTING

N.T.S.



1. SHRUB: REFER TO PLANTING PLAN FOR LOCATION AND PLANTING LEGEND FOR SPECIES
2. COMPACTED SUBGRADE OR ENGINEERED FILL PER SOILS REPORT
3. FINISH GRADE
4. BACK FILL MIX: (1/2 DEPTH OF ROOT BALL HEIGHT): 70% PULVERIZED NATIVE SOIL, 30% NITROGEN FORTIFIED FIR OR REDWOOD SAWDUST.
5. SHRUB ROOTBALL SET ON LIGHTLY TAMPED SOIL. SET CROWN OF ROOTBALL 1" ABOVE FINISH GRADE.
6. FERTILIZER TABS (21 GRAM, 20-10-5):
    - 1 GALLON: 1 TAB
    - 2 GALLON: 2 TABS
    - 5 GAL: 3 TABS
    - 15 GAL: 5 TABS
7. BARK MULCH: 3" DEPTH, KEEP CLEAR FROM ROOT BALL CROWN
8. PULVERIZED NATIVE SOIL

NOTES:

ALL PLANTING AREAS TO BE TREATED WITH PRE-EMERGENT

3 SHRUB PLANTING

N.T.S.

Planting Details

L-12

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

CONCEPTUAL OAKLEY ROAD PERSPECTIVE
A00

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

CONCEPTUAL STREETSCENE
A0.1

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

PASEO VIEW

ENTRY OPEN SPACE

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

CONCEPTUAL PERSPECTIVES
A0.2

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

EXTERIOR MATERIALS

SPANISH ELEVATION

STUCCO WALL FINISH
STUCCO PORCH
ARCHED ENTRY
FOAM WINDOW TRIM
DECORATIVE SHUTTERS
CONCRETE S-TILE ROOFING
DECORATIVE GABLE ACCENT

BUNGALOW ELEVATION

STUCCO WALL FINISH
STUCCO o/ FOAM WINDOW TRIM
STUCCO PORCH COLUMNS w/
STONE VENEER
DECORATIVE SHUTTERS
CONCRETE ROOF TILE
DECORATIVE GABLE ACCENT

FARMHOUSE ELEVATION

STUCCO WALL FINISH
STUCCO o/ FOAM WINDOW TRIM
BOARD AND BATT SIDING
WOOD WINDOW TRIM
DECORATIVE SHUTTERS
ASPHALT COMPOSITION SHINGLE ROOF
WOOD PORCH POSTS w/ WOOD TRIM

SPANISH

FARMHOUSE

BUNGALOW

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

0 1' 2' 3' 4' 8'

PLAN 1 FRONT ELEVATIONS
A01

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

SPANISH REAR ELEVATION

SPANISH RIGHT ELEVATION

SPANISH LEFT ELEVATION

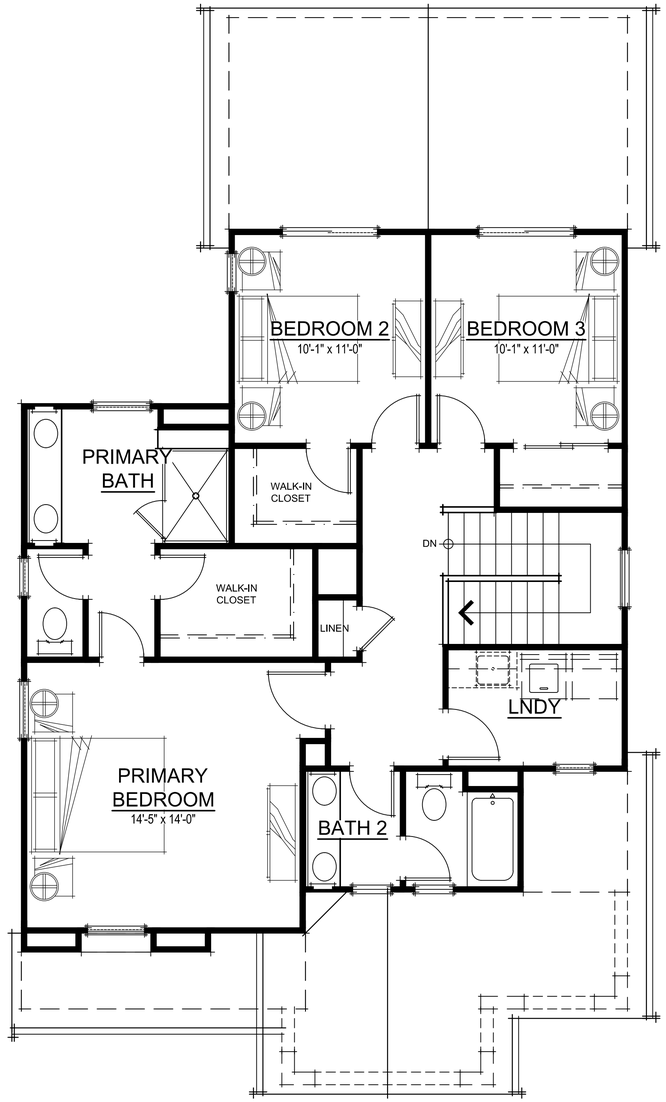
SPANISH FRONT ELEVATION

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

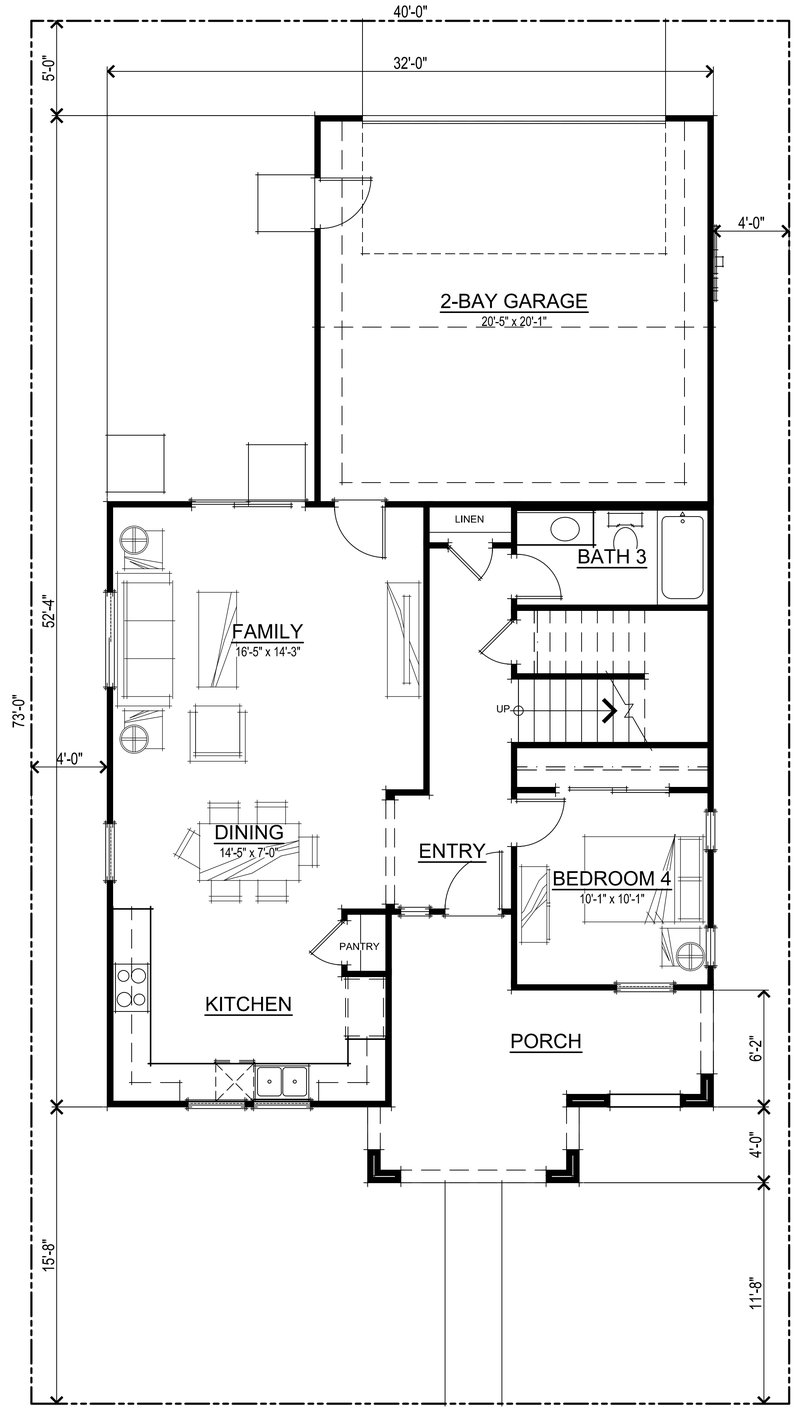
0 1' 2' 3' 4' 8'

PLAN 1 SPANISH EXTERIOR ELEVATIONS
A02

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SECOND FLOOR PLAN



FIRST FLOOR PLAN

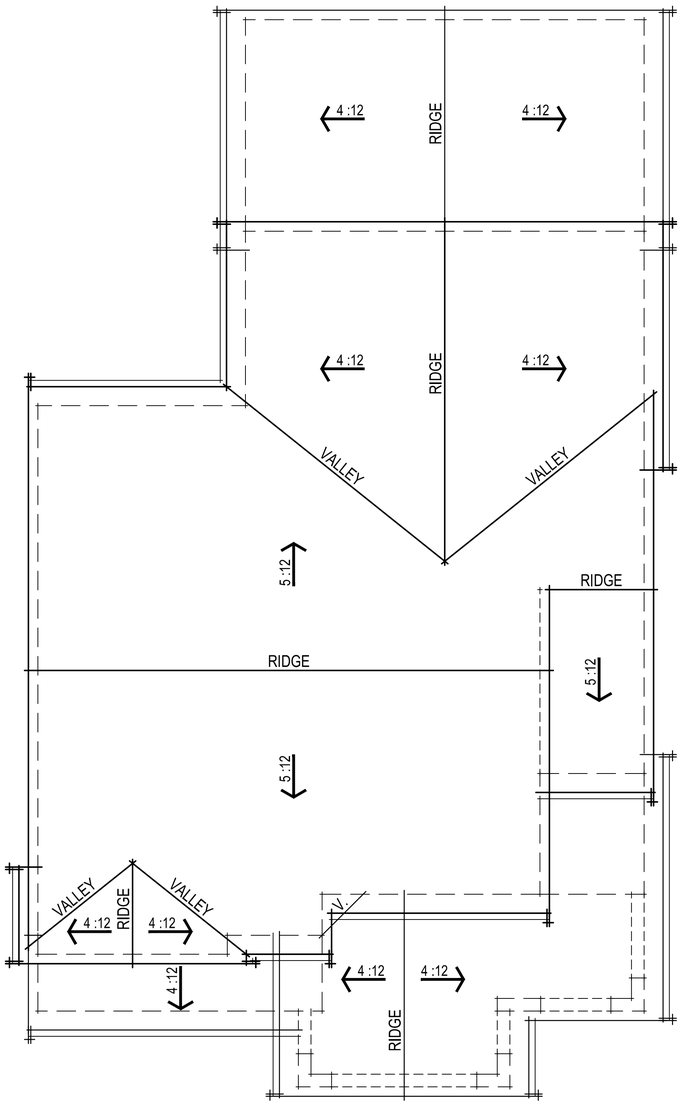
0 1' 2' 3' 4' 8'

SQUARE FOOTAGES	
FIRST FLOOR	892 SQ. FT.
SECOND FLOOR	956 SQ. FT.
TOTAL LIVING	1848 SQ. FT.
2-BAY GARAGE	429 SQ. FT.

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 1 SPANISH FLOOR PLANS
A03

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SPANISH ROOF PLAN

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 1 SPANISH ROOF PLAN
A04

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

BUNGALOW REAR ELEVATION

BUNGALOW RIGHT ELEVATION

BUNGALOW LEFT ELEVATION

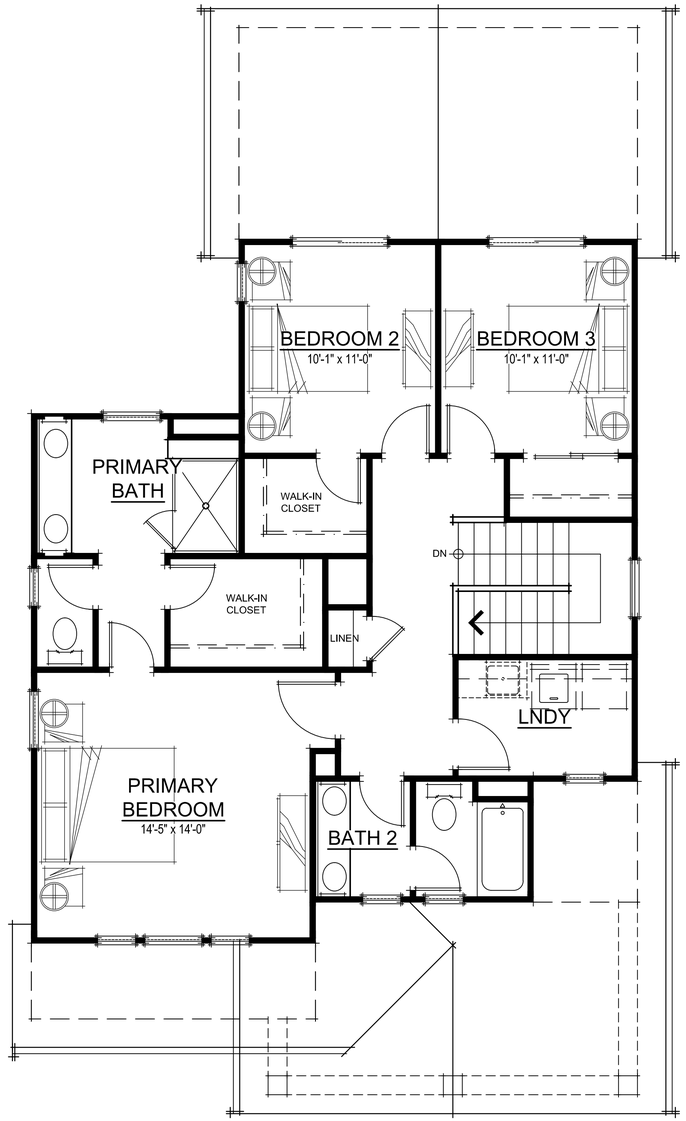
BUNGALOW FRONT ELEVATION

0 1' 2' 3' 4' 8'

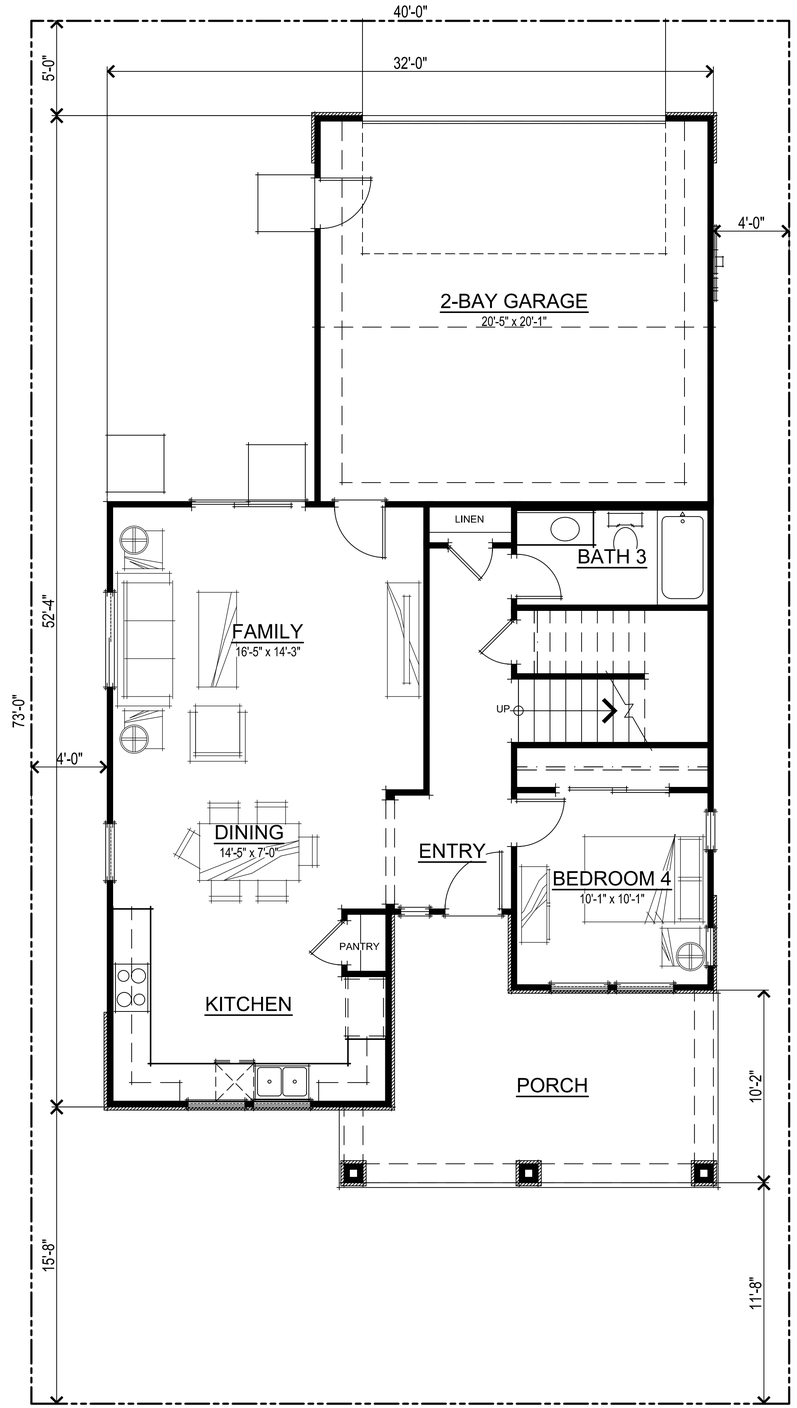
399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 1 BUNGALOW EXTERIOR ELEVATIONS
A05

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SECOND FLOOR PLAN



FIRST FLOOR PLAN

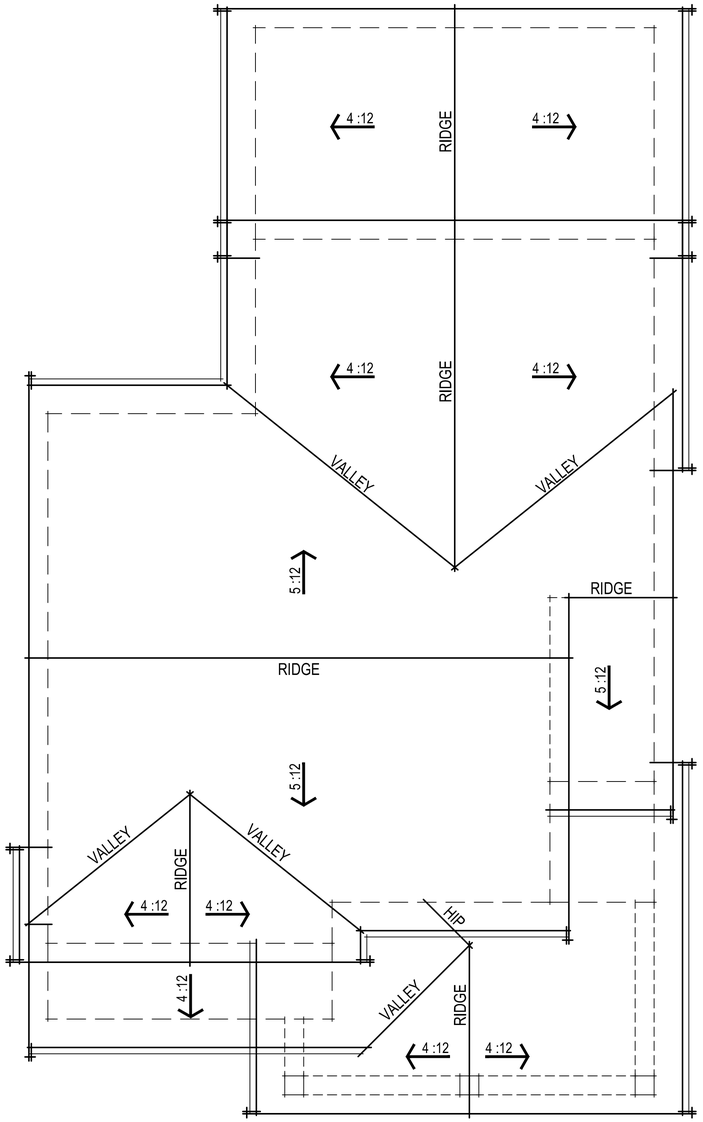
0 1' 2' 3' 4' 8'

SQUARE FOOTAGES	
FIRST FLOOR	892 SQ. FT.
SECOND FLOOR	956 SQ. FT.
TOTAL LIVING	1848 SQ. FT.
2-BAY GARAGE	429 SQ. FT.

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 1 BUNGALOW FLOOR PLANS
A06

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



BUNGALOW ROOF PLAN

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 1 BUNGALOW ROOF PLAN
A07

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

FARMHOUSE REAR ELEVATION

FARMHOUSE RIGHT ELEVATION

FARMHOUSE LEFT ELEVATION

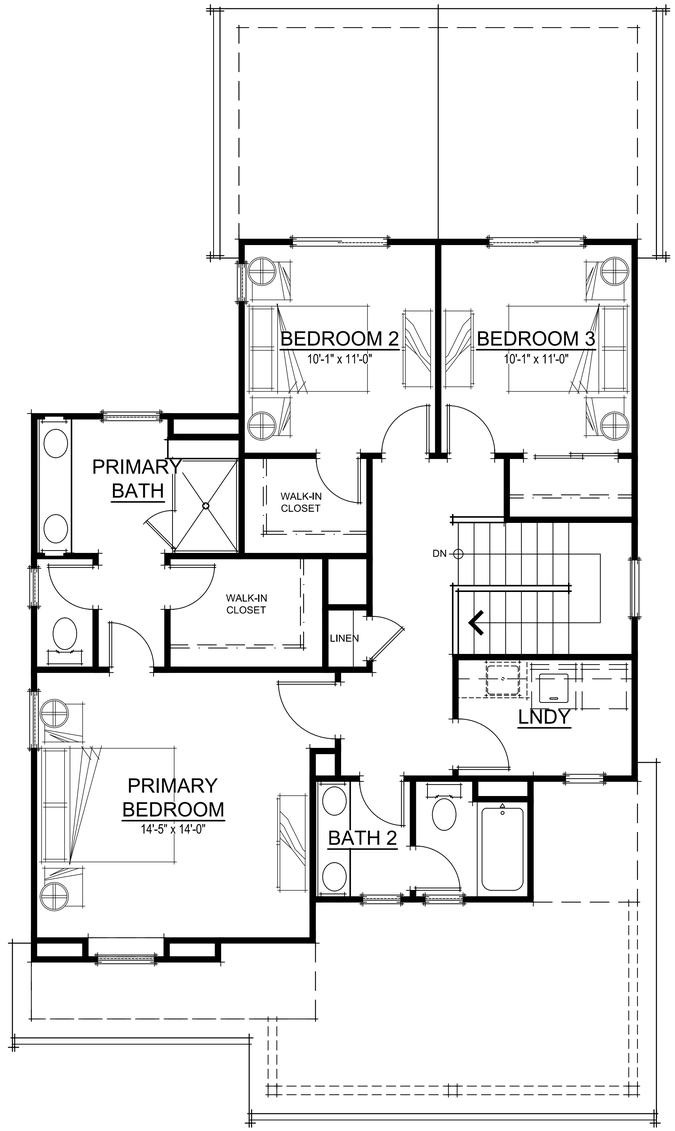
FARMHOUSE FRONT ELEVATION

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

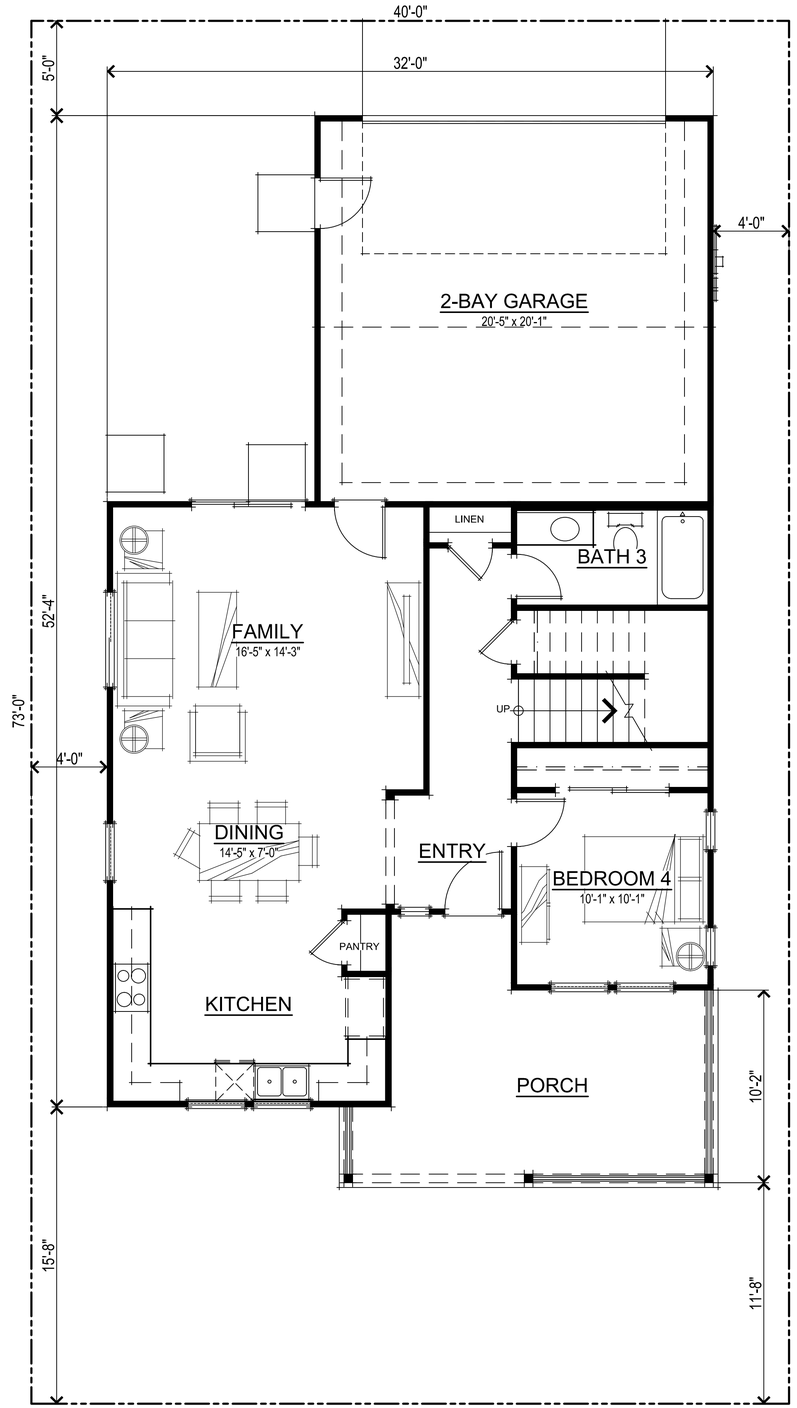
0 1' 2' 3' 4' 8'

PLAN 1 FARMHOUSE EXTERIOR ELEVATIONS
A08

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SECOND FLOOR PLAN



FIRST FLOOR PLAN

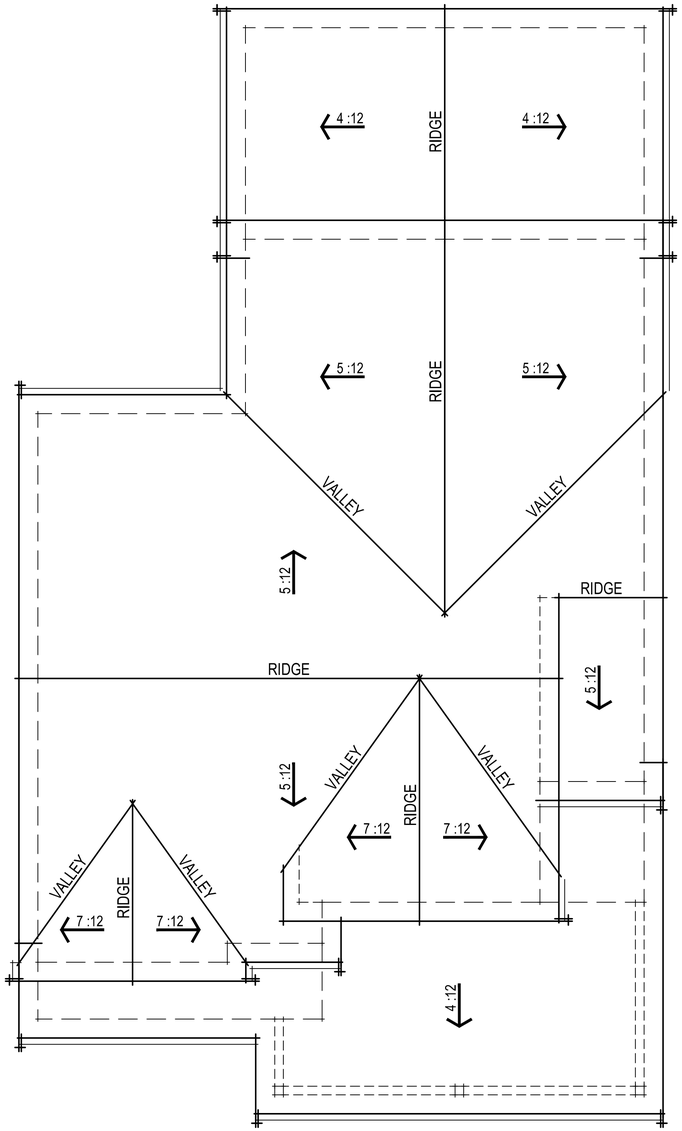
0 1' 2' 3' 4' 8'

SQUARE FOOTAGES	
FIRST FLOOR	892 SQ. FT.
SECOND FLOOR	956 SQ. FT.
TOTAL LIVING	1848 SQ. FT.
2-BAY GARAGE	429 SQ. FT.

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 1 FARMHOUSE FLOOR PLANS
A09

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



FARMHOUSE ROOF PLAN

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 1 FARMHOUSE ROOF PLAN
A10

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

EXTERIOR MATERIALS

SPANISH ELEVATION

STUCCO WALL FINISH
STUCCO PORCH
ARCHED ENTRY
FOAM WINDOW TRIM
DECORATIVE SHUTTERS
CONCRETE S-TILE ROOFING
DECORATIVE GABLE ACCENT

BUNGALOW ELEVATION

STUCCO WALL FINISH
STUCCO o/ FOAM WINDOW TRIM
STUCCO PORCH COLUMNS w/
STONE VENEER
DECORATIVE SHUTTERS
CONCRETE ROOF TILE
DECORATIVE GABLE ACCENT

FARMHOUSE ELEVATION

STUCCO WALL FINISH
STUCCO o/ FOAM WINDOW TRIM
BOARD AND BATT SIDING
WOOD WINDOW TRIM
DECORATIVE SHUTTERS
ASPHALT COMPOSITION SHINGLE ROOF
WOOD PORCH POSTS w/ WOOD TRIM

SPANISH

FARMHOUSE

BUNGALOW

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

0 1' 2' 3' 4' 8'

PLAN 2 FRONT ELEVATIONS
A11

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

SPANISH REAR ELEVATION

SPANISH RIGHT ELEVATION

SPANISH LEFT ELEVATION

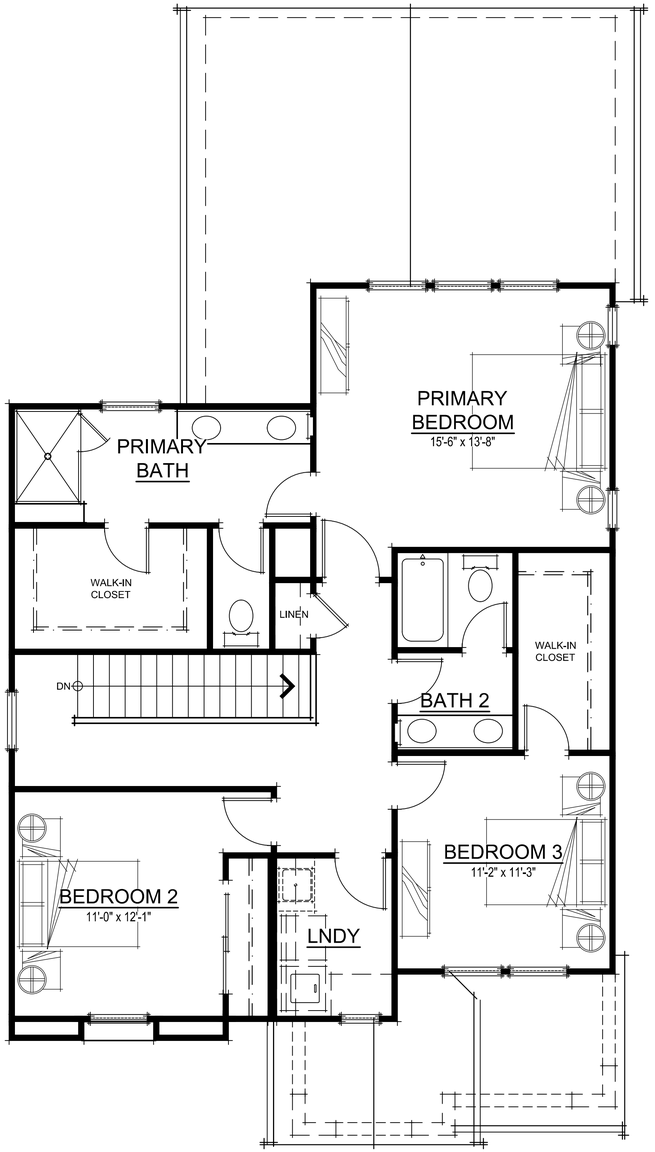
SPANISH FRONT ELEVATION

0 1' 2' 3' 4' 8'

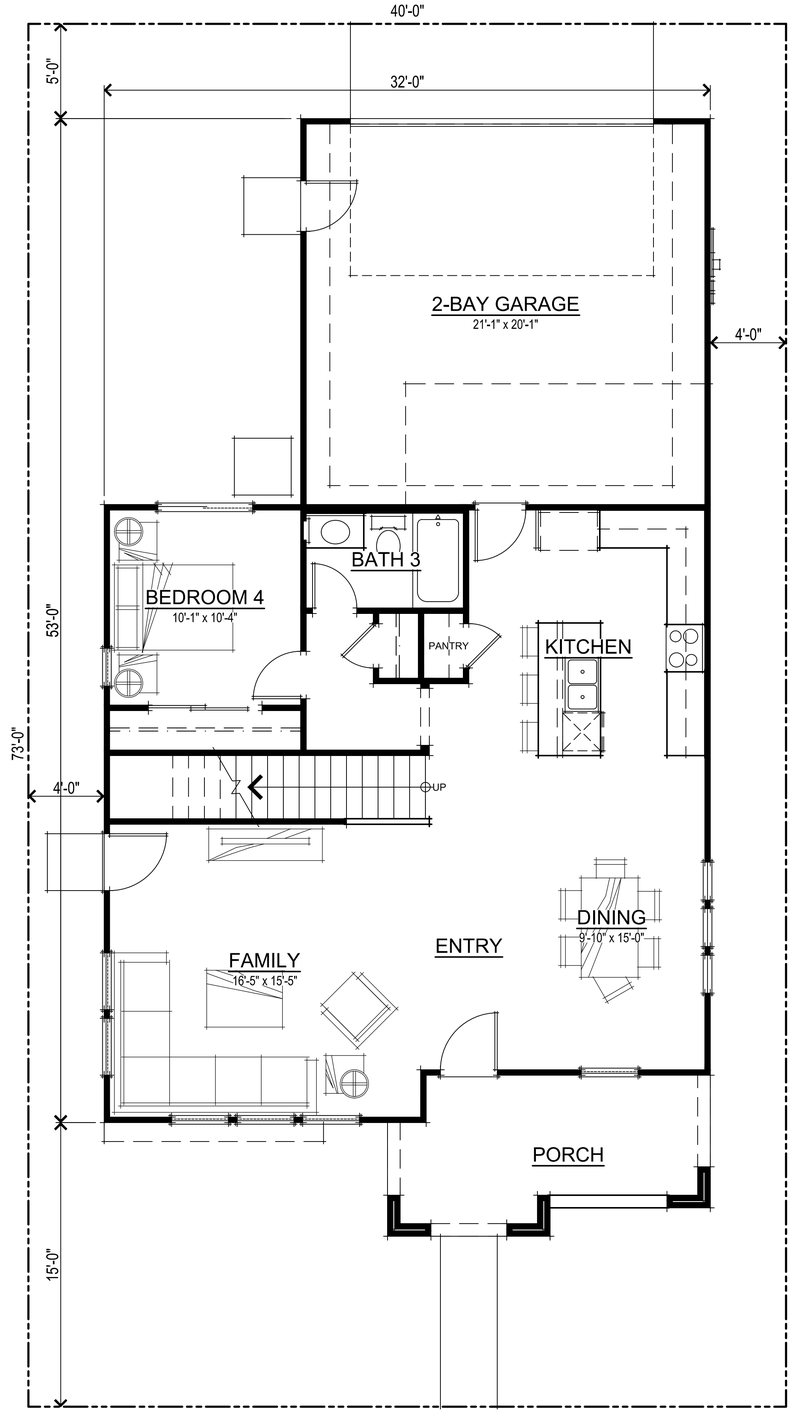
399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 2 SPANISH EXTERIOR ELEVATIONS
A12

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SECOND FLOOR PLAN



FIRST FLOOR PLAN

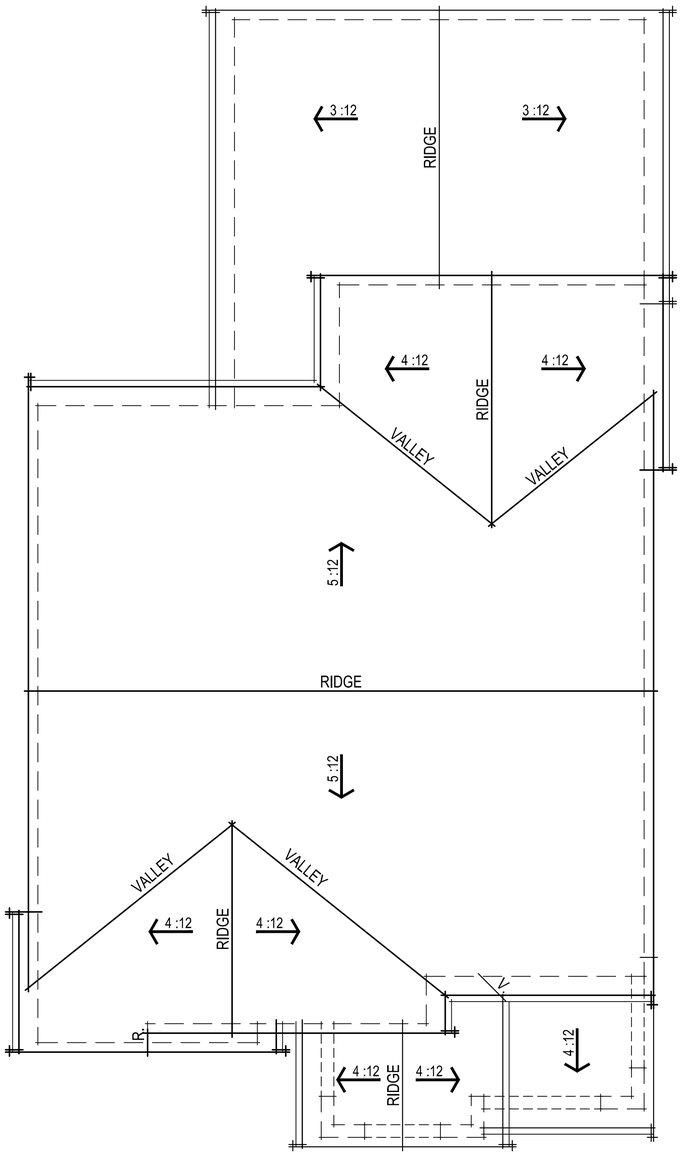
PLAN 2 SQUARE FOOTAGES	
FIRST FLOOR	1006 SQ. FT.
SECOND FLOOR	1077 SQ. FT.
TOTAL LIVING	2083 SQ. FT.
2-BAY GARAGE	441 SQ. FT.

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 2 SPANISH FLOOR PLANS
A13

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SPANISH ROOF PLAN

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 2 SPANISH ROOF PLAN
A14

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

BUNGALOW REAR ELEVATION

BUNGALOW RIGHT ELEVATION

BUNGALOW LEFT ELEVATION

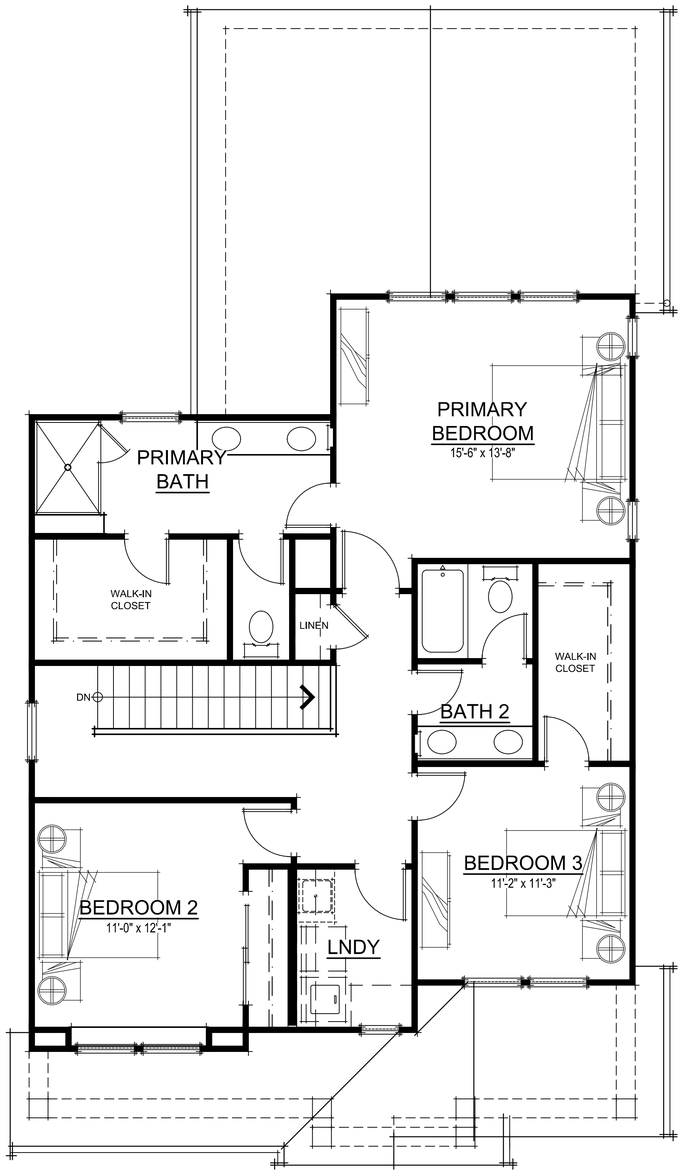
BUNGALOW FRONT ELEVATION

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

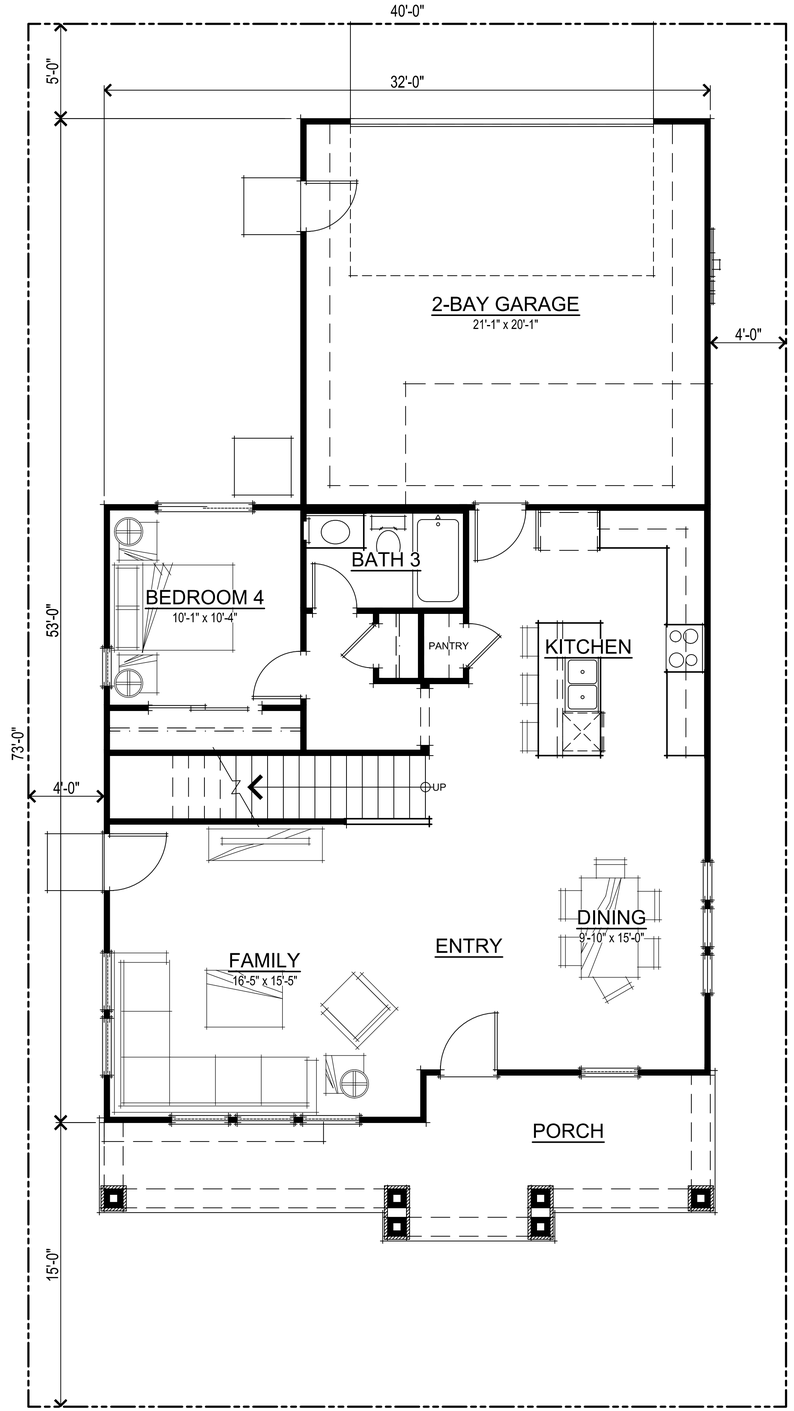
0 1' 2' 3' 4' 8'

PLAN 2 BUNGALOW EXTERIOR ELEVATIONS
A15

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SECOND FLOOR PLAN



FIRST FLOOR PLAN

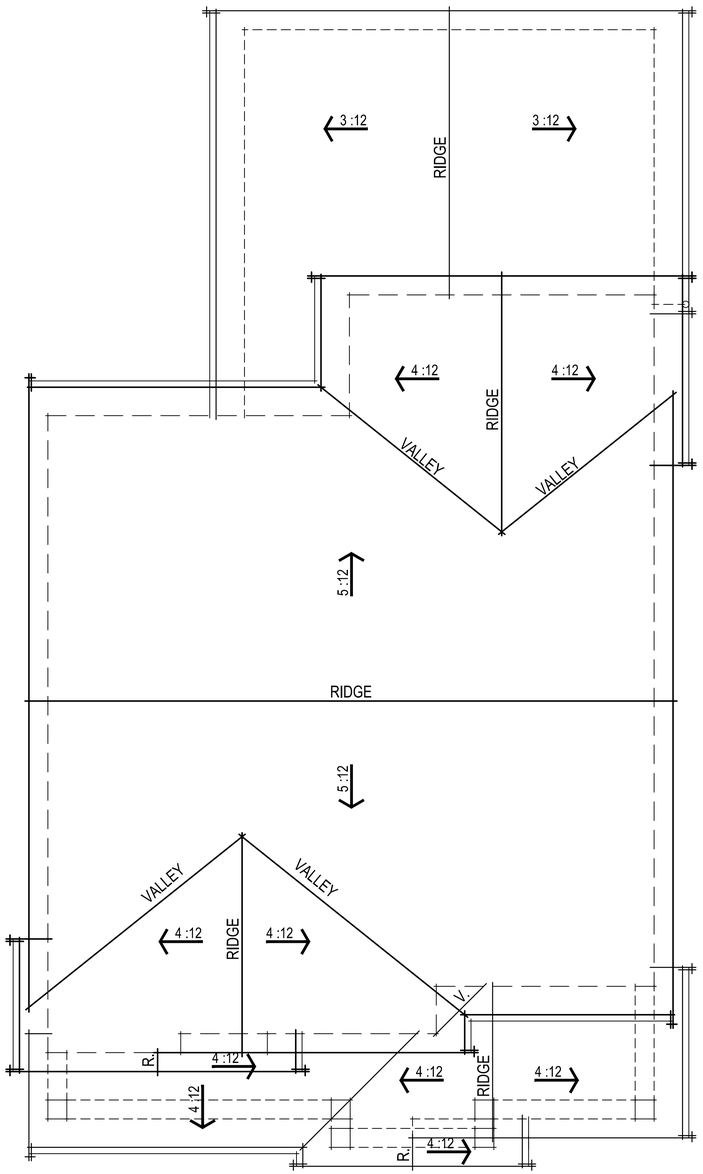
PLAN 2 SQUARE FOOTAGES	
FIRST FLOOR	1006 SQ. FT.
SECOND FLOOR	1077 SQ. FT.
TOTAL LIVING	2083 SQ. FT.
2-BAY GARAGE	441 SQ. FT.

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 2 BUNGALOW FLOOR PLANS
A16

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



BUNGALOW ROOF PLAN

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 2 BUNGALOW ROOF PLAN
A17

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

FARMHOUSE REAR ELEVATION

FARMHOUSE RIGHT ELEVATION

FARMHOUSE LEFT ELEVATION

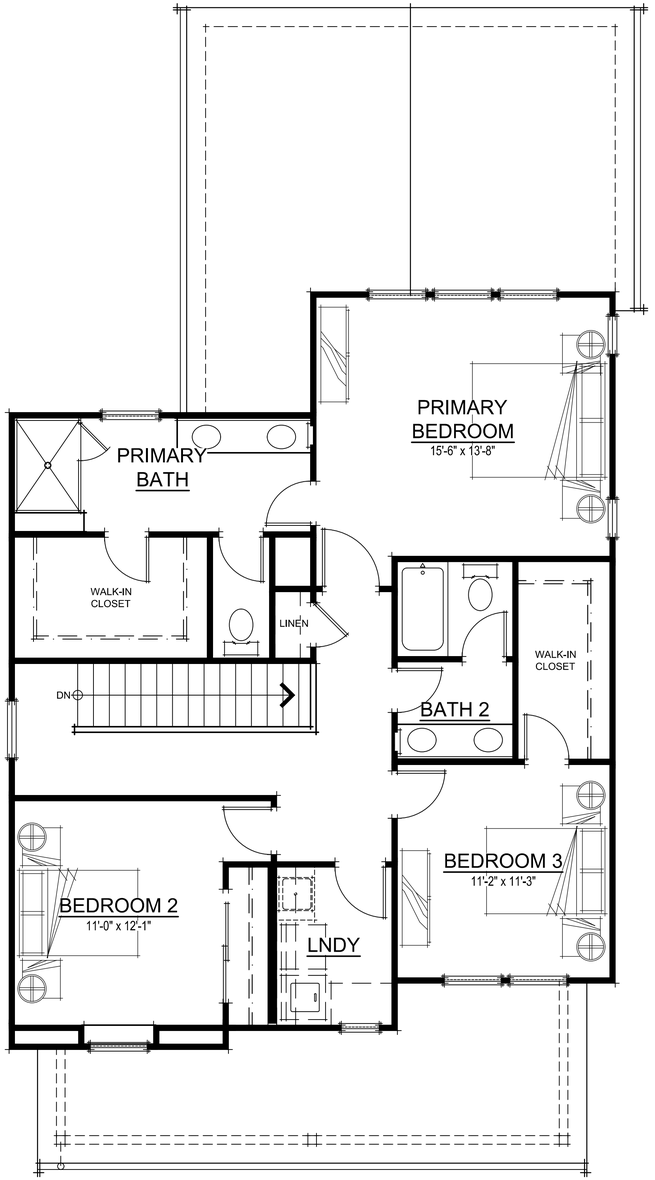
FARMHOUSE FRONT ELEVATION

0 1' 2' 3' 4' 8'

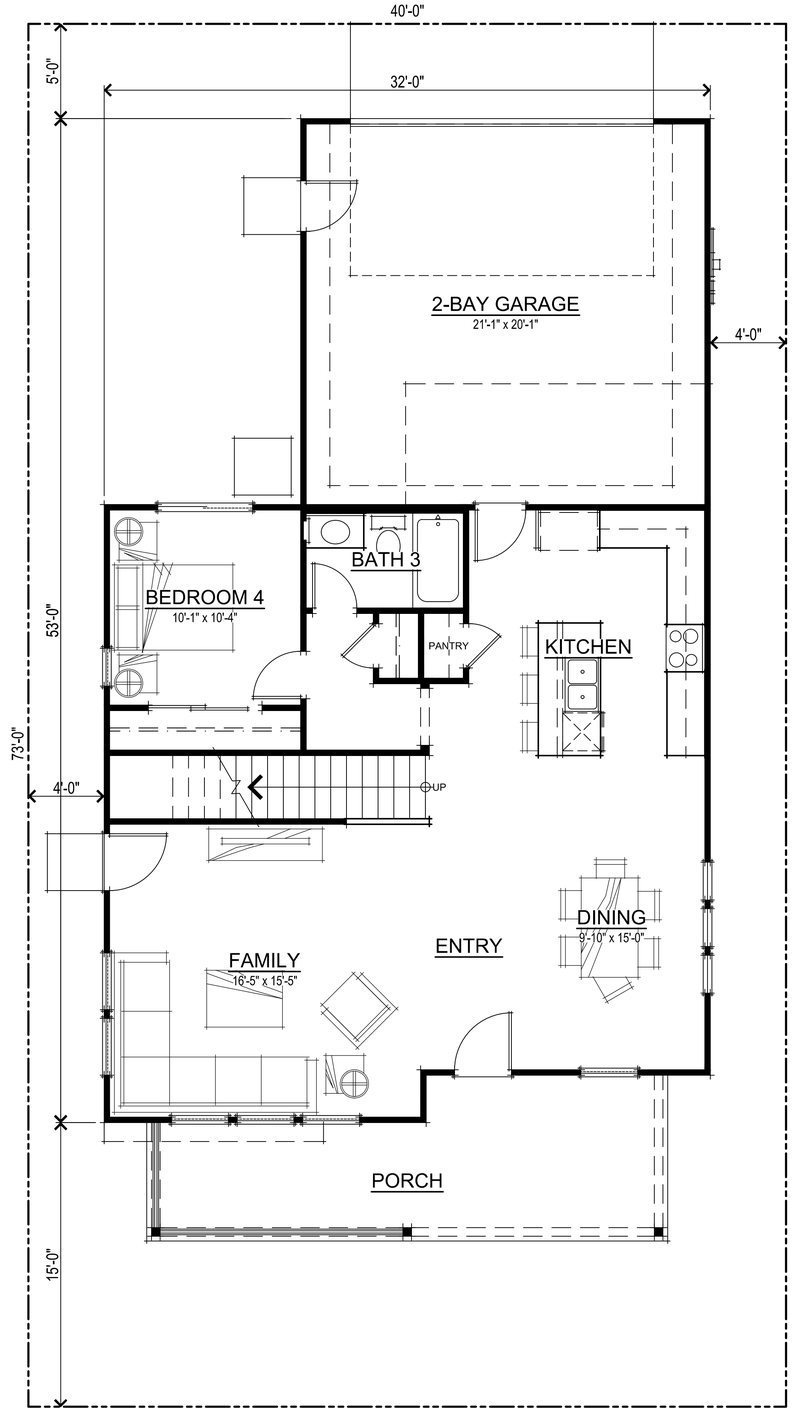
399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 2 FARMHOUSE EXTERIOR ELEVATIONS
A18

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SECOND FLOOR PLAN



FIRST FLOOR PLAN

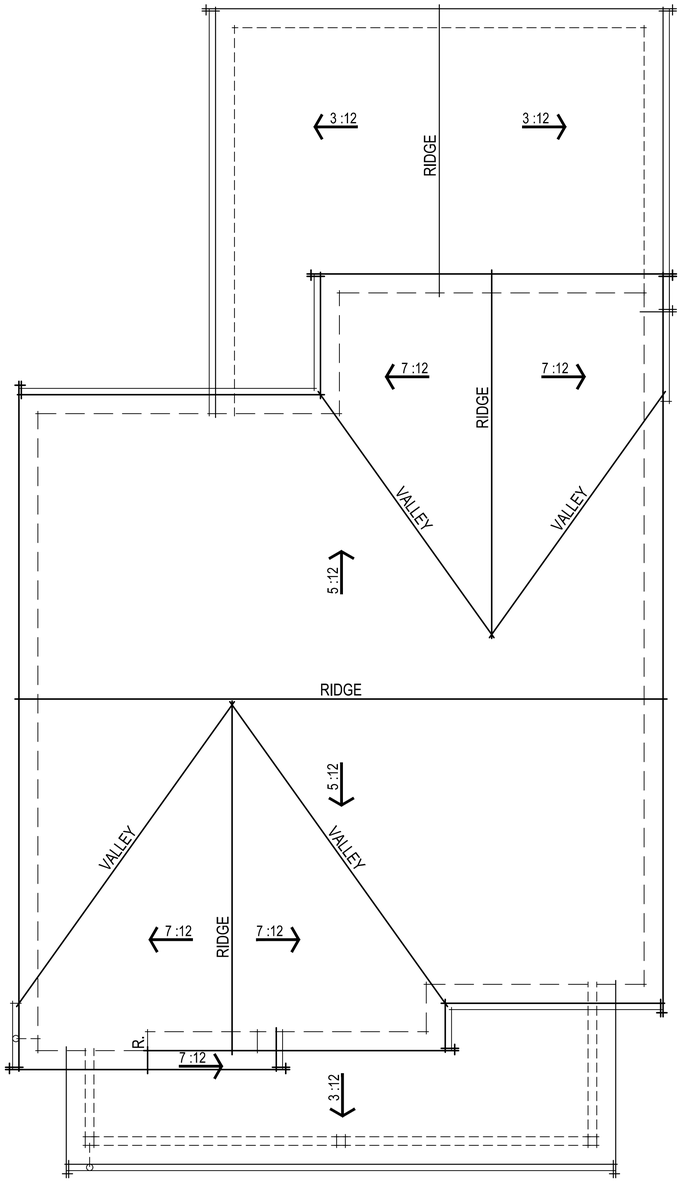
PLAN 2 SQUARE FOOTAGES	
FIRST FLOOR	1006 SQ. FT.
SECOND FLOOR	1077 SQ. FT.
TOTAL LIVING	2083 SQ. FT.
2-BAY GARAGE	441 SQ. FT.

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 2 FARMHOUSE FLOOR PLANS
A19

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



FARMHOUSE ROOF PLAN

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 2 FARMHOUSE ROOF PLAN
A20

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

EXTERIOR MATERIALS

SPANISH ELEVATION

STUCCO WALL FINISH
STUCCO PORCH
ARCHED ENTRY
FOAM WINDOW TRIM
DECORATIVE SHUTTERS
CONCRETE S-TILE ROOFING
DECORATIVE GABLE ACCENT

BUNGALOW ELEVATION

STUCCO WALL FINISH
STUCCO o/ FOAM WINDOW TRIM
STUCCO PORCH COLUMNS w/
STONE VENEER
DECORATIVE SHUTTERS
CONCRETE ROOF TILE
DECORATIVE GABLE ACCENT

FARMHOUSE ELEVATION

STUCCO WALL FINISH
STUCCO o/ FOAM WINDOW TRIM
BOARD AND BATT SIDING
WOOD WINDOW TRIM
DECORATIVE SHUTTERS
ASPHALT COMPOSITION SHINGLE ROOF
WOOD PORCH POSTS w/ WOOD TRIM

SPANISH

FARMHOUSE

BUNGALOW

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 3 FRONT ELEVATIONS
A21

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

SPANISH REAR ELEVATION

SPANISH RIGHT ELEVATION

SPANISH LEFT ELEVATION

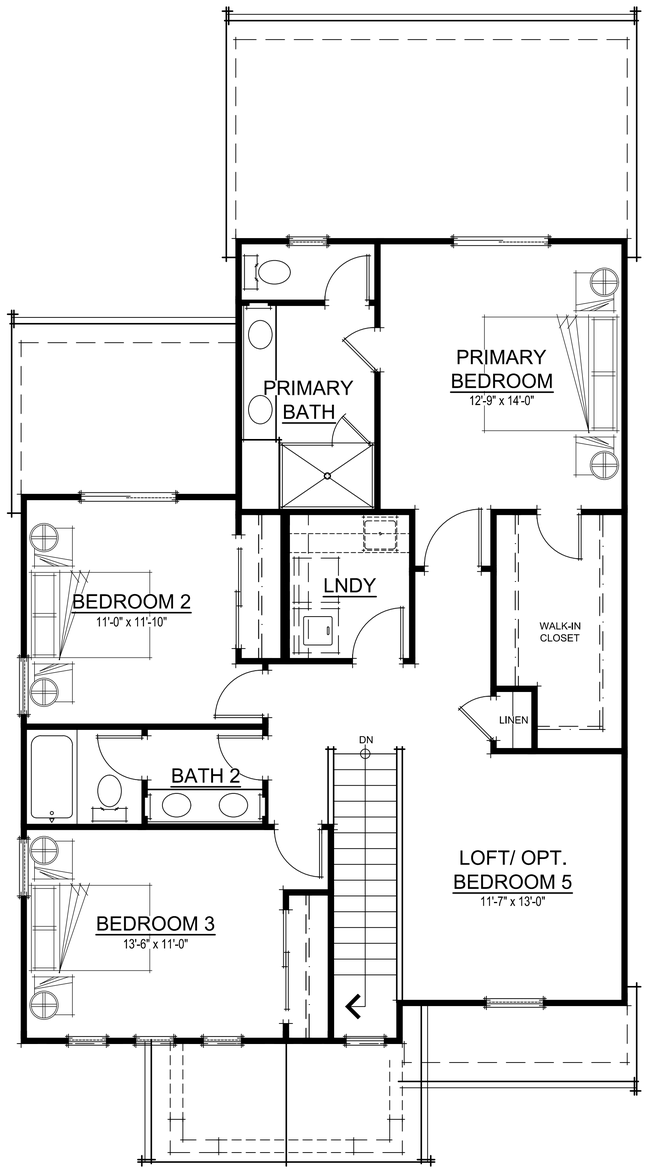
SPANISH FRONT ELEVATION

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

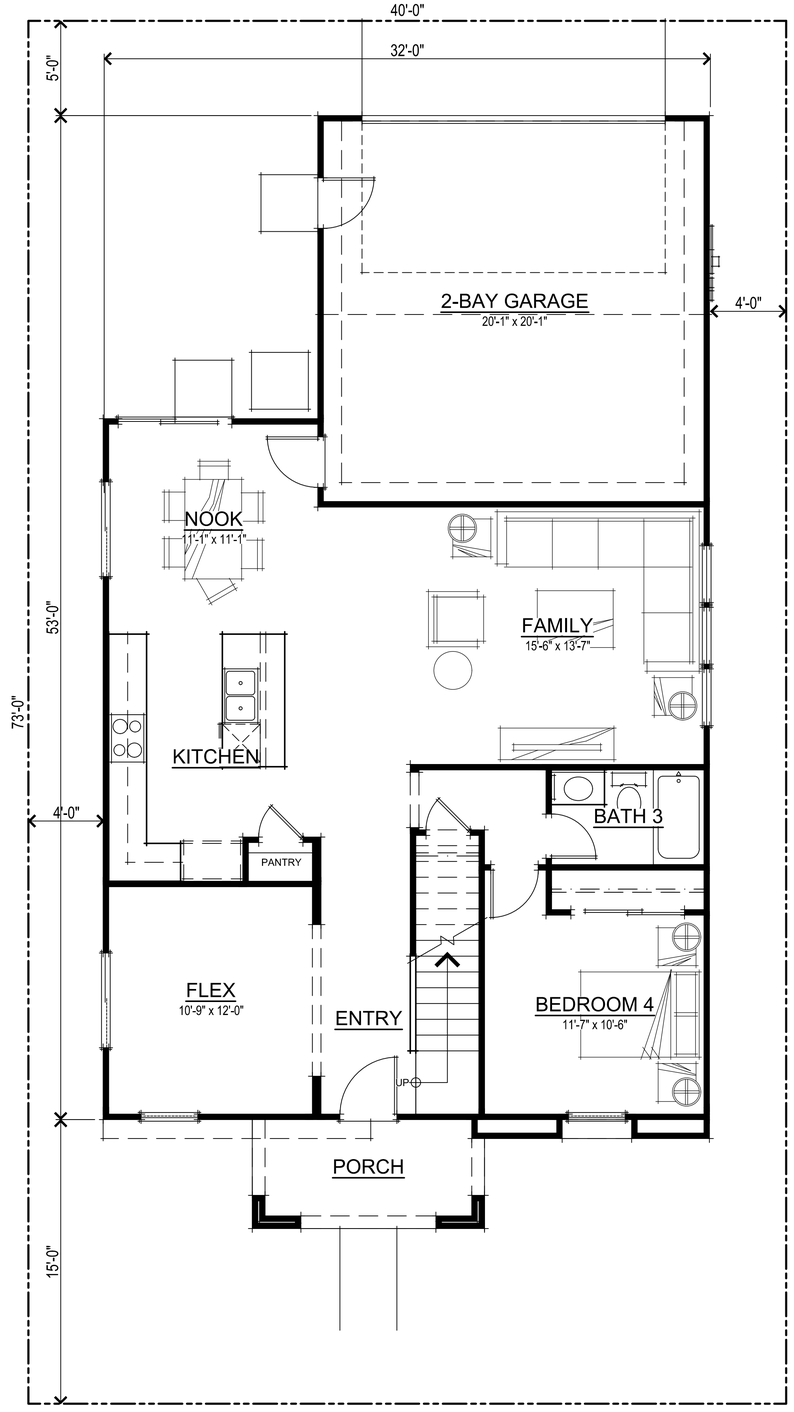
0 1' 2' 3' 4' 8'

PLAN 3 SPANISH EXTERIOR ELEVATIONS
A22

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SECOND FLOOR PLAN



FIRST FLOOR PLAN

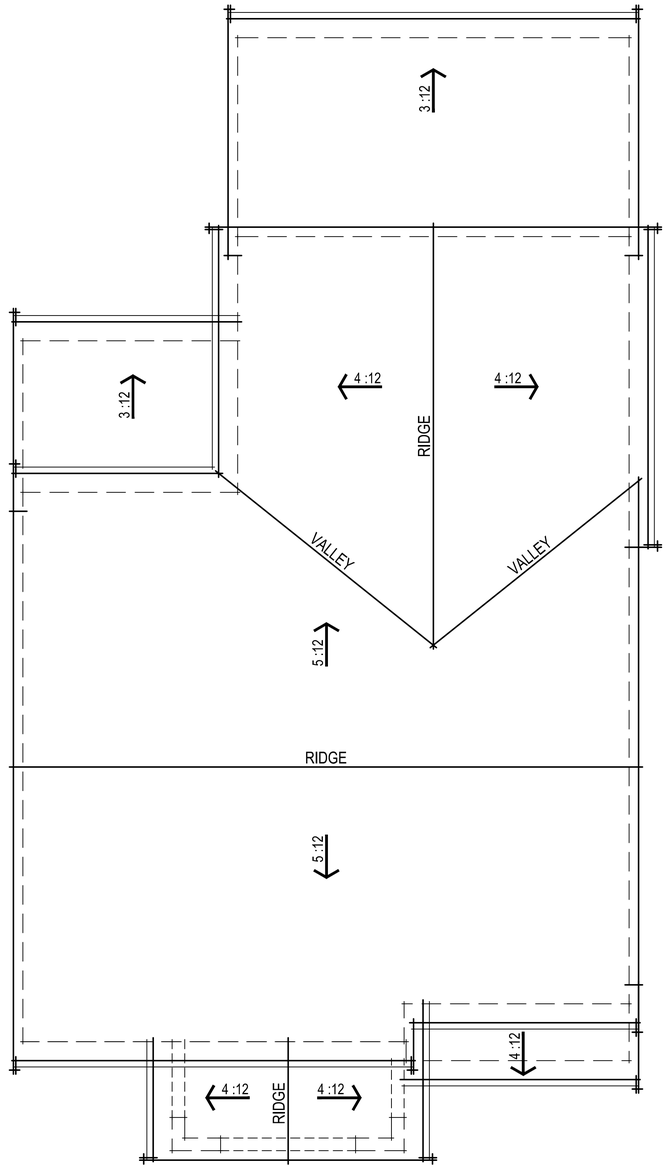
PLAN 3 SQUARE FOOTAGES	
FIRST FLOOR	1095 SQ. FT.
SECOND FLOOR	1141 SQ. FT.
TOTAL LIVING	2236 SQ. FT.
2-BAY GARAGE	420 SQ. FT.

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 3 SPANISH FLOOR PLANS
A23

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SPANISH ROOF PLAN

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 3 SPANISH ROOF PLAN
A24

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

BUNGALOW REAR ELEVATION

BUNGALOW RIGHT ELEVATION

BUNGALOW LEFT ELEVATION

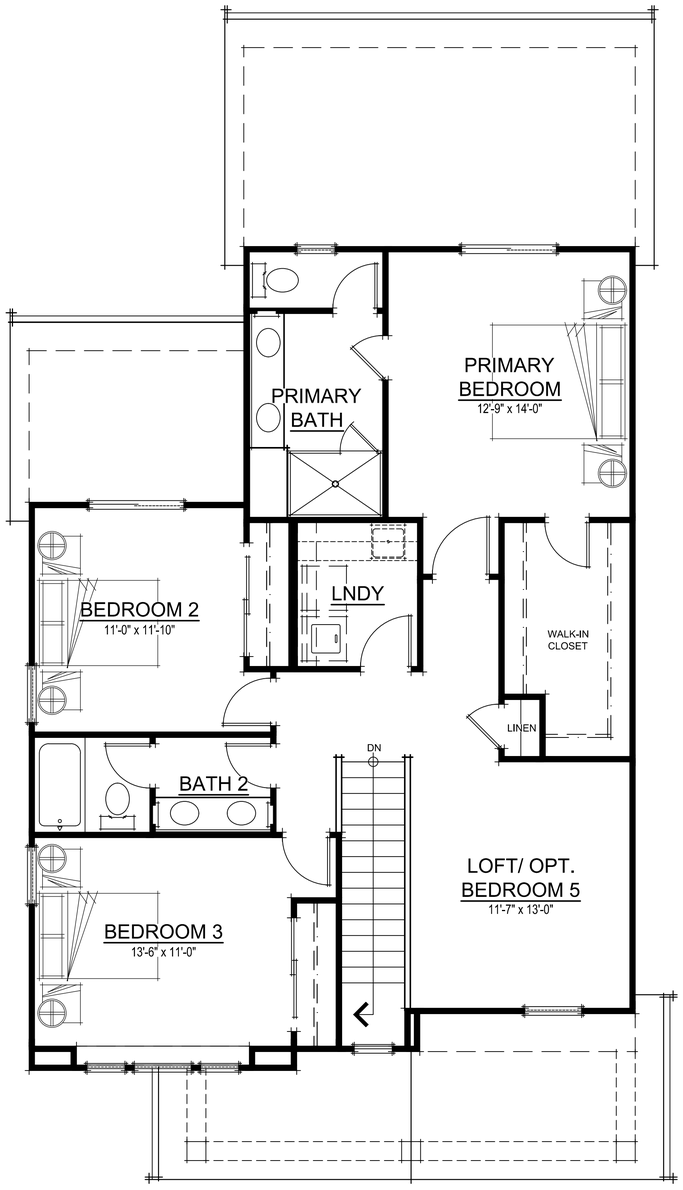
BUNGALOW FRONT ELEVATION

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

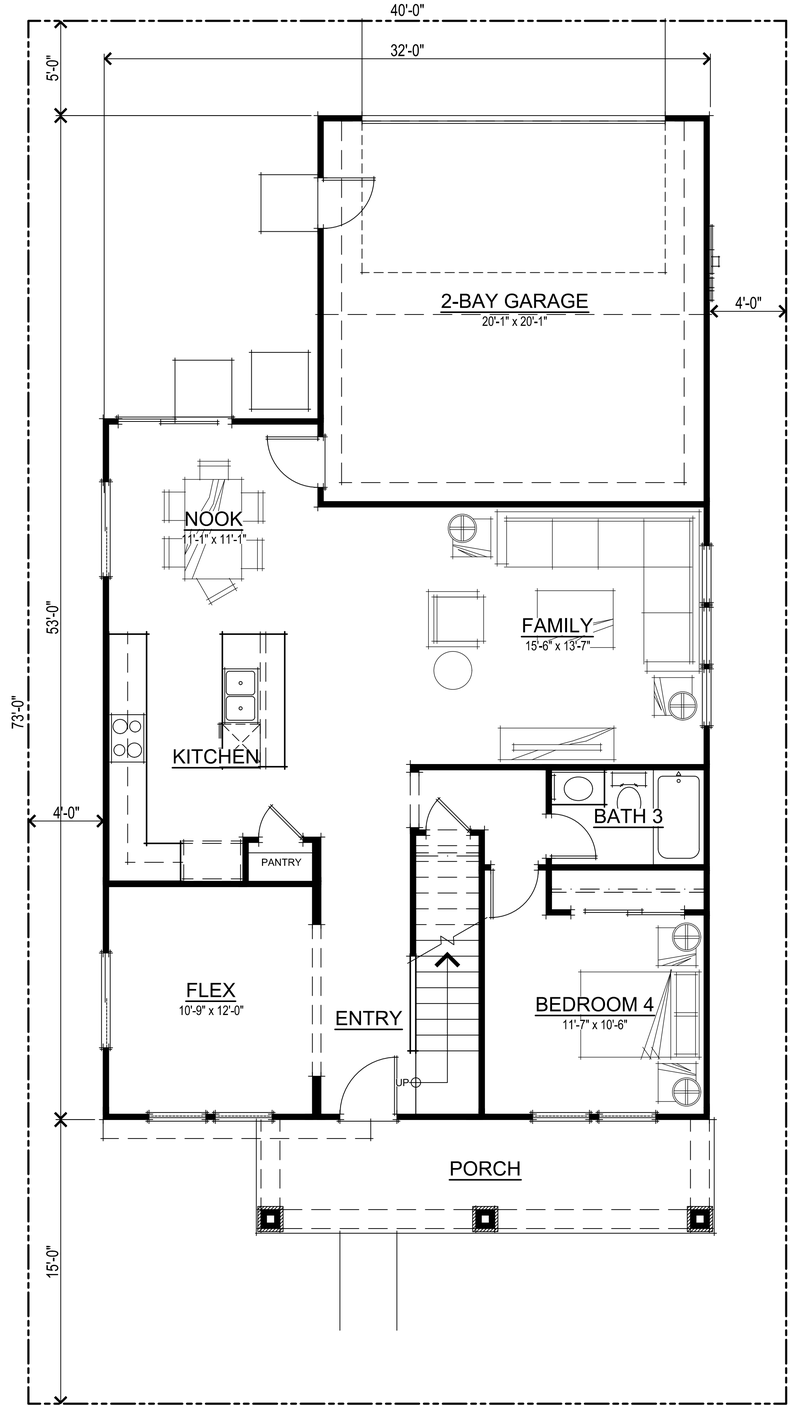
0 1' 2' 3' 4' 8'

PLAN 3 BUNGALOW EXTERIOR ELEVATIONS
A25

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SECOND FLOOR PLAN



FIRST FLOOR PLAN

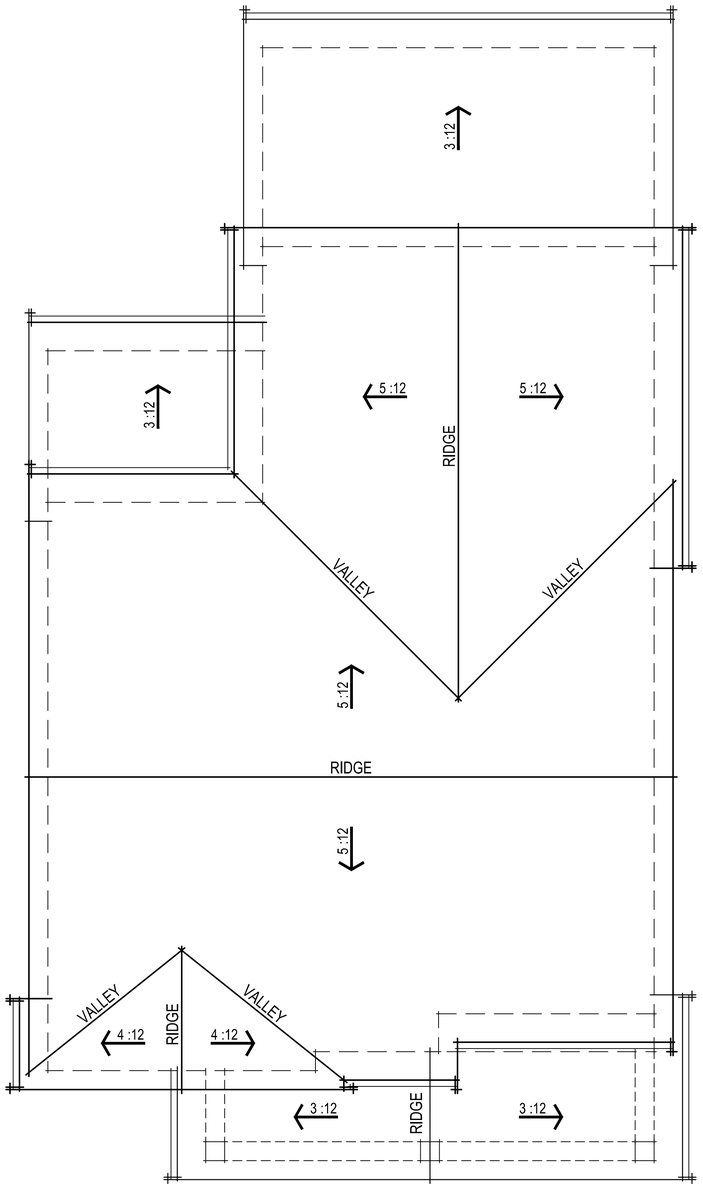
PLAN 3 SQUARE FOOTAGES	
FIRST FLOOR	1095 SQ. FT.
SECOND FLOOR	1141 SQ. FT.
TOTAL LIVING	2236 SQ. FT.
2-BAY GARAGE	420 SQ. FT.

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 3 BUNGALOW FLOOR PLANS
A26

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



BUNGALOW ROOF PLAN

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 3 BUNGALOW ROOF PLAN
A27

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

FARMHOUSE REAR ELEVATION

FARMHOUSE RIGHT ELEVATION

FARMHOUSE LEFT ELEVATION

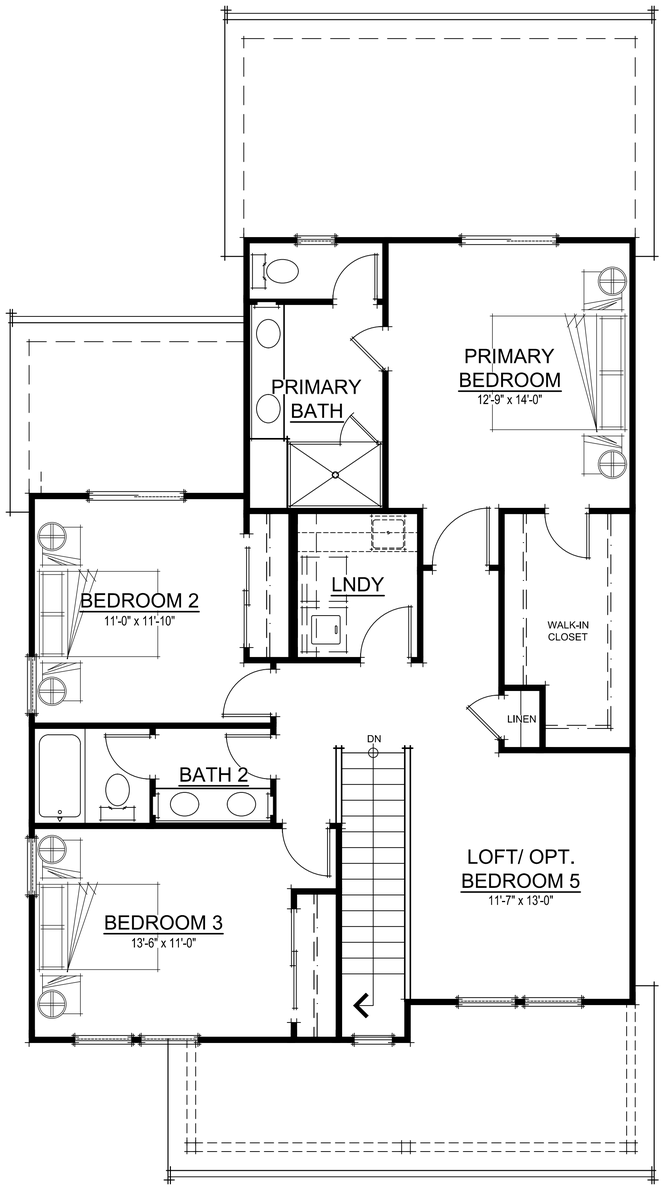
FARMHOUSE FRONT ELEVATION

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

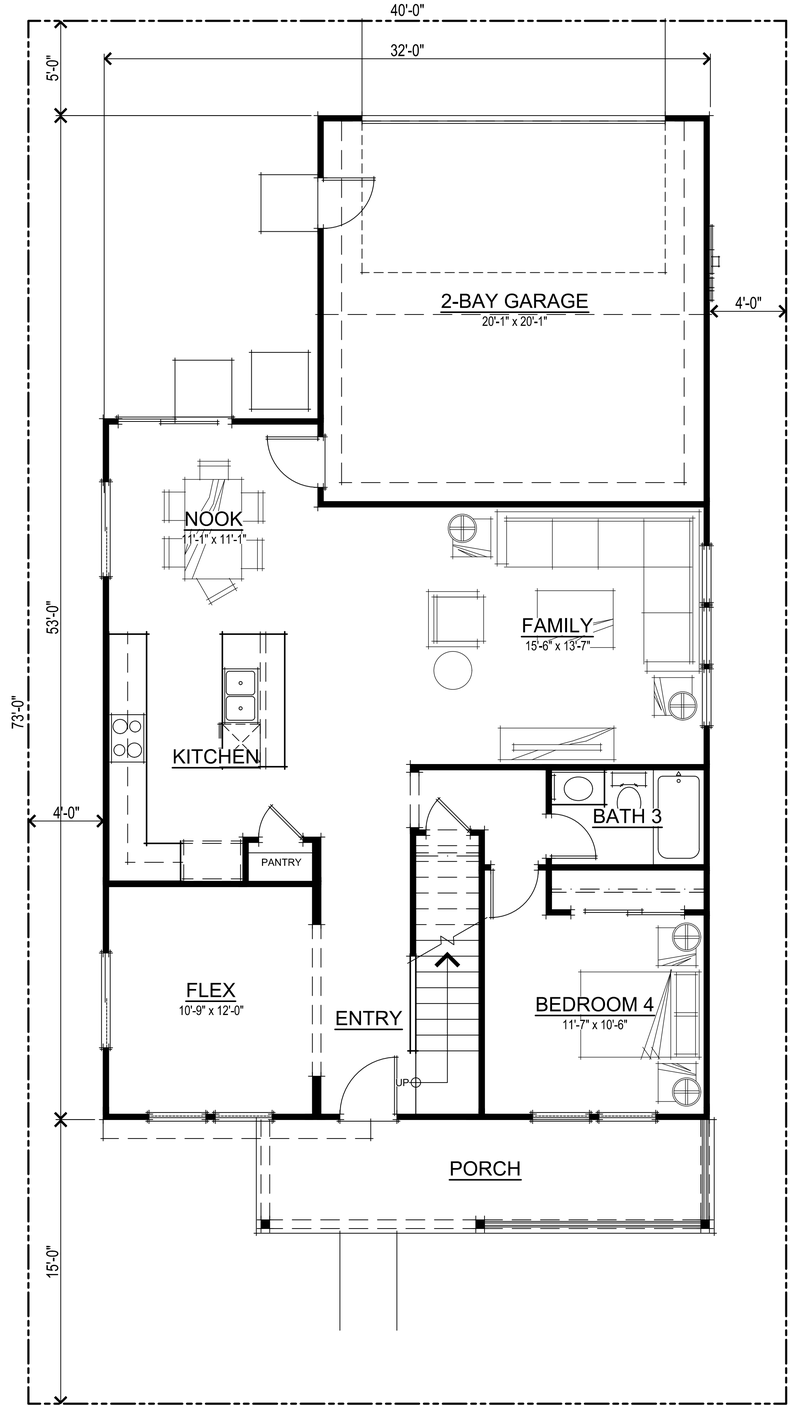
0 1' 2' 3' 4' 8'

PLAN 3 FARMHOUSE EXTERIOR ELEVATIONS
A28

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SECOND FLOOR PLAN



FIRST FLOOR PLAN

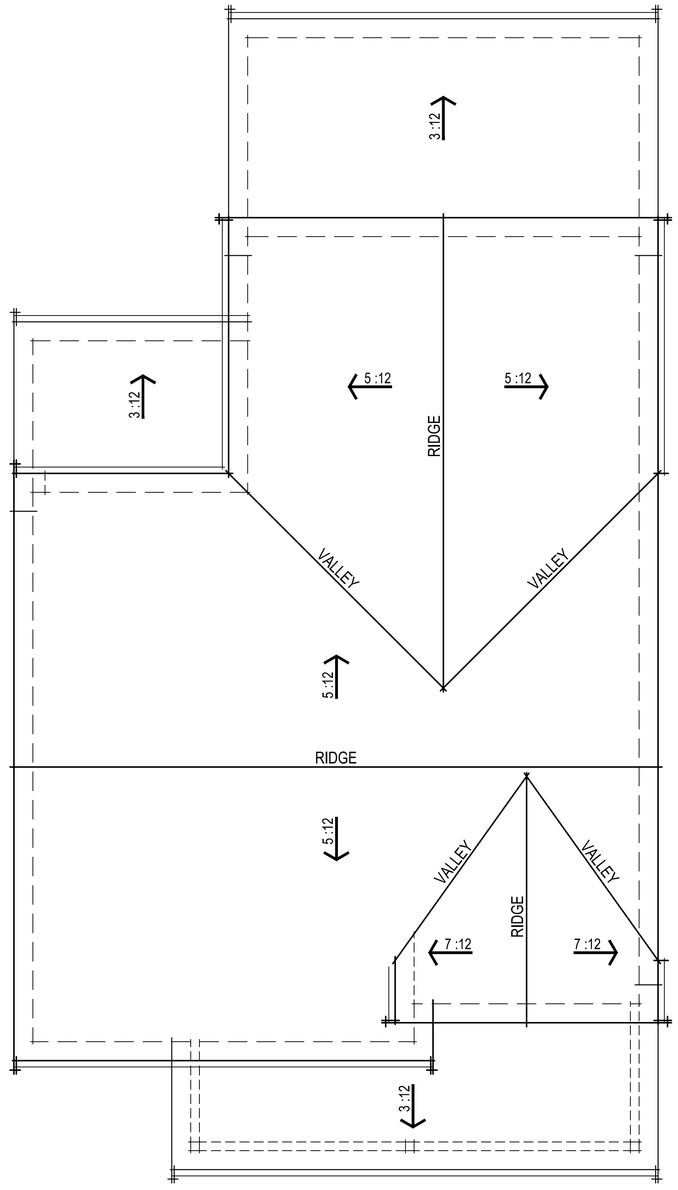
PLAN 3 SQUARE FOOTAGES	
FIRST FLOOR	1095 SQ. FT.
SECOND FLOOR	1141 SQ. FT.
TOTAL LIVING	2236 SQ. FT.
2-BAY GARAGE	420 SQ. FT.

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 3 FARMHOUSE FLOOR PLANS
A29

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



FARMHOUSE ROOF PLAN

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

PLAN 3 FARMHOUSE ROOF PLAN
A30

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

BUNGALOW LEFT ELEVATION

SPANISH LEFT ELEVATION

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

SAMPLE ENHANCED ELEVATIONS
A31

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

FARMHOUSE LEFT ELEVATION

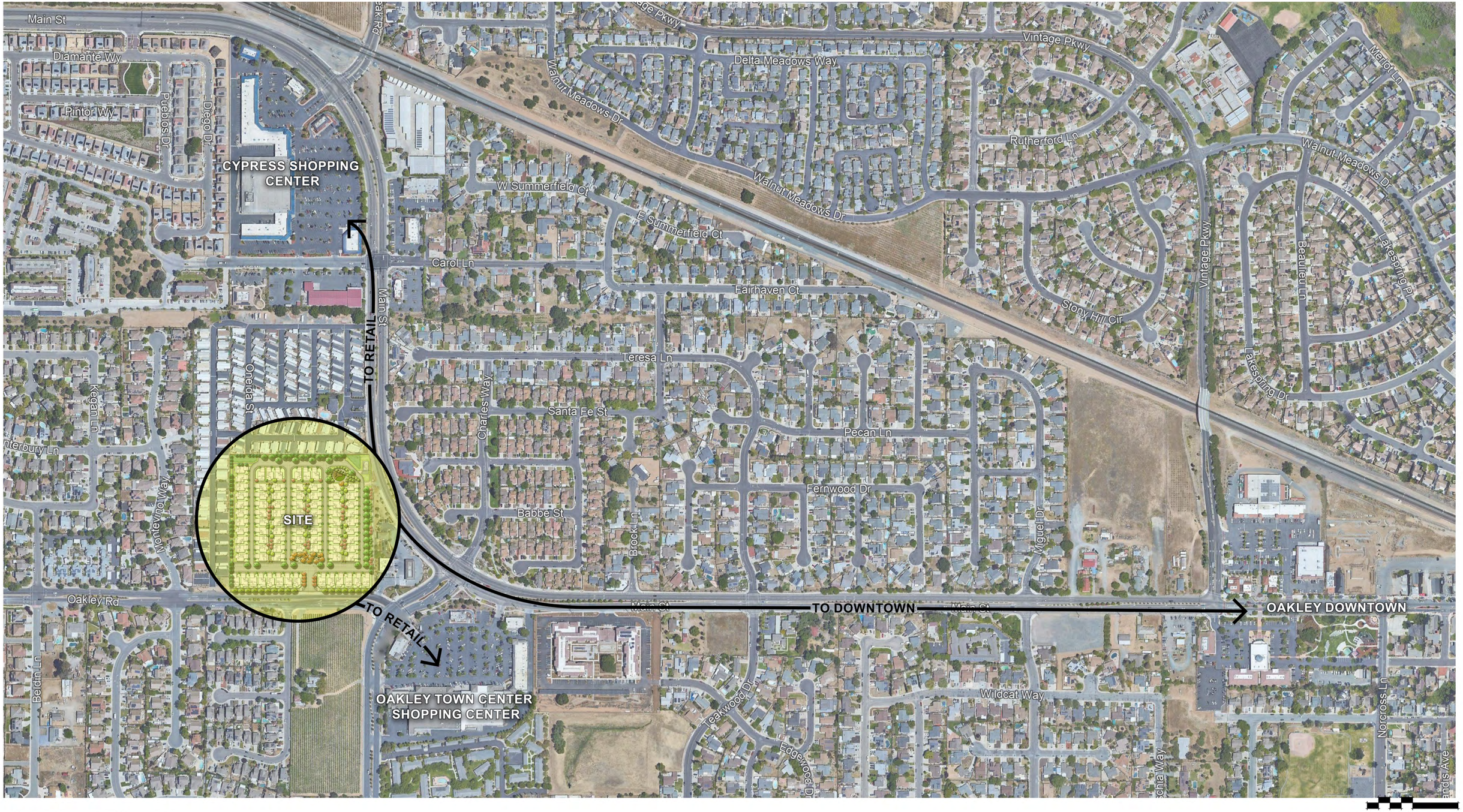
SPANISH LEFT ELEVATION

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

SAMPLE ENHANCED ELEVATIONS
A32

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



399.203 The Village at 2092 Oakley Road
Oakley, CA
February 28, 2024

SITE ACCESS EXHIBIT
A33

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

COLOR SCHEME 1

Boral Roofing
Barcelona Charcoal Brown Blend

Stucco & Garage Door
SW 7551 Greek Villa (254-C1)

Trim & Fascia
SW 7026 Griffin (241-C6)

Entry Door & Sutters
SW 7020 Black Fox (244-C7)

COLOR SCHEME 2

Boral Roofing
Barcelona California Mission Blend

Stucco & Garage Door
SW 7506 Loggia (248-C2)

Trim & Fascia
SW 7040 Smakehouse (241-C6)

Entry Door & Sutters
SW 9182 Rojo Marron (277-C2)

COLOR SCHEME 3

Boral Roofing
Barcelona Cliffside Blend

Stucco & Garage Door
SW 7008 Alabaster (255-C2)

Trim & Fascia
SW 6080 Utterly Beige (198-C3)

Entry Door & Sutters
SW 2819 Downing Slate (311)

Note: *All colors and textures are representative samples only, pending verification of actual material suppliers and manufacturers for this particular project.*

Typycal Exterior Lighting

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

COLOR SCHEME 4

Boral Roofing
Saxony Appalachian Blend

Stucco & Garage Door
SW 7024 Functional Gray (241-C3)

Siding
SW 7025 Backdrop (241-C5)

Trim & Fascia
SW 7634 Pediment (255-C5)

Entry Door & Sutters
SW 6988 Bohemian Black (252-C6)

Cultured Stone by Boral
Umber Creek Alpine Ledgestone

COLOR SCHEME 5

Boral Roofing
Saxony Charcoal Blend

Stucco & Garage Door
SW 7029 Agreeable Gray (243-C1)

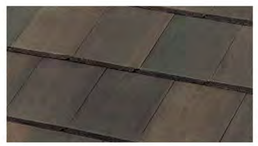
Siding
SW 7530 Barcelona Beige (258-C4)

Trim & Fascia
SW 7053 Adaptive Shade (246-C5)

Entry Door & Sutters
SW 7048 Urbane Bronze (245-C7)

Cultured Stone by Boral
Chardonnay Alpine Ledgestone

COLOR SCHEME 6



Boral Roofing
Saxony Saddleback Blend

Stucco & Garage Door
SW 7052 Gray Area (246-C3)

Siding
SW 6202 Cast Iron (216-C7)

Trim & Fascia
SW 9166 Drift of Mist (238-C2)

Entry Door & Sutters
SW 2801 Rockwood Dark Red (309)

Cultured Stone by Boral
Chardonnay Alpine Ledgestone

Note: *All colors and textures are representative samples only, pending verification of actual material suppliers and manufacturers for this particular project.*

Typycal Exterior Lighting

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

COLOR SCHEME 7

Certainteed Roofing
Landmark Moire Black

Stucco & Garage Door
SW 7570 Egret White (255-C4)

Siding
SW 7074 Softwave (235-C5)

Trim & Fascia
SW 7005 Pure White (255-C1)

Entry Door & Sutters
SW 7076 Cyberspace (235-C7)

COLOR SCHEME 8

Certainteed Roofing
Landmark Georgetown Gray

Stucco & Garage Door
SW 7641 Colonade Gray (283-C2)

Siding
SW 6201 Thunderous (216-C6)

Trim & Fascia
SW 7009 Pearly White (254-C2)

Entry Door & Sutters
SW 7069 Iron Ore (251-C7)

COLOR SCHEME 9

Certainteed Roofing
Landmark Weathered Wood

Stucco & Garage Door
SW 9166 Drift of Mist (238-C2)

Siding
SW 7566 Westhighland White (255-C3)

Trim & Fascia
SW 7566 Westhighland White (255-C3)

Entry Door & Sutters
SW 6258 Tricorn Black (251-C1)

Note: *All colors and textures are representative samples only, pending verification of actual material suppliers and manufacturers for this particular project.*

Typycal Exterior Lighting

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

Minutes of the Regular Joint Meeting of the Oakley City Council/Oakley City Council Acting as the Successor Agency to the Oakley Redevelopment Agency and Special Meeting of the Oakley Public Financing Authority held March 22, 2022

1) OPENING MATTERS

1.1 Call to Order and Roll Call of the Oakley City Council/Oakley City Council Acting as the Successor Agency to the Oakley Redevelopment Agency and Special Meeting of the Oakley Public Financing Authority

Mayor Randy Pope called the meeting to order at 6:33 p.m. in the Oakley City Council Chamber located at 3231 Main Street, Oakley, California. Vice Mayor Aaron Meadows and Councilmembers Anissa Williams, George Fuller and Sue Higgins were in attendance.

1.2 Pledge of Allegiance to the Flag

Mayor Pope led the Pledge of Allegiance to the Flag.

1.3 Contra Costa Mosquito and Vector Control District Board Update (Michael Krieg, President)

Michael Krieg, President of the Contra Costa Mosquito and Vector Control District provided an overview of the District and its status. He discussed the budget, reserves, financial ratings, rodent and mosquito issues to watch, a possible future parking structure at the District site to help accommodate its fleet, technology advancements to allow field technicians to report in real time, and use and placement of mosquito fish.

Mayor Pope thanked him for the update.

2) PUBLIC COMMENTS

None.

3) CONSENT CALENDAR

3.1 Approve Minutes from the Regular Joint City Council/City Council Acting as the Successor Agency to the Redevelopment Agency/Public Financing Authority Meeting held March 8, 2022 (Libby Vreonis, City Clerk)

3.2 Approve Minutes from the Special Meeting of the Oakley City Council held March 10, 2022 (Libby Vreonis, City Clerk)

Council. He encouraged anyone opposed to call or write a letter to our representatives because they are steamrolling us. He mentioned the government definition of affordable housing is different, like apples and oranges, than what they may call affordable such as a working family being able to afford a home. He mentioned this is another reason that splitting the City into districts is a bad idea; they just saw a conflict and they are not even in district yet. He commented that for criteria they need sites close to transit, grocery stores, hospitals, services and schools. He mentioned Oakley doesn't fit that and he believes ABAG is wrong and the City needs to do everything in their power to correct their error. He mentioned as Councilmember Fuller indicated, the sites need to be close to grocery stores and other things. He mentioned sometimes lower-income folks need transportation and sites need to be close to bus routes or BART. He mentioned more affordable housing near BART in Antioch would be good. He shared that Antioch has a huge development on the other side of Hwy160 and if services are going in around that area, he would like to consider sites nearby in Oakley so their residents can access those services. He mentioned he does not people in a desert of services. He expressed he is not in favor of a 30% buffer at the front end; he prefers the minimum to satisfy the law while not encouraging what he thinks is a mistake which is building affordable housing where people can't survive. He mentioned if they need to do 30 units per acre do that and if they do 80%, that is even more reason that the City has no control. He shared he likes Councilmember Higgins' idea of River Oaks Crossing or the northwest side. He mentioned the area was once considered for big-box commercial but would need more residents to support commercial there. He added that many sites in the City are infrastructure deserts. He commented that storm drains and sewer are expensive to put in and staff mentioned a 50-unit project could not afford to put it in, but perhaps a 300-unit project could afford to put it in to benefit everyone else around them to hook in. He requested staff look to areas of the City where economic development can tap into the development and get something positive out of it.

Mr. Strelo commented there is a minimum and maximum of 1/2 acre to 10 acres that should be looked at and staff feels that 1-5 acres is most viable.

Mayor Pope expressed they don't want another Carol Lane.

Mr. Strelo commented there has been enough input from the Council over the years that they don't want another project in Oakley like that again.

Mayor Pope called for recess at 9:33 p.m.

The City Council reconvened at 9:43.

7.2 2092 Oakley Road Preliminary General Plan Amendment (PA 08-21) - Work Session to discuss the merits of a potential project to amend the General Plan Land Use Designation of an approximately 9.9-acre site from Commercial (CO) to Multi-Family Residential, Low Density (ML) (Ariana Ruiz, Planning Technician)

Planning Technician Ariana Ruiz presented the staff report and PowerPoint presentation.

Applicant Dan Cosgrove, Managing Partner of this parcel and owner of the building La Michoacan Bakery operates from and previously owned a parcel next to it. He shared he is the CEO of Mercantile Systems and he has an understanding of commercial property in Oakley. He mentioned after analysis of the property with its current zoning for commercial, it is not financially viable and that is the reason for their proposal.

Ralph Strauss with SDG architects referred to a slide on the PowerPoint. He explained that the site has some unique challenges with circulation, access and visibility and they cannot make it work for commercial. He mentioned they have studied a wide variety of commercial solutions for the site, none of which has probability and they looked at other options for a variety of solutions. He mentioned this housing is affordable by design, affordable being different from the discussion this evening. He mentioned the residential will support surrounding commercial and there will be pedestrian links to Main and to Oakley Road for access. He shared that all 3 designs have 2 car garages and additional parking, with small backyards.

Owen Poole commented they are looking for direction. He shared many years ago he was involved in the Holly Creek Development and spent time with Virgil Calisesi who owned the property next to it and it was always meant to be part of the housing development but the deal never got done. He discussed the proximity to the park, circulation, median in the middle, right in, right out have made it difficult to make it commercially viable.

Public Comments

Mary Roney mentioned she was going to ask if any of the homes meet affordable housing discussed earlier, but her question was answered. She inquired if affordable allows 30 people per acre.

Mayor Pope clarified it is 30 units per acre.

Ms. Roney inquired since they don't meet the requirements if they can request for a percentage or number of units to fall into the low-income requirements as Councilmember Williams suggested earlier.

Marilyn Tiernan was called upon but was not present.

Mayor Pope mentioned the Council received written comments from Mr. Bailey and he moved to deliberation.

Mayor Pope requested the location slide showing the project site be displayed.

Councilmember Williams commented that they mentioned the site is not commercially viable. She inquired how long they have been marketing it. She mentioned in general, she doesn't like rezoning commercial to residential.

The applicant mentioned it has been 3 years.

Councilmember Williams mentioned affordable means different things. She inquired what the houses will go for.

The applicant shared they are thinking $600k.

Councilmember Williams inquired if they would be open to a percentage being actual affordable housing.

The applicant responded they are open to discuss anything.

Councilmember Higgins inquired how they could do a right in, right out without crashing.

Mayor Pope explained it would be west bound in, west bound out. He mentioned staff could determine if a light is needed at the intersection or if a turn lane would be needed or desirable.

Councilmember Higgins commented in Brentwood there is a neighborhood where there are 6 homes in a court and it is unsafe with one-way streets. She inquired if this would be the same.

The architect responded there are two-way streets with full driveway aprons with two driveway parking spaces.

Councilmember Higgins inquired if the driveway is big enough for RVs and boats.

The architect responded they are not.

Councilmember Higgins inquired if there are any single-story homes.

The architect explained the homes are not designed yet, but they are able to provide more homes if they build up.

Vice Mayor Meadows mentioned the applicant quoted a price estimate but he assumes he will be selling to a builder.

The applicant responded he is not sure yet.

Vice Mayor Meadows commented he is not keen on all three plans, but is leaning toward Plan A. He mentioned he understands the constraints on the site for commercial and that it is not viable for that purpose.

Mayor Pope commented a number of these projects have come forward and he only recalls one that was approved on the other side of Raley's. He mentioned although the applicant didn't make the argument, he sees that this project would provide customers for the commercial nearby so there is economic incentive. He shared he is empathetic to the constraints of the site, but generally, he looks for the biggest benefits to the residents of the City and residents of the project. He inquired if they can make it a private, gated community with private roads. He requested clarification which area is the alley and which is the path.

The architect explained where they were and where the access paths are located.

Mayor Pope commented he likes the court concept, but they must be careful how they execute it.

Mayor Pope commented they have the direction to look into housing to help meet the low-income RHNA requirement.

Mayor Pope mentioned they are looking to them for ideas to benefit the City; the City would be giving away possible sales tax revenue, services, commercial, etc.

Mr. Poole commented what the City doesn't want is a substandard commercial site because it will always be struggling and that is why they are here. He mentioned any of the 3 plans will be strong and there will be an HOA so there will be no boats or RVs on the properties, with the properly managed with the right HOA, they will get Councilmember Williams' children living here and his children living here. He mentioned it is a unique, upscale development, a young, urban type of site. He mentioned they can get some young people in that don't leave town.

Mayor Pope inquired if there is an amenity that isn't present, something attractive to the project, another project multi-generational park, something unique. He mentioned he would look for something special.

Councilmember Fuller commented he likes the design and the urban, smaller houses that may be attractive for young families. He mentioned he is not inclined to give up a commercial site, the City is losing light industrial and commercial, one of the reasons the City incorporated, and it is turning into residential.

Mr. Poole mentioned there is a similar development in downtown Pleasant Hill where there is a very good relationship between the housing and nearby commercial.

Councilmember Higgins commented there are homes near the Jack-in-the-Box in Brentwood by Sand Creek Road that are exactly this that have young families with no kids, but dogs. There they have issues with nowhere to walk the dogs, but here there would be sidewalks. She mentioned the Council approved townhomes for the Cypress

area, but she is not sure if they were ever built, modeled after what was built in Pleasant Hill near Gregory Lane.

Vice Mayor Meadows shared there was a study about 2 years ago that indicated the City is oversaturated in commercial zoning. He agreed with Mr. Poole that this site is not a good commercial site. He mentioned there will be issues with ingress and egress for homes; if they have it for commercial, it will kill a commercial project. He mentioned there is no curb on Main, there is a current elevation issue, and there is a cell tower on the site that might be able to be moved. He mentioned he thinks everyone knows he does not want to lose commercial, but this site is not viable for commercial.

Mayor Pope mentioned that Randi Adler put in public comment for item 2.0 and was in a discussion with Police during that time so he would like to provide her the opportunity to speak.

Randi Adler thanked the Council for its support for her with her recent hip replacement. She commented she has an issue with Police. She shared her daughter is abused by her boyfriend and Officer England has shown he doesn't care and told her it is her (Ms. Adler's) fault. She mentioned some officers should not be officers or they should be retrained to actually care about what is going on in their communities. She mentioned women and some men are in relationships where they are being abused and have no way out. She shared her daughter's boyfriend has been looking online for an AK-47 to try and kill them. She expressed she needs help and she is going to get a restraining order, but it is just a piece of paper and she hopes they don't show up dead.

8) ADJOURN

There being no further business, the meeting was adjourned at 10:15 p.m.

Respectively Submitted,

Libby Vreonis
City Clerk

DATE: February 6, 2024

TO: Joshua McMurray, City Manager

FROM: Ken Strelo, Planning Manager

Approved and Forwarded to the Planning Commission

SUBJECT: The Village at 2092 Oakley Road Subdivision 9634 (GPA 01-22, RZ 03-22, FDP 02-22, TM 04-22, DR 07-22) – Request for approval of a General Plan Amendment, Rezone, Final Development Plan, Tentative Map, and Design Review for a 9.99 acre, 83 unit single family residential subdivision project. APN 037-110-031.

Summary

This is an application by Owen Poole ("Applicant") requesting approval of 1) a General Plan Amendment (GPA 01-22) to redesignate 9.99 acres from Commercial (CO) to Residential Medium (RM); 2) a Rezone (RZ 03-22) of 9.99 acres from C (General Commercial) District to P-1 (Planned Unit Development) District; 3) a Final Development Plan (FDP 02-22) for development of the 9.99 acres site; 4) a Tentative Map (TM 04-22) to subdivide 9.99 acres into 83 single family residential lots, additional on-site parking, a toddler park, community gathering areas, and other improvements; and 5) a Design Review (DR 07-22) for floor plans and architecture of three homes types with three elevations and three color schemes, and landscaping and other improvements throughout the project ("Project"). This project includes compliance with the California Environmental Quality Act ("CEQA") and adoption of a Mitigated Negative Declaration is proposed. The site is located at 2092 Oakley Road and is zoned C (General Commercial) District. APN 037-110-031.

Note: The Planning Commission will serve as an advisory role to the City Council on this application.

Background

GENERAL PLAN

Existing Land Use Designation

- Commercial ("CO") – The CO designation allows for a broad range of commercial uses typically found adjacent to residential neighborhoods, downtowns, and freeways.

Proposed Land Use Designation

- Residential Medium ("RM") – The RM designation provides for more affordable, small lot development and to increase the availability of rental or entry-level housing.

ZONING

Current Zoning District

- C (General Commercial) District – The purpose of the C District is to create and maintain major commercial centers accommodating a broad range of commercial uses (e.g., office, retail, and personal services) of community-wide or regional significance typically found adjacent to or along major travel corridors, such as Main Street, O'Hara Avenue, Laurel Avenue and Empire Avenue.

Proposed Zoning District

- P-1 (Planned Unit Development) District – The purpose of the P-1 District is to allow diversification in the relationship of various uses, buildings, structures, lot sizes and open spaces, ensure compatibility with surrounding land uses, and to ensure substantial compliance with the General Plan and the intent of the Municipal Code in requiring adequate standards necessary to satisfy the requirements of the public health, safety and general welfare.

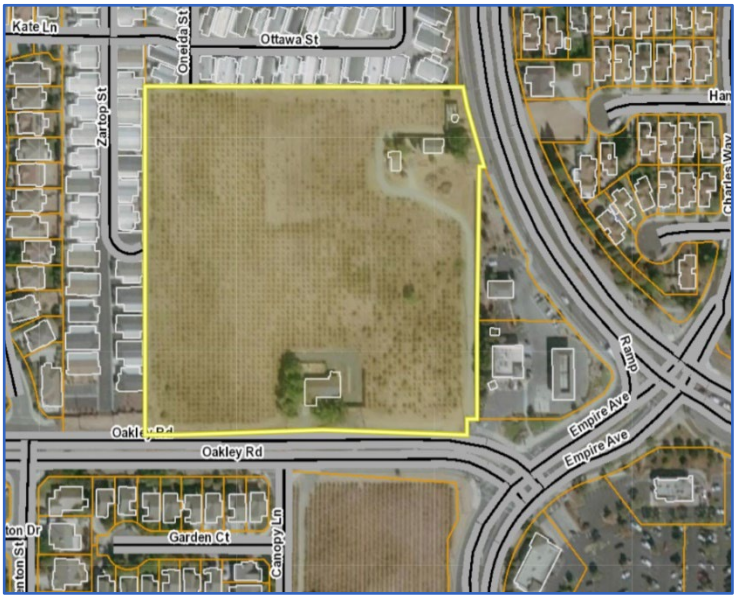
SITE CONDITIONS AND SURROUNDING LAND USES

The subject property is a rectangular shaped site with an approximately 625-foot frontage along Oakley Road, and an approximately 120-foot frontage along Main Street in the northeast corner (See Figure 1. Aerial of Project Site).

The property has two existing single-family residences: one along Oakley Road, and another near the existing wireless communication facility.

There is also an existing mobile home community known as the Eagle City Mobile Home Park located to the north and west of

Figure 1. Aerial of Project Site



the site. These parcels are designated Residential Mobile Home ("RMH") within Oakley's General Plan. The parcels to the southwest contain existing single-family residences and are designated as Residential Medium ("RM"). Directly to the east of the site are the Valvoline Instant Oil Change service station and the 7-11 gas station.

PRELIMINARY GENERAL PLAN AMENDMENT WORK SESSION

On March 22, 2022, the City Council held a Preliminary General Plan Amendment Work Session (Planning Application PA 0-21) to discuss the merits of this potential project. The applicant presented three separate concepts for the site to help visualize how a project under the Residential Medium ("RM") designation may look. After receiving Staff's Report and comments from the applicant, the City Council opened the Work Session up for public comments and followed with their own questions and comments to the Applicant. Feedback from the City Council ranged from questions on the commercial viability of the site to potential amenities in a future project. An excerpt from the adopted minutes is included as an attachment to this Staff Report.

Project Description

The proposed project would include amending the General Plan Land Use Designation of an underutilized commercial site currently occupied by two homes and a vineyard to a fully developed single-family residential subdivision operated by a homeowner's association. Other related entitlements associated with this application include a Rezone, Final Development Plan, Tentative Map, and Design Review. All homes are proposed as two-story structures with front porches loaded onto landscaped pedestrian pathways and rear garages loaded onto the neighborhood's streets. Fourteen of the homes are proposed to have their porches front onto Oakley Road. Those home's garages would also be at the rear of the homes and accessed from the interior street. Each of the proposed entitlements is further described in the following subsections:

GENERAL PLAN AMENDMENT (GPA 01-22)

The project includes a request to amend the General Plan Land Use Designation on the 9.99-acre site from Commercial ("CO") to Residential Medium ("RM"). The RM designation allows for single family and multi-family residential construction at a density between 5.5 and 9.6 dwelling units per gross acre. The project is proposed at 8.3 dwelling units per gross acre. Approval of this General Plan Amendment allows the other associated entitlements to be consistent with the underlying General Plan Land Use Designation. The requested General Plan Amendment and associated project entitlements may be simultaneously analyzed and considered for approval as one project application.

REZONE (RZ 03-22)

The project application includes a request for approval of a Rezone from C (General Commercial) District to P-1 (Planned Unit Development) District that is tied to the proposed Final Development Plan and Tentative Map. The proposed P-1 District would allow for the unique project design that includes private, HOA-maintained road, rear garages, and pedestrian oriented fronts to the homes. A P-1 District has no impact on the allowable density of the underlying General Plan Land Use Designation. Table 1 provides a summary of the P-1 District's proposed Development Regulations.

Table 1. P-1 District's Proposed Development Regulations

	Min. Lot Size (sf.)	Front Yard Setback (ft.)	Side Yard Setback (ft.)	Corner Side Yard Setback (ft.)	Rear Yard Setback (ft.)
Project's P-1 District	2,920	15	4	7 (entry way) 4 (parking areas) 13 (interior roads)	5

FINAL DEVELOPMENT PLAN (FDP 02-22)

A Final Development Plan ("FDP") is a component of a P-1 District. The applicant is choosing to combine the FDP application with the Rezone application, which is allowed per the "Planned Unit Development (P-1)" section of the Oakley Municipal Code (Section 9.1.1002). The FDP includes the information provided on the Vesting Tentative Map and its related plans, as well as other information such as details on housing or elevations and heights of non-residential buildings. When FDPs are processed after a P-1 District is formed, the P-1 District will usually include a Preliminary Development Plan; however, an applicant may submit a FDP with a P-1 District rezone application so that it may be considered in conjunction with the rest of the project entitlements, such as what has occurred with this application. The proposed FDP will approve the general layout design, number of lots, types of residential structures, etc. Any requested change to the approved FDP would be reviewed by the Planning Commission/City Council where that body would determine whether the change is substantial enough to warrant a public hearing in order to further review the request.

TENTATIVE MAP (TM 04-22)

The proposed project would result in the subdivision of approximately 9.99 acres into a new single-family residential subdivision of 83 lots, including additional on-site parking, a toddler park, and community gathering areas. Other improvements will include frontage dedication and improvements along Oakley Road, internal private street network, pedestrian access to the front porches of the interior lots, and stormwater detention/bioretention areas. The development will be managed and maintained by a homeowner's association; however, due to the proximity to Oakley Road and Empire Avenue intersection, it will not include vehicle gates at the entry. As proposed, the

gross density (includes all area before right of way dedication, parks, landscaping, etc.) is 8.3 dwelling units per gross acre (du/ga). Residential lot sizes ranging between 2,920 and 3,790 square feet (sf), and an average residential lot size of 2,986 sf. Most lots have a 40-foot wide frontage.

Access, Circulation and Parking

Access to the neighborhood streets would by a main entrance off of Oakley Road (See Figure 2. Rendering of Neighborhood Entrance). A secondary, 21-foot wide

Figure 2. Rendering of Neighborhood Entrance

emergency vehicle access ("EVA") will connect to Main Street in the northwest corner of the project. The EVA would be blocked to vehicular traffic by removable bollards; however, it will be open to pedestrians and connect direct to Main Street and connect indirectly to Main Street further to the north via an ADA accessible pedestrian pathway. The internal street network is laid out in a grid pattern with on-street. A total of 120 on-street parking spaces are proposed as 90-degree spaces along the two east/west-oriented streets, and the north/south oriented street adjacent to the commercial properties to the east. Parallel parking along other portions of those and the other streets would be prohibited by the HOA. All internal streets provide access to the two-car garages located at the rear of the homes. Off-street parking is limited to garages as there is not sufficient private driveway length to accommodate vehicle parking.

Oakley Road/Main Street Dedication and Improvements

The project is conditioned to dedicate approximately 20 additional feet of right of way along the Oakley Road property line for a total right of way half-width of 55 feet. Improvements within that area would include additional street pavement, new curb and gutter, 6.5 feet of new landscaping, and 6.5 feet of sidewalk. The back of sidewalk would align with the future front property lines of the 14 lots that will front Oakley Road. Additional right of way is not required to be dedicated along Main Street, but the

project is conditioned to install new curb and gutter, 6.5 feet of landscaping, and 4 feet of sidewalk. The applicant would also improve the Oakley Road center median to its full width, some of which may be available for fee credits. Due to the proximity to the Oakley Road/Empire Avenue intersection, the project entry will be right in/right out only.

Proposed Landscape Plans

The proposed landscape plans are included as Sheets L-1.1 through L-12. The information on those plans provides an Illustrative Overall Plan that shows all proposed tree locations and landscaped areas overlaid onto an aerial of the site and surrounding properties, and a Preliminary Landscape Plan that calls out different areas on the site plan and acts as a key for the other included details. Other sheets provide Wall and Fence Plan and Details, Typical House Cluster Enlargement, Open Space Enlargement, Parking Area Concept, Project Entry Enlargement, the Plant Palette, Site Amenities such as the playground furniture and equipment and open space structures, and construction and irrigation details.

Figure 3. Low Picket Fence Along Oakley Road

Fencing throughout the site will consist of 6-foot tall board on board wood fencing. Exterior property lines shared with the mobile home park will be completely solid while fencing protecting private side yards of the lots will have 1-foot of lattice at the top. Wooden entry gates to the private yards will match the fencing, including the lattice top. The 14 lots that front Oakley Road will have a low picket fence at the back of sidewalk (See Figure 3. Low Picket Fence Along Oakley Road). There is an existing slatted chain link fence between a portion of the existing commercial businesses to the east and the project site. The remaining portion of that boundary has no fencing. The proposed plans do not include any additional fencing or walls between the existing commercial properties to the east and the proposed development. Staff have conditioned the PC Resolution to require the applicant to comply with Oakley's Design Standards by installing an 8-foot tall sound wall consistent with Oakley's acceptable design and materials along this boundary. The condition will also require the plans be revised to show the wall location and design prior to presentation to the City Council for final project determination.

One component related to the site landscaping is the Arborist Report that identifies all existing trees on site as well as if any are classified as "Protected Trees" pursuant to the City's Heritage and Protected Trees ordinance (Oakley Municipal Code

Section 9.1.1120). The project's arborist report was prepared by Atlas Tree Service and is dated September 15, 2022. In summary, the report identified 16 living trees on the property, none of which classified as "Protected Trees;" however, there are two non-native pine trees located near the border of the site with Main Street. The project applicant has shown these two trees as remaining as part of the project design.

DESIGN REVIEW (DR 07-22)

As part of the Design Review application, the applicant is proposing house floor plans, architecture, color and material schemes, landscaping plans (including conceptual street tree layout and park equipment), and fence plans. Since the landscaping was covered in the Tentative Map project description, this section will focus on the homes. There are three different floor plans ranging from 1,848 sf. to 2,236 sf. of livable area. All plans are two story homes with two-car garages. Table 2 provides a summary of the proposed floor plans.

Table 2. Summary of Proposed Floor Plans

	Livable Area SF	1st Story / 2nd Story SF	Bedrooms	Bathrooms	Garage SF/cars
Plan 1	1,848	892 / 956	4 bedrooms	3	429 / 2
Plan 2	2,083	1,006 / 1,077	4 bedrooms	3	441 / 2
Plan 3	2,236	1,095 / 1,141	5 bedrooms or 4 w/ opt. loft	3	420 / 2

In addition to the three floor plans are three architectural styles, referred to as Spanish, Farmhouse, and Bungalow. Each of the three architectural styles has three color and material themes tied specifically to that style. Figure 4 shows the conceptual streetscape at the project entry.

Figure 4. Conceptual Streetscape at the Project Entry

Environmental Review

CALIFORNIA ENVIRONMENTAL QUALITY ACT COMPLIANCE

An Initial Study ("IS") and Mitigated Negative Declaration ("MND") have been prepared for this project pursuant to the California Environmental Quality Act ("CEQA"). Raney Planning and Management conducted the CEQA analysis survey on behalf of the City of Oakley. The Notice of Intent ("NOI") to Adopt an MND and IS was circulated for public review and comment from November 16, 2023 to December 18, 2023. It was filed with the County Clerk and Governor's Office of Planning and Research ("OPR"), distributed to over 60 public agencies and parties requesting such notice, and posted in the same manner as a Notice of Public hearing, which is at locations throughout the City and at the project site. The NOI provided a summary of the project as well as methods to access the IS/MND for review and comment. No comments were received by the City within the commenting period for the NOI, nor were any comment letters received after the commenting period for the NOI.

Analysis in the IS found eight (8) of the 21 impact categories require mitigation to reduce potential impacts to a less than significant level. All other 13 impact categories were found to have either no impacts or less than significant impacts. A summary of the mitigation measures can be found in the Mitigation Monitoring Program, included as Exhibit "A" to the Proposed Resolution attached to this Staff Report.

Since the Planning Commission is making recommendations to the City Council on the entitlements associated with this application, they will also make a recommendation for adoption of the MND to the City Council. Recommendation for adoption of the MND is included in the proposed resolution for recommendation for approval of the other entitlements associated with the project. The NOI and IS/MND are included as attachments to this Staff Report.

Habitat Conservation Plan/Natural Community Conservation Plan

This project is subject to the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan ("HCP/NCCP" or "HCP Plan"). Projects that are subject to the HCP Plan are required to submit a Planning Survey Report ("PSR") as part of the project application. The contents of the PSR help guide the project through compliance with both the California and Federal Endangered Species Act by assuming presence of certain plant and animal species and requiring additional surveys to be done prior to any ground disturbance. In addition, whether species are found or not, the project must pay development impact fees for each acre, or fraction thereof, of disturbed land not already considered "urban" under the HCP Plan. Those development impact fees are used to help create, install, and maintain habitat outside of the Urban Limit Line, as well as administer the HCP Plan. The project would contribute

$198,520.38 to the HCP/NCCP program under the impact fees current as of the date of this staff report.

Analysis

GENERAL PLAN AMENDMENT

Requests for amendments to the underlying General Plan land use designation on a property should be considered with respect to surrounding uses and their respective land use designations. The 9.99-acre project site is bordered on the west and north by an existing residential mobile home park to the south by Oakley Road with existing residential uses and a vacant Commercially designated site beyond, and to the east by a gas station with convenience store and drive-through oil change facility. Commercial adjacent to residential is common and in most cases a commercially designated area will eventually border a residentially designated area. With proper design the two land uses can co-exist adjacent to each other.

Amending the General Plan Land Use designation to Residential Medium ("RM") would make the property more consistent with surrounding residential uses, but less consistent with the adjacent commercial uses. However, since this property is not located on a major arterial roadway, the amendment will allow for additional infill housing that will be located near public transit and existing commercial uses. The project design and conditions of approval will minimize the potential issues that could arise with residential and commercial adjacent to teach other.

Staff recommends the Planning Commission recommends City Council approval of the proposed General Plan Amendment.

REZONE/FINAL DEVELOPMENT PLAN

When making a recommendation to the City Council on a rezone to P-1 District and Final Development Plan, the Planning Commission shall be satisfied that the following are true (summarized from OMC section 9.1.1002):

- The applicant intends to start construction within two years from the effective date of the zoning change;
- The development is consistent with the General Plan;
- If residential, it has sustained desirability and stability, and is in harmony with the character of surrounding neighborhoods; and
- The development of a harmonious, integrated plan justifies exceptions from the normal application of the OMC.

The Applicant has stated they are unsure if they will function as developer or sell the property or rights to develop the property; however, construction within two years is reasonable with either option, depending on market conditions. The density and type of development is consistent with the General Plan, and the project integrates pedestrian connectivity to Main Street and nearby commercial developments. Vehicular transportation will have almost immediate access to major arterials such as Empire Avenue and Main Street. The type of development is expected to be desirable in that it includes a variety of homes sizes on smaller lots with an HOA which can appeal to those less interested in large private yards that require maintenance and that may value nearby access to public transportation and walkable amenities. The other HOA amenities such as the park and public gathering areas are additional attractions for the project. The development will be a harmonious and integrated plan that includes exceptions from the normal application of the Oakley Municipal Code due to the number and size of amenities usually found in larger subdivisions, such as a park, public gathering areas. The P-1 District is justified to allow for project-specific development regulations in order to design a feasible project within the allowable range of the General Plan Land Use Designation of RM.

Staff recommends the Planning Commission recommends City Council approval of the proposed Rezone and Final Development Plan applications.

TENTATIVE MAP

The Tentative Map ("TM") has been reviewed against all applicable codes including the Subdivision Map Act, General Plan, and the Zoning Ordinance. The TM's gross density (approximately 8.3 du/ga) falls within the gross density range of the Residential Low (RM) General Plan Land Use Designation of 5.5-9.6 du/ga. The TM is tied to a P-1 District, which has proposed project-specific development regulations, such as required yard setbacks and minimum lot sizes.

The site is physically suitable for the project in that it is accessible, not physically constrained other than the reduction in net developable acres due to frontage right of way dedication, onsite stormwater detention and treatment, in-tract park, and in-tract public gathering areas is similar to surrounding residentially developed projects, and it is also able to accommodate the proposed density of development in a manner consistent with the underlying land use designation of RM. The subdivision is not expected to result in any serious public health problems. Public improvements are proposed and conditioned to occur as a result of the subdivision, which is a benefit to the public and surrounding residents and property owners of the vicinity. One such improvement will be the dedication and frontage improvements along Oakley Road, which currently lacks any sort of curb, gutter, or sidewalk for pedestrian or bicycle safety.

Staff recommends the Planning Commission recommends City Council approval of the proposed Vesting Tentative Map application.

DESIGN REVIEW

Analysis for Design Review refers to the Standards for Review as laid out in OMC section 9.1.1604(f), which focuses on site planning, architecture, landscaping and site elements, and streetscapes. With these standards in mind, the proposed plans were analyzed for consistency with the adopted City of Oakley Residential Guidelines ("Guidelines").

Neighborhood Layout and Design

The project has been designed so that all streets will function as residential streets that provide access to the rear garages for each home. This is a unique and new design for development in Oakley and will add to the product mix available to first-time homebuyers and those looking to move into a newer or larger home that does not require as much outdoor space maintenance while still including outdoor spaces such as the proposed park and public gathering areas. Also, the front doors will be accessible by pedestrian walkways that run through landscaped corridors. The nearby public transportation on Main Street and commercial shopping center nearly adjacent to the project or within ½ mile will provide additional amenities to residents without the need to drive to the location.

Residential Siting and Lot Design

The applicant has designed the homes so that nearly every lot has the same setback to the respective garage and porch area. This is typically not ideal when homes are plotted on public streets and include larger yard spaces; however, this is a unique project given the attention to pedestrian paseos running along the front of the homes. Figure 5 shows the illustration of the view from one of the paseos to the entry of the pedestrian pathway connections to the front of the homes.

Figure 5. Paseo and Pedestrian Pathway

Building mass is an element of lot siting and design and can affect the aesthetics of the overall neighborhood. For the proposed project, changes in roof materials and design among the same floor plan assist in giving the overall neighborhood more visual variety. Some changes are to the main roof line, while others focus on the projecting elements such as porches.

Two common Oakley Design Guidelines look for new single family residential to achieve a minimum of 20% single-story homes and that at least 50% of all corner lots be single-story homes, and another is to maintain at least a 15-foot setback between adjacent second story elements. Often with P-1 District developments the lot sizes are reduced

in both size and width which leads to architects needing to design a two-story home in order to achieve the desirable square footage of the market in a manner that meets the developer's criteria as well. A single-story home is more feasible when lots are closer to 5,000 square feet or more, leaving room for the square footage of the home to take up a larger footprint. For the density and lot size of this project, single-story homes are not feasible.

Architectural Character

The architectural character and design of the proposed homes meets several of the design guidelines. There is variation in materials between architectural styles, such as roofing, veneer, and siding. The three color schemes for each architectural style complement each other while allowing for uniqueness to any given home with the eyesight of another. There are no options for different garage doors or garage door windows, as proposed.

Areas for small improvements and better implementation of the design guidelines are summarized below and have been included as conditions of approval for the applicant to integrate into the plans prior to City Council consideration of the project:

- Exterior lighting specific to each architectural type and/or theme lighting for pedestrian paseo areas to be shown on the proposed elevations;
- Integration of false shutters on the front and rear elevations as feasible and in tune with the respective architectural styles;
- The use of different garage door designs for each architectural style including integration of garage windows, if feasible.

Staff recommends the Planning Commission Recommend City Council approval of the proposed Design Review application.

Findings

Draft findings can be found in the proposed resolution.

Consistency with the Oakley Strategic Plan 27+

Approval of this application would be consistent with the goals in the section of the Oakley Strategic Plan 27+ entitled, "Community and Economic Development Goal". Reviewing applications for compliance with Oakley's development standards ensures strategic and thoughtful growth.

Fiscal Impact

The approval of these entitlements will not impact the General Fund. This is a developer funded account. All Staff time and City of Oakley generated materials are charged to the account and paid for by the developer.

Staff Recommendation

Staff recommends the Planning Commission adopt the proposed resolution recommending the City Council adopt a Mitigated Negative Declaration and approve the project titled, “The Village at 2092 Oakley Road Subdivision 9634 (GPA 01-22, RZ 03-22, FDP 02-22, TM 04-22, DR 07-22)” as conditioned.

Attachments

1. Vicinity Map
2. Notice of Public Hearing
3. City Council Minutes from March 22, 2022 - Excerpt of Project’s Preliminary General Plan Amendment Work Session (Item 7.2)
4. Applicant’s Plans
5. Notice of Intent to Adopt a Mitigated Negative Declaration
6. Initial Study/Mitigated Negative Declaration
7. Proposed Resolution with Exhibit “A” Mitigation Monitoring Program

Minutes of the Regular Meeting of the City of Oakley Planning Commission held February 6, 2024

1) OPENING MATTERS

1.1 Call to Order and Roll Call of the Oakley Planning Commission

Chair Oleksii Chuiko called the meeting to order at 6:30 pm in the Oakley City Council Chambers located at 3231 Main Street, Oakley, California. Vice Chair Diego Verduzco and Commissioners Leonard Price, Jimmy Ramirez and Jeanne Krieg were present.

1.2 Pledge of Allegiance to the Flag

Commissioner Price led the Pledge of Allegiance to the Flag.

2) PUBLIC COMMENTS

None

3) CONSENT CALENDAR

3.1 Approve Minutes from the Regular Planning Commission Meeting held January 16, 2024 (Kim Snodgrass, Deputy City Clerk)

It was moved by Vice Chair Verduzco and seconded by Commissioner Krieg to approve the minutes. Motion was unanimous and so ordered. (5-0)

4) PUBLIC HEARINGS

4.1 The Village at 2092 Oakley Road Subdivision 9634 (GPA 01-22, RZ 03-22, FDP 01-22, TM 04-22, DR 07-22) Request for approval of a General Plan Amendment, Rezone, Final Development Plan, Tentative Map, and Design Review for a 9.99 acre, 83 unit single family residential subdivision project. APN 037-110-031. (Ken Strelo, Planning Manager)

California Environmental Quality Act determination: Recommend that the City Council adopt a Negative Declaration finding the proposed project will not have a significant adverse impact on the environment.

Planning Manager Ken Strelo presented a summary of the project and mentioned that the agenda states Negative Declaration, it should be a Mitigated Negative Declaration, there is a small technical difference between those two types of documents.

Applicant Ralph Strauss with SDG Architects mentioned that the property owner Dan Cosgrove is here as well as Owen Poole who is helping with the entitlement. He thanked staff for their work and provided a PowerPoint presentation.

Commissioner Ramirez thanked Mr. Strauss for his presentation and mentioned he appreciates the variety of the homes, he mentioned he is curious about the onsite amenities and inquired how the firm considered a toddler park and asked If he could speak to the trailer park and the elderly folks nearby and inquired if there had been any conversation about opening up the amenities for those folks to enjoy.

Mr. Strauss mentioned that the common areas have trellises, seating areas and gathering areas, the toddler park will have typical amenities for that age group so kids can run wild in one and people can have more peaceful enjoyment in the other. He mentioned that because it is a privately maintained neighborhood, there wasn't discussion about opening it up but there is nothing preventing someone from coming in and enjoying the park.

Commissioner Krieg thanked Mr. Strauss for the presentation and mentioned he answered all of her questions.

Mr. Strauss mentioned that the property owner is here if there are any questions he could answer.

Chair Chuiko opened the Public Hearing and mentioned since there are no public comments, he will close the Public Hearing and call for deliberations.

Mr. Chuiko mentioned that when it comes to rezoning, they take it very seriously, especially going from commercial to residential because as a community, they would like to see more businesses in Oakley; however as was pointed out, this is a unique project, it's not an ideal location for commercial zoning so with all of the benefits for the local businesses having a community next door, it's a huge win as well as the access to public transit.

It was moved by Commissioner Price and seconded by Commissioner Krieg to approve item 4.1. Motion was unanimous and so ordered. (5-0)

4.2 3370 Main Street Remodel Design Review (DR 09-23) (Evan Gorman, Associate Planner)

California Environmental Quality Act determination: Find the project is exempt under the Class One categorical exemption for existing facilities (14 Cal. Code Regs./CEQA Guideline § 15301)

Associate Planner Evan Gorman presented the staff report.

Applicant Lance Crannell with SDG Architects mentioned the impetus for this project was the City's facade improvement program, which started the conversation to see how this property can be improved. He mentioned that the bakery may stay, it is an existing

running business, and they do not have any firm plans to change that use just yet, but it would benefit from an improved façade.

Chair Chuiko asked Mr. Crannell if he could elaborate on the occupancy.

Mr. Crannell mentioned that Suite B is currently the bakery and that will continue to be a bakery for the foreseeable future, the spaces in the back are separated in a way that they could be used as office executive suites or some office use, it's designed as a shell so it can be tenant improved to fit the needs of whatever allowable use is allowed for that space.

Chair Chuiko asked if the current tenant will remain.

Mr. Crannell confirmed that as of right now, they will remain.

Chair Chuiko asked if the second unit is vacant.

Mr. Crannell confirmed it is currently vacant.

Chair Chuiko inquired if when the structure in between the buildings is removed, there will be clear access to the unit.

Mr. Crannell confirmed the courtyard will be an amenity to benefit both suites.

Commissioner Ramires asked if the applicant could talk about how they came to the design and did they consider potentially making the frontage a place for customers to sit down.

Mr. Crannell responded that given the size of the bakery and all of the baking equipment, it takes up a big foot print within the floor plan itself, so they are working with a limited floor plan, they designed it in such a way that the facade was more inviting to the neighbors, the interior is in pre-design to do a couple of different uses, but considering the bakery is there now, they may stay there for the foreseeable future. Given that there is a point of sale and concessions, it does not leave too much for seating within that footprint and just outside that footprint is the public right of way, so they do not have any discretion over that.

Chair Chuiko opened the Public Hearing and mentioned that since there are no comments, he will close the Public Hearing and call for deliberations.

It was moved by Vice Chair Verduzco and seconded by Commissioner Krieg to approve item 4.2. Motion was unanimous and so ordered. (5-0)

4.3 Tu Jalisco Restaurant Full Alcoholic Service (CUP 05-23) (Evan Gorman, Associate Planner)

California Environmental Quality Act determination: Find the project is exempt under the Class One categorical exemption for existing facilities (14 Cal. Code Regs./CEQA Guideline § 15301)

Associate Planner Evan Gorman presented the staff report.

Commissioner Ramirez asked if the applicant could share what it would mean for his business to have this Conditional Use Permit.

The owner, Mr. Saldana, responded he would have more sales and improved service.

Commissioner Price mentioned that since this is an existing restaurant and they are not talking about opening a new bar, he would like to speak in favor of granting this.

Mr. Chuiko opened the Public Hearing and mentioned since there are no public comments, he would close the Public Hearing.

Commissioner Price stated that there are enough stand alone bars, this is not establishing a new bar, just adding to one that is already there.

It was moved by Commissioner Price and seconded by Commissioner Ramirez to approve item 4.3. Motion was unanimous and so ordered. (5-0)

5) REGULAR CALENDAR

None

6) REPORTS

6.1 Reports from Staff Members

Mr. Strelo reported the next scheduled Planning Commission Meeting will be Tuesday March 5th at 6:30pm.

6.2 OAKLEY PLANNING COMMISSION

(a) Reports from Commission Members

Commissioner Price reported the last Transplan meeting was cancelled; there is a meeting scheduled for Thursday so he should have a report at the next meeting.

(b) Requests for Future Agendas

Commissioner Ramirez mentioned that after looking at some of the projects, he looked at Oakley's parks and mentioned Oakley only has four basketball courts, he didn't see any volleyball courts, and as these development projects come across, he would love to have the Parks and Recreation department come share with them the trials, tribulations, where they are lacking, and who they are not designing parks for if that's possible.

Chair Chuiko thanked Commissioner Ramirez for the request and mentioned that if they are bringing something forward as a future agenda item, Commissioners should have a consensus and asked if the Commissioners would like to have this on a future agenda.

There was a consensus to have this item on a future agenda.

7) WORK SESSIONS

None

8) ADJOURN

There being no further business, the meeting was adjourned at 7:32 p.m.

Respectively Submitted,

Kim Snodgrass
Deputy City Clerk

PLANNING COMMISSION
RESOLUTION NO. 2-24

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF OAKLEY RECOMMENDING THE CITY OF OAKLEY CITY COUNCIL MAKE FINDINGS AND ADOPT A MITIGATED NEGATIVE DECLARATION, ORDINANCE, AND RESOLUTION APPROVING THE PROJECT KNOWN AS THE VILLAGE AT 2092 OAKLEY ROAD SUBDIVISION 9634 (GPA 01-22, RZ-03-22, FDP 02-22, TM 04-22, DR 07-22) APN 037-110-031

WHEREAS, on September 20, 2022, Owen Poole and Dan Cosgrove ("Applicant") filed an application requesting approval of: 1) a General Plan Amendment (GPA 01-22) to redesignate 9.99 acres from Commercial (CO) to Residential Medium (RM); 2) a Rezone (RZ 03-22) of 9.99 acres from C (General Commercial) District to P-1 (Planned Unit Development) District; 3) a Final Development Plan (FDP 02-22) for development of the 9.99 acres site; 4) a Tentative Map (TM 04-22) to subdivide 9.99 acres into 83 single family residential lots, additional on-site parking, a toddler park, community gathering areas, and other improvements; and 5) a Design Review (DR 07-22) for floor plans and architecture of three homes types with three elevations and three color schemes, and landscaping and other improvements throughout the project ("Project"). The site is located at 2092 Oakley Road and is zoned C (General Commercial) District. APN 037-110-031; and

WHEREAS, on April 12, 2023, the project application was deemed complete per Government Code section 65920 et. seq; and

WHEREAS, the project site is designated as Commercial (CO) in the Oakley General Plan, and zoned C (General Commercial) District; and

WHEREAS, pursuant to the requirements of the California Environmental Quality Act ("CEQA"), the City prepared a Draft Initial Study/Mitigated Negative Declaration ("IS/MND"). The Notice of Intent ("NOI") to Adopt an MND and IS was circulated for public review and comment from November 16, 2023 to December 18, 2023. It was filed with the County Clerk and Governor's Office of Planning and Research ("OPR"), emailed or mailed out to over 60 public agencies and parties requesting such notice, and posted in the same manner as a Notice of Public hearing, which is at locations throughout the City and at the project site; and

WHEREAS, on or before January 27, 2024, the Notice of Public Hearing for the Project was duly noticed in the Contra Costa Times, a newspaper of general distribution, was posted at the Project site, at Oakley City Hall located at 3231 Main Street, outside the gym at Delta Vista Middle School located at 4901 Frank Hengel Way, and outside the library at Freedom High School located at 1050 Neroly Road, was posted to the City's website, and was mailed out to all owners of property within a 500-foot radius of the project's boundaries, to parties requesting such notice, and to outside agencies; and

WHEREAS, on February 6, 2024, the Planning Commission opened the public hearing at which it received a report from City Staff, oral and written testimony from the public, and deliberated on the project. At the conclusion of its deliberations, the Planning Commission took a vote and adopted this resolution recommending the City Council adopt the CEQA MND and approve the project, as conditioned; and

WHEREAS, these Findings are based on the City's General Plan and the City's Zoning Ordinance, and the information submitted to the Planning Commission at its February 6, 2024 meeting, both written and oral, as reflected in the minutes of such meetings, together with the documents contained in the file for the Project (hereafter the "Record").

NOW, THEREFORE, BE IT RESOLVED THAT, on the basis of the above findings of fact and the entire Record, the Planning Commission makes the following additional findings in support of the recommendation to the City Council to approve the CEQA MND and Project, as conditioned:

A. The Project's Initial Study and Mitigated Negative Declaration ("IS/MND") was prepared in accordance with CEQA Guidelines and is recommended to be adopted by the City Council in conjunction with the Project's General Plan Amendment (GPA 01-22), Rezone (RZ 03-22), Final Development Plan (FDP 02-22), Tentative Map (TM 04-22), and Design Review (DR 07-22) approvals. Development of the project is subject to all adopted mitigation measures as included in the IS/MND Mitigation Monitoring Program ("MMP"), attached as Exhibit A to this Resolution, unless modified pursuant to the CEQA Guidelines and adopted by the City Council.

B. In regard to the application requesting approval of a General Plan Amendment (GPA 01-22) to redesignate 9.99 acres from Commercial (CO) to Residential Medium (RM), the Planning Commission finds that:

    1. Amending the General Plan Land Use designation to Residential Medium ("RM") would make the property more consistent with surrounding residential uses; and

    2. Since this property is not located on a major arterial roadway, the amendment will allow for additional infill housing that will be located near public transit and existing commercial uses.

C. In regard to the application requesting approval of a Rezone (RZ 03-22) to rezone 9.99 acres from C (General Commercial) District to P-1 (Planned Unit Development) District, the Planning Commission finds that:

    1. The Applicant has stated they plan to pursue development or sale of the project, and construction within two years is reasonable with either option depending on market conditions.

2. The density and type of development is consistent with the General Plan, and the project integrates pedestrian connectivity to Main Street and nearby commercial developments. Vehicular transportation will have almost immediate access to major arterials such as Empire Avenue and Main Street; and

3. The type of development is expected to be desirable in that it includes a variety of homes sizes on smaller lots with an HOA which can appeal to those less interested in large private yards that require maintenance and that may value nearby access to public transportation and walkable amenities. The other HOA amenities such as the park and public gathering areas are additional attractions for the project; and

4. The development will be a harmonious and integrated plan that includes exceptions from the normal application of the Oakley Municipal Code due to the number and size of amenities usually found in larger subdivisions, such as the park and public gathering areas. The P-1 District is justified to allow for project-specific development regulations in order to design a feasible project within the allowable range of the General Plan Land Use Designation of RM.

D. In regard to the application requesting approval of a Final Development Plan (FDP 02-22) in conjunction with the project's P-1 District, the Planning Commission finds that:

1. The Final Development Plan together with the other components of the proposed project's submitted materials includes all of the applicable required information as required by the Oakley Municipal Code, including, but not limited to the information included on the sheet titled "Final Development Plan", the Tentative Map and its associated sheets, and the Design Review plans such as the home elevations and landscape plans.

E. In regard to the application requesting approval of Tentative Map 9634 (TM 04-22) to subdivide 9.99 acres into 83 single family residential lots, additional on-site parking, a toddler park, community gathering areas, and other improvements, the Planning Commission that:

1. The Project's Initial Study and Mitigated Negative Declaration were prepared in accordance with CEQA Guidelines; and

2. The proposed Tentative Map ("TM"), together with the provisions of its design and improvements, is consistent with the Zoning Ordinance, and applicable portions of the Residential Low (RM) General Plan Land Use Designation, in that the TM's gross density (approximately 8.3 du/ga) falls within the gross density range of the RM General Plan Land Use Designation of 5.5-9.6 du/ga, and the TM is tied to a P-1 District, which sets

its own development regulations, such as required yard setbacks and minimum lot sizes; and

3. The site is physically suitable for the project in that it is accessible, not physically constrained other than the reduction in net developable acres due to frontage right of way dedication, onsite stormwater detention and treatment, in-tract park, and in-tract public gathering areas is similar to surrounding residentially developed projects; and it is also able to accommodate the proposed density of development in a manner consistent with the underlying land use designation of RM; and

4. The site is physically suitable for the proposed density and number of dwelling units in that the proposed TM falls within the allowable density while creating lots compliant with the project's P-1 District, and public roads to access the homes; and

5. The design of the subdivision and type of improvements are not likely to cause serious public health problems in that the proposed subdivision consists of 83 single family residential lots. Construction and grading of the project are subject to building or grading permits, and violations of any such permits are subject to appropriate enforcement; and

6. Public improvements are proposed and conditioned to occur as a result of the subdivision, which is a benefit to the public and surrounding residents and property owners of the vicinity. One such improvement will be the dedication and frontage improvements along Oakley Road, which currently lacks any sort of curb, gutter, or sidewalk for pedestrian or bicycle safety; and

7. The design of the subdivision and the type of improvements will not conflict with easements, acquired by the public at large, for access through or use of property within the proposed subdivision.

F. In regard to the application requesting approval of Design Review (DR 07-22) for floor plans and architecture of three home types with three elevations and three color schemes, and landscaping and other improvements throughout the project, the Planning Commission that:

1. The proposed Design Review plans are consistent with the applicable General Plan designation of Residential Medium (RM) and the project's Tentative Map, P-1 District zoning, and Final Development Plan; and

2. The proposed Residential Siting and Lot Design is consistent with the City of Oakley Residential Design Guidelines in that while the homes do not have substantial variation in setbacks, the pedestrian alley-loaded paseo entrances to the homes provide for a landscaped, walkable entry way to the

homes with front facade and porch designs that create aesthetic variations, and changes in roof plans among the same floor plan assist in giving the overall neighborhood more visual variety in overall vertical massing along the streetscape; and

3. The Architectural Character of the proposed single-family homes is consistent with the applicable City of Oakley Residential Design Guidelines in that a variety of materials and architectural styles are used allowing for several different color schemes, and as conditioned, the homes will have unique exterior lighting designs for each architectural type, increased use of false shutters to enhance the exterior appearances, and a different garage door design for each architectural type.

G. The project complies with Measure J Growth Management requirements.

BE IT FURTHER RESOLVED THAT, on the basis of the above Findings and the Record, the Planning Commission recommends the City Council approves of the Applicant's request for a **General Plan Amendment (GPA 01-22), Rezone (RZ 03-22), Final Development Plan (FDP 02-22), Tentative Map (TM 04-22), and Design Review (DR 07-22),** subject to the following Conditions of Approval:

Conditions of Approval

Applicant shall comply with the requirements of the Oakley Municipal Code. Any exceptions must be stipulated in these Conditions of Approval. Conditions of Approval are based on the application received by the Planning Division dated **September 20, 2022**, as well as additional information acquired since that time and made part of the project file.

THE FOLLOWING PLANNING AND BUILDING CONDITIONS OF APPROVAL SHALL BE SATISFIED PRIOR TO THE ISSUANCE OF A BUILDING PERMIT UNLESS OTHERWISE NOTED:

PLANNING DIVISION CONDITIONS OF APPROVAL

General:

1. The proposed project is recommended for City Council approval, as shown on the revised plan included as attachments to the February 6, 2024 Planning Commission Staff Report, and as modified by or with the following conditions of approval.

2. These approvals shall be effectuated within a period of three (3) years from the effective date of the related Rezone approval by recording a final map and if not effectuated shall expire on that same date three years later. Prior to the expiration date, the applicant may apply for a Tentative Map Extension pursuant to the

provisions of the Zoning Code and Subdivision Map Act, which would include extension of the related entitlements.

3. All construction drawings submitted for plan check shall be in substantial compliance with the plans presented to and approved by the City Council on [TBD].

4. All conditions of approval shall be satisfied by the owner/developer. All costs associated with compliance with the conditions shall be at the owner/developer's expense.

5. Noise generating construction activities, including such things as power generators, shall be limited to the hours of 7:30 a.m. to 5:30 p.m. Monday through Friday, and shall be prohibited on City, State and Federal Holidays. The restrictions on allowed working days and times may be modified on prior written approval by the Community Development Director.

6. Should archaeological materials be uncovered during grading, trenching or other on- site excavation(s), earthwork within 30 yards of these materials shall be stopped until a professional archaeologist who is certified by the Society of Professional Archaeology (SOPA) has had an opportunity to evaluate the significance of the find and suggest appropriate mitigation(s), if deemed necessary.

7. All mitigation measures addressed in the environmental document shall be complied with and addressed as outlined in the Mitigation Monitoring Program approved for this project (incorporated as Exhibit A), per the review and approval of the Community Development Director.

8. The applicant shall comply with all mitigation measures contained within the HCP Planning Survey Report for the Project, per the review and approval of the Community Development Director.

9. The applicant shall indemnify, defend, and hold harmless the City of Oakley, the City Approving Authorities, and the officers, agents, and employees of the City from any and all claims, damages and liability (including, but not limited to, damages, attorney fees, expenses of litigation, costs of court).

10. The applicant shall post a copy of the City of Oakley General Plan 2020 Land Use Diagram, in a conspicuous place, within the model homes or sales office.

Final Development Plan/Development Standards:

11. The project development standards, such as minimum setbacks, shall be listed in table form on the Final Development Plan that are presented to the City Council for their consideration. The Development Standards shall match those shown on the plans and as described in the Planning Commission Staff Report.

12. The Final Development Plan shall be modified prior to City Council consideration of the project to show an 8-foot tall decorative split-face CMU wall between the project site and adjacent commercial development. The plans shall include decorative columns and provide details on the colors and materials. Alternative materials are subject to determination by the City Council upon their consideration.

13. The Final Development Plan shall be revised to include regulations either prohibiting or regulating accessory structures.

Design Review

14. The applicant shall include details of home exterior lighting for each architectural type as part of the master plan submittals. Each architectural type shall have unique exterior lighting that complements that respective style for the garage facades and/or porch areas. Alternatively, lighting for the porch areas may be proposed in a theme to provide consistent lighting patterns along the walkways. Spec sheets shall also be included in the master plans. The home exterior lighting is subject to the review and approval of the Community Development Director.

15. The applicant shall revise the architectural plans to be presented to the City Council so that the homes incorporate false shutters on, at a minimum, the front, rear, and corner side elevations of appropriate architectural styles and windows within that style. All false shutters shall match the width of the window. Final approval is subject to the review and approval of the Community Development Director.

16. The applicant shall revise the architectural plans to be presented to the City Council to include a different garage door design for each of the architectural styles. The applicant shall incorporate windows in the garage doors, as feasible, for additional variety.

17. A minimum of sixty percent (60%) of the garage doors throughout the subdivision shall have decorative windows.

Parks and Landscaping:

18. This project will include a Homeowners Association which will own and maintain the park, gathering areas, and other common areas. If the park is available to the general public, the applicant will be credited the appropriate amount on their per lot park impact fees. If the park is only available to members of the HOA, the applicant will be required to pay the full in-lieu park impact fees on each lot.

19. The final landscape plan shall include all trees as shown on the conceptual landscape plans approved with the project. Modifications to the species, size, or location of the trees is subject to the review and approval of the Community

Development Director and City Engineer. It is the responsibility of the applicant to plan utilities, joint trenches, and other improvements that could interfere with placement of trees in a manner to allow the trees to be planted without conflict to those other improvements.

20. All trees located along the Oakley Road frontage and along the entryway to the subdivision shall be 36" box size at installation.

21. A landscaping and irrigation plan for all front yard, right-of-way, parks, open space, and trail landscaping shall conform to the Oakley Water Efficient Landscape Ordinance and the Guidelines for Implementation of the City of Oakley Water Efficient Landscape Ordinance and shall be installed prior to final occupancy. The plan shall be prepared by a licensed landscape architect and shall be certified in compliance with the City's Water Conservation Ordinance.

22. California native drought tolerant plants shall be used as much as possible. All trees shall be a mix of fifteen-gallon, 24" box, and 36" box where conditioned; all shrubs shall be a minimum five-gallon size, except as otherwise noted.

23. All landscaped areas not covered by shrubs or groundcover shall be covered with bark or acceptable alternative as reviewed and approved by the Community Development Director. On slopes greater than 3 to 1, the applicant shall use an alternative to bark per the review and approval of the Community Development Director. Areas covered with bark shall use a weed barrier.

24. The applicant shall maintain all private landscaping until occupancy.

Fences and Walls:

25. Good neighbor fences between private properties shall be six-foot tall, constructed of wood that is resistant to rotting and warping, and erected with galvanized metal posts surrounded and completely hidden by wood fascia that matches the main fencing. Posts and fascia shall be capped by either a decorative upper fence rail or post cap. Good neighbor fences facing a street shall be constructed of a durable material such as, but not limited to, masonry, vinyl, enhanced wood, composite or other durable material, or stained or painted on both sides to prevent water damage, subject to the review and approval of the Community Development Director.

26. Any CMU walls, such as landscape retaining walls, shall use colored (i.e., non-grey) split-face CMU for all publicly and privately visible portions of the wall.

27. Anti-graffiti techniques shall be used on sound walls.

Subdivision Design:

28. The neighborhood entry along Oakley Road shall be modified to include accent paving on the entry road and project monument signage outside of the right of way. These details shall be included in the plans prior to City Council consideration of the project.

29. Driveway openings shall be a maximum 18' in width or up to 25% of a lot's frontage.

30. The street names shall be approved by the Community Development Department and the Contra Costa County Fire Protection District.

Subdivision Disclosures:

31. The model home complex shall have a copy of the City of Oakley's General Plan land use map posted within the sales office or included with the informational material provided to prospective home buyers.

32. Where a lot/parcel is located within 300' of a high voltage electric transmission line, the applicant shall record the following notice:

> "The subject property is located near a high voltage electric transmission line. Purchasers should be aware that there is ongoing research on possible potential adverse health effects caused by the exposure to a magnetic field generated by high voltage lines. Although much more research is needed before the question of whether magnetic fields actually cause adverse health effects can be resolved, the basis for such a hypothesis is established. At this time, no risk assessment has been made."

When a Final Subdivision Public Report issued by the California Department of Real Estate is required, the applicant shall also request that the Department of Real Estate insert the above note in the report.

33. The following statements shall be recorded at the County Recorder's Office for each parcel to notify future owners of the parcels that they own property in an agricultural area:

> "This document shall serve as notification that you have purchased land in an agricultural area where you may regularly find farm equipment using local roads; farm equipment causing dust or blowing sand; crop dusting and spraying occurring regularly; burning associated with agricultural activities; noise associated with farm equipment such as zon guns and aerial crop dusting and certain animals, including equestrian trails as well as flies may exist on surrounding properties. This statement

is again notification that this is part of the agricultural way of life in the open space areas of the City of Oakley and you should be fully aware of this at the time of purchase.

34. The following statement shall be recorded at the County Recorder's Office for each parcel to notify the future owners of the parcel that they are within the Antioch School District and shall be prominently displayed in sales office for the public to view:

> This document shall serve as notification that you have purchased land within the Antioch Unified School District. Properties located within Antioch Unified School District boundaries are subject to Mello Roos tax. Potential property owners should be fully aware of this at the time of purchase."

Energy Efficiency:

35. Water heaters shall provide an energy efficiency factor of 0.62 or better.

36. Dual zone air conditioning shall be provided on all two-story residential units.

37. Air conditioning condenser units shall be located to take advantage of natural shade. Condensers should not be placed on the west or south elevation of a home unless shade is provided. The location of the condenser shall be added to all plot plans for review and approval of the Community Development Director.

38. Design and site units so as to take advantage of natural heating and cooling, sin and wind exposure, and solar energy opportunities.

Waste Management Plan:

39. The applicant shall submit a Waste Management Plan that complies with the City of Oakley Construction and Demolition Debris Recycling Ordinance.

BUILDING DIVISION CONDITIONS OF APPROVAL

40. Plans shall meet the currently adopted Uniform Codes as well as the newest T-24 Energy requirements from the State of California Energy Commission. To confirm the most recently adopted codes please contact the Building Division at (925) 625-7005.

41. An Automatic Life Safety Sprinkler System shall be required in all new construction pursuant to Ordinance 22-06. The automatic Life Safety Sprinkler Systems in commercial and industrial buildings shall be designed and installed to the standards and requirements found in the most recent version of the NFPA (National Fire Protection Association). Automatic Life Safety Sprinkler Systems in

hotels and apartments shall be installed to the standards and requirements found in the most recent version of the NFPA Standard 13R. After July 1, 2011, the Automatic Life Safety Sprinkler Systems in one and two family dwellings, and townhouses not more than three stories above grade plane, shall be designed and installed to the standards and requirements found in the 2010 California Residential Code section R313.

42. Prior to requesting a Certificate of Occupancy from the Building Division, all Conditions of Approval required for occupancy must be completed. When the Public Works Division and the Planning Division place Conditions of Approval on the project, those divisions will sign off on the project prior to the request for a Building division final inspection. Similarly, if the Health Department and/or Fire Department reviewed and approved the original plans, those departments must sign off on the project prior to the request for a final inspection by the Building Division.

PUBLIC WORKS AND ENGINEERING CONDITIONS OF APPROVAL

THE FOLLOWING SHALL BE SATISFIED PRIOR TO THE ISSUANCE OF AN ENCROACHMENT AND/OR GRADING PERMIT:

43. GENERAL. All public improvements shall be made according to the latest adopted City Standard Drawings and Specifications. All work shall conform to the applicable City ordinances. The adjacent public right-of-way shall be kept clear of all job-related dirt and debris at the end of the day. Dirt and debris shall not be washed into storm drainage facilities. The storing of goods and materials on the sidewalk and/or the street will not be allowed unless a special permit is issued. The developer's representative in charge shall be at the job site during all working hours. Failure to maintain the public right-of-way according to this condition may result in the City performing the required maintenance at the developer's expense.

44. ENCROACHMENT PERMIT. All work in the public right-of-way, including any blockage or partial closure of sidewalks will require an Encroachment Permit. Special provisions such as limitations on work hours, protective enclosures, or other means to facilitate public access in a safe manner may be required.

45. GRADING PERMIT. All earthwork must comply with the City's Grading Ordinance. A Grading Permit must be issued by the public works department prior to site disturbance.

46. PUBLIC WORKS INSPECTIONS. The developer or their representative shall notify the Engineering Inspector at least forty-eight (48) hours before starting any work pertaining to on-site drainage facilities, grading or paving, and all improvements in approved plans. Failure to do so will result in rejection of work that was completed without inspection.

47. PRECONSTRUCTION MEETING. Prior to issuance of any permit or the commencement of any site work, the general contractor shall:

    a) Along with the project applicant, attend a pre-construction meeting with the City Engineer to discuss the project conditions of approval, working hours, site maintenance and other construction matters.

    b) Acknowledge in writing that they have read and understand the project conditions of approval and will make certain that all project sub-contractors have read and understand them prior to commencing work and that a copy of the project conditions of approval will be posted on site at all times during construction.

48. CONSTRUCTION STREET PARKING. No vehicle having a manufacturer's rated gross vehicle weight exceeding ten thousand (10,000) pounds shall be allowed to park on the portion of a street which abuts property in a residential zone without prior approval from the City Engineer.

49. EROSION CONTROL. Interim and final erosion control plans shall be prepared and submitted to the Public Works Department. A Notice of Intent (NOI) and Storm Water Pollution Prevention Plan (SWPPP) shall be submitted to the State SMARTS system for projects disturbing more than one acre and obtain a WDID number. A maximum of two weeks is allowed between clearing of an area and stabilizing/building on an area if grading is allowed during the rainy season. Interim erosion control measures, to be carried out during construction and before installation of the final landscaping shall be included. Interim erosion control method shall include, but are not limited to: silt fences, fiber rolls (with locations and details), erosion control blankets, City standard seeding specification, filter berms, check dams, retention basins, etc. Provide erosion control measures as needed to protect downstream water quality during winter months. The grading, drainage, erosion control plans and SWPPP shall comply with applicable measures contained in the City of Oakley's NPDES Permit.

50. DUST CONTROL. Blowing dust shall be reduced by timing construction activities so that paving and building construction begin as soon as possible after completion of grading, and by landscaping disturbed soils as soon as possible. Further, water trucks shall be present and in use at the construction site. All portions of the site subject to blowing dust shall be watered as often as deemed necessary by the City, or a minimum of three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites to ensure proper control of blowing dust for the duration of the project. Watering on public streets shall not occur. Streets will be cleaned by street sweepers or by hand as often as deemed necessary by the City Engineer, or at least once a day. Watering associated with on-site construction activity shall take place between the hours of 8 a.m. and 5 p.m. and shall include at least one late-afternoon watering to minimize the effects of blowing dust. All public streets soiled or littered due to

this construction activity shall be cleaned and swept daily during the workweek to the satisfaction of the City. Demolition or earthwork activities shall be halted when wind speeds (instantaneous gusts) exceed 25 MPH. All trucks hauling soil, sand, or other loose debris shall be covered.

51. SILT AND MUD IN PUBLIC RIGHT-OF-WAY. It is the responsibility of contractor and homeowner to make sure that all dirt tracked into the public right-of-way is cleaned up daily. Mud, silt, concrete, and other construction debris SHALL NOT be washed into the City's storm drains. Construction entrances must be in place per the Erosion Control Plan.

52. TRAFFIC CONTROL PLAN. The project sponsor will be required to work with the Public Works Department to develop a traffic control plan per the current California MUTCD. This plan will include, but not be limited to, the following measures:

    a) Construction activities shall be strategically timed and coordinated to minimize traffic disruption for schools, residents, businesses, and special events. The schools located on the haul route shall be contacted to help with the coordination of the trucking operation to minimize traffic disruption.

    b) Flag persons shall be placed at locations necessary to control one-way traffic flow, if required. All flag persons shall have the capability of communicating with each other to coordinate the operation.

    c) Prior to construction, advance notification of all affected residents and emergency services shall be made regarding one-way operation, specifying dates and hours of operation and lane closures on main arterial and collector streets, and will be permitted only between the hours of 8:30AM to 2:30PM on M, T, TH & F. 8:30AM to 12:00PM on W.

    d) The traffic control plan shall be reviewed for compliance with the project's Haul Route, approved by the City of Oakley.

    e) A full road closure will require a detour plan and a road closure permit issued by the Public Works Department.

53. CONSTRUCTION MANAGEMENT PLAN. The Applicant shall submit a construction management plan that shall incorporate at a minimum the Earth Movement Plan, Traffic Control Plan, Project Schedule, site security fencing, employee parking, construction staging area, construction trailer, and proposed outhouse locations. The public street shall not be used for any construction related activities, including parking for workers and storage of vehicles.

54. RESTORATION OF PUBLIC IMPROVEMENTS. The developer shall repair or replace all existing improvements not designated for removal that are damaged or removed because of developer's operations. Improvements such as, but not

limited to: curbs, gutters, sidewalks, driveways, signs, pavements, raised pavement markers, thermoplastic pavement markings, etc. shall be repaired and replaced to a condition equal to or better than the original condition. Existing improvement to be repaired or replaced shall be at the direction of the Public Works & Engineering Inspector and shall comply with all Title 24 Disabled Access provisions. Developer shall request a walk-through with the Engineering Construction Inspector before the start of construction to verify existing conditions.

55. SIDEWALK REPAIR. The developer shall repair and replace to existing City standards any sidewalk damaged now or during construction of this project. Sidewalk repair shall match existing color, texture, and design, and shall be constructed per City Standard Details. The limits of sidewalk repair will be determined by the Public Works Inspector during the construction phase of the project.

56. CURB AND GUTTER. The developer shall repair and replace to existing City standards any curb and gutter damaged now or during construction of this project. New curb and gutter shall be constructed per City Standard Details. The limits of curb and gutter repair will be determined by the Public Works Inspector during the construction phase of the project.

57. CONSTRUCTION NOISE. Between the hours of 7:30 a.m. to 5:30 p.m., weekdays and 9:00 a.m. to 5:30 p.m. weekends and holidays, construction, alteration, or repair activities shall be allowed. No individual piece of equipment shall produce a noise level exceeding eighty-five (85) dBA at twenty-five (25) feet. If the device is located within a structure on the property, the measurement shall be made at distances as close to twenty-five (25) feet from the device as possible. The noise level at any point outside of the property plane shall not exceed eighty-five (85) dBA. Pickup and delivery of materials and equipment is restricted to the hours listed above unless prior written approval is obtained by the Public Works Department.

58. GOOD HOUSEKEEPING. Good housekeeping practices shall be observed at all times during the course of construction. Superintendence of construction shall be diligently performed by a person or persons authorized to do so at all times during working hours. The storing of goods and/or materials on the sidewalk and/or the street will not be allowed unless a special permit is issued by the Engineering Division. The adjacent public right-of-way shall be kept clear of all job-related dirt and debris at the end of the day. Dirt and debris shall not be washed into storm drainage facilities. The storing of goods and materials on the sidewalk and/or the street will not be allowed unless a special permit is issued. The developer's representative in charge shall be at the job site during all working hours. Failure to maintain the public right-of-way according to this condition may result in the City performing the required maintenance at the developer's expense.

THE FOLLOWING SHALL BE SATISFIED PRIOR TO THE APPROVAL OF THE GRADING PLAN:

59. EXISTING WELLS. Provide documentation that any gas wells located onsite have been abandoned per regulations.

60. GEOLOGY AND SOIL MITIGATION MEASURES. A geotechnical investigation shall be conducted for the project to determine the surface and sub-surface conditions at the site and to determine the potential for surface fault rupture on the site. The geotechnical study shall provide recommendations for site grading as well as the design of foundations, retaining walls, concrete slab-on-grade construction, excavation, drainage, on-site utility trenching and pavement sections. The soils report shall include specific criteria and standards governing site grading, drainage, pavement design, retaining wall design, and erosion control. All recommendations of the investigation shall be incorporated into project plans. One copy of the geologic report shall be submitted with the grading permit and public improvement application. Prior to issuance of any permit, the applicant's soils engineer shall review the final grading and drainage plans to ensure that designs for foundations, retaining walls, site grading, and site drainage are in accordance with their recommendations. The applicant's soils engineer's approval shall then be conveyed to the City either by letter or by signing the plans.

61. GRADING

a) Grade any slopes with a vertical height of four (4) feet or more at a slope no steeper than 3H to 1V. Retaining walls that may be installed to reduce the slope must be masonry and comply with the City's building code.

b) Retaining wall or other suitable option acceptable by the City Engineer is required where the grade differential between property or adjacent lots are greater than 6". Retaining walls are required to be identified on the grading plans and shall have a note stating a separate building permit is required for retaining wall greater than four (4) feet in height, measured from the bottom of footing to top of wall.

c) At least one week prior to commencement of grading, the applicant shall post at the site and mail to the owners of property within 300 feet of the exterior boundary of the project site noticing that construction work will commence. The notice shall include a list of contact persons with their name, title, phone number and area of responsibility. The person responsible for maintaining the list shall be included. The list shall always be kept current and shall consist of persons with authority to indicate and implement corrective action in their area of responsibility. The names of the individual responsible for noise and litter control shall be expressly identified in the notice. The notice shall be reissued with each phase of major grading activity. A copy of the notice shall be concurrently transmitted to the City Engineer. The notice shall be accompanied

by a list of the names and addresses of the property owners noticed, and a map identifying the area noticed.

d) Submit a Haul Route Plan to the City Engineer for review and approval prior to importing or exporting any material from the site. The plan shall include the location of the borrow or fill area, the proposed haul routes, the estimated number and frequency of trips, and the proposed schedule of hauling. Based on this plan, the City Engineer shall determine whether pavement condition surveys must be conducted along the proposed haul routes to determine what impacts the trucking activities may have. The project proponents shall be responsible to repair to their pre-construction condition any roads along the utilized routes.

e) Prior to commencement of any site work that will result in a land disturbance of one acre or more, the applicant shall provide evidence to the City Engineer that the requirements for obtaining a State General Construction Permit have been met. Such evidence may be a copy of the Notice of Intent Letter sent by the State Water Resources Control Board. The WDID Number shall be shown on the grading plan prior to approval by the City Engineer.

f) The burying of any construction debris is prohibited on construction sites.

62. NPDES – NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM. Comply with all rules, regulations and procedures of the NPDES for municipal, construction and industrial activities as promulgated by the California State Water Resources Control Board, the Regional Water Quality Control Board (Central Valley – Region IV), including the Stormwater C.3 requirements as detailed in the Guidebook available at www.cccleanwater.org

Compliance shall include developing long-term best management practices (BMP's) for the reduction or elimination of storm water pollutants. The project design shall incorporate, wherever feasible, the following long-term BMPs in accordance with the Contra Costa Clean Water Program for the site's storm water drainage.

- Offer pavers for household driveways and/or walkways as an option to buyers.
- Minimize the amount of directly connected impervious surface area.
- Delineate all storm drains with "No Dumping, Drains to the Delta" permanent metal markers per City Standards.
- Construct concrete driveway weakened plane joints at angles to assist in directing run-off to landscaped/pervious areas prior to entering the street curb and gutter.
- Distribute public information items regarding the Clean Water Program to buyers.
- Other alternatives as approved by the City Engineer.

- Prepare an Operations and Maintenance Manual for the project's storm water control measures.

THE FOLLOWING SHALL BE SATISFIED PRIOR TO THE APPROVAL OF THE IMPROVEMENT PLAN:

63. PUBLIC IMPROVEMENTS. Construct the project streets within public right of way to City public road standards and as shown on the Tentative Map with the following exceptions:

    a) The minimum street grade may be lowered from the standard 1% to 0.75% provided that the project proponent demonstrates that the City's drainage standards can be achieved.

    b) Submit a turning radius exhibit to the City Engineer for review and approval to illustrate that the ninety-degree turns of project streets can accommodate the largest expected vehicle to use the streets without the inclusion of City standard elbows. If the exhibit illustrates that elbows are necessary to accommodate the expected traffic, then they shall be included in the improvement plans.

64. ROADWAY IMPROVEMENTS. The following improvements shall be installed by the developer as shown on the Tentative Map. Plans for these roadway improvements shall be prepared by a California registered civil engineer, reviewed, and approved by the City, to the satisfaction of the City Engineer.

    a) Design and construct the frontage improvements for Oakley Road as shown on the Vesting Tentative Map. The improvements must be consistent with the City of Oakley standard for a four-lane divided arterial roadway. The median island will need to be improved to its ultimate width. The Developer must continue the coordination efforts with the adjacent property owner west of the project to fully construct the improvements of Oakley Road between Montevino Way to the eastern limits for the project frontage to the satisfaction of the City Engineer.

    b) Design and construct the project entrance from Oakley Road for a right-in and right-out only driveway as outlined in the Traffic Report prepared for this development. The driveway must be designed to accommodate turning radii for garbage and emergency vehicles. The project driveway must be designed to meet standard sight distance requirements.

    c) Design and construct the frontage improvements for MainStreet as shown on the Vesting Tentative Map. The improvements must be consistent with the City of Oakley standard for a six-lane divided arterial.

65. Install traffic calming measures consistent with the City's Neighborhood Traffic Management Program. The traffic calming measures shall be included on the

improvement plans and are subject to the review and approval of the City Engineer.

66. Install traffic control devices such as stop signs and other signing and striping on the project streets to the satisfaction of the City Engineer.

67. Construct emergency vehicle access from Main Street to F Street as shown on the approved Tentative Map. The design and configuration of the accesses shall be per the current City standard and shall be subject to the review and approval of the City Engineer and the Contra Costa County Fire Protection District.

68. Construct an asphalt concrete overlay for the entire width of the northern half of Oakley Road up to the median curb adjacent to the project to be coordinated with the pavement widening required for the project. The City Engineer shall determine the depth and extent of the overlay. The extent of utility trenching pavement repair must be completed to the satisfaction of the City Engineer.

69. Design all public and private pedestrian facilities in accordance with Title 24 (Handicap Access) and the Americans with Disabilities Act.

70. DRAINAGE IMPROVEMENTS

a) Collect and convey all stormwater entering and /or originating on this property, without diversion and within an adequate storm drainage facility, to an adequate natural watercourse having definable bed and banks, or to an existing adequate public storm drainage facility that conveys the storm waters to an adequate natural watercourse.

b) Submit a final hydrology and hydraulic report including 10-year and 100-year frequency event calculations for the proposed drainage system and stormwater pond to the city Engineer for review and approval. The report shall include study of the downstream storm drain facilities to confirm its adequacy and mitigate on-site so that the peak flows of post-project conditions do not exceed the pre-project peak flows. The report must include a narrative that describes the project's proposed overland release for storm water runoff. In the event of a failure of the project's storm drain system, the overland release path shall convey storm water runoff to a public street right-of-way or drainage channel. All pad elevations shall be designed to be at a minimum 12 inches above the 100-year storm elevation scenario.

c) Design and construct all storm drainage facilities in compliance with the Municipal Code and City design standards.

d) Prevent storm drainage from draining across the sidewalk(s) and driveway(s) in a concentrated manner.

e) Dedicate a public drainage easement over the drainage system that conveys storm water run-off from public streets.

f) On-site parking areas and driveways shall not surface drain across public sidewalk or driveway aprons.

71. SIGHT DISTANCE EXHIBIT. For the project driveways' ingress and egress, provide an exhibit that will analyze the sight distance required for the appropriate speed limit identified with this project as required by the City Engineer.

72. DESIGN CHANGES. The Applicant's registered Engineer shall notify the City Engineer, in writing, at least 72 hours in advance of all differences between the proposed work and the design indicated on the plans. Any proposed changes shall be subject to the approval of the City before altered work is started. A plan revision must be submitted for approval by the City Engineer.

73. JOINT TRENCH PLANS. The applicant shall submit Joint Trench Composite Plans to the City for review prior to approval of improvement plans or recordation of the final map. The developer shall provide joint trench composite plans for the underground electrical, gas, telephone, cable television and communication conduits and cables including the size, location and details of all trenches, locations of building utility service stubs and meters and placements or arrangements of junction structures as a part of the improvement Plan submittals for the project. The composite drawings and/or utility improvement plans shall be signed by a licensed civil engineer. The joint trench plans shall include street and/or site lighting and associated photometrics. A letter shall be provided by PG&E stating that public streetlight billing will be per Rule LS2A, and that private lights shall be metered with billing to the owner. Pole numbers, assigned by PG&E, shall be clearly delineated on the plans.

74. UTILITIES & UNDERGROUNDING

a) Underground all new and existing utility distribution facilities per City of Oakley code section Title 6 Chapter 8 Underground Utility Districts.

b) All utility boxes shall be installed underground, and all wires and cables must be installed in conduits. Compliance with this condition shall be at the discretion of the City Engineer.

c) Above ground utility boxes shall be camouflaged per the review and approval of the City Engineer.

d) A written approval from Diablo Water District and Iron House Sanitary District must be provided that all underground utility improvements have passed all testing requirements prior to commencement of paving a street.

75. The Developer must coordinate with the adjacent property owner west of the project to underground the existing utilities along Oakley Road as required by the Deferred Improvement Agreement to the satisfaction of the City Engineer.

76. STREETLIGHTS. Install streetlights along all public streets as required by the City Engineer. The City Engineer shall determine the final number and location of the lights, and the lights shall be on an LS2-A rate service. Streetlights shall be spun aluminum "cobra head" style or decorative residential streetlights as required by the City of Oakley Standard Plans.

77. LANDSCAPING IN PUBLIC RIGHT OF WAY

    a) Prepare landscape plans for landscape improvements within the public right of way. Landscape plans shall be prepared by a licensed landscape architect.

    b) Install public right-of-way landscaping along the project's frontages as required by the City Engineer and Community Development Director.

    c) Maintain all landscaping within the public right-of-way until such time that the adjacent roadway improvements have been accepted for maintenance.

    d) Prior to the issuance of certificate of occupancy, an inspection will be performed to verify the health and location of the street trees. Trees in poor health or those without adequate clearance from utilities will require replacement or relocation.

78. FENCING. Any proposed fencing and walls shall be located on private property and maintained by the property owner or owner.

79. SOUNDWALL. Soundwalls along any right of way or public property shall be installed within private property and not within public right of way. The soundwall must match the proposed soundwalls in this area or as required to the satisfaction of the Community Development Director.

80. MAINTENANCE EXHIBIT. Submit a maintenance exhibit showing the responsible maintenance entity of proposed subdivision improvements. The exhibit must clearly show which areas are to be maintained by the City of Oakley.

    a) Parcels A, B, C, D, E, and F are to be retained and maintained by the Owner/Developer/HOA.

    b) Bioretention Areas to be maintained by the Owner/Developer/HOA.

THE FOLLOWING PUBLIC WORKS AND ENGINEERING CONDITIONS OF APPROVAL SHALL BE SATISFIED PRIOR TO THE APPROVAL OF THE FINAL MAP:

81. BONDS. The applicant shall supply suitable securities for all improvements that are a part of the development in a form acceptable to the City in the amount of 100% (performance), 50% (labor and material) prior to issuance of any permit.

82. FINAL MAP. Submit a Final Map prepared by a Licensed Land Surveyor. The final map shall be recorded, and the Subdivision Agreement must be executed before any building permits are issued. Insurance shall be provided per the terms of the Subdivision Agreement.

83. DEDICATIONS. The following shall be dedicated on the final map. The dedication shall be recorded before any permits are issued and under specific timelines listed below:

    a) Dedicate the required right-of-way along the project frontage on Oakley Road and MainStreet as shown in the typical sections of the Tentative Map.

    b) Relinquish abutter's rights of access along all non-primary frontages to the satisfaction of the City Engineer.

    c) Public Utility Easement (PUE): 5' PUE beyond public right of way as required.

    d) Ingress-egress, storm drainage easements, emergency access easements as required.

    Any necessary rights of way, rights of entry, permits and/or easements for the construction of off-site, temporary or permanent, public and private road, utility and drainage improvements shall be furnished to the City. Prior to the issuance of the first building permit, the applicant must provide the necessary documentation that any existing easements no longer necessary have been quitclaimed.

84. PRIVATE EASEMENTS. Agreements detailing rights, limitations, and responsibilities of involved parties shall accompany each private easement. The easements and associated agreements shall be recorded simultaneously with the final map.

85. UTILITY SETBACKS. Building foundations shall be set back from utility lines a sufficient distance to allow excavation of the utility without undermining the house foundation. The City Engineer shall determine the appropriate setback based on the depth of the utility, input from the project soils engineer, and the type of foundation.

86. DRAINAGE FEES. Applicant shall comply with the drainage fee requirements as adopted by the County Board of Supervisors. The applicant shall pay the fee in effect at the time of final map approval. Certain improvements required by the Conditions of Approval for this development, or the Code may be eligible for credit or reimbursement against the drainage area fee. The developer should contact the City Engineer to personally determine the extent of any credit or reimbursement for which they might be eligible. Any credit or reimbursements shall be determined prior to filing the final map or as approved by the Flood Control District.

87. ANNEXATIONS

a) The applicant shall establish a funding mechanism to cover the ongoing financial impact their project has on fire protection services provided in the City. All costs associated with meeting this condition of approval shall be paid for by the applicant. Compliance with this requirement shall be to the satisfaction of the City Engineer and shall be completed prior to final map approval.

b) The applicant shall establish a funding mechanism to cover the ongoing financial impact their project has on police services provided in the City. All costs associated with meeting this condition of approval shall be paid for by the applicant. Compliance with this requirement shall be to the satisfaction of the City Engineer and shall be completed prior to final map approval.

c) The applicant shall establish a funding mechanism to cover the ongoing financial impact their project has on maintenance and operation services associated with public landscaping, parks, streetlighting, and stormwater facilities. All costs associated with meeting this condition of approval shall be paid for by the applicant. Compliance with this requirement shall be to the satisfaction of the City Engineer and shall be completed prior to final map approval.

THE FOLLOWING SHALL BE SATISFIED PRIOR TO THE ISSUANCE OF THE BUILDING PERMIT:

88. PAD CERTIFICATION. A letter from a licensed land surveyor stating that the building pad was constructed in accordance with the approved plans shall be provided prior to the issuance of the building permit.

89. SOILS ENGINEER CONSTRUCTION OBSERVATION. During construction, all excavations and grading shall be inspected by the applicant's soils engineer prior to placement of concrete and/or backfill so they can verify that the actual conditions are as anticipated in the design-level geotechnical report and recommend appropriate changes in the recommendations contained in the report, if necessary. The results of the construction observation and testing should be documented in

an "as-built" letter/report prepared by the applicants' soils engineer and submitted to the City before any building permit is granted.

90. AGREEMENT FOR STORMWATER BEST MANAGEMENT PRACTICES INSPECTION AND MAINTENANCE OBLIGATIONS. The property owner shall enter into an agreement with the City for maintenance of the stormwater filtration devices required to be installed on this project. The agreement will specify that certain routine maintenance shall be performed by the property owner and will specify device maintenance reporting requirements. The agreement will also specify routine inspection requirements, permits and payment of fees. The agreement shall be recorded prior to release of any occupancy permits.

91. AS-BUILT PLANS. After completion of the construction of all work, the original plans shall have all changes (change orders and field changes) clearly marked. The "as-built" plans shall again be signed and "wet-stamped" by the civil engineer who prepared the plans, attesting to the changes. The original "as-built" plans shall be reviewed and approved by the Engineering Inspector. A Mylar and AutoCAD disk of the approved "as-built" plans shall be provided to the City before acceptance of improvements.

92. IMPACT FEES. Comply with the requirements of the development impact fees listed below, in addition to those noticed by the City Council in Resolution 85-00 and 08-03. The applicant shall pay the fees in the amounts in effect at the time each building permit is issued.

a) Traffic Impact Fee (authorized by Ordinance No. 14-00, adopted by Resolution 49-03, update Resolution No 91-21);

b) Regional Transportation Development Impact Mitigation Fee or any future alternative regional fee adopted by the City (authorized by Ordinance No. 14-00, adopted by Resolution No. 73-05);

c) Park Land Dedication In-Lieu Fee (adopted by Ordinance No. 03-03, updated Resolution No. 48-17);

d) Park Impact Fee (authorized by Ordinance No. 05-00, adopted by Resolution No. 19-03, updated Resolution No. 48-17);

e) Public Facilities Fee (authorized by Ordinance No. 05-00, adopted by Resolution No. 18-03);

f) Fire Facilities Impact Fee (adopted by Resolution No. 24-21);

g) General Plan Fee (adopted by Resolution No. 53-03);

h) East Contra Costa County Habitat Conservation Plan Fee (adopted by Ordinance 6-23).

The applicant should contact the City Engineer prior to constructing any public improvements to determine if any of the required improvements are eligible for credits or reimbursements against the applicable traffic benefit fees or from future developments.

ADVISORY NOTES

The following Advisory Notes are provided to the applicant as a courtesy but are not a part of the conditions of approval. Advisory Notes are provided for the purpose of informing the applicant of additional ordinance requirements that must be met in order to proceed with development.

A. The applicant/owner should be aware of the expiration dates and renewing requirements prior to requesting building or grading permits.

B. The project will require a grading permit pursuant to the Oakley Municipal Code.

C. The applicant shall comply with the requirements of Ironhouse Sanitary District.

D. The applicant shall comply with the requirements of the Diablo Water District.

E. The applicant shall comply with the requirements of the Contra Costa Water District.

F. The applicant shall comply with the requirements of the Contra Costa County Fire Protection District.

G. The applicant shall comply with the requirements of Contra Costa Environmental Health if subject to applicable permits.

H. The applicant shall comply with the requirements of the Building Inspection Division. Building permits are required prior to the construction of most structures.

I. This project may be subject to the requirements of the Department of Fish and Wildlife. It is the applicant's responsibility to notify the Department of Fish and Wildlife, P.O. Box 47, Yountville, California 94599, of any proposed construction within this development that may affect any fish and wildlife resources, per the Fish and Game Code.

J. The applicant shall be responsible for paying applicable CEQA filing fees for the County Clerk for the Notice of Determination as well as the State Department of Fish and Wildlife's Filing Fee.

K. This project may be subject to the requirements of the Army Corps of Engineers. It is the applicant's responsibility to notify the appropriate district of the Corps of Engineers to determine if a permit is required, and if it can be obtained.

L. The applicant shall obtain an encroachment permit for construction within existing City rights of way.

M. The applicant shall obtain an encroachment permit from Caltrans for construction within the State right of way.

PASSED AND ADOPTED by the Planning Commission of the City of Oakley at a meeting held on the 6th day of February 2024 by the following vote:

AYES: Chuiko, Krieg, Price, Ramirez, Verduzco
NOES:
ABSTENTIONS:
ABSENT:

APPROVED:

Oleksii Chuiko, Chairperson

ATTEST:

Libby Vreonis, City Clerk

02/07/2024

Date

EXHIBIT A

The Village at 2092 Oakley Road Subdivision Mitigation Monitoring Program

– January 2024

The California Environmental Quality Act (CEQA) and CEQA Guidelines require Lead Agencies to adopt a program for monitoring the mitigation measures required to avoid significant environmental impacts of a project. The Mitigation Monitoring Program ensures that mitigation measures imposed by the City are completed at the appropriate time in the development process.

The mitigation measures identified in The Village at 2092 Oakley Road Subdivision Initial Study/Mitigated Negative Declaration are listed below along with the party responsible for implementation of the mitigation measure, the party responsible for monitoring implementation of the mitigation measure, the milestones for implementation and monitoring, and a sign off that the mitigation measure has been implemented.

MITIGATION MONITORING PROGRAM The Village at 2092 Oakley Road Subdivision					
Impact Number	**Impact**	**Mitigation Measure**	**Monitoring Agency**	**Implementation Schedule**	**Sign-off**
		Cultural Resources			
V (b,c).	Would the project cause a substantial adverse change in the significance of a unique archaeological resource pursuant to Section 15064.5; or disturb any human remains, including those interred outside of dedicated cemetaries?	*V-1. If buried archaeological, paleontological, and/or cultural resources are encountered during site grading or other site work, all such work shall be halted immediately within 100 feet of the discovery and the developer shall immediately notify the City of Oakley Planning Division of the discovery. In such case, the developer shall be required, at their own expense, to retain the services of a qualified archaeologist for the purpose of recording, protecting, or curating the discovery, as appropriate. The archaeologist shall be required to submit to the City of Oakley Planning Division for review and approval a report of the findings and method of curation or protection of the resources. Further grading or site work within the area of discovery would not be allowed until the preceding work has occurred.* *The foregoing requirements shall be noted on the project improvement plans and disclosed to any subcontractors by the general contractor or job superintendent during pre-construction meetings, subject to review and approval by the City of Oakley Planning Division.*	City of Oakley Planning Division Qualified Archaeologist	If buried archaeological, paleontological, and/or cultural resources are encounterd during site grading or other site work.	
		V-2. Pursuant to State Health and Safety Code §7050.5 (c) State Public Resources Code §5097.98, if human bone or bone of unknown origin is found during construction, all work shall stop within 100 feet of the find and the Contra Costa County Coroner shall be contacted immediately. If the remains are determined to be Native American, the Coroner shall notify the Native American Heritage Commission, who shall notify the person believed to be the most likely descendant. The most likely descendant shall	City of Oakley Planning Division Contra Costa County Coroner Native American Heritage	If human bone or bone of unknown origin is found during construction.	

MITIGATION MONITORING PROGRAM The Village at 2092 Oakley Road Subdivision					
Impact Number	**Impact**	**Mitigation Measure**	**Monitoring Agency**	**Implementation Schedule**	**Sign-off**
		work with the contractor to develop a program for re-internment of the human remains and any associated artifacts. Additional work is not to take place within 100 feet of the find until the identified appropriate actions have been implemented. *The foregoing requirements shall be noted on the project improvement plans and disclosed to any subcontractors by the general contractor or job superintendent during pre-construction meetings, subject to review and approval of compliance by the City of Oakley Planning Division.*	Commission		
		Geology and Soils			
VII (a[iii,iv], c,d).	Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction, or landslides; or be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse; or be located on expansive soil, as defined in Table 18-1B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	*VII-1.* *Prior to approval of any grading permits, the project Civil Engineer shall show on the project plans that the project design adheres to all engineering recommendations provided in the site-specific Geotechnical Investigation prepared for the proposed project by BAEZ Geotechnical Group. Proof of compliance with all recommendations specified in the Geotechnical Investigation shall be subject to review and approval by the City Engineer.* *The project plans shall include, but not be limited to, engineering recommendations related to site preparation and grading, utility trench excavation, backfill, foundations, concrete slab-on-grade floors, exterior concrete flatwork, retaining walls, pavement areas, and project review and construction monitoring.* *The site demolition activities shall also specify that any underground structures, such as abandoned irrigation lines, septic tanks, and leach fields, encountered during demolition and construction shall be properly removed, all*	City of Oakley Planning Division City Engineer	Prior to approval of any grading permits.	

MITIGATION MONITORING PROGRAM The Village at 2092 Oakley Road Subdivision					
Impact Number	**Impact**	**Mitigation Measure**	**Monitoring Agency**	**Implementation Schedule**	**Sign-off**
		excavations left open for backfilling, and loose material created by the demolition of existing structures should be excavated and replaced as engineered fill.			
VII (f).	Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	*VII-2. Implement Mitigation Measures V-1 and V-2.*	See Mitigation Measures V-1 and V-2	See Mitigation Measures V-1 and V-2.	
Greenhouse Gas Emissions					
VIII (a,b).	Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gasses?	*VIII-1. Consistent with the BAAQMD's thresholds of significance, prior to issuance of building permits for the proposed project, the project applicant shall demonstrate via project design and/or notation included on project design that natural gas infrastructure shall be prohibited. Natural gas infrastructure may be allowed if the applicant implements alternative methods that reduce the project's greenhouse gas emissions in an equally effective or superior manner as would exist without natural gas emission infrastructure.* *Conformance with the foregoing requirement shall be confirmed through review and approval of building permit plans by the City of Oakley Planning Division.*	City of Oakley Planning Division	Prior to the issuance of building permits.	
Hazards and Hazardous Materials					
IX (b).	Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the likely release of hazardous materials into the environment?	*IX-1. Prior to initiation of construction activities on the proposed project site, the project applicant shall complete an analysis of on-site soils to determine whether substantial concentrations of organochloride pesticides, arsenic, or other soil contaminants are present above the applicable direct exposure Environmental Screening Levels (ESLs) set by the Regional Water Quality Control Board, the residential screening levels set by the Department of Toxic Substances Control's Human Health Risk Assessment Note 3, and/or*	City of Oakley Planning Division	Prior to initiation of construction activities.	

MITIGATION MONITORING PROGRAM The Village at 2092 Oakley Road Subdivision					
Impact Number	**Impact**	**Mitigation Measure**	**Monitoring Agency**	**Implementation Schedule**	**Sign-off**
		the U.S. Environmental Protection Agency's Regional Screening Levels for Region 9. If contaminants are not detected above applicable ESLs/RSLs, then further mitigation is not required. If contaminants are detected above the applicable ESLs/RSLs, then the soils shall be remediated by off-hauling to a licensed landfill facility. Such remediation activities shall be performed by a licensed hazardous waste contractor (Class A) and contractor personnel that have completed 40-hour OSHA hazardous training. Impacted soils shall be managed in accordance with the recommendations of applicable federal, State, and local standards, to the satisfaction of the City of Oakley and the Contra Costa County Environmental Health Division. The results of soil sampling and analysis, as well as verification of proper remediation and disposal, shall be submitted to the City of Oakley Planning Division for review and approval.			
		IX-2. Prior to issuance of a demolition permit by the City for any on-site structures, the project applicant shall provide a site assessment that determines whether any structures to be demolished contain lead-based paint (LBP), asbestos, mercury, or polychlorinated biphenyl caulk. Sampling shall be conducted in accordance with the California Department of Toxic Substances Control's 2006 Interim Guidance Evaluation of School Sites with Potential Contamination from Lead based Paint, Termiticides, and Electrical Transformers. If structures do not contain the aforementioned chemicals, further mitigation is not required; however, if LBP is found, all loose and peeling paint shall be removed and disposed of by a	City of Oakley Planning Division City Engineer	Prior to issuance of a demolition permit.	

MITIGATION MONITORING PROGRAM The Village at 2092 Oakley Road Subdivision					
Impact Number	**Impact**	**Mitigation Measure**	**Monitoring Agency**	**Implementation Schedule**	**Sign-off**
		licensed and certified lead paint removal contractor, in accordance with CARB recommendations and OSHA requirements. If asbestos is found, all construction activities shall comply with all requirements and regulations promulgated through the National Emission Standards for Hazardous Air Pollutants (NESHAP). The demolition contractor shall be informed that all paint on the buildings shall be considered as containing lead and/or asbestos. The contractor shall follow all work practice standards set forth in the Asbestos National Emission Standards for Hazardous Air Pollutants (Asbestos NESHAP, 40 CFR, Part 61, Subpart M) regulations, as well as Section V, Chapter 3 of the OSHA Technical Manual. Should mercury or polychlorinated biphenyl caulk be detected, the removal, demolition, and disposal of such chemicals shall be conducted in compliance with California environmental regulations and policies. Work practice standards generally include appropriate precautions to protect construction workers and the surrounding community, and appropriate disposal methods for construction waste containing lead paint or asbestos in accordance with federal, State, and local regulations subject to approval by the City Engineer.			
		IX-3. During ground-disturbing activities, if one or more wells and/or septic systems are identified on-site, the project applicant shall hire a licensed contractor to obtain the applicable abandonment permit from Contra Costa County Environmental Health Division (CCCEHD), and properly abandon the on-site wells and/or septic systems	CCCEHD City of Oakley Planning Division	During ground-disturbing activities.	

MITIGATION MONITORING PROGRAM The Village at 2092 Oakley Road Subdivision					
Impact Number	**Impact**	**Mitigation Measure**	**Monitoring Agency**	**Implementation Schedule**	**Sign-off**
		for review and approval by the CCCEHD and the City of Oakley Planning Division.			
IX (f).	Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	*IX-4. Prior to issuance of demolition or grading permits, the project applicant shall prepare and submit a Traffic Control Plan to the City for review and approval. The Traffic Control Plan shall include, but not be limited to, the following items, to the satisfaction of the City Engineer:* • *Truck drivers shall be notified of and required to use the most direct route between the site and SR 4, as determined by the City Engineering Department;* • *All site ingress and egress shall occur only at the main driveways to the project site and construction activities may require installation of temporary (or ultimate) traffic signals as determined by the City Engineer;* • *Specifically-designated travel routes for large vehicles shall be monitored and controlled by flaggers for large construction vehicle ingress and egress;* • *Warning signs indicating frequent truck entry and exit shall be posted on Oakley Road and Main Street;* • *Any debris and mud on nearby streets caused by trucks shall be monitored daily and may require instituting a street cleaning program;* • *Construction employee parking shall be provided on the project site to eliminate conflicts with nearby areas. Construction of the project shall be staggered so that employee parking demand is met primarily by using on-site parking; and*	City of Oakley Planning Division City Engineer	Prior to issuance of demolition or grading permits.	

MITIGATION MONITORING PROGRAM The Village at 2092 Oakley Road Subdivision					
Impact Number	**Impact**	**Mitigation Measure**	**Monitoring Agency**	**Implementation Schedule**	**Sign-off**
		• *If importation and exportation of material becomes a traffic nuisance, the City Engineer shall limit the hours the activities can take place.*			
		Noise			
XIII (a).	Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinacnce, or applicable standards of other agencies?	*XIII-1. Prior to approval of grading permits, the following criteria shall be established and noted on graded plans, subject to review and approval by the City of Oakley Planning Division:* • *Construction activities shall be limited to between the daytime hours of 7:30 AM to 7:00 PM Monday through Friday, and 9:00 AM to 7:00 PM on Saturdays, Sundays, and holidays.* • *Construction equipment shall be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers' recommendations. Equipment engine shrouds shall be closed during equipment operation.* • *When not in use, motorized construction equipment shall not be left idling for more than five minutes.* • *Stationary equipment (power generators, compressors, etc.) shall be located at the furthest practical distance from nearby noise-sensitive land uses or sufficiently shielded to reduce noise-related impacts.*	City of Oakley Planning Division	Prior to the approval of grading permits.	

MITIGATION MONITORING PROGRAM The Village at 2092 Oakley Road Subdivision					
Impact Number	**Impact**	**Mitigation Measure**	**Monitoring Agency**	**Implementation Schedule**	**Sign-off**
XIII (b).	Would the project result in the generation of excessive groundborne vibration or groundborne noise levels?	*XIII-2. Throughout the duration of construction, any compaction required within 26 feet from the adjacent residential structures to the north and west shall be accomplished by using static drum rollers, which use weight instead of vibrations to achieve soil compaction. As an alternative to this requirement, preconstruction crack documentation and construction vibration monitoring could be conducted to ensure that construction vibrations do not cause damage to any adjacent structures. Proof of compliance with this measure shall be submitted to the City of Oakley Public Works and Engineering Department for review and approval.*	City of Oakley Public Works and Engineering Department	Throughout the duration of construction.	
Transportation					
XVII (c,d).	Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment); or result in inadequate emergency access ?	*XVII-1. Implement Mitigation Measure IX-4.*	See Mitigation Measure IX-4	See Mitigation Measure IX-4.	
Tribal Cultural Resources					
XVIII (a,b).	Would the project cause a substantial adverse change in the significance of a tribal cultural resource listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020. 1(k); or a resource determined by the lead agency, in its descretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resources	*XVIII-1. Implement Mitigation Measures V-1 and V-2.*	See Mitigation Measures V-1 and V-2	See Mitigation Measures V-1 and V-2.	

MITIGATION MONITORING PROGRAM The Village at 2092 Oakley Road Subdivision					
Impact Number	**Impact**	**Mitigation Measure**	**Monitoring Agency**	**Implementation Schedule**	**Sign-off**
	Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.				

OAKLEY

CALIFORNIA

California Environmental Quality Act (CEQA)

NOTICE OF INTENT TO ADOPT A MITIGATED NEGATIVE DECLARATION

Project Title: The Village at 2092 Oakley Road Subdivision

Lead Agency Name and Address:
City of Oakley
3231 Main Street
Oakley, CA 94561

Contact Person and Phone Number:
Ken Strelo, Planning Manager
strelo@ci.oakley.ca.us
(925) 625-7000

Project Location:
2092 Oakley Road
Oakley, CA 94561
Assessor's Parcel Number (APN): 037-110-031

Project Sponsor's Name and Address:
John D'Ambrosio Family Trust/
Mercantile Systems, Inc.
9040 Brentwood Boulevard
Brentwood, CA 94513

Existing General Plan: Commercial (CO)

Existing Zoning: C (General Commercial) District

Project Description Summary:
The approximately 9.99-acre project site, identified by APN 037-110-031, is located at 2092 Oakley Road in the City of Oakley, California. The project site is developed with one single-family residence in the southern portion of the project site and one single-family residence, one ancillary shed, and one cell tower resembling a water tower in the northeast corner of the site. The remainder of the parcel is planted as a vineyard with rows of grapevines. A total of 16 trees exist on-site. An off-site gravel roadway runs along the eastern boundary of the site and provides access to the single-family residence in the northeast corner of the site. Surrounding existing uses include a mobile home park to the north and west; a convenience store, gas station, and an oil change service shop to the east; a shopping center to the

southeast, across Empire Avenue; and single-family residences and agricultural land to the south, across Oakley Road. The City of Oakley General Plan designates the project site as Commercial (CO) and the site is zoned C (General Commercial) District.

Development of The Village at 2092 Oakley Road Subdivision (proposed project) would include the demolition of the two on-site existing single-family residences and one ancillary structure; removal of 14 trees; the subdivision of the project site into 83 single-family residential lots, Parcel A, and Parcel B; and the subsequent development of 83 single-family residential units, three bioretention basins, landscaping, and an internal circulation network. The existing on-site cell tower would remain. The project would also include the off-site, northerly extension of storm drain lines within Main Street and installation of a water line tie-in within Oakley Road, as well as off-site improvements to widen the north side of Oakley Road along the project frontage and increase the westbound direction from one to two lanes. The project would require approval of a General Plan Amendment (GPA 01-22) to change the land use designation for the project site from CO to Residential Medium (RM), a Rezone (RZ 03-22) to change the zoning designation for the project site from C District to P-1 (Planned Unit Development) District, a Final Development Plan (FDP 01-22), a Vesting Tentative Map (TM 04-22), as well as a Design Review (DR 07-22).

Declaration:

On November 16, 2023, the City of Oakley Planning Division determined that the above project will have no significant effect on the environment and is therefore exempt from the requirement of an Environmental Impact Report. The determination is based on the following findings:

a) The project will not have the potential to degrade the quality of the environment, substantially reduce the habitat of fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory.
b) It will not have the potential to achieve short-term, to the disadvantage of long-term, environmental goals.
c) It will not have significant impacts, which are individually limited, but cumulatively considerable.
d) It will not have environmental effects, which will cause substantial adverse effects on human beings, either directly or indirectly.
e) No substantial evidence exists that the project will have a significant negative adverse effect on the environment.
f) The proposed project is not on any of the lists enumerated under Section 65962.5 of the Government Code as related to hazardous materials.

The Initial Study/Mitigated Negative Declaration is available for review at https://www.ci.oakley.ca.us/ceqa-documents/. Written comments must be submitted no

later than 5:00 PM on December 18, 2023. Appeal of this determination must be made during the 30-day posting period. Notice is further given that the City of Oakley will hold public hearings to discuss the project and provide an opportunity for public comment on the Mitigated Negative Declaration and project approvals. Subsequent notices will be published which will identify the date, time, and location of public hearings.

Submit comments to:
City of Oakley
Attn: Ken Strelo, Planning Manager
3231 Main Street
Oakley, CA 94561

Posting period: November 16, 2023 – December 18, 2023

Initial Study Prepared By:
Ken Strelo, Planning Manager

City of Oakley
Planning Division

The Village at 2092 Oakley Road Subdivision

Initial Study/Mitigated Negative Declaration

November 2023

Prepared by

RANEY PLANNING & MANAGEMENT, INC. | 20 years
1501 Sports Drive, Suite A, • Sacramento • CA • 95834
Office 916.372.6100 • Fax 916.419.6108

TABLE OF CONTENTS

A. PROJECT SUMMARY 1
B. SOURCES 3
C. ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED 6
D. DETERMINATION 6
E. BACKGROUND AND INTRODUCTION 7
F. PROJECT DESCRIPTION 8
G. ENVIRONMENTAL CHECKLIST 20

I. AESTHETICS. 21
II. AGRICULTURE AND FOREST RESOURCES. 25
III. AIR QUALITY. 27
IV. BIOLOGICAL RESOURCES. 38
V. CULTURAL RESOURCES. 44
VI. ENERGY. 48
VII. GEOLOGY AND SOILS. 52
VIII. GREENHOUSE GAS EMISSIONS. 57
IX. HAZARDS AND HAZARDOUS MATERIALS. 61
X. HYDROLOGY AND WATER QUALITY. 68
XI. LAND USE AND PLANNING. 72
XII. MINERAL RESOURCES. 73
XIII. NOISE. 74
XIV. POPULATION AND HOUSING. 82
XV. PUBLIC SERVICES. 83
XVI. RECREATION. 86
XVII. TRANSPORTATION. 87
XVIII. TRIBAL CULTURAL RESOURCES. 93
XIX. UTILITIES AND SERVICE SYSTEMS. 95
XX. WILDFIRE. 98
XXI. MANDATORY FINDINGS OF SIGNIFICANCE. 99

Appendices

Appendix A – Air Quality and Greenhouse Gas Emissions – CalEEMod and Road Construction Emissions Model Results
Appendix B – Planning Survey Report
Appendix C – CNDDB Search Results
Appendix D – Preliminary Arborist Report
Appendix E – Historic Evaluation
Appendix F – Geotechnical Investigation
Appendix G – Phase I Environmental Site Assessment
Appendix H – Hydrology Report
Appendix I – Preliminary Stormwater Control Plan
Appendix J – Traffic Study

INITIAL STUDY

A. PROJECT SUMMARY

1. Project Title: The Village at 2092 Oakley Road Subdivision (GPA 01-22, RZ 03-22, FDP 01-22, TM 04-22, DR 07-22)

2. Lead Agency Name and Address: City of Oakley
Planning Division
3231 Main Street
Oakley, CA 94561

3. Contact Person and Phone Number: Ken Strelo
Planning Manager
(925) 625-7000

4. Project Location: 2092 Oakley Road
Oakley, CA 94561
Assessor's Parcel Numbers (APNs): 037-110-031

5. Project Applicant Name and Address: John D'Ambrosio Family Trust/
Mercantile Systems, Inc.
9040 Brentwood Boulevard
Brentwood, CA 94513

6. Existing General Plan Designation: Commercial (CO)

7. Proposed General Plan Designation: Residential Medium (RM)

8. Existing Zoning Designation: C (General Commercial) District

9. Proposed Zoning Designation: P-1 (Planned Unit Development) District

10. Required Approvals from Other Public Agencies: None

11. Surrounding Land Uses and Setting:

The approximately 9.99-acre project site, identified by APN 037-110-031, is located at 2092 Oakley Road in the City of Oakley, California. The project site is developed with one single-family residence in the southern portion of the project site and one single-family residence, one ancillary shed, and one cell tower resembling a water tower in the northeast corner of the site. The remainder of the parcel is planted as a vineyard with rows of grapevines. A total of 16 trees exist on-site. An off-site gravel roadway runs along the eastern boundary of the site and provides access to the single-family residence in the northeast corner of the site. Surrounding existing uses include a mobile home park to the north and west; a convenience store, gas station, and an oil change service shop to the east; a shopping center to the southeast, across Empire Avenue; and single-family residences and

agricultural land to the south, across Oakley Road. The City of Oakley General Plan designates the project site as Commercial (CO) and the site is zoned C (General Commercial) District.

12. Project Description Summary:

Development of The Village at 2092 Oakley Road Subdivision (proposed project) would include the demolition of the two on-site existing single-family residences and one ancillary structure; removal of 14 trees; the subdivision of the project site into 83 single-family residential lots, Parcel A, and Parcel B; and the subsequent development of 83 single-family residential units, three bioretention basins, landscaping, and an internal circulation network. The existing on-site cell tower would remain. The project would also include the off-site, northerly extension of storm drain lines within Main Street and installation of a water line tie-in within Oakley Road, as well as off-site improvements to widen the north side of Oakley Road along the project frontage and increase the westbound direction from one to two lanes. The project would require approval of a General Plan Amendment (GPA 01-22) to change the land use designation for the project site from CO to Residential Medium (RM), a Rezone (RZ 03-22) to change the zoning designation for the project site from C (General Commercial) District to P-1 (Planned Unit Development) District, a Final Development Plan (FDP 01-22), a Vesting Tentative Map (TM 04-22), as well as a Design Review (DR 07-22).

13. Status of Native American Consultation Pursuant to Public Resources Code Section 21080.3.1:

In compliance with Assembly Bill (AB) 52 (Public Resources Code [PRC] Section 21080.3.1) and Senate Bill (SB) 18, a project notification letter was distributed to the chairpersons of the following tribes on June 8, 2023: Amah Mutsun Tribal Band of Mission San Juan Bautista, Chicken Ranch Rancheria of Me-Wuk Indians, Guidiville Indian Rancheria, Indian Canyon Mutsun Band of Costanoan Ohlone People, Muwekma Ohlone Indian Tribe of the SF Bay Area, Nashville Enterprise Miwok-Maidu-Nishinam Tribe, North Valley Yokuts Tribe, The Ohlone Indian Tribe, Wilton Rancheria, Wuksache Indian Tribe/Eshom Valley Band, and The Confederated Villages of Lisjan.

The Indian Canyon Mutsun Band of Costanoan Ohlone People responded on June 19, 2023, with a request to consult on the proposed project. The City of Oakley contacted the Indian Canyon Mutsun Band of Costanoan Ohlone People on July 19, 2023, to discuss the next steps for consultation. Further response from the Indian Canyon Mutsun Band of Costanoan Ohlone People has not been received to date.

The Confederated Villages of Lisjan responded on June 21, 2023, with a request to consult on the proposed project. A request for information was received from The Confederated Villages of Lisjan Chairperson Corrina Gould on July 5, 2023. Chairperson Gould was supplied with the Cultural Resources Report prepared by Tom Origer & Associates for the proposed project on July 5, 2023. On November 1, 2023, Chairperson Gould responded that the Confederated Villages of Lisjan did not have any comments on the project. As such, consultation was concluded on November 1, 2023.

B. SOURCES

All technical reports and modeling results prepared for the project analysis are available at: https://www.ci.oakley.ca.us/ceqa-documents/. The following documents are referenced information sources used for the purposes of this Initial Study/Mitigated Negative Declaration (IS/MND):

1. Antioch Unified School District. *Facilities Master Plan*. July 2018.
2. Association of Bay Area Governments. *Hazard Viewer.* Available at: https://abag.ca.gov/our-work/resilience/data-research/hazard-viewer/. Accessed June 2023.
3. ASTM International. *ASTM E1527, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.* 2013.
4. Atlas Tree Service, Inc. *Arborist Report, 2092 Oakley Road, Oakley, CA 94561.* September 16, 2022.
5. BAEZ Geotechnical Group. *Geotechnical Investigation, Paseo Residential Subdivision, 2092 Oakley Road, Oakley, California.* November 9, 2022.
6. Basics Environmental. *Phase I Environmental Site Assessment, 2092 Oakley Road, Oakley, California.* May 2, 2023.
7. Bay Area Air Quality Management District. *2022 California Environmental Quality Act Guidelines*. April 2023.
8. Bay Area Air Quality Management District. *Air Quality Summary Reports*. Available at: http://www.baaqmd.gov/about-air-quality/air-quality-summaries. Accessed June 2023.
9. Bay Area Air Quality Management District. *California Environmental Quality Act Air Quality Guidelines*. May 2017.
10. Bellecci & Associates, Inc. *Hydrology Report for The Village at 2092 Oakley Road.* December 2, 2022.
11. Bellecci & Associates, Inc. *Stormwater Control Plan for The Village at 2092 Oakley Road.* March 2023.
12. CalEPA. *Cortese List Data Resources.* Available at: https://calepa.ca.gov/sitecleanup/corteselist/. Accessed June 2023.
13. California Air Resources Board. *2022 Scoping Plan for Achieving Carbon Neutrality.* November 16, 2022.
14. California Air Resources Board. *Air Quality and Land Use Handbook: A Community Health Perspective*. April 2005.
15. California Building Standards Commission. *2022 California Green Building Standards Code*. 2023.
16. California Department of Conservation. *California Earthquake Hazards Zone Application.* Available at: https://maps.conservation.ca.gov/cgs/EQZApp/app/. Accessed June 2023.
17. California Department of Conservation. *California Important Farmland Finder.* Available at: https://maps.conservation.ca.gov/dlrp/ciff/. Accessed May 2022.
18. California Department of Forestry and Fire Protection. *Contra Costa County, Very High Fire Hazard Severity Zones in LRA*. January 7, 2009.
19. California Department of Resources Recycling and Recovery (CalRecycle). *Facility/Site Summary: Potrero Hill Landfill (48-AA-0075)*. Available at: https://www2.calrecycle.ca.gov/SolidWaste/Site/Summary/3591. Accessed May 2023.
20. California Department of Transportation. *California State Scenic Highway System Map.* Available at: https://www.arcgis.com/apps/webappviewer/index.html?id=465dfd3d807c46cc8e8057116f1aacaa. Accessed May 2023.
21. California Geologic Survey. *Seismic Hazard Zone Report for the Brentwood 7.5-Minute Quadrangle, Contra Costa County, California.* 2018.

22. Centers for Disease Control and Prevention. *Overview of Water-related Diseases and Contaminants in Private Wells*. Available at: https://www.cdc.gov/healthywater/drinking/private/wells/diseases.html. Accessed June 2023.
23. City of Oakley. *City of Oakley 2020 General Plan Draft Environmental Impact Report*. September 2002.
24. City of Oakley. *City of Oakley General Plan, Focused General Plan Update*. Adopted January 11, 2022.
25. City of Oakley. *Mobility White Paper, City of Oakley Focused General Plan Update.* December 2021.
26. City of Oakley. *Oakley Municipal Code* [Title 6, Chapter 11]. Updated February 23, 2021.
27. City of Oakley. *Strategic Energy Plan*. Fall 2015.
28. Contra Costa Conservation and Development. *2016 Agricultural Preserves Map.* Available at: https://www.contracosta.ca.gov/DocumentCenter/View/882/Map-of-Properties-Under-Contract. Accessed May 2023.
29. Contra Costa County Fire Protection District. *2021 Annual Report*. Available at: https://www.cccfpd.org/2021-annual-report/. Accessed May 2023.
30. Contra Costa County. *Transportation Analysis Guidelines.* June 23, 2020.
31. Department of Toxic Substances Control. *Hazardous Waste and Substances Site List (Cortese).* Available at: https://www.envirostor.dtsc.ca.gov/public/. Accessed June 2023.
32. Diablo Water District. *2020 Urban Water Management Plan.* May 2022.
33. East Contra Costa County Habitat Conservation Plan Association. *Final East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan.* October 2006.
34. Federal Emergency Management Agency. *Flood Insurance Rate Map 06013C0355G.* Effective March 21, 2017.
35. Governor's Office of Planning and Research. *Technical Advisory on Evaluating Transportation Impacts in CEQA*. December 2018.
36. H.T. Harvey & Associates. *East Contra Costa County Habitat Conservation Plan – Assessment of Plan Effects on CEQA Species.* February 17, 2015.
37. Institute of Transportation Engineers. *Trip Generation Manual, 9th Edition.* November 2012.
38. Ironhouse Sanitary District. *Sewer System Management Plan*. April 2017.
39. Kenneth W. Strelo, Planning Manager, City of Oakley. Personal communication [email] with Rod Stinson, Vice President, Raney Planning and Management. September 6, 2022.
40. Olberding Environmental, Inc. *Application Form and Planning Survey Report.* May 9, 2023.
41. State Water Resources Control Board. *GeoTracker.* Available at: https://geotracker.waterboards.ca.gov/map/?myaddress=California&from=header&cqid=8858350455. Accessed June 2023.
42. TJKM. *Traffic Study for 2092 Oakley Road in Oakley, CA.* November 1, 2022.
43. Tom Origer & Associates. *Cultural Resources Study of the Property at 2092 Oakley Road, Oakley, Contra Costa County, California.* June 9, 2023.
44. Tom Origer & Associates. *The Results of an Historic Evaluation of the Property at 2092 Oakley Road, Oakley, Contra Costa County.* September 28, 2023.
45. U.S. Census Bureau. *Quick Facts, City of Oakley, California.* Available at: https://www.census.gov/quickfacts/fact/table/oakleycitycalifornia/POP010220#POP010220. Accessed June 2023.
46. U.S. Environmental Protection Agency. *Contaminated Land.* Available at: https://www.epa.gov/report-environment/contaminated-land. Accessed June 2023.

47. U.S. Environmental Protection Agency. *Septic System Impacts on Water Sources.* Available at: https://www.epa.gov/septic/septic-system-impacts-water-sources. Accessed June 2023.
48. U.S. Fish and Wildlife Service. *National Wetlands Inventory.* Available at: https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/. Accessed May 2023.

C. ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Less Than Significant with Mitigation Incorporated" or as indicated by the checklist on the following pages.

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

D. DETERMINATION

On the basis of this initial study:

☐ I find that the Proposed Project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☒ I find that although the Proposed Project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the applicant. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the Proposed Project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature	Date
Ken Strelo, Planning Manager	City of Oakley
Printed Name	For

E. BACKGROUND AND INTRODUCTION

This IS/MND provides an environmental analysis pursuant to the California Environmental Quality Act (CEQA) for the proposed project. The applicant has submitted this application to the City of Oakley, which is the Lead Agency for the purposes of CEQA review. The IS/MND contains an analysis of the environmental effects of construction and operation of the proposed project.

In December 2002, the City of Oakley adopted the Oakley General Plan and the Oakley General Plan Environmental Impact Report (EIR). The General Plan EIR was a program-level EIR, prepared pursuant to Section 15168 of the CEQA Guidelines (Title 14, California Code of Regulations [CCR], Sections 15000 et seq.). The General Plan EIR analyzed full implementation of the Oakley General Plan and identified measures to mitigate the significant adverse project and cumulative impacts associated with the General Plan.

In January 2022, the City of Oakley adopted the Focused General Plan Update and the Focused General Plan Update Initial Study/Negative Declaration (IS/ND). The Focused General Plan Update IS/ND analyzed implementation of the Focused General Plan Update. The Focused General Plan Update amended the City's existing General Plan to bring it into compliance with State requirements related to environmental justice, mobility, and climate change and adaptation. The Focused General Plan Update also updated the setting information, and provided minor revisions to the goals, policies, and programs in the following elements: Land Use, Growth Management, Open Space and Conservation, Parks and Recreation, Noise, and Economic Development. All updates were applied to be consistent with current conditions, to remove policies and programs that have already been implemented or are no longer applicable, to update policies and programs to reflect current City practices, and to clarify the City's approach to achieving the vision and goals of the General Plan.

While the proposed project would require approval of a General Plan Amendment and Rezone, pursuant to CEQA Guidelines Section 15150(a), the City of Oakley General Plan, Focused General Plan Update, General Plan EIR, and Focused General Plan Update IS/ND are incorporated by reference to the extent that the analysis included in the aforementioned documents is applicable to the proposed project. The aforementioned documents are available online at:

- https://www.ci.oakley.ca.us/departments/planning-zoning/reference-documents/
- https://www.ci.oakley.ca.us/general-plan-update/

The impact discussions for each section of this IS/MND have been largely based on information in the Oakley General Plan, Focused General Plan Update, Oakley General Plan EIR, and Focused General Plan Update IS/ND, as well as technical studies prepared for the proposed project.

The mitigation measures prescribed for environmental effects described in this IS/MND would be implemented in conjunction with the project, as required by CEQA, and the mitigation measures would be incorporated into the project. In addition, a project Mitigation Monitoring and Reporting Program (MMRP) would be adopted in conjunction with approval of the project.

F. PROJECT DESCRIPTION

The following section provides a comprehensive description of the proposed project in accordance with CEQA Guidelines, including the project location and setting, and project components.

Project Location and Setting

The project site, further identified by APN 037-110-031, is located at 2092 Oakley Road in the City of Oakley, California (see Figure 1 and Figure 2). The site consists of approximately 9.99 acres and is planted as a vineyard with rows of grapevines. One single-family residence is located in the southern portion of the site, adjacent to Oakley Road and one single-family residence, one ancillary shed, and a cell tower resembling a water tower are located in the northeast corner of the site. In addition, a gravel roadway runs along the eastern boundary of the site and provides access to the single-family residence in the northeast corner of the site. A total of 16 trees exist on-site and the topography of the site is relatively flat.

Surrounding existing uses include a mobile home park to the north and west; a convenience store, gas station, and an oil change service shop to the east; a shopping center to the southeast, across Empire Avenue; and single-family residences and agricultural land to the south, across Oakley Road. The project site is located approximately 1.18 miles northeast of State Route (SR) 4 and approximately 1.12 miles east of SR 160. The City of Oakley General Plan designates the project site CO and the site is zoned C District.

Project Components

The proposed project would include the demolition of the two on-site existing single-family residences and one ancillary structure, removal of 14 on-site trees, and subdivision of the project site into 83 residential lots, and two open space lots (see Figure 3). The existing on-site cell tower would remain. The project would also include the development of three bioretention areas, a picnic area at the southern open space lot, a tot lot/picnic area at the open space lot in the northeast corner of the project site, and the off-site northerly extension of storm drain lines within Main Street and a water line tie-in within Oakley Road, as well as off-site improvements to widen the north side of Oakley Road along the project frontage and increase the westbound direction from one to two lanes. The proposed project would require approval of a General Plan Amendment to change the land use designation of the project site from CO to RM (GPA 01-22); a Rezone to change the zoning designation of the project site from C District to P-1 District (RZ 03-22); Final Development Plan (FDP 01-22), a Vesting Tentative Map (TM 04-22), and Design Review (DR 07-22). The following sections describe the foregoing project components.

General Plan Amendment

The proposed project would require a General Plan Amendment to change the land use designation of the project site from CO to RM. The RM land use designation provides for more affordable, small lot development and to increase the availability of rental or entry-level housing. Primary land uses include single-family dwellings; attached single-family residences, such as duplexes and duets; multiple-family residences, such as condominiums, town houses, apartments; and accessory structures normally auxiliary to the primary uses. Public and semi-public uses and similar and compatible uses are also allowed. The allowable residential density for the RM land use designation ranges from 5.5 to 9.6 dwelling units per acre (du/ac). The residential density of the proposed project is 8.31 du/ac.

Figure 1
Regional Project Location

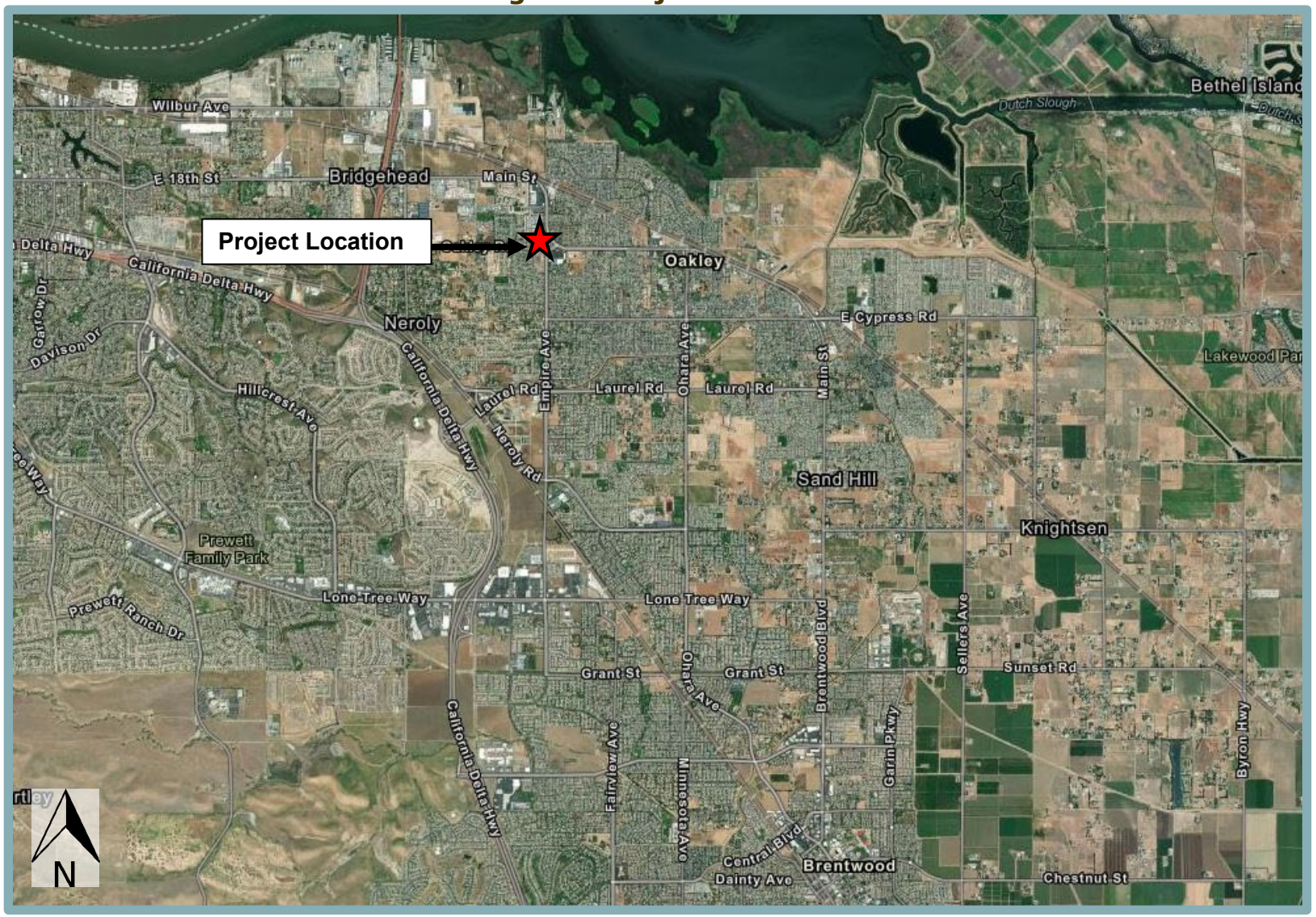
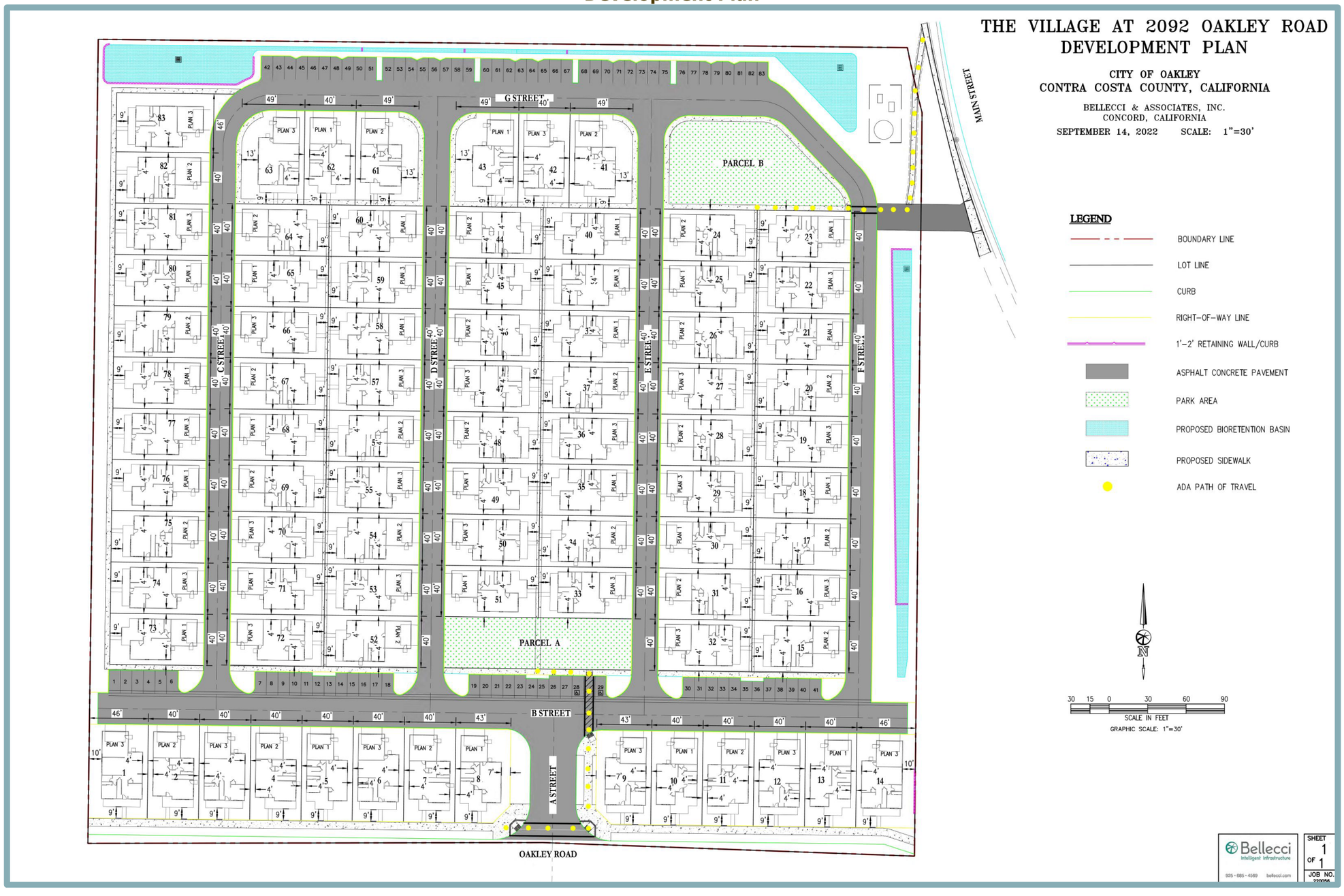


Figure 2
Project Site Boundaries

Figure 3
Development Plan



Rezone/Final Development Plan

The proposed project would include a Rezone and Final Development Plan to change the zoning designation of the project site from C District to P-1 District. The purpose of the P-1 District would be to allow diversification in the relationship of various uses, buildings, structures, lot sizes, and open spaces. Requirements for the P-1 District would be established as part of the adoption of the P-1 District for the project site. Approval of a Rezone would ensure compatibility with surrounding land uses, and maintain substantial compliance with the City's General Plan. Preparation of a Final Development Plan is required for developments in the P-1 District pursuant to Municipal Code Section 9.1.1002.h.3.

Vesting Tentative Map

The Vesting Tentative Map would subdivide the project site into 83 single-family residential lots, Parcel A, and Parcel B (see Figure 4). The single-family lots would range in size from 2,920 square feet (sf) to 3,790 sf. Parcel A, located in the southern portion of the project site, would contain a picnic area. Parcel B, located in the northeastern corner of the project site, would contain a play structure/picnic area.

Below is additional detail regarding the site access and circulation, landscaping, utility infrastructure, and off-site improvements.

Site Access and Circulation

Primary vehicular access to the site would be provided by a new roadway ("A Street") off of Oakley Road. An internal private roadway system would be constructed throughout the project site to provide access to each unit. The internal roadways would be within a 21 to 67-foot private right-of-way (ROW) and would generally provide 10 to 18 feet of travel lane in each direction (see Figure 5). Overall, the proposed project would include 166 covered parking spaces (garage spaces) and 83 uncovered parking spaces on B Street and G Street for guests, for a total of 249 parking spaces. There are no private driveway parking spaces.

New curbs, gutters, and 4.5 to six-foot-wide sidewalks would be included intermittently along the roadways. Four-foot-wide walking paths would connect the sidewalks along the internal roadways to the porches located at the first-floor entry of each unit. The proposed project would also provide continuous sidewalks along the project's frontage at Oakley Road. Emergency vehicle access would be provided by the new driveway off of Oakley Road and a new 21-foot-wide emergency vehicle access-only driveway off of Main Street, which would connect to the internal roadway in the northeastern corner of the site (see Figure 4 and Figure 5). Removable bollards would be installed as part of the northern most emergency vehicle access driveway and the EVA driveway would not be accessible to the general public.

Landscaping

The proposed project would include a 5,840-sf open space area located at the terminus of A Street (Figure 6). The park would include a pergola, picnic tables, park benches, bicycle racks, and a mailbox station. An 8,730-sf community park would be located in the northeast corner of the project site and would include a play structure and synthetic turf area, picnic tables, and bicycle racks. A total of 14 existing on-site trees would be removed as part of the proposed project; however, trees would be planted throughout the parks and along the internal roadway network within the project site and the frontage of the residential lots. In addition, a variety of drought tolerant shrubs, groundcover, and grasses would be planted throughout the project site. All landscaping would comply with the State's Model Water Efficient Landscape Ordinance (MWELO).

Figure 4
Vesting Tentative Map

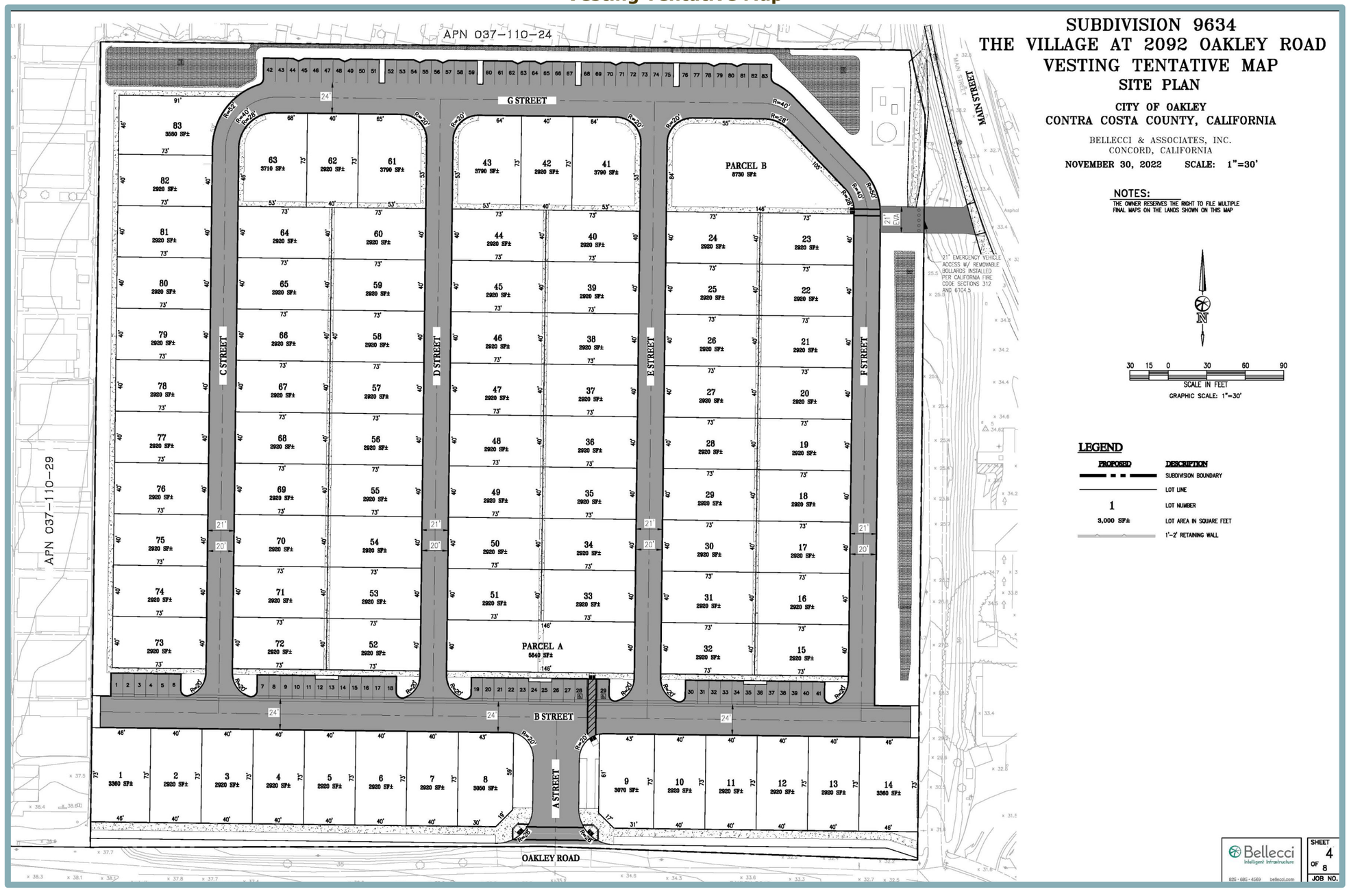


Figure 5
Preliminary Roadway Sections

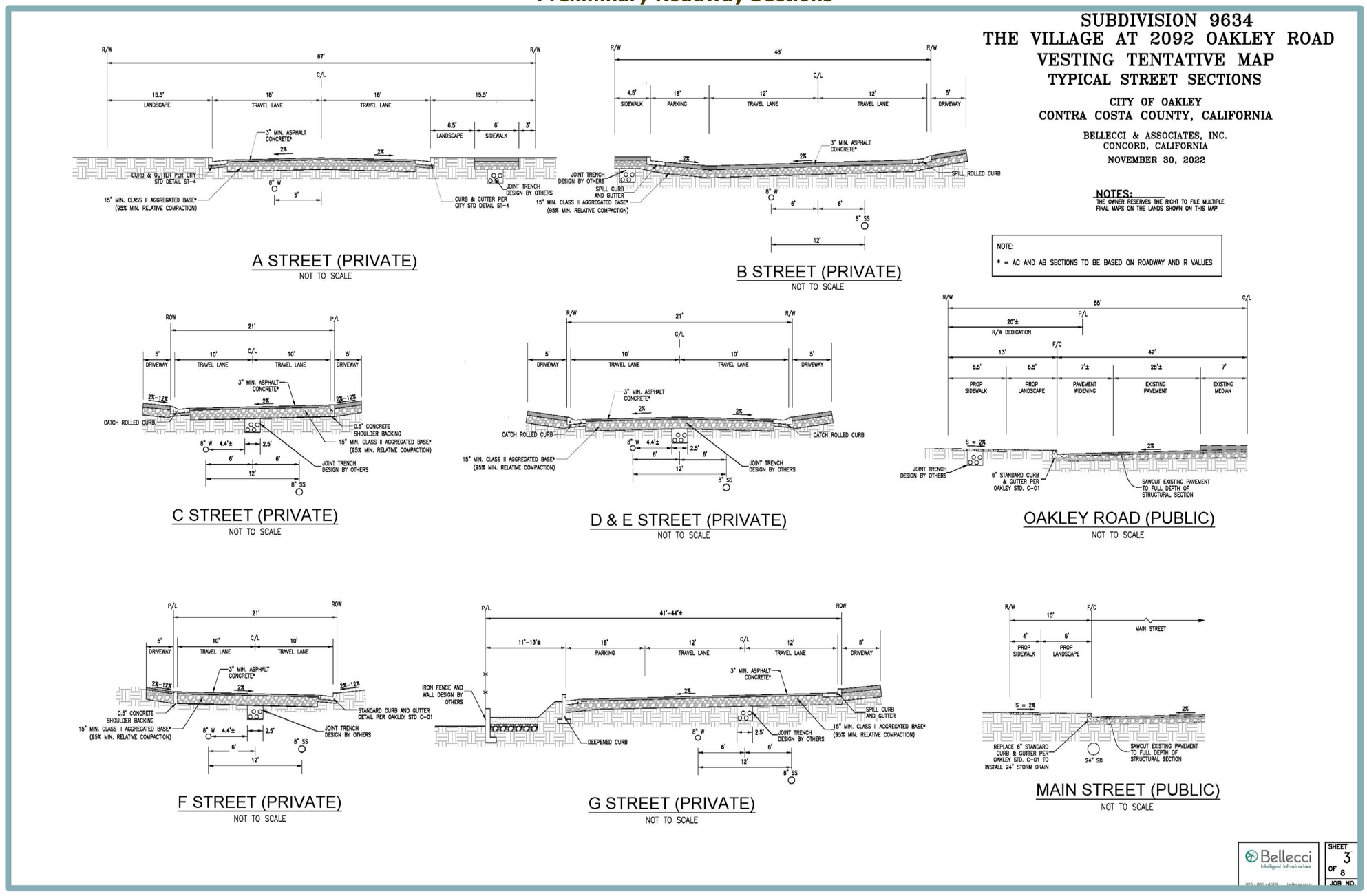


Figure 6
Landscape Plan

Utilities

A preliminary utility plan has been prepared for the proposed project and is included as Figure 7. Water service for the proposed project would be provided by the Diablo Water District (DWD). The proposed project would include the installation of new eight-inch water lines throughout the project site. The new water system would connect to the existing 10-inch water main within Oakley Road.

Sanitary sewer service for the proposed project would be provided by the Ironhouse Sanitary District (ISD). The proposed project would include the installation of new eight-inch sanitary sewer lines throughout the project site. The new sewer network would connect to the existing sanitary sewer main within Main Street.

A Preliminary Stormwater Control Plan has been prepared for the proposed project (see Figure 8). In order to manage and treat stormwater, the project site would be divided into 13 drainage management areas (DMAs). Stormwater from the impervious areas within DMA 1A, 1B, 2A, 2B, 3A, and 3B would be collected by catch basins and curb cuts and directed through storm drain lines towards one of the three dry wells/bioretention facilities (Integrated Management Practices or IMPs) on-site. DMA 1A and 1B would be associated with IMP 1, located in the northwest corner of the site; DMA 2A and 2B would be associated with IMP 2, located in the northeast corner of the site; and DMA 3A and 3B would be associated with IMP 3, located along the eastern boundary of the site. Following treatment, stormwater from IMPs 1, 2, and 3 would be directed into a new network of 18-inch stormwater lines along the northern boundary of the site and ultimately into the City's storm drain system in Main Street (see Figure 8). DMA 4 would be self-treating.

Stormwater from the impervious off-site sidewalks, located within DMA 10A, 10B, 11A, 11B, 12A, and 12B, would be captured and treated within three proposed IMPs (IMP 10, IMP 11, and IMP 12), which would serve as landscape planters along the project site frontage. The IMPs would range in size from 1,023 sf to 2,045 sf. Each IMP would have a perforated four-inch-wide pipe, which would function as underdrain and would transport any treated runoff to the City's storm drain system.

The bioretention areas would accommodate runoff from all 83 residential lots, the roadways on the site, and the halfwidth of right of way along Oakley Road. The bioretention basin areas would be designed according to the criteria in the Contra Costa County Clean Water Program *Stormwater C.3 Guidebook* to treat stormwater on the project site prior to discharge into the City's stormwater system.

Off-Site Improvements

To facilitate utility access to the project site, the proposed project would include off-site improvements to install 633.6 linear feet of 24-inch storm drain line within Main Street (see Figure 9). The new storm drain pipeline would extend from the northeast corner of the project site and connect to the existing 36-inch storm drain line located along the eastern frontage of the Les Schwab Tire Center on Main Street. In addition, as part of the proposed project, a water line tie-in would be installed within Oakley Road in order to connect the new water pipeline within A Street to the existing 10-inch water main within Oakley Road. The off-site infrastructure improvements would involve a total of 686.4 feet of ground disturbance (633.6 feet associated with the storm drain and 52.8 feet associated with the water tie-in). The project would also include off-site improvements to widen the north side of Oakley Road along the project frontage and increase the westbound direction from one to two lanes. All off-site improvements would occur within the existing and future dedicated right-of-way of Main Street and Oakley Road.

Figure 7
Preliminary Utility Plan

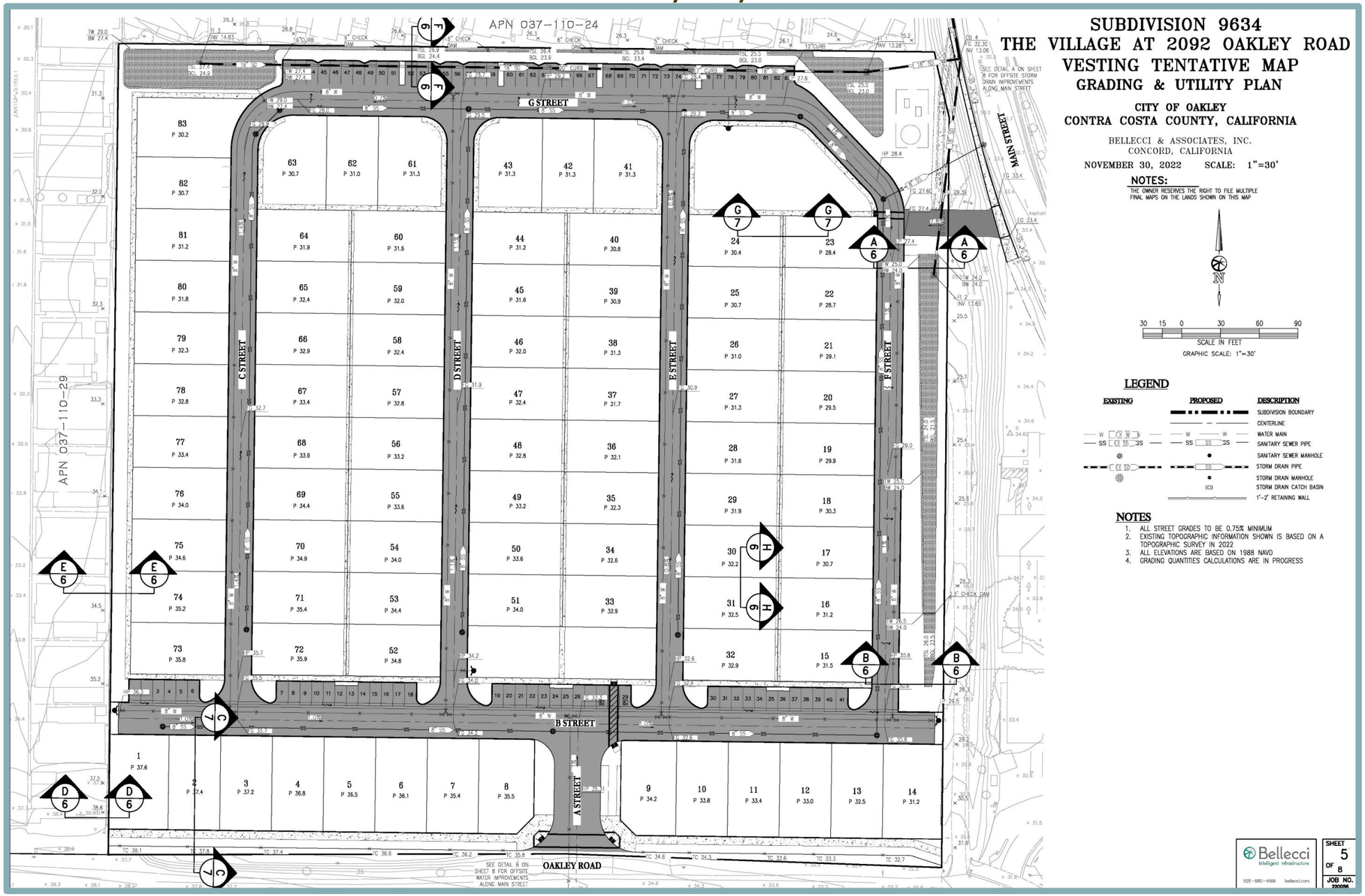


Figure 8
Preliminary Stormwater Control Plan

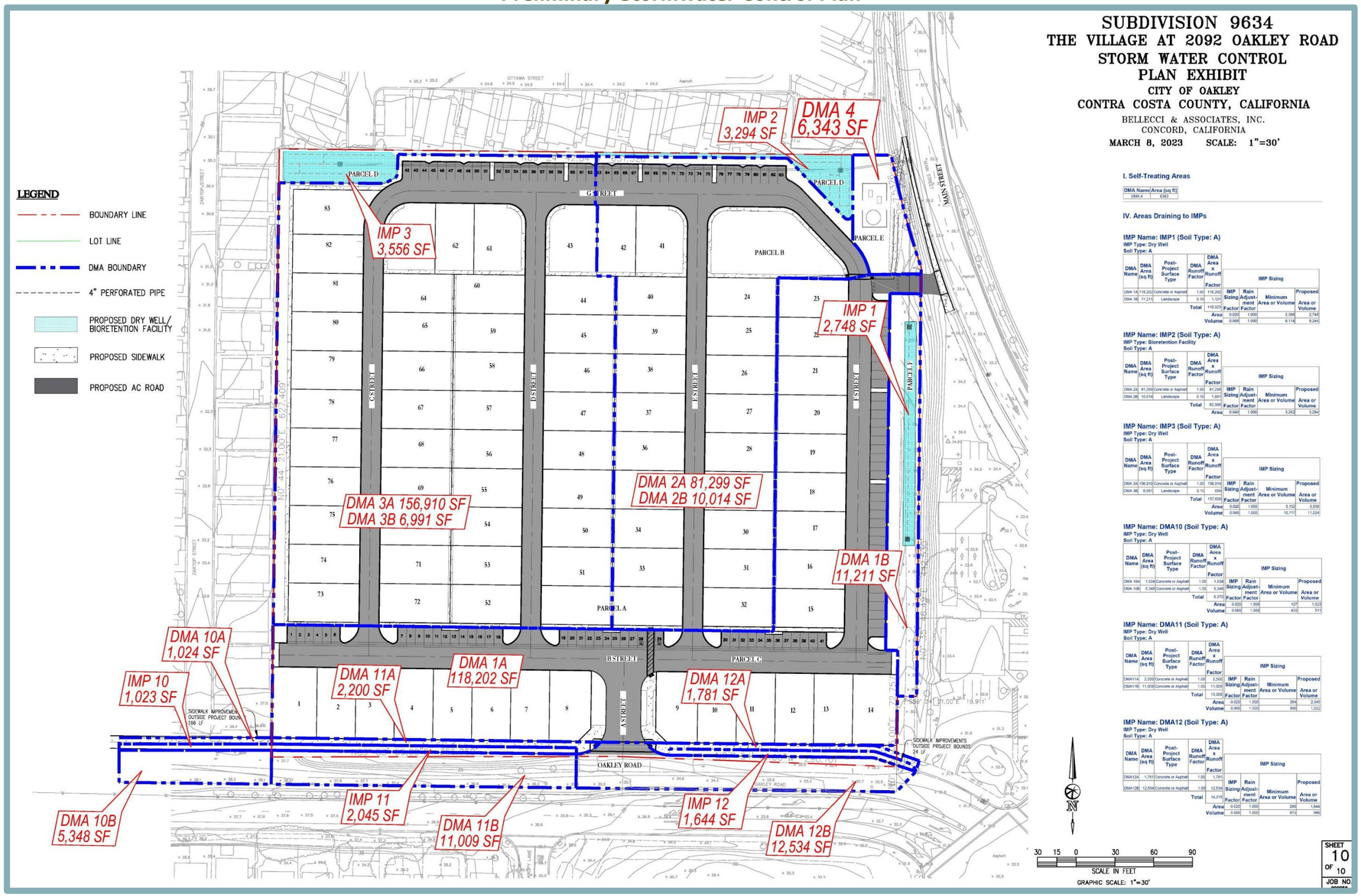


Figure 9
Offsite Utility Plan

LEGEND

EXISTING	PROPOSED	DESCRIPTION
		SUBDIVISION BOUNDARY
		CENTERLINE
W EX W W	W W	WATER MAIN
SS EX SS SS	SS SS	SANITARY SEWER PIPE
EX SD	SD	STORM DRAIN PIPE
		1'-2' RETAINING WALL

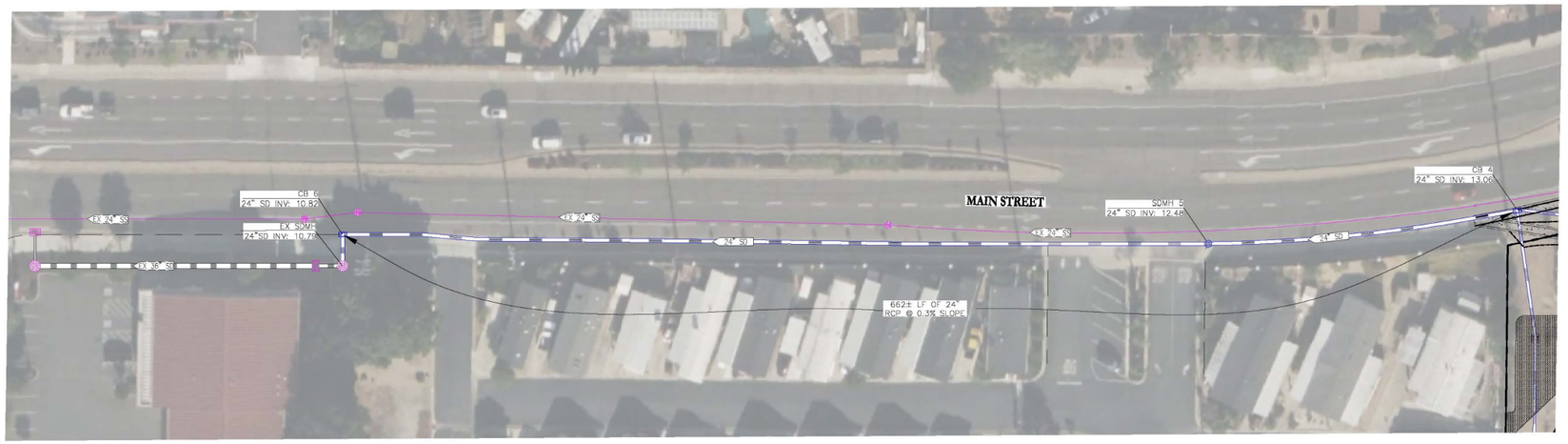
30 15 0 30 60 90
SCALE IN FEET
GRAPHIC SCALE: 1"=30'

SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
OFFSITE WORK

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

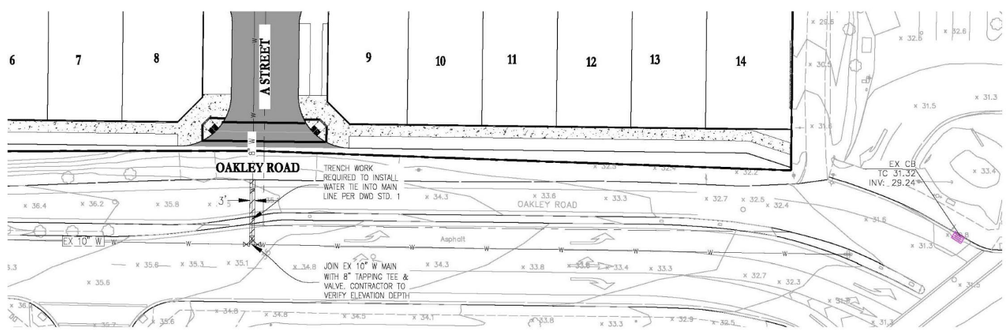
BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA
NOVEMBER 30, 2022 SCALE: 1"=30'

NOTES:
THE OWNER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS ON THE LANDS SHOWN ON THIS MAP



DETAIL A. OFFSITE STORM DRAIN CONNECTION

N
30 15 0 30 60 90
SCALE IN FEET
GRAPHIC SCALE: 1"=30'



DETAIL B. OFFSITE WATER CONNECTION

Bellecci
Intelligent Infrastructure
925 • 685 • 4569 bellecci.com

SHEET 8 OF 8
JOB NO

Design Review

Pursuant to Section 9.1.1604 of the City's Municipal Code, the proposed project would be subject to Design Review by the City. Specifically, the site plan would be analyzed based on elements of design, development location, arrangement of all structures, and design in harmony with surrounding facilities. The purpose of the regulations is to allow design review of all developments, signs, buildings, structures, and other facilities in order to further enhance the City's appearance, and the livability and usefulness of properties. Additional detail regarding the proposed residences is provided below.

Proposed Residences

The proposed two-story, single-family residences would range in size from 2,277 sf to 2,656 sf. Each residence would include four bedrooms, three bathrooms, a private porch and yard, and an attached two-car garage with a private five-foot-long driveway. Each private yard would be gated with a six-foot-tall fence and the units along the frontage of Oakley Road would also have a low picket fence and gate to separate the porch from the sidewalk. The residences would be arranged around and set back approximately 20 to 24 feet from the proposed internal roadways and on-site guest parking spaces. The front elevations of each unit are proposed to be constructed with various building materials, including stucco; concrete S-tile, concrete roof tile, or asphalt composition shingle roof; decorative gable accents; and would be painted a variety of colors.

Discretionary Actions

The proposed project would require the following approvals from the City of Oakley:

- Adoption of the IS/MND, including the MMRP;
- Approval of a General Plan Amendment of the 9.99-acre site from CO to RM;
- Approval of a Rezone of the site from C District to P-1 District;
- Approval of a Final Development Plan;
- Approval of a Vesting Tentative Map; and
- Approval of Design Review.

G. ENVIRONMENTAL CHECKLIST

The following checklist contains the environmental checklist form presented in Appendix G of the CEQA Guidelines. The checklist form is used to describe the impacts of the proposed project. A discussion follows each environmental issue identified in the checklist. For this checklist, the following designations are used:

Potentially Significant Impact: An impact that could be significant, and for which no mitigation has been identified. If any potentially significant impacts are identified, an EIR must be prepared.

Less Than Significant with Mitigation Incorporated: An impact that requires mitigation to reduce the impact to a less-than-significant level.

Less-Than-Significant Impact: Any impact that would not be considered significant under CEQA relative to existing standards.

No Impact: The project would not have any impact.

I. AESTHETICS. *Would the project:*	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Have a substantial adverse effect on a scenic vista?	☐	☐	✖	☐
b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?	☐	☐	✖	☐
c. In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	✖	☐
d. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	✖	☐

Discussion

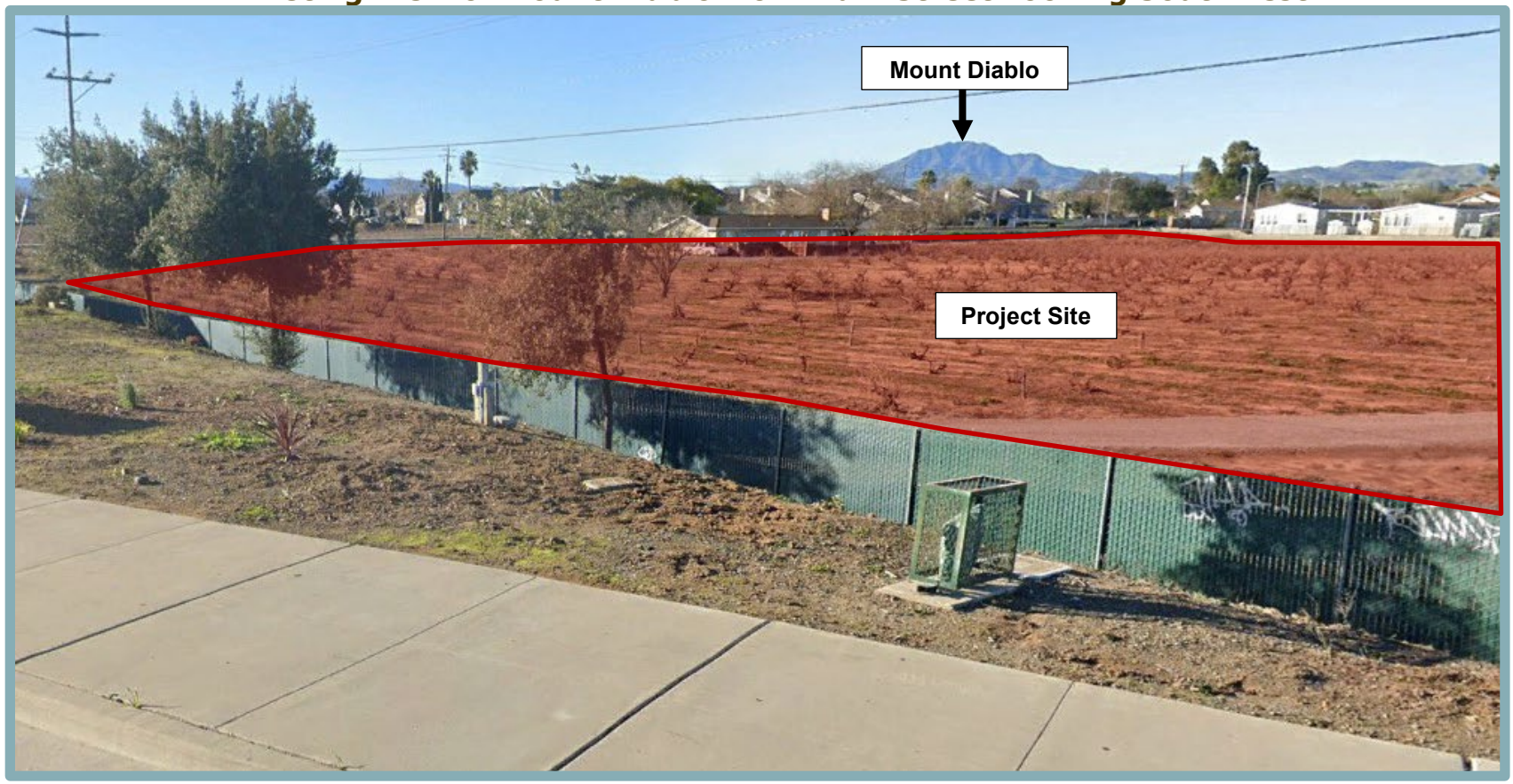
a. Examples of typical scenic vistas include mountain ranges, ridgelines, or bodies of water as viewed from a highway, public space, or other area designated for the express purpose of viewing and sightseeing. In general, a project's impact to a scenic resource would occur if development of the project would substantially change or remove a scenic resource. A scenic resource includes any such areas designated by a federal, State, or local agency. The City's predominantly flat landscape is rich in scenic resources. Oakley's scenic resources include the waterways of the Delta, Dutch Slough, Marsh Creek, and Contra Costa Canal, habitat areas, and open space land. Other scenic resources include the view of Mount Diablo west of the City.[1] Views of the Delta, Dutch Slough, Marsh Creek, and the Contra Costa Canal, are not available from the project site.

While, the project site is located in a relatively urbanized area, public views of Mount Diablo from Main Street to the southwest are framed by rolling hillsides within the project site (see Figure 10). Therefore, public views of Mount Diablo could be partially obstructed by development of the proposed project. However, as presented in Figure 10, potential views of Mount Diablo from Main Street are already partially blocked by surrounding development, including the existing on-site single-family residence and the single-family residences south and west of the project site. Furthermore, the speed limit on the Main Street is 40 miles per hour (mph) along the project frontage. Given the speed limit, public views from Main Street are temporary, occurring only as motorists briefly pass by the project site.

In addition, the project site is currently zoned C District, which allows for a maximum commercial building height of 35 feet. While buildout of the project site was not anticipated for residential uses, the proposed two-story single-family residences would be similar in size to the single-family residences south and west of the project site and would not exceed a height of 35 feet.

[1] City of Oakley. *City of Oakley General Plan, Focused General Plan Update* [pg. 6-24]. Adopted January 11, 2022.

Figure 10
Existing View of Mount Diablo from Main Street Looking Southwest



Furthermore, the project site is currently designated by the City of Oakley General Plan as CO. While buildout of the site was not anticipated for residential uses, general development of the site has been anticipated, and development of residential uses would not result in greater impacts as compared to development of the site with commercial uses.

As such, the proposed project is within the realm of what has been anticipated for the site and potential impacts to scenic vistas and visual character associated with future development of the project site were already evaluated and considered in the General Plan EIR, which concluded that the General Plan's goals, policies, and programs would reduce any potential impacts on the aesthetic qualities to a less-than-significant level.[2] Therefore, the proposed project would not have a substantial adverse effect on a scenic vista and a ***less-than-significant*** impact would occur.

b. According to the California Scenic Highway Mapping System, portions of SR 160, 580, and 680 are listed as Officially Designated as State Scenic Highways, while portion of SR 4, 160, and 580 are listed as Eligible designations.[3] The project site is located approximately two miles southeast of the portion of SR 160, which is an Officially Designated State Scenic Highway. The site is also approximately 19.5 miles north of SR 580 and 17.6 miles northeast of SR 680. Views of the project site from the aforementioned highways are not available due to the substantial distance and intervening urban development. Development of the proposed project would, therefore, not substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State Scenic Highway. Thus, a ***less-than-significant*** impact would occur.

c. The project site is located within a developed area of the City. Therefore, the applicable CEQA consideration is whether the project would conflict with applicable zoning and other regulations related to scenic quality.

The project site has been previously anticipated for development by the City's General Plan, and impacts related to degradation of visual character and quality were analyzed in the General Plan EIR. As noted previously, the proposed project would require approval of a General Plan Amendment from CO to RM and a Rezone from C District to P-1 District. The RM land use designation provides for more affordable, small lot development and to increase the availability of rental or entry-level housing. The purpose of the P-1 District is to allow diversification in the relationship of various uses, buildings, structures, lot sizes, and open spaces. Approval of the proposed General Plan Amendment and Rezone would ensure compatibility with the surrounding land uses. Therefore, the proposed General Plan Amendment and Rezone would contribute to the consistency of scenic quality in the project area. The proposed development would be generally consistent with the existing residential development to the south of the site, across Oakley Road. Following approval of the Rezone, the proposed project would comply with the adopted Final Development Plan of the P-1 District for the project site, which would include project-specific development standards.

Implementation of the proposed project would also require Design Review, which is a City regulation related to scenic quality. Design Review would ensure that the aesthetic and

---

2 City of Oakley. *City of Oakley 2020 General Plan Draft Environmental Impact Report* [pg. 3-24]. September 2002.

3 California Department of Transportation. *California State Scenic Highway System Map*. Available at: https://www.arcgis.com/apps/webappviewer/index.html?id=465dfd3d807c46cc8e8057116f1aacaa. Accessed May 2023.

architectural design of the development would be compatible with surrounding development. The proposed project would include landscaping features at the project site frontage and within the project site that would be similar to existing features in the development west of the site, and proposed residences would be designed in keeping with the surrounding residential land uses.

Based on the above, the proposed project would not conflict with applicable zoning and other regulations governing scenic qualities, and a ***less-than-significant*** impact would occur.

d. The only existing sources of light on the project site are the two on-site single-family residences. Therefore, redevelopment of the project site with 83 residences would add new sources of light and glare to the site, where minimal sources currently exist. The proposed project is anticipated to include streetlights along internal roadways and the project frontage, as well as interior lights spilling from the windows of the proposed residences. In addition, the proposed project would generate vehicle trips which, in turn, would create sources of light from vehicle headlights. As previously discussed, the project site is surrounded by existing development including similar land uses. Light and glare associated with the proposed project would be expected to be similar to that of the surrounding area.

Furthermore, pursuant to Section 9.1.1604 of the City's Municipal Code, the project would be required to undergo a Design Review to ensure that development of the project would be in compliance with the Residential Design Guidelines, which, among other things, establishes the City's standard for residential streetlights and limits residential lighting for security purposes. Therefore, any creation of new sources of light and glare by the proposed project would be considered a ***less-than-significant*** impact.

II. AGRICULTURE AND FOREST RESOURCES. *Would the project:*	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	✖	☐
b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	✖
c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	✖
d. Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	✖
e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	✖	☐

Discussion

a,e. Pursuant to the California Department of Conservation (DOC) Farmland Mapping and Monitoring Program, the project site is designated as "Farmland of Statewide Importance."[4] The DOC defines Farmland of Statewide Importance as "irrigated land that has a good combination of physical and chemical characteristics for the production of agricultural crops. According to the Department of Conservation, in order for land to be considered Farmland of Statewide Importance, the land must have been used for agricultural purposes within four years of the mapping date. Because the project site was mapped as Farmland of Statewide Importance in 2018, the site must have been used as agricultural land between 2014 and 2018 for the designation to be appropriate. The project site is currently planted as a vineyard with rows of grape vines. According to the Phase I Environmental Site Assessment (ESA) prepared for the project site, the site has been historically farmed since 1939.[5] However, the site is not zoned or designated in the General Plan for agricultural uses; rather, the site is zoned for Commercial uses and is designated in the General Plan as Commercial. Furthermore, the project site is surrounded by urban development to the north, east, and west. Nonetheless, due to the existing California DOC designation, implementation of the proposed project would convert land designated as Farmland of Statewide Importance to non-agricultural uses.

The City of Oakley General Plan EIR and Update IS/ND analyzed the impacts of Farmland of Statewide Importance conversion that would result from buildout of the City and determined the results would be less-than-significant with implementation of General Plan

[4] California Department of Conservation. *California Important Farmland Finder.* Available at: https://maps.conservation.ca.gov/dlrp/ciff/. Accessed May 2023.

[5] Basics Environmental. *Phase I Environmental Site Assessment, 2092 Oakley Road, Oakley, California.* May 2, 2023.

policies. Because the project site has already been planned for urban development by the City, buildout of the site with non-agricultural uses and the conversion of Farmland of Statewide Importance has already been anticipated by the General Plan EIR. As a result, the project's impact related to the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) to a non-agricultural use would be ***less than significant***.

b. The site is not under an active Williamson Act contract and is not designated or zoned for agricultural uses.[6] Therefore, the proposed project would not conflict with existing zoning for agricultural use or conflict with a Williamson Act contract, and ***no impact*** would occur.

c,d. The project site is not zoned forest land (as defined in PRC Section 12220[g]), timberland (as defined by PRC Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104[g]). Therefore, the proposed project would have ***no impact*** with regard to conversion of forest land or any potential conflict with forest land, timberland, or Timberland Production zoning.

[6] Contra Costa Conservation and Development. *2016 Agricultural Preserves Map*. Available at: https://www.contracosta.ca.gov/DocumentCenter/View/882/Map-of-Properties-Under-Contract. Accessed May 2023.

III. AIR QUALITY. *Would the project:*	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	✖	☐
b. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☐	☐	✖	☐
c. Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	✖	☐
d. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	✖	☐

Discussion

a,b. The City of Oakley is located in the San Francisco Bay Area Air Basin (SFBAAB), which is under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). The SFBAAB area is currently designated as a nonattainment area for State and federal ozone, State and federal fine particulate matter 2.5 microns in diameter ($PM_{2.5}$), and State respirable particulate matter 10 microns in diameter (PM_{10}) ambient air quality standards (AAQS). The SFBAAB is designated attainment or unclassified for all other AAQS. It should be noted that on January 9, 2013, the U.S. Environmental Protection Agency (USEPA) issued a final rule to determine that the Bay Area has attained the 24-hour $PM_{2.5}$ federal AAQS. Nonetheless, the Bay Area must continue to be designated as nonattainment for the federal $PM_{2.5}$ AAQS until such time as the BAAQMD submits a redesignation request and a maintenance plan to the USEPA, and the USEPA approves the proposed redesignation. The USEPA has not yet approved a request for redesignation of the SFBAAB; therefore, the SFBAAB remains in nonattainment for 24-hour $PM_{2.5}$.

In compliance with regulations, due to the nonattainment designations of the area, the BAAQMD periodically prepares and updates air quality plans that provide emission reduction strategies to achieve attainment of the AAQS, including control strategies to reduce air pollutant emissions through regulations, incentive programs, public education, and partnerships with other agencies. The current air quality plans are prepared in cooperation with the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG).

The most recent federal ozone plan is the 2001 Ozone Attainment Plan, which was adopted on October 24, 2001 and approved by the California Air Resources Board (CARB) on November 1, 2001. The plan was submitted to the USEPA on November 30, 2001 for review and approval. The most recent State ozone plan is the 2017 Clean Air Plan, adopted on April 19, 2017. The 2017 Clean Air Plan was developed as a multi-pollutant plan that provides an integrated control strategy to reduce ozone, PM, toxic air contaminants (TACs), and greenhouse gases (GHGs). Although a plan for achieving the State PM_{10} standard is not required, the BAAQMD has prioritized measures to reduce PM in developing the control strategy for the 2017 Clean Air Plan. The control strategy serves as the backbone of the BAAQMD's current PM control program.

The aforementioned air quality plans contain mobile source controls, stationary source controls, and transportation control measures to be implemented in the region to attain the State and federal AAQS within the SFBAAB. Adopted BAAQMD rules and regulations, as

well as the thresholds of significance, have been developed with the intent to ensure continued attainment of AAQS, or to work towards attainment of AAQS for which the area is currently designated nonattainment, consistent with applicable air quality plans. For development projects, BAAQMD establishes significance thresholds for emissions of the ozone precursors reactive organic gases (ROG) and oxides of nitrogen (NO_X), as well as for PM_{10}, and $PM_{2.5}$, expressed in pounds per day (lbs/day) and tons per year (tons/yr). The thresholds are listed in Table 1. Thus, by exceeding the BAAQMD's mass emission thresholds for construction and/or operational emissions of ROG, NO_X, or PM_{10}, a project would be considered to conflict with or obstruct implementation of the BAAQMD's air quality planning efforts.

Table 1
BAAQMD Thresholds of Significance

	Construction	Operational	
Pollutant	**Average Daily Emissions (lbs/day)**	**Average Daily Emissions (lbs/day)**	**Maximum Annual Emissions (tons/year)**
ROG	54	54	10
NO_x	54	54	10
PM_{10} (exhaust)	82	82	15
$PM_{2.5}$ (exhaust)	54	54	10

Source: BAAQMD, Air Quality Guidelines, April 2023.

Particulate matter can be split into two categories: fugitive and exhaust. The BAAQMD thresholds of significance for exhaust are presented in Table 1. It should be noted that BAAQMD does not maintain quantitative thresholds for fugitive emissions of PM_{10} or $PM_{2.5}$, rather, BAAQMD requires all projects within the district's jurisdiction to implement Basic Construction Mitigation Measures (BCMMs) related to dust suppression.

The proposed project's construction and operational emissions were quantified using the California Emissions Estimator Model (CalEEMod) software version 2022.1.1.14 – a Statewide model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify air quality emissions, including GHG emissions, from land use projects. The model applies inherent default values for various land uses, including construction data, vehicle mix, trip length, average speed, compliance with the 2022 California Building Standards Code (CBSC), etc. Where project-specific information is available, such information should be applied in the model. Accordingly, the proposed project's modeling assumes the following project and/or site-specific information:

- Demolition would involve approximately 2,000 sf of building material and would occur over approximately one week;
- Construction would begin in June 2024 and occur over approximately one year;
- Operational trip generation rates were updated to 9.33 daily vehicle trips per unit, consistent with the project-specific Traffic Study prepared by TJKM;
- Wood-burning fireplaces would not be included;
- The project would comply with the MWELO and the 2019 CALGreen Code; and
- The project would comply with all applicable provisions of the 2022 California CBSC.

The proposed project's construction emissions associated with the off-site infrastructure improvements were quantified using the Sacramento Metropolitan Air Quality Management District's (SMAQMD) Road Construction Emissions Model (RoadMod) Version 9.0.0. While the project site is not located within the jurisdiction of SMAQMD, the model is an industry standard tool for evaluating construction emissions throughout the State. SMAQMD's RoadMod was used to calculated the ROG, NO_X, PM_{10}, and $PM_{2.5}$ emissions associated with project construction. RoadMod requires the user to input information related to the area of disturbance, the length of time a project would occur, and, for linear non-roadway projects, a list of equipment that would be used during project construction. Accordingly, the proposed project's modeling assumes the following project and/or site-specific information:

- Construction associated with the off-site infrastructure improvements would begin in June 2024 and occur during the grading phase for approximately 1.86 months;
- The off-site infrastructure improvements would involve a total of 686.4 feet of ground disturbance (633.6 feet associated with the storm drain and 52.8 feet associated with the water tie-in); and
- The total disturbance area related to the off-site infrastructure improvements would be 0.08 acres.

The proposed project's estimated emissions associated with construction and operations are presented and discussed in further detail below. A discussion of the proposed project's contribution to cumulative air quality conditions is provided below as well. All CalEEMod and RoadMod modeling results are included as Appendix A to this IS/MND.

Construction Emissions

During construction of the proposed project, various types of equipment and vehicles would temporarily operate on the project site. Construction exhaust emissions would be generated from construction equipment, vegetation clearing and earth movement activities, construction worker commutes, and construction material hauling for the entire construction period. The aforementioned activities would involve the use of diesel- and gasoline-powered equipment that would generate emissions of criteria pollutants. Project construction activities also represent sources of fugitive dust, which includes PM emissions. As construction of the proposed project would generate air pollutant emissions intermittently within the site and vicinity, until all construction has been completed, construction is a potential concern because the project is in a non-attainment area for ozone, PM_{10}, and $PM_{2.5}$.

According to the CalEEMod and RoadMod modeling results, buildout of the proposed project would result in maximum unmitigated construction criteria air pollutant emissions as shown in Table 2. As shown in the table, the proposed project's construction emissions would be below the applicable thresholds of significance for ROG, NO_X, PM_{10}, and $PM_{2.5}$.

Table 2
Maximum Unmitigated Construction Emissions (lbs/day)

Pollutant	Construction Emissions	Threshold of Significance	Exceeds Threshold?
ROG	13.24	54	**NO**
NO_X	53.2	54	**NO**
PM_{10}*	13.76	82	**NO**
$PM_{2.5}$*	6.42	54	**NO**

Notes:
* Denotes emissions from exhaust only. BAAQMD does not have adopted PM thresholds for fugitive emissions.

Sources: CalEEMod, June 2023 (see Appendix A).
RoadMod, June 2023 (see Appendix A).

All projects within the jurisdiction of the BAAQMD are required to implement all of the BAAQMD's BCMMs, which would be required by the City as conditions of approval:

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 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. All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph.
7. All trucks and equipment, including their tires, shall be washed off prior to leaving the site.
8. Unpaved roads providing access to sites located 100 feet or further from a paved road shall be treated with a six- to 12-inch layer of compacted layer of wood chips, mulch, or gravel.
9. Publicly visible signs shall be posted with the telephone number and name of the person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's General Air Pollution Complaints number shall also be visible to ensure compliance with applicable regulations.

The proposed project's required implementation of the BAAQMD's BCMMs listed above for the project's construction activities would help to further minimize construction-related emissions.

Overall, because the proposed project would be below the applicable thresholds of significance for construction emissions, project construction would not result in a significant air quality impact.

Operational Emissions

Operational emissions of ROG, NO_X, and PM would be generated by the proposed project from both mobile and stationary sources. Day-to-day activities, such as the future vehicle trips to and from the project site, would make up the majority of the mobile emissions. Emissions would also occur from area sources, such as landscape maintenance equipment exhaust.

According to the CalEEMod results, buildout of the proposed project would result in maximum unmitigated operational criteria air pollutant emissions as shown in Table 3.

Table 3
Maximum Unmitigated Operational Emissions

Pollutant	Proposed Project Emissions		Threshold of Significance		Exceeds Threshold?
	lbs/day	tons/yr	lbs/day	tons/yr	
ROG	7.78	1.33	54	10	**NO**
NO_X	4.03	0.69	54	10	**NO**
PM_{10}*	5.82	1.04	82	15	**NO**
$PM_{2.5}$ *	1.57	0.28	54	10	**NO**

Note:
* Denotes emissions from exhaust only. BAAQMD does not have adopted PM thresholds for fugitive emissions.

Source: CalEEMod, June 2023 (see Appendix A).

As shown in the table, operations of the proposed project would be below the applicable thresholds of significance. Thus, operations of the project would not be considered to conflict with air quality plans during project operations.

Cumulative Emissions

Past, present, and future development projects contribute to the region's adverse air quality impacts on a cumulative basis. By nature, air pollution is largely a cumulative impact. A single project is not sufficient in size to, by itself, result in nonattainment of AAQS. Instead, a project's individual emissions contribute to existing cumulatively significant adverse air quality impacts. If a project's contribution to the cumulative impact is considerable, then the project's impact on air quality would be considered significant. In developing thresholds of significance for air pollutants, BAAQMD considered the emission levels for which a project's individual emissions would be cumulatively considerable. The thresholds of significance presented in Table 1 represent the levels at which a project's individual emissions of criteria air pollutants or precursors would result in a cumulatively considerable contribution to the SFBAAB's existing air quality conditions. If a project exceeds the significance thresholds presented in Table 1, the proposed project's emissions would be cumulatively considerable, resulting in significant adverse cumulative air quality impacts to the region's existing air quality conditions.

Because the proposed project would result in both construction-related and operational emissions below the applicable thresholds of significance, construction and operations of the project would not be expected to result in a cumulatively considerable contribution to the region's existing air quality conditions.

Conclusion

As stated previously, the applicable regional air quality plans include the 2001 Ozone Attainment Plan and the 2017 Clean Air Plan. According to BAAQMD, if a project would not result in significant and unavoidable air quality impacts, after the application of all feasible mitigation, the project may be considered consistent with the air quality plans.

As discussed above, the proposed project would result in construction and operational emissions below the applicable thresholds of significance. Therefore, the proposed project would not conflict with or obstruct implementation of the applicable air quality plans, violate any air quality standards or contribute substantially to an existing or projected air quality violation, or result in a cumulatively considerable net increase in any criteria air pollutant, and impacts would be considered ***less than significant***.

c. Some land uses are considered more sensitive to air pollution than others, due to the types of population groups or activities involved. Heightened sensitivity may be caused by health problems, proximity to the emissions source, and/or duration of exposure to air pollutants. Children, pregnant women, the elderly, and those with existing health problems are especially vulnerable to the effects of air pollution.

Accordingly, land uses that are typically considered to be sensitive receptors include residences, schools, playgrounds, childcare centers, retirement homes, convalescent homes, hospitals, and medical clinics. Existing sensitive receptors near the project site include the mobile homes located to the north and west of the project site boundary; the nearest mobile home is located 20 feet west of the site boundary. The closest receptor to where the off-site infrastructure improvements would occur along Main Street is located approximately 30 feet to the west of the off-site improvement area. The closest receptor to where the off-site improvements would occur along Oakley Road is located 120 feet southwest of the off-site improvement area.

The major pollutant concentrations of concern are localized carbon monoxide (CO) emissions and TACs, as well as regional effects of emissions of criteria pollutants, which are addressed in further detail below.

Localized CO Emissions

Localized concentrations of CO are related to the levels of traffic and congestion along streets and at intersections. High levels of localized CO concentrations are only expected where background levels are high, and traffic volumes and congestion levels are high. Emissions of CO are of potential concern, as the pollutant is a toxic gas that results from the incomplete combustion of carbon-containing fuels such as gasoline or wood. CO emissions are particularly related to traffic levels.

In order to provide a conservative indication of whether a project would result in localized CO emissions that would exceed the applicable threshold of significance, the BAAQMD has established screening criteria for localized CO emissions. According to BAAQMD, a proposed project would result in a less-than-significant impact related to localized CO emission concentrations if all of the following conditions are true for the project:

- The project is consistent with an applicable congestion management program established by the county congestion management agency for designated roads or highways, regional transportation plan, and local congestion management agency plans;
- The project traffic would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour; and
- The project traffic would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g., tunnel, parking garage, bridge underpass, natural or urban street canyon, below-grade roadway).

While BAAQMD has established the foregoing screening criteria for potential impacts, it should be noted that the SFBAAB has been in attainment of California AAQS (CAAQS) and National AAQS (NAAQS) for CO for more than 20 years.[7] Due to the continued attainment of CAAQS and NAAQS, and advances in vehicle emissions technologies, the likelihood that any single project would create a CO hotspot is minimal. With regard to the proposed project, according to the Traffic Study prepared by TJKM, the proposed project is expected to generate approximately 774 daily vehicle trips, 57 of which would be during the AM peak hour, and 77 during the PM peak hour.[8] The addition of 134 total peak hour trips per day generated by the proposed project is not anticipated to increase traffic volumes at any nearby intersections to more than 44,000 vehicles per hour. Furthermore, areas where vertical and/or horizontal mixing is limited due to tunnels, underpass, or similar features do not exist in the project area. Therefore, based on the BAAQMD's screening criteria for localized CO emissions, the proposed project would not be expected to result in substantial levels of localized CO at surrounding intersections or generate localized concentrations of CO that would exceed standards or cause health hazards.

TAC Emissions

Another category of environmental concern is TACs. The CARB's *Air Quality and Land Use Handbook: A Community Health Perspective* (Handbook) provides recommended setback distances for sensitive land uses from major sources of TACs, including, but not limited to, freeways and high traffic roads, distribution centers, gas dispensing facilities, and rail yards. The CARB has identified diesel particulate matter (DPM) from diesel-fueled engines as a TAC; thus, high volume freeways, stationary diesel engines, and facilities attracting heavy and constant diesel vehicle traffic are identified as having the highest associated health risks from DPM. Health risks associated with TACs are a function of both the concentration of emissions and the duration of exposure, where the higher the concentration and/or the longer the period of time that a sensitive receptor is exposed to pollutant concentrations would correlate to a higher health risk.

[7] Bay Area Air Quality Management District. *Air Quality Summary Reports*. Available at: http://www.baaqmd.gov/about-air-quality/air-quality-summaries. Accessed June 2023.

[8] TJKM. *Traffic Study for 2092 Oakley Road in Oakley, CA.* November 1, 2022.

It should be noted that impacts of the environment on a project (as opposed to impacts of a project on the environment) are beyond the scope of required CEQA review.[9] Therefore, for the purposes of the CEQA analysis, the relevant inquiry is not whether residents at the proposed single-family homes would be exposed to pre-existing TAC emissions, but instead whether project-generated emissions would exacerbate pre-existing conditions. Although the analysis of a project's existing TAC emissions environment is not required for CEQA purposes, such analysis is included in this document for compliance with applicable CARB recommendations. Gasoline dispensing facilities (GDFs) are considered sources of various types of TACs, including benzene. As a result, in order to reduce adverse health effects, the CARB recommends that typical GDFs be sited at least 50 feet away from existing sensitive land uses, or that a detailed health risk assessment be performed if such land uses are within 50 feet from each other.[10] The project site is located approximately 160 feet west of an existing gas station. Therefore, the proposed residences would be sited outside of the CARB's recommended setback distance from GDFs, and, based on agency guidance, health risks would be less than significant.

As previously noted, the nearest existing sensitive receptors to the project site are the mobile homes located north and west of the project site. The proposed project does not include any operations that would be considered a substantial source of TACs. Accordingly, operations of the proposed project would not expose sensitive receptors to excess concentrations of TACs.

Short-term, construction-related activities would result in the generation of TACs, specifically DPM, from on-road haul trucks and off-road equipment exhaust emissions. Construction is temporary and occurs over a relatively short duration in comparison to the operational lifetime of the proposed project. Health risks are typically associated with exposure to high concentrations of TACs over extended periods of time (e.g., 30 years or greater), whereas the construction period associated with the proposed project is estimated to be approximately one year.

All construction equipment and operation thereof would be regulated per the In-Use Off-Road Diesel Vehicle Regulation, which is intended to help reduce emissions associated with off-road diesel vehicles and equipment, including DPM. Project construction would also be required to comply with all applicable BAAQMD rules and regulations, particularly associated with permitting of air pollutant sources. In addition, only portions of the site would be disturbed at a time throughout the construction period, with operation of construction equipment occurring intermittently throughout the course of a day rather than continuously at any one location on the project site. Operation of construction equipment within portions of the development area would allow for the dispersal of emissions, and

---

9 Impacts of the environment on a project (as opposed to impacts of a project on the environment) are beyond the scope of required CEQA review. "[T]he purpose of an EIR is to identify the significant effects of a project on the environment, not the significant effects of the environment on the project." (*Ballona Wetlands Land Trust v. City of Los Angeles,* (2011) 201 Cal.App.4th 455, 473 (*Ballona*).) The California Supreme Court recently held that "CEQA does not generally require an agency to consider the effects of existing environmental conditions on a proposed project's future users or residents. What CEQA does mandate… is an analysis of how a project might exacerbate existing environmental hazards." (*California Building Industry Assn. v. Bay Area Air Quality Management Dist.* (2015) 62 Cal.4th 369, 392; see also *Mission Bay Alliance v. Office of Community Investment & Infrastructure* (2016) 6 Cal.App.5th 160, 197 ["identifying the effects on the project and its users of locating the project in a particular environmental setting is neither consistent with CEQA's legislative purpose nor required by the CEQA statutes"], quoting *Ballona*, *supra*, 201 Cal.App.4th at p. 474.)

10 California Air Resources Board. *Air Quality and Land Use Handbook: A Community Health Perspective* [pg. 32]. April 2005.

would ensure that construction-activity is not continuously occurring in the portions of the project site closest to existing receptors. Because construction equipment on-site would not operate for long periods of time and would be used at varying locations within the site, associated emissions of DPM would not occur at the same location (or be evenly spread throughout the entire project site) for long periods of time. Due to the temporary nature of construction and the relatively short duration of potential exposure to associated emissions, the potential for any one sensitive receptor in the area to be exposed to concentrations of pollutants for a substantially extended period of time would be low. For the aforementioned reasons, project construction would not be expected to expose sensitive receptors to substantial pollutant concentrations.

Criteria Pollutant Emissions

Criteria pollutant emissions have the ability to cause negative health effects. As discussed under section 'a' above, the AAQS presented are health-based standards designed to ensure safe levels of criteria pollutants that avoid specific adverse health effects. Because the SFBAAB is designated as nonattainment for State and federal eight-hour ozone and State PM_{10} standards, the BAAQMD, along with other air districts in the SFBAAB region, has adopted federal and state attainment plans to demonstrate progress towards attainment of the AAQS. Full implementation of the attainment plans would ensure that the AAQS are attained and sensitive receptors within the SFBAAB are not exposed to excess concentrations of criteria pollutants. The BAAQMD's thresholds of significance were established with consideration given to the health-based air quality standards established by the AAQS, and are designed to aid the district in implementing the applicable attainment plans to achieve attainment of the AAQS. Thus, if a project's criteria pollutant emissions exceed the BAAQMD's emission thresholds of significance, a project would be considered to conflict with or obstruct implementation of the BAAQMD's air quality planning efforts, thereby delaying attainment of the AAQS. Because the AAQSs are representative of safe levels that avoid specific adverse health effects, a project's hinderance of attainment of the AAQS could be considered to contribute towards regional health effects associated with the existing nonattainment status of ozone and PM standards.

The proposed project would not result in short-term construction-related or long-term operational emissions of criteria pollutants that would exceed BAAQMD standards. Consequently, implementation of the proposed project would not conflict with the BAAQMD's adopted attainment plans nor would the proposed project inhibit attainment of regional AAQS. Therefore, implementation of the proposed project would not contribute towards regional health effects associated with the existing nonattainment status of ozone and PM_{10} standards.

Conclusion

Based on the above, the proposed project would not expose any sensitive receptors to substantial concentrations of localized CO, TACs, or criteria pollutants associated with construction or operation. Therefore, the proposed project would result in a ***less-than-significant*** impact related to the exposure of sensitive receptors to substantial pollutant concentrations.

d. Emissions such as those leading to odors have the potential to adversely affect sensitive receptors within the project area. Pollutants of principal concern include emissions leading to odors, emission of dust, or emissions considered to constitute air pollutants. Air

pollutants have been discussed in sections 'a' through 'c' above. Therefore, the following discussion focuses on emissions of odors and dust.

Pursuant to the BAAQMD CEQA Guidelines, odors are generally regarded as an annoyance rather than a health hazard.[11] Manifestations of a person's reaction to odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache). The presence of an odor impact is dependent on several variables including: the nature of the odor source; the frequency of odor generation; the intensity of odor; the distance of odor source to sensitive receptors; wind direction; and sensitivity of the receptor.

Due to the subjective nature of odor impacts, the number of variables that can influence the potential for an odor impact, and the variety of odor sources, quantification of significant odor impacts is relatively difficult. Typical odor-generating land uses include, but are not limited to, wastewater treatment plants, landfills, and composting facilities. The proposed project would not introduce any such land uses.

Construction activities often include diesel-fueled equipment and heavy-duty diesel trucks, which can create odors associated with diesel fumes, which could be found to be objectionable. However, as discussed above, construction activities would be temporary, and hours of operation for construction equipment would be restricted to the hours of 7:30 AM to 7:00 PM Monday through Friday and 9:00 AM to 7:00 PM on weekends holiday per Section 4.2.208 of the City of Oakley Municipal Code. Project construction would also be required to comply with all applicable BAAQMD rules and regulations, particularly associated with permitting of air pollutant sources. The aforementioned regulations would help to minimize air pollutant emissions, as well as any associated odors. Accordingly, substantial objectionable odors would not be expected to occur during construction activities or affect a substantial number of people.

BAAQMD regulates objectionable odors through Regulation 7, Odorous Substances, which does not become applicable until the Air Pollution Control Officer (APCO) receives odor complaints from ten or more complainants within a 90-day period. Once effective, Regulation 7 places general limitation on odorous substances and specific emission limitations on certain odorous compounds, which remain effective until such time that citizen complaints have not been received by the APCO for one year. The limits of Regulation 7 become applicable again when the APCO receives odor complaints from five or more complainants within a 90-day period. Thus, although not anticipated, if odor complaints are made after the proposed project is developed, the BAAQMD would ensure that such odors are addressed, and any potential odor effects are minimized or eliminated.

With respect to dust, as noted previously, all projects under the jurisdiction of BAAQMD are required to implement the BAAQMD's BCMMs. Such measures would act to reduce construction-related dust by ensuring that haul trucks with loose material are covered, reducing vehicle dirt track-out, and limiting vehicle speeds within project site, among other methods, which would ensure that construction of the proposed project does not result in substantial emissions of dust. Although the project would require soil hauling, California Vehicle Code Section 23114(e) requires all haul trucks to be covered, which would minimize emissions of fugitive dust during transport. Following project construction,

[11] Bay Area Air Quality Management District. *California Environmental Quality Act Air Quality Guidelines* [pg. 7-1]. May 2017.

vehicles operating within the project site would be limited to paved areas of the site, and non-paved areas would be landscaped. Thus, project operations would not include sources of dust that could adversely affect a substantial number of people.

For the aforementioned reasons, construction and operation of the proposed project would not result in emissions (such as those leading to odors) adversely affecting a substantial number of people, and a ***less-than-significant*** impact would occur.

IV. BIOLOGICAL RESOURCES. *Would the project:*	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	✖	☐
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Wildlife or US Fish and Wildlife Service?	☐	☐	✖	☐
c. Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	✖	☐
d. Interfere substantially with the movement of any resident or migratory fish or wildlife species or with established resident or migratory wildlife corridors, or impede the use of wildlife nursery sites?	☐	☐	✖	☐
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	✖	☐
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Conservation Community Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	✖	☐

Discussion

a,f. The following discussion is based primarily on a Planning Survey Report (PSR), prepared by Olberding Environmental, Inc. (Olberding) for the proposed project (see Appendix B).[12] The PSR did not evaluate the off-site improvement areas because all ground disturbance would occur within the existing ROW, where development has already occurred, and sensitive biological resources do not exist.

Currently, the approximately 9.99-acre project site is planted with vineyards and rows of grapevines. One single-family residence is located along the southern boundary of the property, and one single-family residence, one ancillary shed, and a cell tower are located in the northeast corner of the site. A total of 16 trees are located on-site.

Special-status species include those plant and wildlife species that have been formally listed, are proposed as endangered or threatened, or are candidates for such listing under the federal and State Endangered Species Acts. Both acts afford protection to listed and proposed species. In addition, California Department of Fish and Wildlife (CDFW) Species of Special Concern, which are species that face extirpation in California if current population and habitat trends continue, U.S. Fish and Wildlife Service (USFWS) Birds of Conservation Concern, sensitive species included in USFWS Recovery Plans, and CDFW

[12] Olberding Environmental, Inc. *Application Form and Planning Survey Report.* May 9, 2023.

special-status invertebrates are all considered special-status species. Although CDFW Species of Special Concern generally do not have special legal status, they are given special consideration under CEQA. In addition to regulations for special-status species, most birds in the U.S., including non-status species, are protected by the Migratory Bird Treaty Act (MBTA) of 1918. Under the MBTA, destroying active nests, eggs, and young is illegal. Species that meet the definition of rare, threatened, or endangered under Section 15380 of the CEQA guidelines are also considered special-status species. In addition, plant species on California Native Plant Society (CNPS) categories 1A, 1B, 2B, 3, and 4 are considered special-status plant species and are protected under CEQA.

The project site is located within the boundaries of the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (ECCCHCP/NCCP), which is intended to provide an effective framework to protect natural resources in the County, including special-status species. Raney Planning and Management conducted a search of the California Natural Diversity Database (CNDDB) within the nine U.S. Geological Survey (USGS) quadrangles that define the project region, including the project site. The CNDDB search was conducted in order to identify special-status plant and wildlife species that may occur at or near the project site. The intent of the database review was to identify documented occurrences of special-status species in the vicinity of the project area, to determine their locations relative to the project site, and to evaluate whether the site meets the habitat requirements of such species. Furthermore, the CNDDB search was conducted to identify any special-status species that are not covered by the ECCCHCP/NCCP and were not evaluated in the PSR prepared by Olberding.

Based on the results of the CNDDB search, 48 special-status plant species and 48 special-status wildlife species have the potential to occur within the vicinity of the project site (see Appendix C). Of the 96 special-status species that could occur within the vicinity of the project site, 24 species (14 special-status plant species and 10 special-status wildlife species) are covered under the ECCCHCP/NCCP and 72 species (34 special-status plant species and 38 special-status wildlife species) are not covered under the ECCCHCP/NCCP. Because the project site does not support grasslands, coastal scrub, wetlands, riparian forest, streams/creek, and other forms of aquatic habitat, the majority of the special-status species were eliminated from further consideration due to lack of suitable on-site habitat. Furthermore, due to past site disturbance, the majority of species are not expected to occur on-site.

In February 2015, the East Contra Costa County Habitat Conservancy prepared an ECCCHCP/NCCP Assessment of Plan Effects on CEQA Species.[13] The purpose of the assessment was to provide a programmatic, cumulative CEQA effects analysis for CEQA species not covered by the HCP/NCCP. The 2015 ECCCHCP/NCCP Assessment of Plan Effects on CEQA Species concluded that mitigation measures required in the ECCCHCP/NCCP also provide mitigation for non-covered species; therefore, projects consistent with the ECCCHCP/NCCP would have a less-than-significant impact on other potential special-status species.

According to the 2015 ECCCHCP/NCCP Assessment of Plan Effects on CEQA Species, for all but two of the potential special-status species addressed (Lime Ridge navarretia [*Navarretia gowenii*] and the Lime Ridge eriastrum [*Eriastrum ertterae]*), impacts would be

[13] H.T. Harvey & Associates. *East Contra Costa County Habitat Conservation Plan – Assessment of Plan Effects on CEQA Species.* February 17, 2015.

less than significant under CEQA. Because of uncertainty regarding the distribution of the Lime Ridge navarretia and the Lime Ridge eriastrum, the 2015 ECCCHCP/NCCP Assessment of Plan Effects on CEQA Species concluded that a potentially significant impact could occur related to the two aforementioned species. Based on the CNDDB search conducted by Raney Planning & Management, Inc., known occurrences of Lime Ridge navarretia or Lime Ridge eriastrum did not occur within the nine USGS quadrangles that define the project region, including the project site. Therefore, implementation of the proposed project would not impact the species. Based on the conclusions of the 2015 ECCCHCP/NCCP Assessment of Plan Effects on CEQA Species and the absence of the Lime Ridge navarretia and Lime Ridge eriastrum in the vicinity of the project site, the proposed project would have a less-than-significant impact on any potential special-status plant species and potential special-status wildlife species not covered by the ECCCHCP/NCCP that could occur within the vicinity of the project site because the proposed project would be required to comply with the ECCCHCP/NCCP.

In compliance with the ECCCHCP/NCCP, the PSR prepared for the proposed project by Olberding included all species covered under the ECCCHCP/NCCP. According to the PSR, the approximately 9.99-acre site is categorized by Irrigated Agriculture (Vineyard) land cover type. Based on the on-site land cover type, Olberding Environmental, Inc. determined that covered plant species do not have the potential to occur on-site. As a result, special-status plants are not discussed further. However, based on the on-site land cover types, Olberding conducted planning-level surveys on the project site for western burrowing owl and Swainson's hawk.

Special-Status Wildlife

As part of the PSR, Olberding conducted a field survey on April 27, 2023, of species habitat within the entire study area, including visible portions of the adjacent properties. The purpose of the habitat survey was to evaluate wildlife habitats and the potential for any protected species to occur on or adjacent to the project site. Olberding also conducted a reconnaissance-level raptor survey on-site and a reconnaissance-level burrowing owl survey to identify potential burrow sites or burrowing owl use of on-site habitat. The general presence and density of suitable burrow sites (e.g., rodent burrows) was evaluated for the project site.

According to the PSR, the project site provides foraging opportunities for western burrowing owl (*Athene cunnicularia*) and breeding and foraging opportunities for Swainson's hawk (*Buteo swainsoni*). In addition, other avian species protected by the MBTA could use the project site as foraging and potential nesting habitat.

Western Burrowing Owl

The primary habitat requirement for western burrowing owls is small mammal burrows that the species uses for nesting. Typically, the species uses abandoned ground squirrel burrows, but western burrowing owls have been known to dig burrows in softer soils. In urban areas, western burrowing owls may use pipes, culverts, and piles of material as artificial burrows. Western burrowing owls breed semi-colonially from March through August.

While the CNDDB search returned 53 occurrences of burrowing owl within a five-mile radius of the project site, the nearest record of burrowing owl in the CNDDB search area is approximately 1.5-mile south of the project site. According to the PSR, the area

surrounding the project site is historically known to provide suitable habitat for western burrowing owls. Western burrowing owls are known to occur within disked fields, if small mammal burrows are present. In addition, the on-site sandy soil could provide suitable foraging opportunities for western burrowing owls. As part of the PSR, the site was inspected for western burrowing owls and ground squirrel burrows with evidence of burrowing owl occupancy (i.e., white wash, pellets, feathers). While pocket gopher burrows were observed on-site, pocket gopher burrows are too small for western burrowing owls. Furthermore, ground squirrel burrows were not observed during the survey. Nonetheless, because suitable habitat for western burrowing owl exists on the project site, pre-construction surveys for western burrowing owls would be required by the ECCCHCP/NCCP to confirm presence or absence of the species. If western burrowing owls are present on or near the project site, development of the proposed project could result in an adverse impact to the species.

Swainson's Hawk

Swainson's hawk is a summer resident and migrant in California's Central Valley and scattered portions of the southern California interior. Areas typically used by Swainson's hawk for nesting include the edge of narrow bands of riparian vegetation, isolated patches of oak woodland, lone trees, planted and natural trees associated with roads, farmyards and sometimes adjacent residential areas. Swainson's hawk typically forage in open habitats, including grasslands, open woodlands, and agricultural areas.

While the CNDDB search returned 14 occurrences of Swainson's hawk within a five-mile radius of the project site, the nearest record of Swainson's hawk in the CNDDB search area is approximately one mile northwest of the project site. According to the PSR, the area surrounding the project site is historically known to provide suitable habitat for Swainson's hawk. While Swainson's hawks characteristically prefer to nest in large, tall trees, such as eucalyptus, along riparian corridors, some of the ornamental trees on the project site and other trees within 1,000 feet of the project site may provide suitable nesting sites. The project site provides suitable foraging habitat within the vineyard, but the surrounding developments may deter Swainson's hawk as they prefer to forage in open habitat, such as fields. Based on the above, the PSR determined that the Swainson's hawk has a moderate potential to occur on the project site in a breeding and foraging capacity. Because suitable habitat for Swainson's hawk exists on the project site, pre-construction surveys for Swainson's hawk would be required by the ECCCHCP/NCCP to confirm presence or absence of the species. If Swainson's hawks are present on or near the project site, development of the proposed project could result in an adverse impact to the species.

Nesting Raptors and Migratory Birds

The trees on-site may be used by other migratory birds protected by the MBTA for nesting. As part of the proposed project, 14 of the 16 trees on site would be removed. Construction activities that adversely affect the nesting success of raptors and migratory birds (i.e., lead to the abandonment of active nests) or result in mortality of individual birds constitute a violation of State and federal laws, and in the event that such species occur on or near the project site during the breeding season, project construction activities could result in an adverse effect to species protected under the MBTA.

ECCCHCP/NCCP Requirements

Procedures for pre-construction surveys, best management practices, and construction monitoring, as well as Applicable Avoidance and Minimization Measures for species covered by the ECCCHCP/NCCP are outlined in Section 6.3.3 Surveys for Construction Monitoring and Section 6.4.3 Species-Level Measures of the ECCCHCP/NCCP.[14] The project would be required to comply with all ECCCHCP/NCCP requirements, including conducting pre-construction surveys prior to ground disturbance activities to establish whether nests of Swainson's hawks are occupied. If nests are occupied, the project would be required to comply with the minimization requirements and construction monitoring in the ECCCHCP/NCCP. In compliance with the ECCCHCP/NCCP, the project would also be required to follow Applicable Avoidance and Minimization Measures if nests are located within 1,000 feet of the project site.

All birds covered by the ECCCHCP/NCCP (tricolored blackbird, western burrowing owl, golden eagle, and Swainson's hawk) are also considered migratory birds and are subject to the prohibitions of the MBTA. Therefore, actions conducted under the ECCCHCP/NCCP comply with the provisions of the MBTA. Conservation Measure 1.12, Implement Best Management Practices for Rural Road Maintenance, and Conservation, Measure 1.14, Design Requirements for Covered Roads Outside of the UDA, of the ECCCHCP/NCCP incorporates avoidance guidelines for compliance with the MBTA. Because the project would comply with all ECCCHCP/NCCP requirements, the project would also comply with the provisions of the MBTA.

Additionally, the proposed project would be subject to pay all applicable fees according to the Fee Zone Map of the ECCCHCP/NCCP prior to construction and in compliance with Section 9.2.712 of the Oakley Municipal Code. The developer would be required to pay the appropriate fees based on the applicable fee calculator at the time of development.

Conclusion

Based on the above, western burrowing owl, Swainson's hawk, and other nesting migratory birds and raptors, have the potential to occur on-site. However, the project would comply with ECCCHCP/NCCP requirements, and pre-construction surveys would be required. The project would be required to comply with the ECCCHCP/NCCP's Applicable Avoidance and Minimization Measures for western burrowing owl, Swainson's hawk, and nesting and migratory birds. The proposed project would comply with all applicable ECCCHCP/NCCP requirements. Thus, the proposed project would not have an adverse effect, either directly or through habitat modifications, on species identified as special-status species in local or regional plans, policies, or regulations, or by the CDFW or the USFWS, nor conflict with provisions of an adopted Habitat Conservation Plan, Natural Conservation Community Plan, or other approved local, regional, or State habitat conservation plan. As such, a ***less-than-significant*** impact would result.

b,c. The project site is currently planted as a vineyard and does not contain riparian habitat or other sensitive natural communities, including wetlands, or potentially jurisdictional waters of the State.[15] Therefore, the proposed project would not have a substantial adverse effect

[14] East Contra Costa County Habitat Conservation Plan Association. *Final East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan.* October 2006.

[15] U.S. Fish and Wildlife Service. *National Wetlands Inventory.* Available at: https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/. Accessed May 2023.

on riparian habitat, sensitive natural communities, or federally protected wetlands, and a ***less-than-significant*** impact would occur.

d. The project site is located in an urbanized area and is developed with one single-family residence in the southern portion of the project site and one single-family residence, one ancillary shed, and one cell tower in the northeast corner of the site. The remainder of the parcel is planted as a vineyard with rows of grapevines. The project site is surrounded by residences to the north and west; a convenience store, gas station, and oil change to the east; and single-family residences and agricultural land to the south. Furthermore, according to the Cultural Resource Report and the Phase I ESA prepared for the project site,[16] the project site has been used as agricultural land since at least 1939 and, therefore, has been subject to regular disturbance. The developed nature of the surrounding area precludes the use of the project site as a migratory corridor and, therefore, the project site and surrounding area are not anticipated to support any substantial wildlife movement corridors or wildlife nursery sites. As such, the project would not interfere substantially with the movement of any resident or migratory fish or wildlife species or with established resident or migratory wildlife corridors, or impede the use of wildlife nursery sites, and a ***less-than-significant*** impact would occur.

e. A Preliminary Arborist Report was prepared for the proposed project by Atlas Tree Service, Inc. (see Appendix D).[17] As previously noted, 16 trees currently exist on the project site. Two non-native pines (Allepo pine and Italian stone pine) would be preserved and a total of 14 trees would be removed as part of the project, including 13 non-native trees and one native tree. The non-native trees consist primarily of Monterey pine, camphor, fruitless mulberry, and almond, and the native tree is a black walnut.

   Section 9.1.1112 of the Municipal Code defines protected trees and heritage trees, and establishes requirements governing the removal of such. Section 9.1.1112 defines a protected tree as any tree adjacent to or part of a riparian habitat, foothill woodland, or oak savanna that measures 20 inches in circumference or larger and an indigenous tree that measures 40 inches in circumference or larger or as a California native oak that measures at least 50 inches in circumference (15.6 inches diameter). Section 9.1.1112 also requires that any protected trees that are to be removed shall be replaced. The Preliminary Arborist Report does not identify any of the on-site trees as heritage or protected trees.

   Based on the above, none of the trees to be preserved or removed are classified as heritage or protected trees under Section 9.1.1112, and the proposed project would not conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. Therefore, a ***less-than-significant*** impact would occur.

[16] Basics Environmental. *Phase I Environmental Site Assessment, 2092 Oakley Road, Oakley, California.* May 2, 2023.
[17] Atlas Tree Service, Inc. *Arborist Report, 2092 Oakley Road, Oakley, CA 94561*. September 16, 2022.

V. CULTURAL RESOURCES. *Would the project:*	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5?	☐	☐	✖	☐
b. Cause a substantial adverse change in the significance of a unique archaeological resource pursuant to Section 15064.5?	☐	✖	☐	☐
c. Disturb any human remains, including those interred outside of dedicated cemeteries.	☐	✖	☐	☐

Discussion

The following discussion is primarily based on a Cultural Resources Study[18] and Historic Evaluation[19] (see Appendix E) prepared for the proposed project by Tom Origer & Associates (Origer). It is noted that the off-site improvement areas were not surveyed as all ground disturbance would occur within the existing ROW, where development has already occurred.

a. The Cultural Resources Study consisted of a literature review to identify any previously recorded cultural resources and a field survey, conducted on May 18, 2023, of the entire project site. Origer conducted archival research to assess the potential to encounter archaeological sites and built environment within the study area. Origer also completed research to determine the potential for buried archaeological deposits. On August 23, 2022, Origer conducted a review of the archaeological site base maps and records, survey reports, and other materials on file at the Northwest Information Center (NWIC), including the current listings of properties on the National Register of Historic Places, California Historical Landmarks, California Register of Historical Resources, and California Points of Historical Interest as listed in the OHP's *Historic Property Directory* (2012) and the *Built Environment Resources Directory* (2022). Origer's research determined that the project site has not been subject to any previous cultural studies and nine studies have been conducted within a 0.25-mile radius of the project site. Based on the previous studies conducted for the project area, cultural resources are not known to exist within 0.25-mile of the project site.

   The intensive field survey included surface examination and excavation using a hoe. The field survey confirmed that a total of four structures exist within the project site: one single-family residence, an ancillary shed, and a cell tower in the northeast corner of the site, and one single-family residence on the southern portion of the site. The remainder of the project site is planted as a vineyard with rows of grapevines.

   In order to determine whether the on-site structures and vineyard are historically significant, the structures would be required to undergo evaluation using the National Register of Historic Places (NRHP) and the California Register of Historic Resources (CRHR) eligibility criteria.

[18] Tom Origer & Associates. *Cultural Resources Study of the Property at 2092 Oakley Road, Oakley, Contra Costa County, California.* June 9, 2023.

[19] Tom Origer & Associates. *The Results of an Historic Evaluation of the Property at 2092 Oakley Road, Oakley, Contra Costa County.* September 28, 2023.

The NRHP and CRHR eligibility criteria include the following:

(1)/(A) It is associated with events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the U.S.;
(2)/(B) It is associated with the lives of persons important to local, California, or national history;
(3)/(C) It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of a master or possesses high artistic values; or
(4)/(D) It has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation.

In addition, the resources must retain integrity. Integrity is evaluated with regard to the retention of location, design, setting, materials, workmanship, feeling, and association. The resource must be at least 50 years old, except in exceptional circumstances.

According to the Cultural Resources Study, the cell tower is modern and does not meet the age threshold for consideration as a historic resource. According to the Historic Evaluation, the property is associated with Ben Romiti and his family who grew wine grapes at the property for nearly 100 years; the existing vineyard on the property predates the ownership period of the Romiti family. The single-family residence in the northeast corner of the site was built in 1936 by Ben Romiti. County records indicate that the single-family residence located in the southern portion of the project site was constructed in 1967. Therefore, the vineyard, 1936 residence, and 1967 residence meet the age threshold for consideration as historic resources.

While the 1967 single-family residence could be considered important under the context of post-World War II development, individual properties generally do not meet Criteria 1 of the CRHR because individual homes do not adequately convey associations with important post-World War II development. In addition, according to the Historic Evaluation, the 1967 residence is not considered to be an important building and does not meet criteria 2 of the CRHR. Furthermore, the residence is not architecturally distinct and does not meet Criteria 3 of the CRHR. According to the Cultural Resources Report, buildings do not generally meet Criteria 4 of the CRHR. Based on the above, Origer determined that the 1967 residence is not considered eligible for listing under the CRHR. Based on the above, the following discussion focuses on the eligibility of the 1936 residence and vineyard for inclusion on the CRHR.

According to the Historic Evaluation, the project site is associated with viticulture, which played a major role in Contra Costa County's agricultural development. Given the longevity and endurance of the vineyard at the project site, Origer determined that the existing vineyard is exemplary of a small vineyard in Contra Costa County; therefore, the vineyard is eligible for the CRHR under Criteria 1.

While Ben Romiti was well known and well respected in the Oakley community, archival research conducted by Origer does not indicate that Ben Romiti was a particularly significant individual on his own merits; rather it was the contributions of the Romiti family that made an impact on the Oakley community. Therefore, the 1936 residence built by Ben Romiti is not eligible for inclusion on the CRHR under Criteria 2.

With the exception of the windows, which were replaced, the original construction of the 1936 residence has been retained. According to Origer, the 1936 residence is a good example of a simple Great Depression-era farmhouse in the Oakley vicinity. Therefore, the 1936 residence is eligible for inclusion on the CRHR under Criteria 3.

Criteria 4 generally applies to archaeological resources or resources that, through the study of construction details, can provide information that cannot be obtained in other ways. The 1936 residence and vineyard do not possess intrinsic qualities that could provide important information in history or prehistory. Therefore, the 1936 residence and vineyard are not eligible for inclusion on the CRHR under Criteria 4.

In order to meet the necessary criteria for inclusion on the CRHR, a property must also retain sufficient integrity to convey significance. While the property retains integrity of location, materials, and association, the property does not retain integrity of design, setting, or feeling; the integrity element of workmanship does not apply. Typically, a property should retain most, if not all, of the integrity considerations to be listed on the CRHR. While the project site retains integrity of association, which is an important integrity consideration for a property to be listed under Criteria 1, the degradation of the element of setting and the alterations to the project site affect the element of design and preclude the project site from retaining sufficient integrity to convey significance.

Therefore, Origer concluded that the project site, including the 1936 residence and vineyard, is not eligible for inclusion on the CRHR because the property does not retain the integrity of design, setting, and feeling necessary to reflect a small agricultural property in the vicinity of the City of Oakley.

Based on the above, development of the site would not cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5. Therefore, a ***less-than-significant*** impact would occur.

b,c. As noted above, Origer conducted a record search at the NWIC as part of the Cultural Resources Study. The search concluded that the project site has a moderate potential for identifying historic-period archaeological resources in the project area. However, the field survey did not indicate the presence of any archaeological resources. On May 31, 2023, the Native American Heritage Commission (NAHC) conducted a records search of the Sacred Lands File (SLF) which indicated that archaeological and other cultural resources are not known to be present in the project vicinity.

According to the Cultural Resources Study, the project site is underlain by Holocene-age dune sands. Given that the project area dates to the Holocene Epoch (11,700 years ago to the present), the Cultural Resources Study determined that a moderate potential exists for buried resources to occur within the project site. While the project site has been subject to ground disturbance associated with past development and agricultural activities, unknown archaeological resources, including human remains, have the potential to be uncovered during future ground-disturbing construction and excavation activities at the subject property. If previously unknown resources are encountered during construction activities, the proposed project could cause a substantial adverse change in the significance of a unique archaeological resource pursuant to CEQA Guidelines Section 15064.5 and/or disturb human remains, including those interred outside of dedicated cemeteries. Therefore, a ***potentially significant*** impact could occur.

Mitigation Measure(s)

Implementation of the following mitigation measures would reduce the above potential impact to a *less-than-significant* level.

V-1. *If buried archaeological, paleontological, and/or cultural resources are encountered during site grading or other site work, all such work shall be halted immediately within 100 feet of the discovery and the developer shall immediately notify the City of Oakley Planning Division of the discovery. In such case, the developer shall be required, at their own expense, to retain the services of a qualified archaeologist for the purpose of recording, protecting, or curating the discovery, as appropriate. The archaeologist shall be required to submit to the City of Oakley Planning Division for review and approval a report of the findings and method of curation or protection of the resources. Further grading or site work within the area of discovery would not be allowed until the preceding work has occurred.*

The foregoing requirements shall be noted on the project improvement plans and disclosed to any subcontractors by the general contractor or job superintendent during pre-construction meetings, subject to review and approval by the City of Oakley Planning Division.

V-2. *Pursuant to State Health and Safety Code §7050.5 (c) State Public Resources Code §5097.98, if human bone or bone of unknown origin is found during construction, all work shall stop within 100 feet of the find and the Contra Costa County Coroner shall be contacted immediately. If the remains are determined to be Native American, the Coroner shall notify the Native American Heritage Commission, who shall notify the person believed to be the most likely descendant. The most likely descendant shall work with the contractor to develop a program for re-internment of the human remains and any associated artifacts. Additional work is not to take place within 100 feet of the find until the identified appropriate actions have been implemented.*

The foregoing requirements shall be noted on the project improvement plans and disclosed to any subcontractors by the general contractor or job superintendent during pre-construction meetings, subject to review and approval of compliance by the City of Oakley Planning Division.

VI. ENERGY. *Would the project:*	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	✖	☐
b. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	✖	☐

Discussion

a,b. The main forms of available energy supply are electricity, natural gas, and oil. A description of the 2022 California Green Building Standards Code, the Building Energy Efficiency Standards, and the City's Strategic Energy Plan (SEP), with which the proposed project would be required to comply, as well as discussions regarding the proposed project's potential effects related to energy demand during construction and operations, are provided below.

California Green Building Standards Code

The 2022 California Green Building Standards Code, otherwise known as the CALGreen Code (CCR Title 24, Part 11), is a portion of the California Building Standards Code (CBSC), which became effective with the rest of the CBSC on January 1, 2023.[20] The purpose of the CALGreen Code is to improve public health, safety, and general welfare by enhancing the design and construction of buildings through the use of building concepts having a reduced negative impact or positive environmental impact and encouraging sustainable construction practices. The provisions of the code apply to the planning, design, operation, construction, use, and occupancy of every newly constructed building or structure throughout California. Requirements of the CALGreen Code include, but are not limited to, the following measures:

- Compliance with relevant regulations related to future installation of electric vehicle (EV) charging infrastructure in residential and non-residential structures;
- Indoor water use consumption is reduced through the establishment of maximum fixture water use rates;
- Outdoor landscaping must comply with the California Department of Water Resources' MWELO, or a local ordinance, whichever is more stringent, to reduce outdoor water use;
- Diversion of 65 percent of construction and demolition waste from landfills;
- Incentives for installation of electric heat pumps, which use less energy than traditional heating, ventilation, and air conditioning (HVAC) systems and water heaters;
- Required solar PV system and battery storage standards for certain buildings; and
- Mandatory use of low-pollutant emitting interior finish materials such as paints, carpet, vinyl flooring, and particle board.

Building Energy Efficiency Standards

The 2022 Building Energy Efficiency Standards is a portion of the CBSC, which expands upon energy-efficiency measures from the 2019 Building Energy Efficiency Standards,

[20] California Building Standards Commission. *2022 California Green Building Standards Code*. 2023.

went into effect starting January 1, 2023. The 2022 standards provide for additional efficiency improvements beyond the 2019 standards. The proposed project would be subject to all relevant provisions of the most recent update of the CBSC, including the Building Energy Efficiency Standards. Adherence to the most recent CALGreen Code and Building Energy Efficiency Standards would ensure that the proposed structure would consume energy efficiently.

Strategic Energy Plan

In the fall of 2015, the City of Oakley adopted a SEP to help meet State mandates for required energy use and GHG emission reductions.[21] The SEP included six energy planning goals and priorities, including, but not limited to, improving energy performance to exceed Title 24 requirements for new construction and major renovations of the City facilities; exploring opportunities for energy efficiency, demand reduction, and/or clean self-generation measures; and exploring existing economic and fiscal criteria commonly used for the evaluation and implementation of energy use reduction and energy generation strategies.

Construction Energy Use

Construction of the proposed project would involve on-site energy demand and consumption related to use of oil in the form of gasoline and diesel fuel for construction worker vehicle trips, hauling and materials delivery truck trips, and operation of off-road construction equipment. In addition, diesel-fueled portable generators may be necessary to provide additional electricity demands for temporary on-site lighting, welding, and for supplying energy to areas of the site where energy supply cannot be met via a hookup to the existing electricity grid. Even during the most intense period of construction, due to the different types of construction activities (e.g., site preparation, grading, building construction), only portions of the project site and off-site improvement areas would be disturbed at a time, with operation of construction equipment occurring at different locations on the project site, rather than a single location. Project construction would not involve the use of natural gas appliances or equipment.

All construction equipment and operation thereof would be regulated by the CARB's In-Use Off-Road Diesel Vehicle Regulation. The In-Use Off-Road Diesel Vehicle Regulation is intended to reduce emissions from in-use, off-road, heavy-duty diesel vehicles in California by imposing limits on idling, requiring all vehicles to be reported to CARB, restricting the addition of older vehicles into fleets, and requiring fleets to reduce emissions by retiring, replacing, or repowering older engines, or installing exhaust retrofits. In addition, as a means of reducing emissions, construction vehicles are required to become cleaner through the use of renewable energy resources. The In-Use Off-Road Diesel Vehicle Regulation would therefore help to improve fuel efficiency for equipment used in construction of the proposed project. Technological innovations and more stringent standards are being researched, such as multi-function equipment, hybrid equipment, or other design changes, which could help to further reduce demand on oil and limit emissions associated with construction.

Based on the above, the temporary increase in energy use occurring during construction of the proposed project would not result in a significant increase in peak or base demands or require additional capacity from local or regional energy supplies. In addition, construction activities would be required to comply with all applicable regulations related

[21] City of Oakley. *Strategic Energy Plan*. Fall 2015.

to energy conservation and fuel efficiency, which would help to reduce the temporary increase in demand.

Operational Energy Use

Following implementation of the proposed project, PG&E would provide electricity to the project site. Energy use associated with operation of the proposed project would be typical of residential uses, requiring electricity for interior and exterior building lighting, HVAC, electronic equipment, machinery, refrigeration, appliances, security systems, and more. Maintenance activities during operations, such as landscape maintenance, would involve the use of electric or gas-powered equipment. In addition to on-site energy use, the proposed project would result in transportation energy use associated with vehicle trips generated by the proposed residential development. It should be noted that, as required by Mitigation Measure VIII-1 in this IS/MND, natural gas infrastructure would be prohibited in the proposed residences.

The proposed residential project would be subject to all relevant provisions of the most recent update of the CBSC, including the Building Energy Efficiency Standards. Adherence to the most recent CALGreen Code and the Building Energy Efficiency Standards would ensure that the proposed structures would consume energy efficiently through the incorporation of such features as efficient water heating systems, high performance attics and walls, and high efficacy lighting. Required compliance with the CBSC would ensure that the building energy use associated with the proposed project would not be wasteful, inefficient, or unnecessary. In addition, electricity supplied to the project site by PG&E would comply with the State's Renewable Portfolio Standard (RPS), which requires investor-owned utilities, electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources to 33 percent of total procurement by 2020 and to 60 percent by 2030. Thus, a portion of the energy consumed during operation of the proposed project would originate from renewable sources.

The CARB prepared the 2022 Scoping Plan for Achieving Carbon Neutrality (2022 Scoping Plan),[22] which builds upon previous efforts to reduce GHG emissions and is designed to continue to shift the California economy away from dependence on fossil fuels. Appendix D of the 2022 Scoping Plan provides suggestions for prioritizing various types of mitigation, such as on-site GHG-reducing design features and mitigation measures. Appendix D includes the methods to reduce Vehicle Miles Traveled (VMT), support building decarbonization, and provide access to shared mobility services or transit, as well as EV charging. Appendix D provides further suggestions for prioritizing other mitigation types, including non-local off-site mitigation, and voluntary offsets issued by a recognized and reputable voluntary carbon registry. The regulation described above, with which the proposed project must comply, would be consistent with the intention of the 2022 Scoping Plan and the recommended actions included in Appendix D of the 2022 Scoping Plan.

Additionally, the proposed project would be consistent with the goals of the SEP, as the proposed project would comply with the latest CBSC standards regarding energy conservation, renewable energy resources, and green building standards.

[22] California Air Resources Board. *2022 Scoping Plan for Achieving Carbon Neutrality.* November 16, 2022.

With regard to transportation energy use, the proposed project would comply with all applicable regulations associated with vehicle efficiency and fuel economy. In addition, as discussed in Section XVII, Transportation, of this Initial Study, the project site is not anticipated to substantially increase VMT. Furthermore, the Tri-Delta Transit provides transit services in the City of Oakley, with three lines connecting Brentwood and the Pittsburg/Bay Point Bay Area Rapid Transit (BART) station. Transit would provide access to several grocery stores, restaurants, banks, and schools within close proximity to the project site. The site's access to public transit and proximity to bicycle and pedestrian facilities, such as existing sidewalks along Oakley Road, Main Street, and Empire Avenue, would reduce VMT and, consequently, fuel consumption associated with the proposed single-family residences.

Conclusion

Based on the above, construction and operations of the proposed project would not result in wasteful, inefficient, or unnecessary consumption of energy resources or conflict with or obstruct a state or local plan for renewable energy or energy efficiency. Thus, a ***less-than-significant*** impact would occur.

VII. GEOLOGY AND SOILS. *Would the project:*	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	✖	☐
ii. Strong seismic ground shaking?	☐	☐	✖	☐
iii. Seismic-related ground failure, including liquefaction?	☐	✖	☐	☐
iv. Landslides?	☐	✖	☐	☐
b. Result in substantial soil erosion or the loss of topsoil?	☐	☐	✖	☐
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	✖	☐	☐
d. Be located on expansive soil, as defined in Table 18-1B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	✖	☐	☐
e. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	✖
f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	✖	☐	☐

Discussion

ai-ii. The project site does not contain any active or potentially active faults, nor is the site located within a State-designated Alquist-Priolo Fault Zone.[23] However, according to the City's General Plan EIR, the City of Oakley is subject to seismic risk because the City is within the San Francisco Bay Area, an area of high seismicity.[24]

According to the Geotechnical Investigation prepared for the proposed project by BAEZ Geotechnical Group (see Appendix F), [25] the project site is not located within a seismic hazard zone mapped for earthquake faults by the California Geological Survey. Therefore, it is unlikely for surface fault rupture to occur at the site. Furthermore, proper engineering

[23] California Geologic Survey. *Seismic Hazard Zone Report for the Brentwood 7.5-Minute Quadrangle, Contra Costa County, California.* 2018.
[24] City of Oakley. *City of Oakley 2020 General Plan Draft Environmental Impact Report* [pg. 3-161]. September 2002.
[25] BAEZ Geotechnical Group. *Geotechnical Investigation, Paseo Residential Subdivision, 2092 Oakley Road, Oakley, California.* November 9, 2022.

of the proposed buildings in compliance with the CBSC would ensure that the proposed project would not be subject to substantial risks related to seismic ground shaking. Projects designed in accordance with the CBSC should be able to: 1) resist minor earthquakes without damage, 2) resist moderate earthquakes without structural damage but with some nonstructural damage, and 3) resist major earthquakes without collapse but with some structural as well as nonstructural damage. Conformance with the CBSC design standards would be enforced through building plan review and require approval by the City.

Based on the above, the proposed project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault or strong seismic ground shaking. Thus, a ***less-than-significant*** impact would occur.

aiii,aiv, c,d. The proposed project's potential effects related to liquefaction, subsidence/settlement, landslides, lateral spreading, and expansive soil are discussed in detail below.

Liquefaction and Subsidence/Settlement

Liquefaction is the temporary transformation of loose, saturated granular sediments from a solid state to a liquefied state as a result of seismic ground shaking. In the process, the soil undergoes transient loss of strength, which commonly causes ground displacement or ground failure to occur. Because saturated soils are a necessary condition for liquefaction, soil layers in areas where the groundwater table is near the surface have higher liquefaction potential than those in which the water table is located at greater depths. Additionally, loose unsaturated sandy soils have the potential to settle during strong seismic shaking. Liquefaction can often result in subsidence, which refers to the gradual settling or sudden sinking of land surface, or settlement, which refers to the vertical movement of soil when a load is applied to the surface.

The project site is located within a State of California Seismic Hazard Zone for liquefaction.[26] According to the MTC/ABAG Hazard Viewer Map, project site is located within a "Moderate" Earthquake Liquefaction Susceptibility zone.[27] An evaluation of liquefaction hazards of settlement, lateral spreading, and surface ground rupture, as well as dry sand settlement of the soil above the water table were conducted by BAEZ Geotechnical Group and consisted of previous cone penetration test data using mapped historical high groundwater levels of 20 feet and 25 feet below ground surface, and an expected earthquake magnitude of 7.0. Based upon the analysis, an estimated one inch of liquefaction-induced settlement may occur at the site as a result of a strong seismic event. However, the Geotechnical Investigation determined that total seismically induced ground settlement would not impact the surface improvements associated with the proposed project because the settlement would likely occur over the general area. Differential settlement could impact surface structures due to the increased amount of potential combined seismic and static differential settlement for the structures. Overall, the Geotechnical Investigation determined that potential impacts to surface improvements from lateral spreading and surface disturbance would be negligible. However, due to the potential for liquefaction to occur on-site, foundation subsidence or settlement may occur, and, without the implementation of mitigation, an impact could occur.

---

[26] California Department of Conservation. *California Earthquake Hazards Zone Application*. Available at: https://maps.conservation.ca.gov/cgs/EQZApp/app/. Accessed June 2023.

[27] Association of Bay Area Governments. *Hazard Viewer.* Available at: https://abag.ca.gov/our-work/resilience/data-research/hazard-viewer/. Accessed June 2023.

Landslides

Seismically-induced landslides are triggered by earthquake ground shaking. The risk of landslide hazard is greatest in areas with steep, unstable slopes. The project site is relatively flat and is not located near any slopes. Therefore, the proposed project would not be subject to landslide risks and would not expose people or structures to potential risk of loss, injury, or death involving landslides.

Lateral Spreading

Lateral spreading involves horizontal/lateral ground movement of relatively flat-lying soil deposits towards a free face such as an excavation, channel, or open body of water; typically, lateral spreading is associated with liquefaction of one or more subsurface layers near the bottom of the exposed slope. Given that the project site does not contain, and is not adjacent to, any free faces including excavations, channels, or open bodies of water, lateral spreading would not present a likely hazard at the site.

Expansive Soils

Expansive soils can undergo significant volume changes with variations in moisture content. Specifically, such soils shrink and harden when dried and expand and soften when wetted. If structures are underlain by expansive soils, foundation systems must be capable of withstanding the potential damaging movements of the soil.

Pursuant to the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey, the project site is comprised entirely of Delhi sand with two to nine percent slopes, which has a shrink-swell numerical rating of 0.12. The numerical ratings indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00). Therefore, the potential exists for expansive soils to exist on site and adversely affect the proposed project.

Conclusion

Based on the above, the proposed project would not be subject to substantial risks related to landslides, or lateral spreading. However, the potential exists for liquefaction and associated subsidence/settlement, or expansive soils to occur at the project site. Without implementation of mitigation, the proposed project could cause substantial adverse effects related to such. Thus, a ***potentially significant*** impact could occur.

Mitigation Measure(s)

Implementation of the following mitigation measure would reduce the above impact to a *less-than-significant* level.

VII-1. *Prior to approval of any grading permits, the project Civil Engineer shall show on the project plans that the project design adheres to all engineering recommendations provided in the site-specific Geotechnical Investigation prepared for the proposed project by BAEZ Geotechnical Group. Proof of compliance with all recommendations specified in the Geotechnical Investigation shall be subject to review and approval by the City Engineer.*

The project plans shall include, but not be limited to, engineering recommendations related to site preparation and grading, utility trench excavation, backfill, foundations, concrete slab-on-grade floors, exterior

concrete flatwork, retaining walls, pavement areas, and project review and construction monitoring.

The site demolition activities shall also specify that any underground structures, such as abandoned irrigation lines, septic tanks, and leach fields, encountered during demolition and construction shall be properly removed, all excavations left open for backfilling, and loose material created by the demolition of existing structures should be excavated and replaced as engineered fill.

b. During construction activities, topsoil would be exposed following site grading and prior to constructing building foundations. As a result, the potential for topsoil erosion would exist. Following development of the site, all exposed soils would be covered with impervious surfaces or landscaping and, thus, the potential for erosion to occur would not exist long-term.

As discussed further under questions 'ci' and 'ciii' in Section X, Hydrology and Water Quality, of this IS/MND, pursuant to the City of Oakley Municipal Code Sections 6.9.308 and 6.11.212, preparation of an Erosion Control Plan and Stormwater Pollution Prevention Plan (SWPPP) prior to construction activities and implementation of Best Management Practices (BMPs) during construction is required. The erosion control measures required by both the SWPPP and the Erosion Control Plan would ensure that the proposed project would not result in substantial erosion or the loss of topsoil. Therefore, the proposed project would not result in substantial soil erosion or the loss of topsoil, and a ***less-than-significant*** impact would occur.

e. The proposed project would connect to existing City sewer services. Thus, the construction or operation of septic tanks or other alternative wastewater disposal systems would not be included as part of the project. Therefore, ***no impact*** regarding the capability of soil to adequately support the use of septic tanks or alternative wastewater disposal systems would occur.

f. The City's General Plan does not note the existence of any unique geologic features within the City. Consequently, implementation of the proposed project is not anticipated to result in direct or indirect destruction of unique geologic features.

The City's General Plan indicates that few paleontological resources are known to occur within the City Planning Area.[28] In addition, portions of the surrounding area are developed and paleontological resources have not been encountered in the vicinity. Thus, existing paleontological resources are not expected to occur on the site. Nonetheless, the potential exists for previously unknown paleontological resources could exist within the project site. Ground-disturbing activity such as grading, trenching, or excavating associated with implementation of the proposed project would have the potential to disturb or destroy such resources if present. Therefore, the proposed project could result in the direct or indirect destruction of a unique paleontological resource, and a ***potentially significant*** impact could occur.

[28] City of Oakley. *City of Oakley General Plan, Focused General Plan Update* [pg. 6-19]. Adopted January 11, 2022.

Mitigation Measure(s)

Implementation of the following mitigation measure would reduce the above impact to a *less-than-significant* level.

VII-1. Implement Mitigation Measures V-1 and V-2.

VIII. GREENHOUSE GAS EMISSIONS. *Would the project:*	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
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 gasses?	☐	✖	☐	☐

Discussion

a,b. Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the industrial/manufacturing, utility, transportation, residential, and agricultural sectors. Therefore, the cumulative global emissions of GHGs contributing to global climate change can be attributed to every nation, region, and city, and virtually every individual on Earth. An individual project's GHG emissions are at a micro-scale level relative to global emissions and effects to global climate change; however, an individual project could result in a cumulatively considerable incremental contribution to a significant cumulative macro-scale impact. As such, impacts related to emissions of GHG are inherently considered cumulative impacts.

Implementation of the proposed project would cumulatively contribute to increases of GHG emissions. Estimated GHG emissions attributable to future development would be primarily associated with increases of carbon dioxide (CO_2) and, to a lesser extent, other GHG pollutants, such as methane (CH_4) and nitrous oxide (N_2O) associated with area sources, mobile sources or vehicles, utilities (electricity), water usage, wastewater generation, and the generation of solid waste. The primary source of GHG emissions for the project would be mobile source emissions. The common unit of measurement for GHG is expressed in terms of annual metric tons of CO_2 equivalents ($MTCO_2e$/yr).

The proposed project is located within the jurisdictional boundaries of BAAQMD. The most recent BAAQMD Air Quality Guidelines were released in April 2023.[29] The updated GHG thresholds address more recent climate change legislation, including SB 32, and provide qualitative thresholds related to Buildings and Transportation.

Construction GHG emissions are a one-time release and are, therefore, not typically expected to generate a significant contribution to global climate change. Neither the City nor BAAQMD has an adopted threshold of significance for construction-related GHG emissions and does not require quantification. Nonetheless, the proposed project's construction GHG emissions, as well as operational emissions, have been estimated using CalEEMod under the same assumptions discussed in Section III, Air Quality, of this IS (see Appendix A). The emissions estimates prepared for the proposed project determined that unmitigated construction of the project would result in total GHG emissions of 398 $MTCO_2e$ over the entire construction period.

Potential impacts related to operational GHG emissions resulting from implementation of the proposed project are considered in comparison with BAAQMD's adopted thresholds of significance below.

[29] Bay Area Air Quality Management District. *2022 California Environmental Quality Act Guidelines*. April 2023.

BAAQMD Thresholds of Significance

The BAAQMD's adopted thresholds of significance for GHG emissions are qualitative, and address recent climate change legislation, including SB 32. According to the new thresholds of significance, a project must either include specific project design elements (e.g., exclude use of natural gas, achieve a specific reduction in project-generated VMT below the regional average) or be consistent with a local GHG reduction strategy that meets the criteria under State CEQA Guidelines Section 15183.5(b).[30]

The City of Oakley does not have a GHG reduction strategy under CEQA Guidelines Section 15183.5(b). Therefore, the following analysis focuses on the new BAAQMD GHG thresholds related to specific project design elements.

According to the BAAQMD's thresholds of significance, in order to find a less-than-significant GHG impact, projects must include, at a minimum, the following project design elements:

1. The project will not include natural gas appliances or natural gas plumbing (in both residential and nonresidential development);
2. The project will not result in any wasteful, inefficient, or unnecessary energy usage as determined by the analysis required under CEQA Section 21100(b)(3) and Section 15126.2(b) of the State CEQA Guidelines;
3. The project will achieve a reduction in project-generated VMT below the regional average consistent with the current version of the California Climate Change Scoping Plan (currently 15 percent) or meet a locally adopted SB 743 VMT target, reflecting the recommendations provided in the Governor's Office of Planning and Research's "Technical Advisory on Evaluating Transportation Impacts in CEQA"; and
4. The project will achieve compliance with off-street electric vehicle requirements in the most recently adopted version of CALGreen Tier 2.

In order to be consistent with the first criterion, the proposed project would be required to include all electric appliances and plumbing. The 2022 Building Energy Efficiency Standards requires that new development be built electric-ready (i.e., structures will be required to have electric supply panels and circuitry to support all-electric appliances and heating). Mitigation would be required to ensure that the proposed project would not include the use of natural gas appliances or natural gas plumbing and, thus, would comply with the first criterion.

Regarding the second criterion, as discussed in Section VI, Energy, of this IS/MND, the proposed project would comply with all applicable federal, State, and local regulations regarding energy use during both project construction and project operations. Therefore, as discussed therein, the proposed project would not result in any wasteful, inefficient, or unnecessary energy usage.

With respect to the third criterion, as discussed in Section XVII, Transportation, of this IS/MND, the citywide VMT per capita was calculated to be 26.76, and, as a result, the impact threshold of 15 percent below the Citywide average VMT per capita equates to 22.75 VMT per capita. The project is projected to generate VMT per capita of 19.09. Therefore, the project would achieve a 15 percent reduction in project-generated VMT

[30] Bay Area Air Quality Management District. *2022 California Environmental Quality Act Guidelines*. April 2023.

below the regional average consistent with the current version of the California Climate Change Scoping Plan.

With respect to the fourth criterion, the proposed project would be subject to the single-family residential requirements set forth in the CALGreen standards. Per the 2022 CALGreen Code, single-family residential projects are required to install a listed raceway to accommodate a dedicated 208/240-volt branch circuit for each unit, which would be suitable for EV charging. Compliance with this requirement would be sufficient to comply with the Tier 2 CALGreen standards, as required by BAAQMD.

As previously noted, the CARB prepared the 2022 Scoping Plan, which builds upon previous efforts to reduce GHG emissions and is designed to continue to shift the California economy away from dependence on fossil fuels. Appendix D of the 2022 Scoping Plan provides suggestions for prioritizing various types of mitigation, such as on-site GHG-reducing design features and mitigation measures. Similar to the 2022 Scoping Plan, BAAQMD identified the necessary design elements required of new land use projects and plans being built today in order to achieve California's long-term climate goal of carbon neutrality by 2045. If these design elements are incorporated into the design and construction of a project, then the project would contribute its portion of what is necessary to achieve California's long-term climate goals— its "fair share"—and a lead agency reviewing the project under CEQA can conclude that the project would not make a cumulatively considerable contribution to global climate change.

Based on the above, BAAQMD's thresholds of significance are consistent with the 2022 Scoping Plan. Therefore, if a development project is consistent with BAAQMD's thresholds of significance, it can be assumed that the project would also be consistent with the 2022 Scoping Plan. Given that the proposed project would not be consistent with BAAQMD's required thresholds of significance without implementation of mitigation, the proposed project would conflict with the 2022 Scoping Plan.

Conclusion

Based on the above, without the implementation of mitigation, the project may not comply with the BAAQMD's required thresholds of significance. Therefore, the proposed project could generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment, or could conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs. Thus, a ***potentially significant*** impact could occur.

Mitigation Measure(s)

Implementation of the following mitigation measure would reduce the above potential impact to a *less-than-significant* level.

VIII-1. *Consistent with the BAAQMD's thresholds of significance, prior to issuance of building permits for the proposed project, the project applicant shall demonstrate via project design and/or notation included on project design that natural gas infrastructure shall be prohibited. Natural gas infrastructure may be allowed if the applicant implements alternative methods that reduce the project's greenhouse gas emissions in an equally effective or superior manner as would exist without natural gas emission infrastructure.*

Conformance with the foregoing requirement shall be confirmed through review and approval of building permit plans by the City of Oakley Planning Division.

IX. HAZARDS AND HAZARDOUS MATERIALS. *Would the project:*	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	✖	☐
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the likely release of hazardous materials into the environment?	☐	✖	☐	☐
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	✖
d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	✖	☐
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	✖
f. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	✖	☐	☐
g. Expose people or structures, either directly or indirectly, to the risk of loss, injury or death involving wildland fires?	☐	☐	✖	☐

Discussion

a. A significant hazard to the public or the environment could result from the routine transport, use, or disposal of hazardous materials. Future operations of the proposed residences on the project site could involve the use of common household cleaning products, fertilizers, and herbicides on-site, any of which could contain potentially hazardous chemicals; however, such products would be expected to be used in accordance with label instructions. Due to the regulations governing use of such products and the amount that could reasonably be used on the site, routine use of such products would not represent a substantial risk to public health or the environment. Therefore, the proposed project would not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials, and a ***less-than-significant*** impact would occur.

b. A development project could create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the likely release of hazardous materials into the environment should a site contain potential Recognized Environmental Conditions (RECs) that are not properly addressed prior to project implementation. A REC indicates the presence or likely presence of any hazardous

substances in, on, or at a property due to any release into the environment, under conditions indicative of a release to the environment, or under conditions that pose a material threat of a future release to the environment.[31]

The following discussion provides an analysis of potential hazards related to the proposed construction activities and the project's potential to exacerbate any existing on-site hazardous conditions. The analysis of existing on-site hazardous conditions is based on a Phase I ESA conducted for the proposed project by Basics Environmental (see Appendix G).[32]

Construction Activities

Construction activities associated with the proposed project would involve the use of heavy equipment, which would contain fuels and oils, and the use of other products such as concrete, paints, and adhesives. Small quantities of potentially toxic substances (e.g., petroleum and other chemicals used to operate and maintain construction equipment) would be used at the project site and transported to and from the site during construction. However, the project contractor would be required to comply with all California Health and Safety Codes and local City ordinances regulating the handling, storage, and transportation of hazardous and toxic materials. Thus, construction of the proposed project would not create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the likely release of hazardous materials into the environment.

Existing On-Site Hazardous Conditions

A discussion of potential on-site hazardous conditions related to contaminated soils, septic systems and/or wells, and hazardous building materials is discussed below.

Contaminated Soils

The project site has been historically used for agricultural activities, such as vineyards, since at least 1939. Past agricultural activities within the subject property may have included the use of pesticides and arsenic. In addition, building maintenance may have included the application of persistent pesticides (termiticides) around the foundation of former and existing structures to prevent pest invasions. Contaminated soils can leach toxic chemicals into nearby ground or surface waters, where these materials can be taken up by plants and animals, contaminate a human drinking water supply, or volatilize and contaminate the indoor air in overlying buildings.[33] Accordingly, the Phase I ESA determined that the potential exists for residual levels of persistent agricultural chemicals to remain in the soil.

Septic Systems and/or Wells

Because the project site is currently developed with two residences, an ancillary shed, and a cell tower, the potential exists for a well or septic field associated with the residences to be uncovered during construction. Failing or older septic systems are likely to discharge untreated wastewater, which contain pathogens, nutrients, and other harmful substances

---

31 ASTM International. *ASTM E1527, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.* 2013.

32 Basics Environmental. *Phase I Environmental Site Assessment, 2092 Oakley Road, Oakley, California.* May 2, 2023.

33 U.S. Environmental Protection Agency. *Contaminated Land.* Available at: https://www.epa.gov/report-environment/contaminated-land. Accessed June 2023.

directly into the groundwater or onto the ground and into surface waters.[34] In addition, wells carry the potential to be contaminated by both naturally occurring sources and by human activities, with contaminants potentially released into the environment through ground-disturbing construction activities in the event that on-site wells are disrupted.[35] Proper abandonment and removal of the facilities would be required prior to construction. Thus, without proper abandonment, a significant impact could occur.

Hazardous Building Materials

Asbestos is the name for a group of naturally occurring silicate minerals that are considered to be "fibrous" and, through processing, can be separated into smaller and smaller fibers. The fibers are strong, durable, chemical resistant, and resistant to heat and fire. They are also long, thin, and flexible, such that they can be woven into cloth. Because of the above qualities, asbestos was considered an ideal product and has been used in thousands of consumer, industrial, maritime, automotive, scientific, and building products. However, later discoveries found that, when inhaled, the material caused serious illness.

For buildings constructed prior to 1980, the Code of Federal Regulations (29 CFR 1926.1101) states that all thermal system insulation (boiler insulation, pipe lagging, and related materials) and surface materials must be designated as "presumed asbestos-containing material" unless proven otherwise through sampling in accordance with the standards of the Asbestos Hazard Emergency Response Act. Because the existing on-site residences were constructed between the 1930s and the 1970's, the potential exists that asbestos-containing materials were used in the construction of the residential structures and the barn. Thus, the proposed project could potentially expose construction workers to asbestos during demolition of the structures, and a significant impact could occur.

Federal guidelines define lead-based paint (LBP) as any paint, varnish, stain, or other applied coating that has one milligram of lead per square centimeter or greater. Lead is a highly toxic material that may cause a range of serious illnesses, and in some cases death. In buildings constructed after 1978, the presence of LBP is unlikely. Structures built prior to 1978, and especially prior to the 1960s, are expected to contain LBP. Given that the existing structures on the property were constructed before the phase-out of LBPs in the 1970s, the proposed project could potentially expose construction workers to LBP during demolition of the structures. Thus, a significant impact could occur during demolition of the on-site structures.

Furthermore, caulk containing polychlorinated biphenyls (PCBs) were commonly used in building construction practices between 1950 and 1970 and, thus, may be present in the existing single-family residence in the southern portion of the site. Finally, the existing structures may include items that contain mercury, such as gas pressure regulators or thermostats. Therefore, demolition of the on-site structures could present a potential hazard risk related to LBP, asbestos, PCB-containing caulk, or mercury. However, it should be noted that the project site has not been subject to past uses that would lead to site-specific lead contamination in soils and, as a result, testing for lead in on-site soils is not warranted.

---

[34] U.S. Environmental Protection Agency. *Septic System Impacts on Water Sources.* Available at: https://www.epa.gov/septic/septic-system-impacts-water-sources. Accessed June 2023.

[35] Centers for Disease Control and Prevention. *Overview of Water-related Diseases and Contaminants in Private Wells*. Available at: https://www.cdc.gov/healthywater/drinking/private/wells/diseases.html. Accessed June 2023.

Conclusion

Based on the above, the potential exists for persistent pesticides and arsenic in on-site soils, existing septic systems and/or water wells, asbestos-containing materials, LBPs, and PCB-containing caulk or mercury associated with the existing structures to occur. Therefore, the proposed project could create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the likely release of hazardous materials into the environment, and a ***potentially significant*** impact could occur.

Mitigation Measure(s)

Implementation of the following mitigation measures would reduce the above potential impact to a *less-than-significant* level.

IX-1. *Prior to initiation of construction activities on the proposed project site, the project applicant shall complete an analysis of on-site soils to determine whether substantial concentrations of organochloride pesticides, arsenic, or other soil contaminants are present above the applicable direct exposure Environmental Screening Levels (ESLs) set by the Regional Water Quality Control Board, the residential screening levels set by the Department of Toxic Substances Control's Human Health Risk Assessment Note 3, and/or the U.S. Environmental Protection Agency's Regional Screening Levels for Region 9. If contaminants are not detected above applicable ESLs/RSLs, then further mitigation is not required. If contaminants are detected above the applicable ESLs/RSLs, then the soils shall be remediated by off-hauling to a licensed landfill facility. Such remediation activities shall be performed by a licensed hazardous waste contractor (Class A) and contractor personnel that have completed 40-hour OSHA hazardous training. Impacted soils shall be managed in accordance with the recommendations of applicable federal, State, and local standards, to the satisfaction of the City of Oakley and the Contra Costa County Environmental Health Division. The results of soil sampling and analysis, as well as verification of proper remediation and disposal, shall be submitted to the City of Oakley Planning Division for review and approval.*

IX-2. *Prior to issuance of a demolition permit by the City for any on-site structures, the project applicant shall provide a site assessment that determines whether any structures to be demolished contain lead-based paint (LBP), asbestos, mercury, or polychlorinated biphenyl caulk. Sampling shall be conducted in accordance with the California Department of Toxic Substances Control's 2006 Interim Guidance Evaluation of School Sites with Potential Contamination from Lead based Paint, Termiticides, and Electrical Transformers. If structures do not contain the aforementioned chemicals, further mitigation is not required; however, if LBP is found, all loose and peeling paint shall be removed and disposed of by a licensed and certified lead paint removal contractor, in accordance with CARB recommendations and OSHA requirements. If asbestos is found, all construction activities shall comply with all requirements and regulations promulgated through the National Emission Standards for Hazardous Air Pollutants (NESHAP). The demolition contractor shall be informed that all paint on the buildings shall be considered as containing*

lead and/or asbestos. The contractor shall follow all work practice standards set forth in the Asbestos National Emission Standards for Hazardous Air Pollutants (Asbestos NESHAP, 40 CFR, Part 61, Subpart M) regulations, as well as Section V, Chapter 3 of the OSHA Technical Manual. Should mercury or polychlorinated biphenyl caulk be detected, the removal, demolition, and disposal of such chemicals shall be conducted in compliance with California environmental regulations and policies. Work practice standards generally include appropriate precautions to protect construction workers and the surrounding community, and appropriate disposal methods for construction waste containing lead paint or asbestos in accordance with federal, State, and local regulations subject to approval by the City Engineer.

IX-3. *During ground-disturbing activities, if one or more wells and/or septic systems are identified on-site, the project applicant shall hire a licensed contractor to obtain the applicable abandonment permit from Contra Costa County Environmental Health Division (CCCEHD), and properly abandon the on-site wells and/or septic systems for review and approval by the CCCEHD and the City of Oakley Planning Division.*

c. The nearest school relative to the project site is Orchard Park School, which is located approximately 1,570 feet (0.29-mile) northwest of the site. In addition, residential developments do not typically include the use of or emission of hazardous materials. Therefore, the proposed project would not emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school, and ***no impact*** would occur.

d. The California Environmental Protection Agency (Cal EPA) has compiled a list of data resources that provide information regarding the facilities or sites identified as meeting the "Cortese List" requirements, pursuant to Government Code 65962.5. The components of the Cortese List include the Department of Toxic Substances Control (DTSC) Hazardous Waste and Substances Site List,[36] the list of leaking underground storage tank (UST) sites from the State Water Resources Control Board (SWRCB's) GeoTracker database,[37] the list of solid waste disposal sites identified by the SWRCB, and the list of active Cease and Desist Orders (CDO) and Cleanup and Abatement Orders (CAO) from the SWRCB.[38]

According to the Phase I ESA, the project site is listed on the County and the Cal EPA's California Environmental Reporting System (CERS) databases and is listed with the County as a site utilizing unspecified hazardous material since 2017. The project site has a current permit to operate the cell tower and as part of the on-site operations, an approximately 16.64-gallon backup battery and approximately 132-gallon diesel fuel aboveground storage tank is utilized for the emergency back-up generator. Inspections were conducted in 2017, 2019, and 2021 by the CCCHSA and the site has not had any major violations or spills. Reports of spills or unauthorized releases have not been at the

[36] Department of Toxic Substances Control. *Hazardous Waste and Substances Site List (Cortese).* Available at: https://www.envirostor.dtsc.ca.gov/public/. Accessed June 2023.

[37] State Water Resources Control Board. *GeoTracker.* Available at: https://geotracker.waterboards.ca.gov/map/?myaddress=California&from=header&cqid=8858350455. Accessed June 2023.

[38] CalEPA. *Cortese List Data Resources*. Available at: https://calepa.ca.gov/sitecleanup/corteselist/. Accessed June 2023.

site. Furthermore, according to the Phase I ESA, the project site is not included on the DTSC Hazardous Waste and Substances Site List, SWRCB's list of solid waste disposal sites, list of leaking UST sites, or list of active CDO and CAO.

Therefore, the proposed project would not create a significant hazard to the public or the environment related to being located on a site which is included on a list of hazardous materials compiled pursuant to Government Code Section 65962.5, and a ***less-than-significant*** impact would occur.

e. The nearest airport to the project site is the Byron Airport, located approximately 12.64 miles southeast of the project site. Therefore, the project site is not located within two miles of any public airports and does not fall within an airport land use plan area. Accordingly, ***no impact*** would occur related to a safety hazard or excessive noise for people residing or working in the project area.

f. During construction of the proposed project, all construction equipment would be staged on-site so as to prevent obstruction of local and regional travel routes in the City that could be used as evacuation routes during emergency events.

Emergency vehicle access would be provided by the new driveway off of Oakley Road and a new 21-foot-wide emergency vehicle access-only driveway off of Main Street, which would connect to the internal roadway in the northeastern corner of the site. Removable bollards would be installed as part of the northern most emergency vehicle access driveway and the EVA driveway would not be accessible to the general public. The new internal circulation system would ensure that the proposed residences would not interfere with potential evacuation or response routes used by emergency response teams during operations.

The project would also include off-site improvements to install a new storm drain line in Main Street, install a water line tie-in within Oakley Road, and widen the north side of Oakley Road along the project frontage and increase the westbound direction from one to two lanes. The implementation of the off-site improvements would directly influence the transportation network near the site during construction, and could result in roadway or lane closures that adversely affect residents in the project area.

Based on the above, the project would not substantially alter the existing circulation system in the surrounding area. However, without proper planning of construction activities, construction traffic could interfere with existing roadway operations during the construction phase, which could impair the implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. Therefore, project traffic related to construction activities could result in a ***significant*** impact.

Mitigation Measure(s)

Implementation of the following mitigation measure would reduce the above potential impact to a *less-than-significant* level.

IX-4. *Prior to issuance of demolition or grading permits, the project applicant shall prepare and submit a Traffic Control Plan to the City for review and approval. The Traffic Control Plan shall include, but not be limited to, the following items, to the satisfaction of the City Engineer:*

- *Truck drivers shall be notified of and required to use the most direct route between the site and SR 4, as determined by the City Engineering Department;*
- *All site ingress and egress shall occur only at the main driveways to the project site and construction activities may require installation of temporary (or ultimate) traffic signals as determined by the City Engineer;*
- *Specifically-designated travel routes for large vehicles shall be monitored and controlled by flaggers for large construction vehicle ingress and egress;*
- *Warning signs indicating frequent truck entry and exit shall be posted on Oakley Road and Main Street;*
- *Any debris and mud on nearby streets caused by trucks shall be monitored daily and may require instituting a street cleaning program;*
- *Construction employee parking shall be provided on the project site to eliminate conflicts with nearby areas. Construction of the project shall be staggered so that employee parking demand is met primarily by using on-site parking; and*
- *If importation and exportation of material becomes a traffic nuisance, the City Engineer shall limit the hours the activities can take place.*

g. According to the California Department of Forestry and Fire Protection (CAL FIRE) Fire and Resource Assessment Program, the project site is not located within a Very High or High Fire Hazard Severity Zone (FHSZ).[39] Furthermore, the existing roadways in the project vicinity would act as fire breaks and would reduce the risk for the uncontrolled spread of wildland fires. Therefore, the proposed project would not expose people or structures to the risk of loss, injury or death involving wildland fires, and a ***less-than-significant*** impact would occur.

[39] California Department of Forestry and Fire Protection. *Contra Costa County, Very High Fire Hazard Severity Zones in LRA*. January 7, 2009.

X. HYDROLOGY AND WATER QUALITY. *Would the project:*	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☐	✖	☐
b. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	✖	☐
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
i. Result in substantial erosion or siltation on- or off-site;	☐	☐	✖	☐
ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	☐	☐	✖	☐
iii. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☐	✖	☐
iv. Impede or redirect flood flows?	☐	☐	✖	☐
d. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	✖
e. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	✖	☐

Discussion

a, ci-ciii. The following discussion provides a summary of the proposed project's potential to violate water quality standards/waste discharge requirements, alter the drainage pattern of the site resulting in erosion or siltation, increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site, contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems, or otherwise degrade water quality during construction and operation.

Construction

During the early stages of construction activities, topsoil would be exposed due to grading and excavation of the site. After grading and prior to overlaying the ground with impervious surfaces and structures, the potential exists for wind and water to discharge sediment and/or urban pollutants into stormwater runoff, which could adversely affect water quality.

The SWRCB regulates stormwater discharges associated with construction activities where clearing, grading, or excavation results in land disturbance of one or more acres. The City's National Pollutant Discharge Elimination System (NPDES) permit requires applicants to show proof of coverage under the State's General Construction Permit prior

to receipt of any construction permits. The State's General Construction Permit requires a SWPPP to be prepared for the site. A SWPPP describes BMPs to control or minimize pollutants from entering stormwater and must address both grading/erosion impacts and non-point source pollution impacts of the development project. Because the proposed project would disturb greater than one acre of land, the proposed project would be subject to the requirements of the State's General Construction Permit and, with implementation of the required SWPPP and BMPs included therein, construction of the proposed project would not result in a violation of water quality standards and/or degradation of water quality.

Furthermore, per Municipal Code Sections 6.9.306 and 6.9.404, the proposed project would be required to submit an erosion and sediment control plan with submittal of the grading permit application to ensure water quality is not degraded. The plan would include erosion and sediment control measures that would be implemented during grading and would be approved by the City Engineer. Given the required submittal and approval of a SWPPP and erosion and sediment control plan, the proposed project would not violate water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality during construction.

Operations

Following project buildout, the surface of the site would be covered with either impervious surfaces or landscaped areas, and topsoil would no longer be exposed. As such, the potential for erosion and associated impacts to water quality would be reduced. However, the addition of impervious surfaces on the site would result in the generation of urban runoff during project operations, which could contain pollutants if the runoff comes into contact with vehicle fluids on parking surfaces and/or landscape fertilizers and herbicides. All municipalities within Contra Costa County (and the County itself) are required to develop more restrictive surface water control standards for new development projects as part of the renewal of the Countywide NPDES permit.

The City of Oakley has adopted the County C.3 Stormwater Standards, which require new development and redevelopment projects that create or alter 10,000 sf or more of impervious area to contain and treat all stormwater runoff from the project site. The proposed project would include 226,174 sf of new impervious area; therefore, the proposed project would be subject to the County C.3 Stormwater Standards.[40] The proposed project would also be subject to the requirements of the SWRCB and the Regional Water Quality Control Board (RWQCB), as well as the County C.3 Standards, which are included in the City's NPDES General Permit. In addition, the proposed project would adhere to Title 6, Chapter 11, of the Municipal Code, which establishes standards for stormwater management and discharge.[41] Prior to issuance of a building permit, the applicant would submit a Stormwater Control Plan (SWCP) that meets the criteria in the most recent version of the Contra Costa Clean Water Program Stormwater C.3 Guidebook. Compliance with such requirements would ensure that impacts to water quality standards or waste discharge requirements would not occur during operation of the proposed project.

A Preliminary Stormwater Control Plan has been prepared for the proposed project (see Figure 8 and Appendix I). In order to manage and treat stormwater, the project site would be divided into 13 DMAs. Stormwater from the impervious areas within DMA 1A, 1B, 2A,

[40] Bellecci & Associates, Inc. *Stormwater Control Plan for The Village at 2092 Oakley Road.* March 2023.
[41] City of Oakley. *Oakley Municipal Code* [Title 6, Chapter 11]. Updated February 23, 2021.

2B, 3A, and 3B would be collected by catch basins and curb cuts and directed through storm drain lines towards one of the three dry wells/bioretention facilities (IMPs 1, 2, and 3) on-site. Following treatment, stormwater from IMPs 1, 2, and 3 would be directed into a new network of 18-inch stormwater lines along the northern boundary of the site and ultimately into the City's storm drain system in Main Street. DMA 4 would be self-treating.

Stormwater from the impervious off-site sidewalks, located within DMA 10A, 10B, 11A, 11B, 12A, and 12B, would be captured and treated within three proposed IMPs (IMP 10, IMP 11, and IMP 12), which would serve as landscape planters along the project site frontage. The IMPs would range in size from 1,023 sf to 2,045 sf. Each IMP would have a perforated four-inch-wide pipe, which would function as underdrain and would transport any treated runoff to the City's storm system.

The bioretention areas would accommodate runoff from all 83 residential lots and the roadways on the site. According to the Hydrology Report prepared by Bellecci & Associates for the proposed project (see Appendix H), based on the existing drainage patterns at the project site, the flow rate leaving the site following development of the proposed project would not exceed existing conditions. Furthermore, the Hydrology Report determined that the bioretention basin areas and stormwater lines are designed according to the criteria in the Contra Costa County Clean Water Program *Stormwater C.3 Guidebook* to treat stormwater on the project site prior to discharge into the City's stormwater system and are not anticipated to have a negative impact on the properties adjacent to the project site.[42] Based on the above, the proposed project would not adversely affect surface water quality.

Conclusion

Based on the above, given compliance with the City's Municipal Code and existing County regulations, impacts related to water quality would not occur during project construction or operations. Thus, the proposed project would not violate water quality standards/waste discharge requirement, alter the drainage pattern of the site resulting in erosion or siltation, increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site, contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems, or otherwise degrade water quality during construction, and a ***less-than-significant*** impact would occur.

b,e. Potable water service for the proposed project would be provided by the DWD. According to the DWD's 2020 Urban Water Management Plan (UWMP), the primary water supply for distribution is treated surface water.[43] As a result, any increase in water demand associated with the proposed project would be primarily met through surface water supply, rather than groundwater.

The DWD operates a groundwater supply system that currently consists of groundwater extracted from two wells in Oakley, which is then conveyed in a dedicated well supply pipeline to a blending facility. According to the DWD 2020 UWMP, the wells are connected to the East Contra Costa Subbasin underlying the City. The East Contra Costa Subbasin has been designated as a medium-priority basin by the Department of Water Resources, and is not in overdraft conditions.[44]

---

42 Bellecci & Associates, Inc. *Hydrology Report for The Village at 2092 Oakley Road.* December 2, 2022.
43 Diablo Water District. *2020 Urban Water Management Plan.* May 2022.
44 *Ibid*.

The project site represents a relatively small area compared to the overall surface area of the East Contra Costa Subbasin. In addition, runoff from the proposed impervious surfaces would be directed to bioretention facilities where runoff water would percolate and recharge the East Contra Costa Subbasin. Therefore, any new impervious surfaces associated with the proposed project would not interfere substantially with groundwater recharge within the East Contra Costa Subbasin.

Based on the above, the proposed project would result in a ***less-than-significant*** impact with respect to substantially decreasing groundwater supplies, interfering substantially with groundwater recharge, or conflicting with or obstructing implementation of a water quality control plan or sustainable groundwater management plan.

civ. According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map for the project site, the project site is located within the 500-year floodplain (Zone X), which is not designated as a Special Flood Hazard Area.[45] Additionally, pursuant to Municipal Code Section 6.12.138(e), the project would be required to provide adequate drainage to reduce flood hazards. Thus, the project would not impede or redirect flood flows, resulting in a ***less-than-significant*** impact.

d. Tsunamis are defined as sea waves created by undersea fault movement, whereas a seiche is a long-wavelength, large-scale wave action set up in a closed body of water such as a lake or reservoir. The project site is located 46.1 miles from the California coastline and approximately 1.15 miles south of the San Francisco Bay tributaries. Given the distance to the San Francisco Bay tributaries, it is not anticipated that the project site would be affected by flooding risks associated with tsunamis. Furthermore, seiches do not pose a risk to the proposed project because the project site is not located adjacent to a large, closed body of water. As such, the proposed project would not result in a risk related to the release of pollutants due to project inundation flooding, tsunami, or seiche, and ***no impact*** would occur.

[45] Federal Emergency Management Agency. *Flood Insurance Rate Map 06013C0355G.* Effective March 21, 2017.

XI. LAND USE AND PLANNING. *Would the project:*	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Physically divide an established community?	☐	☐	✖	☐
b. Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	✖	☐

Discussion

a. A project risks dividing an established community if the project would introduce infrastructure or alter a land use so as to change the land use conditions in the surrounding community or isolate an existing land use. Currently, the 9.99-acre project site is planted as a vineyard with rows of grapevines. The site is also developed with two single-family residences, one ancillary shed, and a cell tower.

Surrounding existing uses include a mobile home park to the north; a convenience store, gas station, and an oil change service shop to the east; a shopping center to the southeast, across Empire Avenue; single-family residences and agricultural land to the south, across Oakley Road; and a mobile home park and single-family residences to the west. The City of Oakley General Plan designates the project site as CO and the site is zoned C District. Thus, development of the site was generally evaluated for development as part of the City's General Plan EIR and Update IS/ND.

The proposed project would be a continuation of the surrounding development and would not isolate an existing land use. As such, the proposed project would not physically divide an established community and a ***less-than-significant*** impact would occur.

b. According to the City's General Plan, the project site is designated CO and zoned C District. The proposed project includes a request for a General Plan Amendment from CO to RM and a Rezone from C District to P-1 District. Upon approval of both entitlements, the proposed project would develop 83 single-family residences at the project site. The current designations would be amended to reflect the characteristics of the proposed project. While buildout of the site was not anticipated for residential uses, general development of the site has been anticipated, and development of residential uses would not result in greater impacts as compared to development of the site with commercial uses. As such, the proposed project is generally within the realm of what has been anticipated for the site and potential impacts resulting from development of the project have been analyzed in the General Plan EIR.

As demonstrated throughout this IS/MND, the proposed project would not conflict with City policies and regulations adopted for the purpose of avoiding or mitigating an environmental effect. For example, in compliance with the ECCCHCP/NCCCP, the proposed project would be subject to pay all applicable fees according to the Fee Zone Map of the ECCCHCP/NCCP prior to construction and completion of pre-construction surveys for Swainson's hawk, western burrowing owl, and migratory birds. The developer would be required to pay the appropriate fees based on the applicable fee calculator at the time of development. Thus, the proposed project would not cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect, and thus, a ***less-than-significant*** impact would occur.

XII. MINERAL RESOURCES. *Would the project:*	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	✖
b. Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	✖

Discussion

a,b. The City of Oakley General Plan EIR states that the only viable mineral resource currently mined in the City of Oakley is sand.[46] In addition, the General Plan does not identify any known mineral resource areas within the Planning Area, including the project site. Furthermore, because the site is located near residential development, the site would not be suitable for mining operations. Thus, the proposed project would not result in the loss of availability of a known mineral resource or a locally important mineral recovery site, and the proposed project would result in ***no impact*** related to mineral resources.

[46] City of Oakley. *City of Oakley 2020 General Plan Draft Environmental Impact Report* [pg. 278]. September 2002.

XIII. NOISE. *Would the project result in:*	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	✖	☐	☐
b. Generation of excessive groundborne vibration or groundborne noise levels?	☐	✖	☐	☐
c. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	✖

Discussion

a. The following discussion presents information regarding noise standards and criteria applicable to various land uses, as well as sensitive noise receptors in proximity to the project site and the potential for the proposed project to result in impacts during project construction and operation. The following terms are referenced in the sections below:

- Decibel (dB): A unit of sound energy intensity. An A-weighted decibel (dBA) is a decibel corrected for the variation in frequency response to the typical human ear at commonly encountered noise levels. All references to decibels in this report will be A-weighted unless noted otherwise.
- Day-Night Average Level (L_{dn}): The average sound level over a 24-hour day, with a +10 decibel weighing applied to noise occurring during nighttime (10:00 PM to 7:00 AM) hours.

City Noise Standards and Criteria

Chapter 9, Noise Element, of the City's 2002 General Plan contains the following policies which would be applicable to the proposed project:

9.1.1 New development shall use the land use compatibility table shown in Figure 9-1 and the standards contained within Tables 9-7 and 9-8 (of the General Plan) for determining noise compatibility.

9.1.2 New development of noise-sensitive uses shall not be allowed where the noise level due to non-transportation noise sources will exceed the noise level standards of Table 9-1 (of the General Plan) as measured immediately within the property line or within a designated outdoor activity area (location is at the discretion of the Community Development Director) of the new development, unless effective noise mitigation measures have been incorporated into the development design to achieve the standards specified in Table 9-1 (of the General Plan).

9.1.3 Noise created by new proposed non-transportation noise sources shall be mitigated so as not to exceed the noise level standards of Table 9-7 (of the General

Plan) as measured immediately within the property line of lands designated for noise-sensitive uses.

9.1.5 Noise created by new transportation noise sources shall be mitigated so as not to exceed the levels specified in Table 9-9 (of the General Plan) at outdoor activity areas or interior spaces of existing noise-sensitive land uses.

9.1.8 Obtrusive, discretionary noise generated from residences, motor vehicles, commercial establishments, and/or industrial facilities should be minimized or prohibited.

The City of Oakley General Plan Noise Element establishes a noise level standard of 60 dB as normally acceptable at residential land uses. Based upon General Plan Figure 9-1, an ambient noise level of 60 dBA L_{dn} is considered normally acceptable for single-family residential uses. In addition to the policies listed above, Policy 9.1.6 in the City's General Plan is summarized in Table 4.

Table 4
Significance of Changes in Noise Exposure

Ambient Noise Level Without Project, L_{dn}	Increase Required for Significant Impact
<60 dB	+5.0 dB or more
60-65 dB	+3.0 dB or more
>65 dB	+1.5 dB or more

Source: City of Oakley General Plan Noise Element, 2002.

Per the City's General Plan Table 9-7, with regard to non-transportation noise, exterior noise levels at residences should not exceed 55 dBA during daytime hours (7:00 AM to 10:00 PM) and 45 dBA during nighttime hours (10:00 PM to 7:00 AM).

The following analysis relies on the aforementioned thresholds of significance to determine if noise impacts associated with construction and operation of the proposed project would occur.

Sensitive Noise Receptors and Existing Noise Environment

Some land uses are considered more sensitive to noise than others, and, thus, are referred to as sensitive noise receptors. Land uses often associated with sensitive noise receptors generally include residences, schools, libraries, hospitals and passive recreational areas. Noise sensitive land uses are typically given special attention in order to achieve protection from excessive noise. The nearest sensitive uses include the mobile homes located to the north and west of the project site boundary, with the closest located approximately 20 feet from the northern and western site boundaries. The existing noise environment in the project vicinity is primarily defined by vehicle traffic on the local roadway network.

Construction Noise

During construction of the proposed project, heavy-duty equipment would be used for demolition, grading, excavation, paving, and building construction, which would result in temporary noise level increases. Standard construction equipment, such as backhoes,

dozers, and dump trucks would be used on-site. Project haul truck traffic on local roadways would also result in a temporary noise level increase during construction activities.

Noise levels would vary depending on the type of equipment used, how the equipment is operated, and how well the equipment is maintained. In addition, noise exposure at any single point outside the project site would vary depending on the proximity of construction activities to that point. Construction activities would be temporary in nature and are anticipated to occur during normal daytime hours. Section 4.2.208 of the Municipal Code restricts noise-producing construction activities to weekday hours between 7:30 AM and 7:00 PM Monday through Friday, and from 9:00 AM to 7:00 PM on weekends and holidays.

Table 5 shows the predicted construction noise levels for development of the proposed project.

Table 5
Construction Equipment Noise

Type of Equipment	Maximum Level, dB at 50 feet
Auger Drill Rig	84
Backhoe	78
Compactor	83
Compressor (air)	78
Concrete Saw	90
Dozer	82
Dump Truck	76
Excavator	81
Generator	81
Jackhammer	89
Pneumatic Tools	85

Source: Federal Highway Administration, Roadway Construction Noise Model User's Guide, January 2006.

Based on the table, activities involved in typical construction would generate maximum noise levels up to 90 dB at a distance of 50 feet. However, the nearest receptors to the project site are located within 20 feet west of the construction area and the nearest receptors to the off-site improvement areas are located within 30 feet west of the construction area. Because the nearest single-family residences are located less than 50 feet away from the project site, sensitive receptors would be exposed to noise levels exceeding 90 dB during construction. It should be noted that construction equipment generating maximum levels up to 90 dB would not be used in all phases of construction and would be located 20 feet or more from the nearby residences during construction activities.

Although construction activities are temporary in nature and would likely occur during normal daytime working hours, construction-related noise could result in sleep interference at existing noise-sensitive land uses in the vicinity of the construction if construction activities were to occur outside the normal daytime hours. Furthermore, while the proposed project would be required to comply with all General Plan policies related to noise, a potentially significant impact could occur related to the generation of a substantial temporary increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance during construction. Therefore, impacts resulting from noise levels temporarily exceeding the threshold of significance due to construction would be considered potentially significant.

Operational Noise

Noise generated during operations of the proposed project would be limited to residential noise and traffic noise, as discussed in further detail below.

Residential Noise

Operation of the proposed project would include typical residential noise, such as landscaping maintenance, and heating, ventilation, and HVAC systems, which would be compatible with the adjacent existing residential uses. Assuming the project HVAC systems and maintenance equipment would be in normal working order, the proposed project is not anticipated to contribute a measurable operational noise level increase to the existing ambient noise environment at any sensitive receptor locations. Therefore, a less-than-significant impact would occur with regard to on-site operational noise.

Furthermore, it should be noted that the project site is currently designated CO per the City's General Plan and is zoned C. Residential developments typically generate noise levels that are less than typical of commercial uses. Because the project site would be developed with residential uses, as opposed to commercial uses, potential noise levels increases associated with implementation of the proposed project would be reduced relative to what was anticipated by the City and analyzed for the site in the General Plan EIR and Update IS/ND.

Traffic Noise

The primary noise source associated with the operation of the proposed project would be traffic noise on local roadways. As part of the Traffic Study conducted for the proposed project, TJKM evaluated the existing peak hour traffic volumes at the two nearest major intersections in the vicinity of the project site: the Main Street/Empire Avenue intersection and the Oakley Road/Empire Avenue intersection. The Main Street/Empire Avenue intersection, experiences approximately 2,049 AM peak hour trips and 2,277 PM peak hour trips per day.[47] The Main Street/Empire Avenue intersection experiences approximately 975 AM peak hour trips and 1,236 PM peak hour trips per day.

Based on Table 9-2 of the General Plan, the project site is located in an area with existing noise levels of 66.5 dBA L_{dn} or less. Based upon the Table 4 criteria, where existing traffic noise levels are greater than 65 dB L_{dn}, at the outdoor activity areas of noise-sensitive uses, a +1.5 dB L_{dn} increase in roadway noise levels will be considered significant. A doubling in traffic volumes is required to increase traffic noise levels by 3.0 dB, which is considered to be the threshold for a significant increase per the Federal Interagency Committee on Noise (FICON). As discussed in Section XVII, Transportation, of this IS/MND, the proposed project would generate approximately 57 AM peak hour trips and 77 PM peak hour trips per day. Based on the existing peak hour trips for the nearby intersections and the comparatively minor contribution of project-generated traffic, the increase in traffic associated with project-generated trips would not result in a doubling of peak hour vehicle trips and is not anticipated to increase ambient noise levels to over 66.5 dBA L_{dn}.

The C zoning district allows for commercial development with a maximum Floor Area Ratio (FAR) of 1.0. Therefore, based on the existing zoning designation for the 9.99-acre (435,164.4-sf) project site, it is anticipated that the project site could have included a

[47] TJKM. *Traffic Study for 2092 Oakley Road in Oakley, CA.* November 1, 2022.

maximum of 435,164.4 sf of commercial development. According to the Institute of Transportation Engineers (ITE) Trip Generation Manual (9th Edition)[48] and based on the maximum commercial building square footage for the project site, it is anticipated that development of the site with commercial uses would generate approximately 18,575 daily trips, including 418 AM peak hour trips and 1,614 PM peak hour trips. Based on the General Plan assumptions for the project site, the proposed project would generate significantly less trips per day than what was analyzed in the General Plan EIR and Update IS/ND. Thus, the increase in vehicle trips associated with the proposed project have been generally considered by the City and accounted for in roadway planning efforts. Therefore, the proposed project would not result in a substantial increase in noise levels related to vehicle traffic.

Furthermore, Impact 3.13A of the General Plan EIR determined that new development may increase traffic volumes along existing roadways and introduce traffic along new roadways, thereby exposing residents to excessive roadside noise levels and creating a potentially significant impact. However, implementation of General Plan policies would reduce this impact to a less-than-significant level. As previously discussed, the proposed project would be required to comply with General Plan Policies 9.1.1, 9.1.2, 9.1.3, 9.1.5, 9.1.6, and 9.1.8 with regard to noise generation. Compliance with the aforementioned polices would reduce the proposed project's traffic noise to a less-than-significant impact.

Based on the above, the proposed project would not result in a substantial increase in noise levels related to vehicle traffic.

Conclusion

Based on the above, operation of the proposed project would not result in the generation of a substantial permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the City's General Plan and the Municipal Code. However, considering the potential for construction activities to result in temporary increases in noise levels in the project area in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies, a ***potentially significant*** impact could occur.

Mitigation Measure(s)

Implementation of the following mitigation measure would reduce the above potential impact to a *less-than-significant* level.

XIII-1. *Prior to approval of grading permits, the following criteria shall be established and noted on graded plans, subject to review and approval by the City of Oakley Planning Division:*

- *Construction activities shall be limited to between the daytime hours of 7:30 AM to 7:00 PM Monday through Friday, and 9:00 AM to 7:00 PM on Saturdays, Sundays, and holidays.*
- *Construction equipment shall be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers' recommendations.*

[48] Institute of Transportation Engineers. *Trip Generation Manual, 9th Edition.* November 2012.

Equipment engine shrouds shall be closed during equipment operation.

- *When not in use, motorized construction equipment shall not be left idling for more than five minutes.*
- *Stationary equipment (power generators, compressors, etc.) shall be located at the furthest practical distance from nearby noise-sensitive land uses or sufficiently shielded to reduce noise-related impacts.*

b. Similar to noise, vibration involves a source, a transmission path, and a receiver. However, noise is generally considered to be pressure waves transmitted through air, whereas vibration usually consists of the excitation of a structure or surface. As with noise, vibration consists of an amplitude and frequency. A person's perception to the vibration depends on their individual sensitivity to vibration, as well as the amplitude and frequency of the source and the response of the system which is vibrating.

Vibration is measured in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration in terms of peak particle velocities (PPV) in inches per second (in/sec). Standards pertaining to perception as well as damage to structures have been developed for vibration levels defined in terms of PPV. Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. Table 6, which was developed by the California Department of Transportation (Caltrans), shows the vibration levels that would normally be required to result in damage to structures. As shown in the table, the threshold for architectural damage to structures is 0.20 in/sec PPV and continuous vibrations of 0.10 in/sec PPV, or greater, would likely cause annoyance to sensitive receptors.

The primary vibration-generating activities associated with the proposed project would occur during construction when activities such as grading, utilities placement, and paving occur. Table 7 shows the typical vibration levels produced by construction equipment at various distances. As shown in Table 7, the most substantial source of groundborne vibrations associated with project construction would be the use of vibratory compactors. Use of vibratory compactors/rollers could be required during construction of the proposed project.

Based on Table 7, construction vibration levels anticipated for the project would be less than the 0.2 in/sec threshold at distances of 26 feet or more. Sensitive receptors that could be impacted by construction-related vibrations, including those affected by the off-site improvements, are located approximately 20 feet, or further, from where construction would occur. Thus, construction vibrations could exceed acceptable levels.

However, the proposed project would likely not include the use of vibratory compactors/rollers near the site boundaries as such areas would be designated as the backyards for the residences. Nonetheless, should vibratory compactors be used within 26 feet of the existing structures, the proposed project could exceed acceptable vibration levels.

Table 6
Effects of Vibration on People and Buildings

PPV		Human Reaction	Effect on Buildings
mm/sec	in/sec		
0.15 to 0.30	0.006 to 0.019	Threshold of perception; possibility of intrusion	Vibrations unlikely to cause damage of any type
2.0	0.08	Vibrations readily perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
2.5	0.10	Level at which continuous vibrations begin to annoy people	Virtually no risk of "architectural" damage to normal buildings
5.0	0.20	Vibrations annoying to people in buildings (this agrees with the levels established for people standing on bridges and subjected to relative short periods of vibrations)	Threshold at which there is a risk of "architectural" damage to normal dwelling - houses with plastered walls and ceilings. Special types of finish such as lining of walls, flexible ceiling treatment, etc., would minimize "architectural" damage
10 to 15	0.4 to 0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage

Source: Caltrans. Transportation Related Earthborne Vibrations. TAV-02-01-R9601. February 20, 2002.

Table 7
Vibration Levels for Various Construction Equipment

Type of Equipment	PPV at 25 feet (in/sec)	PPV at 50 feet (in/sec)
Large Bulldozer	0.089	0.031
Loaded Trucks	0.076	0.027
Small Bulldozer	0.003	0.001
Auger/drill Rigs	0.089	0.031
Jackhammer	0.035	0.012
Vibratory Hammer	0.070	0.025
Vibratory Compactor/roller	0.210 (less than 0.20 at 26 feet)	0.074

Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment Guidelines, May 2006.

Because construction activities could expose people to or generate excessive groundbourne vibrations or groundborne noise levels, a ***potentially significant*** impact could occur.

Mitigation Measure(s)

Implementation of the following mitigation measure would reduce the above potential impact to a *less-than-significant* level.

XIII-2. *Throughout the duration of construction, any compaction required within 26 feet from the adjacent residential structures to the north and west shall be accomplished by using static drum rollers, which use weight instead of*

vibrations to achieve soil compaction. As an alternative to this requirement, preconstruction crack documentation and construction vibration monitoring could be conducted to ensure that construction vibrations do not cause damage to any adjacent structures. Proof of compliance with this measure shall be submitted to the City of Oakley Public Works and Engineering Department for review and approval.

c. The nearest airport to the site is Byron Airport, located approximately 12.64 miles southeast of the site. The site is not covered by an existing airport land use plan. Given that the project site is not located within two miles of a public or private airport, the proposed project would not expose people residing or working in the project area to excessive noise levels associated with airports. Thus, ***no impact*** would occur.

XIV. POPULATION AND HOUSING. *Would the project:*	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (e.g., through projects in an undeveloped area or extension of major infrastructure)?	☐	☐	✖	☐
b. Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	✖	☐

Discussion

a. The proposed project would include the development of 83 single-family residential units. Using the City of Oakley General Plan's average person per household value for single-family uses of 3.41, the proposed project would generate approximately 283 additional residents (83 x 3.41 = 283.03).[49] The 2020 U.S. Census estimated the population of Oakley to be approximately 43,357.[50] An increase in population of 283 residents would constitute an approximately 0.65 percent increase in the City's population, which is not considered substantial growth. Furthermore, as discussed in Section XIX, Utilities and Service Systems, of this IS/MND, adequate utility infrastructure would be available to support the proposed project.

Based on the above, the project would have a ***less-than-significant*** impact with respect to inducing substantial unplanned population growth in an area, either directly or indirectly.

b. The proposed project would require demolition of the two existing single-family residences and the ancillary shed. However, the removal of the structures would not be considered to result in the displacement of a substantial number of existing people or housing. In addition, although two residences would be removed from the City's housing stock, the proposed project would involve the construction of 83 new residences in the future. As such, the proposed project would not displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere, and a ***less-than-significant*** impact would occur.

[49] City of Oakley. *City of Oakley General Plan, Focused General Plan Update* [pg. 2-7]. Adopted January 11, 2022.
[50] U.S. Census Bureau. *Quick Facts, City of Oakley, California.* Available at: https://www.census.gov/quickfacts/fact/table/oakleycitycalifornia/POP010220#POP010220. Accessed June 2023.

XV. PUBLIC SERVICES. *Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:*	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Fire protection?	☐	☐	✖	☐
b. Police protection?	☐	☐	✖	☐
c. Schools?	☐	☐	✖	☐
d. Parks?	☐	☐	✖	☐
e. Other Public Facilities?	☐	☐	✖	☐

Discussion

a. Fire protection services within the project area are provided by the Contra Costa County Fire Protection District (CCCFPD). The CCCFPD provides fire suppression and prevention, emergency medical, rescue, ambulance transport, and public education services to more than one million people across the 304-square-mile service area.[51] Services are provided from 25 fire stations and the nearest station, Station 93, is located at 530 O'Hara Avenue, approximately 1.14 miles southeast of the project site. The proposed project would be conditioned to establish a funding mechanism to cover the ongoing financial impact the project would have on fire protection services provided in the City. Participation in the CFD would mitigate any increased demands on fire services that may result from the proposed project, as well as ensure that the project conforms with the City of Oakley's General Plan Policy 4.4.2, which requires new developments to pay a fair share of costs for new fire protection facilities and services. Additionally, the proposed project would not include any alterations to the circulation system of the surrounding area which could conflict with the City of Oakley's General Plan Policy 4.4.4, or otherwise impact response times.

Although buildout of the site was not anticipated for residential uses, general development of the site with commercial uses has been anticipated. As such, the proposed project is generally within the realm of what has been anticipated for the site and the increased demand for fire services due to development at the project site was anticipated and included in the CCCFPD's planning efforts. In addition, the project would be required to pay development fees in accordance with the City of Oakley Municipal Code. As the proposed project is not expected to cause significant degradation to response times or service ratios for the CCCFPD, which would induce the need for physically altered or expanded governmental facilities for fire protection services, the project would result in a ***less-than-significant*** impact.

b. Police protection is provided to the City of Oakley by the Oakley Police Department. The Oakley Police Department currently employs 43 persons, including the Chief of Police, two Lieutenants, six Sergeants, four Detectives, 21 Police Officers, two part time Police Records Assistants, one Records Supervisor and three full time and two part time Police

[51] Contra Costa County Fire Protection District. *2021 Annual Report*. Available at: https://www.cccfpd.org/2021-annual-report/. Accessed May 2023.

Services Assistants and one Property & Evidence Technician.[52] As previously discussed, the proposed project would result in the development of 83 single-family residences. As new residences typically generate a demand for police services, an increase in demand for police services would likely occur with implementation of the project. While buildout of the site was not anticipated for residential uses, general development of the site has been anticipated, and development of residential uses would not result in greater impacts as compared to development of the site with commercial uses. As such, the increase in police service demand from development of the project site has been included in City of Oakley's demand predictions based on anticipated General Plan buildout. In addition, the project would be conditioned to establish a funding mechanism to cover the ongoing financial impact the project would have on police services provided in the City to mitigate the financial impact to the City's police services budget.

Based on the above, the proposed project would create a demand that was anticipated for the site and would not induce the need for physically altered or expanded governmental facilities for police protection services, the construction of which could cause significant environmental impacts. Therefore, the proposed project would result in a ***less-than-significant*** impact.

c. The Oakley Union Elementary School District, Antioch Unified School District, and the Liberty Union High School District provide public educational services to the project site. Given that the proposed project would include development of the project site with 83 single-family residences, the proposed project could increase the demand for schools in the area. Using a standard student generation rate of 0.53 students per dwelling unit, [53] the proposed project's addition of 83 single-family residences would result in approximately 44 new K-12 students. The City of Oakley General Plan includes goals and policies set forth to ensure adequate primary and secondary schools are developed in response to population growth. The City expects the General Plan to assist in the goal of providing an efficient and complete educational system for the citizens of Oakley. For example, Policy 4.6.6, set forth in the General Plan, ensures that school facility impacts fees are collected and requires that the City shall work with developers and school districts to establish mitigation measures to ensure the availability of adequate school facilities.

The proposed project would be subject to payment of School Impact Mitigation Development Fees to fund local school services. Proposition 1A/SB 50 prohibits local agencies from using the inadequacy of school facilities as a basis for denying or conditioning approvals of any "[…] legislative or adjudicative act…involving…the planning, use, or development of real property" (Government Code 65996[b]). Satisfaction of the Proposition 1A/SB 50 statutory requirements by a developer are deemed to be "full and complete mitigation." In other words, payment of applicable development fees would be sufficient in reducing the impacts associated with an increase in students from the project.

Therefore, the proposed project would result in a ***less-than-significant*** impact regarding an increase in demand for schools.

d,e. The City of Oakley Municipal Code Section 9.2.208 requires at least five acres of parkland per 1,000 residents. As noted previously, buildout of the proposed project would result in

[52] Kenneth W. Strelo, Planning Manager, City of Oakley. Personal communication [email] with Rod Stinson, Vice President, Raney Planning and Management. September 6, 2022.
[53] Antioch Unified School District. *Facilities Master Plan* [pg. 248]. July 2018.

an increase of approximately 341 new residents to the City. As a result, approximately 1.71 acres of parkland would be required to achieve the desired parkland ratio (0.005 acres of parkland per resident x 341 new residents = 1.705 acres of parkland). Oakley Resolution 19-03 requires subdividers of land within the City to dedicate land and/or pay fees in lieu of the dedication for the neighborhood and community parks and recreation programs which is discussed in further detail in Section XVI, Recreation, below.

The Oakley 2020 General Plan EIR also analyzed impacts of buildout of the General Plan on other public facilities, such as libraries. The Oakley Branch Library is located in Freedom High School at 1050 Neroly Road and is open Tuesday through Saturday. Other libraries in close proximity to the City of Oakley include the Antioch Library and the Brentwood Branch Library. Future residents of the proposed project would have access to the aforementioned facilities.

Given that the proposed project would be required to pay the applicable park in-lieu fee, and that development of the site was generally anticipated by the City, the project would result in a ***less-than-significant*** impact related to parks and other public facilities.

XVI. RECREATION. *Would the project:*	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	✖	☐
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	✖	☐

Discussion

a,b. As discussed in Section XIV, Population and Housing, of this IS/MND, the proposed project would involve the development of 83 single-family residences, which are anticipated to serve approximately 341 residents. Thus, an increase in demand on recreational facilities is anticipated. The City of Oakley Municipal Code Section 9.2.208 requires five acres of parkland per 1,000 residents. Thus, as noted previously, 1.71 acres of parkland would be required to accommodate the anticipated population increase associated with the proposed project.

Oakley Municipal Code Section 9.2.204 mandates developments that include subdivision of land to either dedicate parkland or pay fees in lieu of the dedication for the neighborhood and community parks and recreation programs. As previously noted, the project would include an 8,730-sf (0.2-acre) community park in the northeast corner of the site and a 5,840-sf (0.13-acre) open space area in the southern portion of the site. In addition, the six dry wells (IMPs 1, 2, 3, 10, 11, and 12) would provide a total of 14,305 sf (0.33 acres) of landscaped bioretention area. Given that the proposed project would only dedicate a total of 0.66 acres of parkland, the proposed project would not meet the parkland requirements set forth in Municipal Code Section 9.2.208. Therefore, the project applicant would be subject to in-lieu fees required pursuant to the Municipal Code. The park impact fees imposed by the City are used to generate revenue to provide park and recreational services on a community-wide level and to the general project vicinity.

Therefore, the proposed project would not increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of facilities would occur or be accelerated. Furthermore, the project would not require further construction or expansion which might have an adverse physical effect on the environment, and a ***less-than-significant*** impact related to recreation would occur.

XVII. TRANSPORTATION. *Would the project:*	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?	☐	☐	✖	☐
b. Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	☐	☐	✖	☐
c. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	✖	☐	☐
d. Result in inadequate emergency access?	☐	✖	☐	☐

Discussion

a. The law has changed with respect to how transportation-related impacts may be addressed under CEQA. Traditionally, lead agencies used level of service (LOS) to assess the significance of such impacts, with greater levels of congestion considered to be more significant than lesser levels. Mitigation measures typically took the form of capacity-increasing improvements, which often had their own environmental impacts (e.g., to biological resources). Depending on circumstances, and an agency's tolerance for congestion (e.g., as reflected in its general plan), LOS D, E, or F often represented significant environmental effects. In 2013, however, the State Legislature passed legislation with the intention of ultimately doing away with LOS in most instances as a basis for environmental analysis under CEQA. Enacted as part of SB 743 (2013), PRC Section 21099, subdivision (b)(1), directed the Governor's Office of Planning and Research (OPR) to prepare, develop, and transmit to the Secretary of the Natural Resources Agency for certification and adoption proposed CEQA Guidelines addressing "criteria for determining the significance of transportation impacts of projects within transit priority areas. Those criteria shall promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses. In developing the criteria, [OPR] shall recommend potential metrics to measure transportation impacts that may include, but are not limited to, vehicle miles traveled, vehicle miles traveled per capita, automobile trip generation rates, or automobile trips generated. The office may also establish criteria for models used to analyze transportation impacts to ensure the models are accurate, reliable, and consistent with the intent of this section."

Subdivision (b)(2) of Section 21099 further provides that "[u]pon certification of the guidelines by the Secretary of the Natural Resources Agency pursuant to this section, automobile delay, as described solely by level of service or similar measures of vehicular capacity or traffic congestion *shall not be considered a significant impact on the environment* pursuant to [CEQA], except in locations specifically identified in the guidelines, if any." (Italics added.)

Pursuant to SB 743, the Natural Resources Agency promulgated CEQA Guidelines Section 15064.3 in late 2018. It became effective in early 2019. Subdivision (a) of that section provides that "[g]enerally, vehicle miles traveled is the most appropriate measure of transportation impacts. For the purposes of this section, 'vehicle miles traveled' refers to the amount and distance of automobile travel attributable to a project. Other relevant considerations may include the effects of the project on transit and non-motorized travel.

Except as provided in subdivision (b)(2) below (regarding roadway capacity), a project's effect on automobile delay shall not constitute a significant environmental impact."[54]

Please refer to question 'b' for a discussion of VMT.

Project Trip Generation

The Traffic Study for the proposed project was prepared by TJKM to identify the proposed project's potential trip generation and any transportation related impacts associated with such (see Appendix J).[55] Project vehicle trip generation rates were obtained from the ITE Trip Generation Manual (11th Edition). Based on the ITE rates, the proposed project is estimated to generate 774 daily vehicle trips, including 57 AM peak hour and 77 PM peak hour trips.

Consistency with the City of Oakley General Plan Policies – Pedestrian, Bicycle, and Transit Facilities

The proposed project's potential impacts related to pedestrian, bicycle, and transit facilities are discussed below.

Pedestrian Facilities

Pedestrian facilities are comprised of crosswalks, sidewalks, pedestrian signals, and off-street paths, which provide safe and convenient routes for pedestrians to access destinations such as institutions, businesses, public transportation, and recreation facilities. Continuous sidewalks with curb cuts are present along both sides of Main Street and Empire Avenue, and along the south side of Oakley Road. Existing sidewalks would facilitate pedestrian traffic to and from the project site and the surrounding commercial and residential land uses. The nearby intersections of Main Street/Empire Avenue and Oakley Road/Empire Avenue provide curb cuts and signalized crosswalks with pedestrian push buttons.

The proposed project would include construction of sidewalks along the project frontage on the north side of Oakley Road and for a short segment on the west side of Main Street. All new sidewalks would be required to comply with the Americans with Disabilities Act (ADA) and would connect to the existing pedestrian network in the project vicinity. The project would add internal sidewalks and pedestrian pathways throughout the project site, which would connect pedestrians to the residences, parking and park areas, and the existing sidewalk on Main Street. The project would include the installation of crosswalks across the A Street, at the proposed A Street and Oakley Road intersection, and at two crossings across the future internal roadways, B Street and F Street. The project would also provide pedestrian access to the northwest corner of the site from the existing sidewalk along the west side of Main Street.

Considering the above, the proposed construction of new sidewalks would enhance the existing pedestrian infrastructure and would be required to comply with applicable City and ADA standards. Therefore, the proposed project would not result in the creation of a

---

54 Subdivision (b)(2) of Section 15064.3 ("transportation projects") provides that "[t]ransportation projects that reduce, or have no impact on, vehicle miles traveled should be presumed to cause a less than significant transportation impact. For roadway capacity projects, agencies have discretion to determine the appropriate measure of transportation impact consistent with CEQA and other applicable requirements. To the extent that such impacts have already been adequately addressed at a programmatic level, such as in a regional transportation plan EIR, a lead agency may tier from that analysis as provided in Section 15152.

55 TJKM. *Traffic Study for 2092 Oakley Road in Oakley, CA.* November 1, 2022.

conflict with any adopted programs, plans, ordinances, or policies addressing pedestrian facilities and a less-than-significant impact would occur related to pedestrian facilities.

Bicycle Facilities

Approximately 29 miles of bicycle facilities are installed throughout the City of Oakley, including 15 miles of Class II on-street bicycle lanes and 12.4 miles of Class I multi-use paths.[56] In addition, 23 miles of additional bicycle facilities are either planned or proposed, such as new Class II bicycle lanes on Main Street and Laurel Road in the vicinity of the project site.[57] In the vicinity of the project site, Class II bicycle facilities exist along Main Street and the along the project frontage on Oakley Road, between Empire Avenue and Kelsey Lane. In addition, a Class III bicycle route exists along Empire Avenue, between Oakley Road and Laurel Road.

Although the proposed project would not include any new bicycle facilities, bicycle access to the project site would be provided by nearby bicycle facilities along Main Street and Oakley Road. The City of Oakley Focused General Plan Update identifies planned Class II bicycle lanes along Oakley Road and Empire Avenue, as well as a Class IV separated bike lane along Main Street. Implementation of the proposed project would not preclude the future development of the planned bicycle lanes. As such, development of the project would not preclude construction of any planned bicycle trails, the proposed project would not result in the creation of a conflict with any adopted programs, plans, ordinances, or policies addressing bicycle facilities, and a less-than-significant impact would occur related to bicycle facilities.

An adverse effect to bicyclists occurs if the proposed project disrupts existing bicycle facilities; or conflicts and/or creates inconsistencies with adopted bicycle system plans, guidelines, and policies. The City of Oakley General Plan Update 2021 illustrates existing and proposed bicycle facilities in the City. The project does not propose bicycle facilities along surrounding roadways, thus adverse impacts to existing and future planned bicycle facilities are not expected.

Transit Facilities

Tri-Delta Transit provides transit services in the City of Oakley, with three lines connecting Brentwood and the Pittsburg/Bay Point Bay Area Rapid Transit (BART) station. The following Tri-Delta Transit Routes currently operate in the project vicinity:

- *Route 300X,* the Brentwood Park & Ride/Antioch BART route, is a weekday express route connecting Brentwood to the Pittsburg/Bay Point BART station via Oakley and Antioch. This bus travels along Main Street, operating from 3:59 AM to approximately 9:57 PM with 15- to 45-minute headways.
- *Route 383*, the Adams Lane-O'Hara Avenue/Wilbur Avenue-Cavallo Road, connects Oakley to Antioch and Freedom High School in Oakley. This route, in both clockwise and counterclockwise directions, provides only weekday service. Route 383 operates from 5:04 AM to 6:45 PM with 45- to 90-minute headways.
- *Route 391,* the Pittsburg Center BART/Brentwood Park & Ride route, provides weekday service to most East County cities. Route 391 operates from 4:06 AM to 1:28 AM with 30- to 74-minute headways.

[56] City of Oakley. *Mobility White Paper, City of Oakley Focused General Plan Update.* December 2021.
[57] *Ibid.*

In the vicinity of the project site, the nearest existing transit facility is located at the intersection of Main Street and Empire Avenue, approximately 0.4 miles north from the project site. As previously noted, the project would construct sidewalks connecting the project site to Main Street and Empire Avenue, which would facilitate pedestrian traffic to the nearby transit stops. Although the proposed project would add riders to the existing transit services, TJKM concluded that the proposed project would add very few trips to the existing transit facilities, which could be accommodated by the existing transit capacity and the transit stops at the Main Street and Empire Avenue intersection. Thus, the proposed project would not conflict with a program, plan, ordinance, or policy addressing transit service and a less-than-significant impact would occur.

Conclusion

Based on the above, a ***less-than-significant*** impact would occur related to conflicting with a program, plan, ordinance, or policy addressing the circulation system, including transit, bicycle, and pedestrian facilities.

b. Section 15064.3 of the CEQA Guidelines provides specific considerations for evaluating a project's transportation impacts. Pursuant to Section 15064.3, analysis of VMT attributable to a project is the most appropriate measure of transportation impacts. Other relevant considerations may include the effects of the project on transit and non-motorized travel. Although the City of Oakley has not yet established any standards or thresholds regarding VMT, pursuant to Section 15064.3(b)(3), a lead agency may analyze a project's VMT qualitatively based on the availability of transit, proximity to destinations, etc. While changes to driving conditions that increase intersection delay are an important consideration for traffic operations and management, the method of analysis does not fully describe environmental effects associated with fuel consumption, emissions, and public health. Section 15064.3(3) changes the focus of transportation impact analysis in CEQA from measuring impact to drivers to measuring the impact of driving.

The Contra Costa Transportation Authority (CCTA) considers residential projects to have a significant impact on VMT if the project generated home-based VMT per resident is higher than the following:

- 85 percent of the home-based VMT per resident in the municipality; or
- 85 percent of the existing County-wide average home-based VMT per resident.

TJKM performed a VMT analysis for the project using the CCTA Model. Two full model runs were performed in accordance with the CCTA VMT methodology. The first model run was for Baseline Conditions, which represent the Year 2020 traffic conditions for the City of Oakley, and the second model run was for Baseline Plus Project Conditions.

Under Baseline conditions, the home-based VMT per capita for the City of Oakley is 26.76. For the project to have a less-than-significant impact, the project must produce VMT within the 85 percent threshold, which equates to 22.75 (0.85 x 26.76) VMT per resident. Under Baseline Plus Project Conditions, the VMT per capita for the project Travel Analysis Zone is 19.09, which falls under the 22.75 threshold. Thus, impacts to VMT would be considered less than significant.

In addition, the CCTA Guidelines require Cumulative VMT impacts to be evaluated for consistency with the Contra Costa County General Plan (Envision 2040).[58] OPR's "Technical Advisory on Evaluating Transportation Impacts in CEQA" recommends that an impact finding from an efficiency-based project-specific VMT analysis (i.e., Baseline Plus Project Conditions) would imply an identical impact finding for a cumulative VMT analysis.[59] An example provided by OPR explains that a project that falls below an efficiency-based threshold that is aligned with long-term environmental goals and relevant plans would have no cumulative impact distinct from the project impact. Therefore, because impacts to VMT under Baseline Plus Project Conditions are less than significant, the proposed project's cumulative impacts related to VMT would be less than significant.

Based on the above, the proposed project would not conflict or be inconsistent with CEQA Guidelines Section 15064.3(b), and a ***less-than-significant*** impact would occur.

c,d. Primary access to the project site would be provided by the new roadway, A Street, off of Oakley Road. A Street would provide right-in and right-only access to and from the project site on the north side of Oakley Road. The project would also include off-site improvements to widen the north side of Oakley Road along the project frontage and increase the westbound direction from one to two lanes. An internal private roadway system would be constructed throughout the project site to provide access to each unit. The internal roadways would be within a 21- to 67-foot ROW and would generally provide 10 to 18 feet of travel lane in each direction. The proposed circulation improvements would be subject to compliance with all applicable roadway design standards. The proposed project would not alter the existing transportation network nor increase hazards due to a geometrical design feature. According to the Traffic Study prepared for the proposed project, the existing and proposed roadways are anticipated to provide adequate site access for vehicles. Implementation of the proposed project would introduce additional vehicle traffic along Main Street and Oakley Road. However, according to the Traffic Study, the proposed on-site circulation is not anticipated to result in any significant operational issues on City streets.

Construction traffic associated with the proposed project would include heavy-duty vehicles which would share the area roadways with normal vehicle traffic, as well as transport of construction materials, and daily construction employee trips to and from the site. However, such heavy-duty truck traffic would only occur throughout the duration of construction activities and would cease upon buildout of the proposed subdivision. During project construction, public roads in the vicinity would remain open and available for use by emergency vehicles and other traffic. In addition to the construction of structures and the new internal roadway network, the project would also include off-site improvements to extend the storm water line within Main Street and install a water line tie-in within Oakley Road. However, during construction of the off-site utility and roadway improvements, vehicle travel along Oakley Road and Main Street may be affected by truck traffic and/or road closures. As a result, the implementation of the utility improvements would directly influence the transportation network near the site during construction, and could result in roadway or lane closures that adversely affect residents in the project area.

---

58 Contra Costa County. *Transportation Analysis Guidelines.* June 23, 2020.
59 Governor's Office of Planning and Research. *Technical Advisory on Evaluating Transportation Impacts in CEQA* [pg. 6]. December 2018.

Emergency vehicle access would be provided by the new driveway off of Oakley Road and a new 21-foot-wide emergency vehicle access-only driveway off of Main Street, which would connect to the internal roadway in the northeastern corner of the site. Removable bollards would be installed as part of the northern most emergency vehicle access driveway and the EVA driveway would not be accessible to the general public. In addition, all interior drive aisles and parking stalls would comply with City design standards, and, thus, on-site circulation would be expected to function acceptably for emergency response vehicles. As such, the proposed on-site vehicle circulation would allow for emergency vehicle access and would not impede current response times to the project site.

Based on the above, operations of the proposed project would not substantially increase hazards due to a geometric design feature or incompatible uses, or result in inadequate emergency access. However, without proper planning of construction activities, construction traffic could interfere with existing roadway operations during the construction phase, which could result in a ***potentially significant*** impact.

Mitigation Measure(s)

Implementation of the following mitigation measure would reduce the above potential impact to a *less-than-significant* level.

XVII-1. Implement Mitigation Measure IX-4.

XVIII. TRIBAL CULTURAL RESOURCES. *Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American Tribe, and that is:*	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k).	☐	✖	☐	☐
b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	✖	☐	☐

Discussion

a,b. As discussed in Section V, Cultural Resources, of this IS/MND, a Cultural Resources Study was prepared for the proposed project by Origer.[60] The study indicated that Native American or historic-era cultural resources were not present in the project site. In addition, the NAHC conducted a records search of the SLF on May 31, 2023. According to the NAHC SLF, the search results were negative and, thus, the project site does not contain known tribal cultural resources.

As part of the Cultural Resources Study, Origer contacted the following tribes: Amah Mutsun Tribal Band of Mission San Juan Bautista, Chicken Ranch Rancheria of Me-Wuk Indians, Indian Canyon Mutsun Band of Costanoan Ohlone People, Muwekma Ohlone Indian Tribe of the SF Bay Area, Nashville Enterprise Miwok-Maidu-Nishinam Tribe, North Valley Yokuts Tribe, The Ohlone Indian Tribe, Tule River Indian Tribe, Wilton Rancheria, and The Confederated Villages of Lisjan. It should be noted that Origer's notification did not constitute formal consultation under AB 52 or SB 18. On May 26, 2023, the Indian Canyon Mutsun Band of Costanoan Ohlone People responded with a request to consult with Origer on the project.

In compliance with AB 52 (PRC Section 21080.3.1) and SB 18, a project notification letter was distributed to the chairpersons of the following tribes on June 8, 2023: Amah Mutsun Tribal Band of Mission San Juan Bautista, Chicken Ranch Rancheria of Me-Wuk Indians, Guidiville Indian Rancheria, Indian Canyon Mutsun Band of Costanoan Ohlone People, Muwekma Ohlone Indian Tribe of the SF Bay Area, Nashville Enterprise Miwok-Maidu-Nishinam Tribe, North Valley Yokuts Tribe, The Ohlone Indian Tribe, Wilton Rancheria, Wuksache Indian Tribe/Eshom Valley Band, and The Confederated Villages of Lisjan.

[60] Tom Origer & Associates. *Cultural Resources Study of the Property at 2092 Oakley Road, Oakley, Contra Costa County, California.* June 9, 2023.

The Indian Canyon Mutsun Band of Costanoan Ohlone People responded on June 19, 2023, with a request to consult on the proposed project. The City of Oakley contacted the Indian Canyon Mutsun Band of Costanoan Ohlone People on July 19, 2023, to discuss the next steps for consultation. Further response from the Indian Canyon Mutsun Band of Costanoan Ohlone People has not been received to date.

The Confederated Villages of Lisjan responded on June 21, 2023, with a request to consult on the proposed project. A request for information was received from The Confederated Villages of Lisjan Chairperson Corrina Gould on July 5, 2023. Chairperson Gould was supplied with the Cultural Resources Report prepared by Tom Origer & Associates for the proposed project on July 5, 2023. On November 1, 2023, Chairperson Gould responded that the Confederated Villages of Lisjan did not have any comments on the project. As such, consultation was concluded on November 1, 2023.

Based on the history of disturbance at the project site as a result of past development and agricultural uses, as well as the lack of identified tribal cultural resources at the site, tribal cultural resources are not expected to occur within the project site. Nevertheless, the possibility exists that development of the proposed project could result in a substantial adverse change in the significance of a tribal cultural resource if previously unknown tribal cultural resources are uncovered during grading or other ground-disturbing activities. Thus, a ***potentially significant*** impact related to tribal cultural resources could occur.

Mitigation Measure(s)

Implementation of the following mitigation measure would reduce the above potential impact to a *less-than-significant* level.

XVIII-1. Implement Mitigation Measures V-1 and V-2.

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

Discussion

a-c. Water, sanitary sewer, stormwater drainage, electricity, and telecommunications services would be provided to the project site by way of new connections to existing infrastructure in the immediate project area. Brief discussions of each utility that would serve the proposed project are included below.

Water

The proposed project would include the installation of new eight-inch water lines throughout the project site. The water system would connect to the existing 10-inch water main in Oakley Road.

Water service for the proposed project would be provided by the DWD. Pursuant to the DWD's 2020 UWMP, DWD's primary water supply for the distribution system is treated surface water from the United States Bureau of Reclamation's Central Valley Project (CVP) purchased from the Contra Costa Water District (CCWD). CVP water is conveyed through the Contra Costa Canal and Los Vaqueros system and treated at the Randall-Bold Water Treatment Plant in Oakley, which is jointly owned by DWD and CCWD.[61] According to the DWD 2020 UWMP, the DWD has a baseline demand of 177 gallons per capita per day (GPCD).[62] Thus, the project is projected to increase water demand by 50,091 gallons per day (177 GPCD x 283 residents), or 56.11 acre-feet per year.

[61] Diablo Water District. *2020 Urban Water Management Plan.* May 2022.
[62] *Ibid* [pg. 3-5].

According to the DWD 2020 UWMP, the DWD's projected water supply exceeds the water demand for normal, single-dry, and multiple-dry years until at least 2040.[63] For example, during the fifth year of drought in 2025, the anticipated supply exceeds the anticipated demand by 1,207 acre-feet per year. Therefore, the DWD would have sufficient water supply to accommodate the 56.11 acre-feet per year increase associated with the proposed project.

Furthermore, the project site has been anticipated for development by the City of Oakley's General Plan EIR and Update IS/ND. The DWD's demand estimates consider increases in demand due to buildout of the City's General Plan;[64] consequently, the DWD has anticipated some level of increased water demand due to development of the project site compared to existing conditions. In addition, DWD's demand estimates would have anticipated commercial development at the project site which would generally have a higher water demand than the proposed residences. Thus, given the DWD's anticipated water surplus even with consideration of building of the project, adequate long-term water supply exists to accommodate the proposed project.

Wastewater

The proposed project would include construction of new eight-inch sanitary sewer lines throughout the project site, which would then direct wastewater to the existing sanitary sewer main within Main Street.

Sanitary sewer services would be provided to the project site by ISD. The wastewater system is composed of collection, treatment, and effluent recycling facilities. ISD operates and maintains the sewer system, which collects wastewater flows from individual developments within the City and conveys them to ISD's Water Recycling Facility. Wastewater is ultimately treated and stored either at the facility in a large 76 million gallon holding pond, or the treated water is conveyed to an outfall pipe in the San Joaquin River. The Water Recycling Facility has an average daily flow of 2.3 million gallons per day (MGD). The facility has a treatment capacity of approximately 4.3 MGD.[65]

Using standard industry assumptions that (1) domestic water use represents 40 percent of consumption; and (2) wastewater generation represents 90 percent of domestic water use, the proposed project would generate approximately 18,033 gallons of wastewater per day (50,091 gallons per day x 0.4 x 0.9). The addition of wastewater from the proposed project would represent less than 0.4 percent of the Water Recycling Facility's total capacity. Therefore, future development of 83 residences would not require the construction of new or expansion of existing wastewater treatment facilities, as the Water Recycling Facility has adequate capacity to serve the proposed project.

In addition, because the site has been anticipated for development in the City's General Plan, and, thus, anticipated by the ISD, the increase in effluent associated with the proposed project would not be entirely new. Therefore, given the available capacity within the wastewater facility and the generation of wastewater, the proposed project would not result in inadequate capacity to serve the project's projected demand in addition to the existing commitments.

---

63 Diablo Water District. *2020 Urban Water Management Plan* [pg. 5-5 to 5-6]. May 2022.
64 *Ibid* [pg. 2-2].
65 Ironhouse Sanitary District. *Sewer System Management Plan* [pg. I-3]. April 2017.

Stormwater

As discussed above in Section X, Hydrology and Water Quality, of this IS/MND, all stormwater runoff from impervious surfaces would be directed and treated at the six IMPs within the project site. The proposed on-site drainage systems would be required to comply with the City's SWPPP and erosion and sediment control plan, as well as the County C.3 standards. Therefore, the proposed project would not affect stormwater flows into ISD's existing system.

Electricity and Telecommunications

Electricity and telecommunications utilities would be provided by way of connections to existing infrastructure located within the immediate project vicinity. PG&E would provide electricity services to the project site, while AT&T would provide telecommunication services. The proposed project would not require major upgrades to, or extension of, existing infrastructure. Thus, impacts related to electricity, natural gas, and telecommunications infrastructure would be less than significant.

Conclusion

Based on the above, the proposed project would not require or result in the relocation or construction of new or expanded water, wastewater treatment, stormwater, electric power, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects. Sufficient water supplies would be available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years. Furthermore, adequate wastewater capacity would also be available to serve the project's projected demand in addition to ISD's existing commitments. Thus, a ***less-than-significant*** impact would occur.

d,e. Solid waste, recyclable materials, and compostable material from the City of Oakley is hauled to Potrero Hills Landfill, located in Solano County. The landfill has a maximum permitted throughput of 4,330 tons per day. According to the California Department of Resources Recycling and Recovery (CalRecycle), the Potrero Hills Landfill has a remaining capacity of 13,872,000 cubic yards out of a total permitted capacity of 83,100,000 cubic yards.[66] Due to the substantial amount of available capacity remaining at Potrero Hills Landfill, sufficient capacity would be available to accommodate the project's solid waste disposal needs. Additionally, because the site has been anticipated for development by the City General Plan, impacts related to solid waste resulting from development of the site have already been evaluated in the City's General Plan EIR and Update IS/ND.

Furthermore, as required by CALGreen Code Section 4.408, the proposed project would be required to submit a Waste Management Plan to the City detailing on-site sorting of construction debris. Implementation of the Waste Management Plan would ensure that the proposed project meets established diversion requirements for reused or recycled construction waste.

Based on the above, the proposed project would comply with applicable federal, State, and local statutes and regulations related to solid waste. Therefore, the proposed project would have a ***less-than-significant*** impact related to solid waste.

[66] California Department of Resources Recycling and Recovery (CalRecycle). *Facility/Site Summary: Potrero Hill Landfill (48-AA-0075)*. Available at: https://www2.calrecycle.ca.gov/SolidWaste/Site/Summary/3591. Accessed May 2023.

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

Discussion

a-d. According to the CALFIRE Fire and Resource Assessment Program, the project site is not located within a Very High or High FHSZ.[67] In addition, the project site is located near existing development and roadways that may act as a fire break. The presence of urban development and paved areas would preclude the uncontrolled spread of wildlife. As such, the proposed project would not result in substantial risks or hazards related to wildfires, and a ***less-than-significant*** impact would occur.

[67] California Department of Forestry and Fire Protection. *Contra Costa County, Very High Fire Hazard Severity Zones in LRA*. January 7, 2009.

XXI. MANDATORY FINDINGS OF SIGNIFICANCE.	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	✖	☐	☐
b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	✖	☐	☐
c. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	✖	☐	☐

Discussion

a. As discussed in Section IV, Biological Resources, of this IS/MND, while a limited potential exists for western burrowing owl, Swainson's hawk, and other birds protected by the MBTA to occur on-site, the proposed project would comply with the ECCCHCP/NCCP requirements including avoidance and minimization measures. In addition, Mitigation Measures V-1 and V-2 would ensure that, in the event that the on-site structures are considered historic, or if previously unknown prehistoric resources are discovered within the project site, such resources would be protected in compliance with the requirements of CEQA and other State standards.

Considering the above, the proposed project would not degrade the quality of the environment, substantially reduce or impact the habitat of fish or wildlife species, cause fish or wildlife populations to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory. Therefore, with implementation of the mitigation measures identified herein, a ***less-than-significant*** impact would occur.

b. The proposed project, in conjunction with other development within the City of Oakley, could incrementally contribute to cumulative impacts in the area. However, as demonstrated in this IS/MND, all potential environmental impacts that could occur as a result of project implementation would be reduced to a less-than-significant level through compliance with the mitigation measures included in this IS/MND, as well as applicable General Plan policies, Municipal Code standards, and other applicable local and State regulations.

All cumulative impacts related to air quality, noise, and transportation are either less than significant or less than significant after mitigation. Given the scope of the project, any incremental effects would not be considerable relative to the effects of all past, current, and probable future projects. In addition, although buildout of the site was not anticipated for residential uses, general development of the site has anticipated, and development of residential uses would not result in greater impacts compared to development of the site with commercial uses. As such, the proposed project is within the realm of what has been anticipated for the site and potential impacts resulting from development of the project have been analyzed in the General Plan EIR and the Update IS/ND.

Therefore, when viewed in conjunction with other closely related past, present, or reasonably foreseeable future projects, with the implementation of mitigation, development of the proposed project would not result in a cumulatively considerable contribution to cumulative impacts, and the project's incremental contribution to cumulative impacts would be ***less than significant***.

c. As described in this IS/MND, the proposed project would comply with all applicable General Plan policies, Municipal Code standards, other applicable local and State regulations, and mitigation measures included herein. In addition, as discussed in Section VII, Geology and Soils, Section IX, Hazards and Hazardous Materials, and Section XIII, Noise, of this IS/MND, the proposed project would not cause substantial effects to human beings, including effects related to exposure to hazardous materials and noise, after the implementation of the required mitigation measures. Therefore, with implementation of the required mitigation measures, the proposed project would result in a ***less-than-significant*** impact.

Appendix A
Air Quality and Greenhouse Gas Emissions – CalEEMod and Road Construction Emissions Model Results

Village at 2092 Oakley Road Detailed Report

Table of Contents

1. Basic Project Information

1.1. Basic Project Information

1.2. Land Use Types

1.3. User-Selected Emission Reduction Measures by Emissions Sector

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

2.2. Construction Emissions by Year, Unmitigated

2.4. Operations Emissions Compared Against Thresholds

2.5. Operations Emissions by Sector, Unmitigated

3. Construction Emissions Details

3.1. Demolition (2024) - Unmitigated

3.3. Site Preparation (2024) - Unmitigated

3.5. Grading (2024) - Unmitigated

3.7. Building Construction (2024) - Unmitigated

3.9. Building Construction (2025) - Unmitigated

3.11. Paving (2025) - Unmitigated

3.13. Architectural Coating (2024) - Unmitigated

3.15. Architectural Coating (2025) - Unmitigated

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

4.3. Area Emissions by Source

4.3.2. Unmitigated

4.4. Water Emissions by Land Use

4.4.2. Unmitigated

4.5. Waste Emissions by Land Use

4.5.2. Unmitigated

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

5. Activity Data

5.1. Construction Schedule

5.2. Off-Road Equipment

5.2.1. Unmitigated

5.3. Construction Vehicles

5.3.1. Unmitigated

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

5.5. Architectural Coatings

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

5.6.2. Construction Earthmoving Control Strategies

5.7. Construction Paving

5.8. Construction Electricity Consumption and Emissions Factors

5.9. Operational Mobile Sources

5.9.1. Unmitigated

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

5.10.2. Architectural Coatings

5.10.3. Landscape Equipment

5.11. Operational Energy Consumption

5.11.1. Unmitigated

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

5.13. Operational Waste Generation

5.13.1. Unmitigated

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

5.16.2. Process Boilers

5.17. User Defined

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

5.18.2. Sequestration

5.18.2.1. Unmitigated

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

6.2. Initial Climate Risk Scores

6.3. Adjusted Climate Risk Scores

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

7.2. Healthy Places Index Scores

7.3. Overall Health & Equity Scores

7.4. Health & Equity Measures

7.5. Evaluation Scorecard

7.6. Health & Equity Custom Measures

8. User Changes to Default Data

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Village at 2092 Oakley Road
Construction Start Date	6/1/2024
Operational Year	2025
Lead Agency	City of Oakley
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	3.60
Precipitation (days)	20.6
Location	37.999009795899084, -121.73388586447466
County	Contra Costa
City	Oakley
Air District	Bay Area AQMD
Air Basin	San Francisco Bay Area
TAZ	1361
EDFZ	1
Electric Utility	Pacific Gas & Electric Company
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.14

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description

Single Family Housing	83.0	Dwelling Unit	9.99	161,850	972,167	—	240	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	11.4	36.0	33.7	0.09	1.60	11.2	12.2	1.47	4.09	5.56	—	12,236	12,236	0.87	1.50	20.3	12,726
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	11.4	12.6	15.8	0.03	0.53	1.45	1.98	0.49	0.36	0.85	—	3,069	3,069	0.12	0.07	0.05	3,093
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	4.29	7.71	7.89	0.02	0.30	1.76	2.05	0.27	0.54	0.81	—	2,344	2,344	0.14	0.19	1.23	2,405
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.78	1.41	1.44	< 0.005	0.05	0.32	0.37	0.05	0.10	0.15	—	388	388	0.02	0.03	0.20	398
Exceeds (Daily Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	54.0	54.0	—	—	82.0	—	—	54.0	—	—	—	—	—	—	—	—	—
Unmit.	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—	—	—

Exceeds (Average Daily)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	54.0	54.0	—	—	82.0	—	—	54.0	—	—	—	—	—	—	—	—	—
Unmit.	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—	—	—

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	11.4	36.0	33.7	0.09	1.60	11.2	12.2	1.47	4.09	5.56	—	12,236	12,236	0.87	1.50	20.3	12,726
2025	11.3	11.7	15.8	0.03	0.46	1.45	1.91	0.43	0.36	0.78	—	3,087	3,087	0.12	0.07	1.89	3,111
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	11.4	12.6	15.8	0.03	0.53	1.45	1.98	0.49	0.36	0.85	—	3,069	3,069	0.12	0.07	0.05	3,093
2025	11.3	11.8	15.6	0.03	0.46	1.45	1.91	0.43	0.36	0.78	—	3,060	3,060	0.12	0.07	0.05	3,083
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	3.19	7.71	7.89	0.02	0.30	1.76	2.05	0.27	0.54	0.81	—	2,344	2,344	0.14	0.19	1.23	2,405
2025	4.29	4.31	5.73	0.01	0.17	0.52	0.69	0.16	0.13	0.29	—	1,118	1,118	0.04	0.02	0.30	1,127
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2024	0.58	1.41	1.44	< 0.005	0.05	0.32	0.37	0.05	0.10	0.15	—	388	388	0.02	0.03	0.20	398
2025	0.78	0.79	1.05	< 0.005	0.03	0.09	0.13	0.03	0.02	0.05	—	185	185	0.01	< 0.005	0.05	187

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	7.78	3.61	32.9	0.07	0.13	5.69	5.82	0.12	1.44	1.57	36.8	8,126	8,163	4.11	0.27	26.6	8,374
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	7.17	4.03	25.9	0.07	0.12	5.69	5.81	0.12	1.44	1.56	36.8	7,664	7,700	4.15	0.30	1.82	7,896
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	7.28	3.80	26.8	0.07	0.12	5.56	5.69	0.12	1.41	1.53	36.8	7,584	7,621	4.13	0.28	11.9	7,821
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	1.33	0.69	4.89	0.01	0.02	1.02	1.04	0.02	0.26	0.28	6.09	1,256	1,262	0.68	0.05	1.97	1,295
Exceeds (Daily Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	54.0	54.0	—	—	82.0	—	—	54.0	—	—	—	—	—	—	—	—	—
Unmit.	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—	—	—
Exceeds (Average Daily)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	54.0	54.0	—	—	82.0	—	—	54.0	—	—	—	—	—	—	—	—	—
Unmit.	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—	—	—
Exceeds (Annual)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Threshold	10.0	10.0	—	—	15.0	—	—	10.0	—	—	—	—	—	—	—	—	—
Unmit.	No	No	—	—	No	—	—	No	—	—	—	—	—	—	—	—	—

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	3.22	2.60	27.8	0.06	0.04	5.69	5.74	0.04	1.44	1.49	—	6,547	6,547	0.26	0.25	25.5	6,654
Area	4.51	0.05	4.70	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.00	12.6	12.6	< 0.005	< 0.005	—	12.6
Energy	0.06	0.97	0.41	0.01	0.08	—	0.08	0.08	—	0.08	—	1,516	1,516	0.16	0.01	—	1,523
Water	—	—	—	—	—	—	—	—	—	—	5.79	50.0	55.8	0.60	0.02	—	75.4
Waste	—	—	—	—	—	—	—	—	—	—	31.0	0.00	31.0	3.10	0.00	—	108
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.16	1.16
Total	7.78	3.61	32.9	0.07	0.13	5.69	5.82	0.12	1.44	1.57	36.8	8,126	8,163	4.11	0.27	26.6	8,374
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	3.02	3.06	25.5	0.06	0.04	5.69	5.74	0.04	1.44	1.49	—	6,097	6,097	0.30	0.28	0.66	6,188
Area	4.09	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Energy	0.06	0.97	0.41	0.01	0.08	—	0.08	0.08	—	0.08	—	1,516	1,516	0.16	0.01	—	1,523
Water	—	—	—	—	—	—	—	—	—	—	5.79	50.0	55.8	0.60	0.02	—	75.4
Waste	—	—	—	—	—	—	—	—	—	—	31.0	0.00	31.0	3.10	0.00	—	108
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.16	1.16
Total	7.17	4.03	25.9	0.07	0.12	5.69	5.81	0.12	1.44	1.56	36.8	7,664	7,700	4.15	0.30	1.82	7,896
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	2.92	2.80	24.0	0.06	0.04	5.56	5.61	0.04	1.41	1.45	—	6,012	6,012	0.28	0.26	10.7	6,107
Area	4.30	0.02	2.32	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.00	6.21	6.21	< 0.005	< 0.005	—	6.23
Energy	0.06	0.97	0.41	0.01	0.08	—	0.08	0.08	—	0.08	—	1,516	1,516	0.16	0.01	—	1,523
Water	—	—	—	—	—	—	—	—	—	—	5.79	50.0	55.8	0.60	0.02	—	75.4

Waste	—	—	—	—	—	—	—	—	—	—	31.0	0.00	31.0	3.10	0.00	—	108
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.16	1.16
Total	7.28	3.80	26.8	0.07	0.12	5.56	5.69	0.12	1.41	1.53	36.8	7,584	7,621	4.13	0.28	11.9	7,821
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.53	0.51	4.39	0.01	0.01	1.02	1.02	0.01	0.26	0.27	—	995	995	0.05	0.04	1.78	1,011
Area	0.78	< 0.005	0.42	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.00	1.03	1.03	< 0.005	< 0.005	—	1.03
Energy	0.01	0.18	0.08	< 0.005	0.01	—	0.01	0.01	—	0.01	—	251	251	0.03	< 0.005	—	252
Water	—	—	—	—	—	—	—	—	—	—	0.96	8.28	9.24	0.10	< 0.005	—	12.5
Waste	—	—	—	—	—	—	—	—	—	—	5.13	0.00	5.13	0.51	0.00	—	17.9
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.19	0.19
Total	1.33	0.69	4.89	0.01	0.02	1.02	1.04	0.02	0.26	0.28	6.09	1,256	1,262	0.68	0.05	1.97	1,295

3. Construction Emissions Details

3.1. Demolition (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	2.62	24.9	21.7	0.03	1.06	—	1.06	0.98	—	0.98	—	3,425	3,425	0.14	0.03	—	3,437
Demolition	—	—	—	—	—	0.26	0.26	—	0.04	0.04	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.34	0.30	< 0.005	0.01	—	0.01	0.01	—	0.01	—	46.9	46.9	< 0.005	< 0.005	—	47.1
Demolition	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.06	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	7.77	7.77	< 0.005	< 0.005	—	7.79
Demolition	—	—	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.04	0.68	0.00	0.00	0.51	0.51	0.00	0.13	0.13	—	135	135	< 0.005	< 0.005	0.57	137
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.43	0.20	< 0.005	0.01	0.29	0.29	< 0.005	0.07	0.08	—	335	335	0.03	0.05	0.73	353
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.71	1.71	< 0.005	< 0.005	< 0.005	1.73
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	4.59	4.59	< 0.005	< 0.005	< 0.005	4.83
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.28	0.28	< 0.005	< 0.005	< 0.005	0.29

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	0.76	0.76	< 0.005	< 0.005	< 0.005	0.80

3.3. Site Preparation (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	3.65	36.0	32.9	0.05	1.60	—	1.60	1.47	—	1.47	—	5,296	5,296	0.21	0.04	—	5,314
Dust From Material Movement	—	—	—	—	—	7.67	7.67	—	3.94	3.94	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.49	0.45	< 0.005	0.02	—	0.02	0.02	—	0.02	—	72.5	72.5	< 0.005	< 0.005	—	72.8
Dust From Material Movement	—	—	—	—	—	0.11	0.11	—	0.05	0.05	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.01	0.09	0.08	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	12.0	12.0	< 0.005	< 0.005	—	12.1
Dust From Material Movement	—	—	—	—	—	0.02	0.02	—	0.01	0.01	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.07	0.05	0.79	0.00	0.00	0.60	0.60	0.00	0.15	0.15	—	157	157	< 0.005	0.01	0.66	160
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.99	1.99	< 0.005	< 0.005	< 0.005	2.02
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.33	0.33	< 0.005	< 0.005	< 0.005	0.33
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.5. Grading (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO

Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.90	18.2	18.8	0.03	0.84	—	0.84	0.77	—	0.77	—	2,958	2,958	0.12	0.02	—	2,969
Dust From Material Movement	—	—	—	—	—	2.80	2.80	—	1.34	1.34	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.21	2.05	2.11	< 0.005	0.09	—	0.09	0.09	—	0.09	—	332	332	0.01	< 0.005	—	333
Dust From Material Movement	—	—	—	—	—	0.31	0.31	—	0.15	0.15	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.37	0.39	< 0.005	0.02	—	0.02	0.02	—	0.02	—	55.0	55.0	< 0.005	< 0.005	—	55.2
Dust From Material Movement	—	—	—	—	—	0.06	0.06	—	0.03	0.03	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.06	0.04	0.68	0.00	0.00	0.51	0.51	0.00	0.13	0.13	—	135	135	< 0.005	< 0.005	0.57	137
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.19	11.8	5.59	0.06	0.17	7.85	8.02	0.11	2.02	2.13	—	9,143	9,143	0.75	1.47	19.8	9,620
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.06	0.00	0.00	0.06	0.06	0.00	0.01	0.01	—	14.0	14.0	< 0.005	< 0.005	0.03	14.2
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	1.37	0.63	0.01	0.02	0.87	0.89	0.01	0.22	0.24	—	1,027	1,027	0.08	0.17	0.96	1,080
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	2.32	2.32	< 0.005	< 0.005	< 0.005	2.35
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.25	0.11	< 0.005	< 0.005	0.16	0.16	< 0.005	0.04	0.04	—	170	170	0.01	0.03	0.16	179

3.7. Building Construction (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.20	11.2	13.1	0.02	0.50	—	0.50	0.46	—	0.46	—	2,398	2,398	0.10	0.02	—	2,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.20	11.2	13.1	0.02	0.50	—	0.50	0.46	—	0.46	—	2,398	2,398	0.10	0.02	—	2,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.33	3.10	3.62	0.01	0.14	—	0.14	0.13	—	0.13	—	662	662	0.03	0.01	—	664
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	0.57	0.66	< 0.005	0.03	—	0.03	0.02	—	0.02	—	110	110	< 0.005	< 0.005	—	110
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.11	0.08	1.34	0.00	0.00	1.02	1.02	0.00	0.25	0.25	—	269	269	0.01	0.01	1.14	273
Vendor	0.01	0.33	0.16	< 0.005	< 0.005	0.23	0.23	< 0.005	0.06	0.06	—	243	243	0.01	0.04	0.64	255
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.11	0.10	1.14	0.00	0.00	1.02	1.02	0.00	0.25	0.25	—	246	246	0.01	0.01	0.03	249
Vendor	0.01	0.35	0.16	< 0.005	< 0.005	0.23	0.23	< 0.005	0.06	0.06	—	243	243	0.01	0.04	0.02	254
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.03	0.03	0.31	0.00	0.00	0.28	0.28	0.00	0.07	0.07	—	68.5	68.5	< 0.005	< 0.005	0.14	69.6
Vendor	< 0.005	0.10	0.04	< 0.005	< 0.005	0.06	0.06	< 0.005	0.02	0.02	—	67.1	67.1	< 0.005	0.01	0.08	70.3
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	< 0.005	0.06	0.00	0.00	0.05	0.05	0.00	0.01	0.01	—	11.3	11.3	< 0.005	< 0.005	0.02	11.5
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	11.1	11.1	< 0.005	< 0.005	0.01	11.6
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.9. Building Construction (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.13	10.4	13.0	0.02	0.43	—	0.43	0.40	—	0.40	—	2,398	2,398	0.10	0.02	—	2,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.13	10.4	13.0	0.02	0.43	—	0.43	0.40	—	0.40	—	2,398	2,398	0.10	0.02	—	2,406
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.40	3.72	4.64	0.01	0.15	—	0.15	0.14	—	0.14	—	854	854	0.03	0.01	—	857

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.68	0.85	< 0.005	0.03	—	0.03	0.03	—	0.03	—	141	141	0.01	< 0.005	—	142
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.11	0.07	1.25	0.00	0.00	1.02	1.02	0.00	0.25	0.25	—	263	263	< 0.005	0.01	1.04	267
Vendor	0.01	0.32	0.15	< 0.005	< 0.005	0.23	0.23	< 0.005	0.06	0.06	—	239	239	0.01	0.03	0.63	251
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.10	0.09	1.06	0.00	0.00	1.02	1.02	0.00	0.25	0.25	—	241	241	0.01	0.01	0.03	244
Vendor	0.01	0.33	0.16	< 0.005	< 0.005	0.23	0.23	< 0.005	0.06	0.06	—	239	239	0.01	0.03	0.02	250
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.04	0.03	0.37	0.00	0.00	0.36	0.36	0.00	0.09	0.09	—	86.7	86.7	< 0.005	< 0.005	0.16	88.1
Vendor	< 0.005	0.12	0.05	< 0.005	< 0.005	0.08	0.08	< 0.005	0.02	0.02	—	85.3	85.3	< 0.005	0.01	0.10	89.1
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.07	0.00	0.00	0.07	0.07	0.00	0.02	0.02	—	14.4	14.4	< 0.005	< 0.005	0.03	14.6
Vendor	< 0.005	0.02	0.01	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	14.1	14.1	< 0.005	< 0.005	0.02	14.8
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.11. Paving (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.80	7.45	9.98	0.01	0.35	—	0.35	0.32	—	0.32	—	1,511	1,511	0.06	0.01	—	1,517
Paving	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.10	0.14	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	20.7	20.7	< 0.005	< 0.005	—	20.8
Paving	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	0.02	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	3.43	3.43	< 0.005	< 0.005	—	3.44
Paving	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Worker	0.05	0.04	0.63	0.00	0.00	0.51	0.51	0.00	0.13	0.13	—	132	132	< 0.005	< 0.005	0.52	134
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	1.67	1.67	< 0.005	< 0.005	< 0.005	1.70
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	< 0.005	0.00	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	—	0.28	0.28	< 0.005	< 0.005	< 0.005	0.28
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.13. Architectural Coating (2024) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.91	1.15	< 0.005	0.03	—	0.03	0.03	—	0.03	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	9.91	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.14	0.91	1.15	< 0.005	0.03	—	0.03	0.03	—	0.03	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	9.91	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.23	0.28	< 0.005	0.01	—	0.01	0.01	—	0.01	—	33.2	33.2	< 0.005	< 0.005	—	33.3
Architectural Coatings	2.46	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.04	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	5.49	5.49	< 0.005	< 0.005	—	5.51
Architectural Coatings	0.45	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.27	0.00	0.00	0.20	0.20	0.00	0.05	0.05	—	53.7	53.7	< 0.005	< 0.005	0.23	54.6
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.23	0.00	0.00	0.20	0.20	0.00	0.05	0.05	—	49.1	49.1	< 0.005	< 0.005	0.01	49.8
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	< 0.005	0.06	0.00	0.00	0.05	0.05	0.00	0.01	0.01	—	12.3	12.3	< 0.005	< 0.005	0.02	12.5
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	2.04	2.04	< 0.005	< 0.005	< 0.005	2.07
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.15. Architectural Coating (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.13	0.88	1.14	< 0.005	0.03	—	0.03	0.03	—	0.03	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	9.91	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.13	0.88	1.14	< 0.005	0.03	—	0.03	0.03	—	0.03	—	134	134	0.01	< 0.005	—	134
Architectural Coatings	9.91	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.34	0.43	< 0.005	0.01	—	0.01	0.01	—	0.01	—	51.0	51.0	< 0.005	< 0.005	—	51.1
Architectural Coatings	3.78	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.06	0.08	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	8.44	8.44	< 0.005	< 0.005	—	8.46
Architectural Coatings	0.69	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.01	0.25	0.00	0.00	0.20	0.20	0.00	0.05	0.05	—	52.7	52.7	< 0.005	< 0.005	0.21	53.5
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.21	0.00	0.00	0.20	0.20	0.00	0.05	0.05	—	48.2	48.2	< 0.005	< 0.005	0.01	48.8
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.08	0.00	0.00	0.08	0.08	0.00	0.02	0.02	—	18.6	18.6	< 0.005	< 0.005	0.03	18.9
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.01	0.00	0.00	0.01	0.01	0.00	< 0.005	< 0.005	—	3.08	3.08	< 0.005	< 0.005	0.01	3.12
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	3.22	2.60	27.8	0.06	0.04	5.69	5.74	0.04	1.44	1.49	—	6,547	6,547	0.26	0.25	25.5	6,654
Total	3.22	2.60	27.8	0.06	0.04	5.69	5.74	0.04	1.44	1.49	—	6,547	6,547	0.26	0.25	25.5	6,654

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	3.02	3.06	25.5	0.06	0.04	5.69	5.74	0.04	1.44	1.49	—	6,097	6,097	0.30	0.28	0.66	6,188
Total	3.02	3.06	25.5	0.06	0.04	5.69	5.74	0.04	1.44	1.49	—	6,097	6,097	0.30	0.28	0.66	6,188
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	0.53	0.51	4.39	0.01	0.01	1.02	1.02	0.01	0.26	0.27	—	995	995	0.05	0.04	1.78	1,011
Total	0.53	0.51	4.39	0.01	0.01	1.02	1.02	0.01	0.26	0.27	—	995	995	0.05	0.04	1.78	1,011

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	287	287	0.05	0.01	—	290
Total	—	—	—	—	—	—	—	—	—	—	—	287	287	0.05	0.01	—	290
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	287	287	0.05	0.01	—	290
Total	—	—	—	—	—	—	—	—	—	—	—	287	287	0.05	0.01	—	290
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	47.5	47.5	0.01	< 0.005	—	48.0
Total	—	—	—	—	—	—	—	—	—	—	—	47.5	47.5	0.01	< 0.005	—	48.0

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	0.06	0.97	0.41	0.01	0.08	—	0.08	0.08	—	0.08	—	1,230	1,230	0.11	< 0.005	—	1,233
Total	0.06	0.97	0.41	0.01	0.08	—	0.08	0.08	—	0.08	—	1,230	1,230	0.11	< 0.005	—	1,233
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	0.06	0.97	0.41	0.01	0.08	—	0.08	0.08	—	0.08	—	1,230	1,230	0.11	< 0.005	—	1,233
Total	0.06	0.97	0.41	0.01	0.08	—	0.08	0.08	—	0.08	—	1,230	1,230	0.11	< 0.005	—	1,233
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	0.01	0.18	0.08	< 0.005	0.01	—	0.01	0.01	—	0.01	—	204	204	0.02	< 0.005	—	204
Total	0.01	0.18	0.08	< 0.005	0.01	—	0.01	0.01	—	0.01	—	204	204	0.02	< 0.005	—	204

4.3. Area Emissions by Source

4.3.2. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Consumer Products	3.46	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.62	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.42	0.05	4.70	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	12.6	12.6	< 0.005	< 0.005	—	12.6
Total	4.51	0.05	4.70	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.00	12.6	12.6	< 0.005	< 0.005	—	12.6
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Consumer Products	3.46	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	0.62	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	4.09	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hearths	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00
Consumer Products	0.63	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Architectural Coatings	0.11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.04	< 0.005	0.42	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.03	1.03	< 0.005	< 0.005	—	1.03
Total	0.78	< 0.005	0.42	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.00	1.03	1.03	< 0.005	< 0.005	—	1.03

4.4. Water Emissions by Land Use

4.4.2. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	5.79	50.0	55.8	0.60	0.02	—	75.4
Total	—	—	—	—	—	—	—	—	—	—	5.79	50.0	55.8	0.60	0.02	—	75.4
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	5.79	50.0	55.8	0.60	0.02	—	75.4
Total	—	—	—	—	—	—	—	—	—	—	5.79	50.0	55.8	0.60	0.02	—	75.4
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	0.96	8.28	9.24	0.10	< 0.005	—	12.5
Total	—	—	—	—	—	—	—	—	—	—	0.96	8.28	9.24	0.10	< 0.005	—	12.5

4.5. Waste Emissions by Land Use

4.5.2. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	31.0	0.00	31.0	3.10	0.00	—	108
Total	—	—	—	—	—	—	—	—	—	—	31.0	0.00	31.0	3.10	0.00	—	108
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	31.0	0.00	31.0	3.10	0.00	—	108
Total	—	—	—	—	—	—	—	—	—	—	31.0	0.00	31.0	3.10	0.00	—	108
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	5.13	0.00	5.13	0.51	0.00	—	17.9
Total	—	—	—	—	—	—	—	—	—	—	5.13	0.00	5.13	0.51	0.00	—	17.9

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.16	1.16
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.16	1.16
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.16	1.16
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.16	1.16
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.19	0.19
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.19	0.19

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Demolition	Demolition	6/1/2024	6/7/2024	5.00	5.00	—
Site Preparation	Site Preparation	6/8/2024	6/14/2024	5.00	5.00	—
Grading	Grading	6/15/2024	8/12/2024	5.00	41.0	—

Building Construction	Building Construction	8/13/2024	7/1/2025	5.00	230	—
Paving	Paving	7/2/2025	7/8/2025	5.00	5.00	—
Architectural Coating	Architectural Coating	8/27/2024	7/14/2025	5.00	230	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Demolition	Concrete/Industrial Saws	Diesel	Average	1.00	8.00	33.0	0.73
Demolition	Excavators	Diesel	Average	3.00	8.00	36.0	0.38
Demolition	Rubber Tired Dozers	Diesel	Average	2.00	8.00	367	0.40
Site Preparation	Rubber Tired Dozers	Diesel	Average	3.00	8.00	367	0.40
Site Preparation	Tractors/Loaders/Backhoes	Diesel	Average	4.00	8.00	84.0	0.37
Grading	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Grading	Graders	Diesel	Average	1.00	8.00	148	0.41
Grading	Rubber Tired Dozers	Diesel	Average	1.00	8.00	367	0.40
Grading	Tractors/Loaders/Backhoes	Diesel	Average	3.00	8.00	84.0	0.37
Building Construction	Cranes	Diesel	Average	1.00	7.00	367	0.29
Building Construction	Forklifts	Diesel	Average	3.00	8.00	82.0	0.20
Building Construction	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Building Construction	Tractors/Loaders/Backhoes	Diesel	Average	3.00	7.00	84.0	0.37
Building Construction	Welders	Diesel	Average	1.00	8.00	46.0	0.45
Paving	Pavers	Diesel	Average	2.00	8.00	81.0	0.42
Paving	Paving Equipment	Diesel	Average	2.00	8.00	89.0	0.36
Paving	Rollers	Diesel	Average	2.00	8.00	36.0	0.38

Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Demolition	—	—	—	—
Demolition	Worker	15.0	11.7	LDA,LDT1,LDT2
Demolition	Vendor	—	8.40	HHDT,MHDT
Demolition	Hauling	4.60	20.0	HHDT
Demolition	Onsite truck	—	—	HHDT
Site Preparation	—	—	—	—
Site Preparation	Worker	17.5	11.7	LDA,LDT1,LDT2
Site Preparation	Vendor	—	8.40	HHDT,MHDT
Site Preparation	Hauling	0.00	20.0	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Grading	—	—	—	—
Grading	Worker	15.0	11.7	LDA,LDT1,LDT2
Grading	Vendor	—	8.40	HHDT,MHDT
Grading	Hauling	125	20.0	HHDT
Grading	Onsite truck	—	—	HHDT
Building Construction	—	—	—	—
Building Construction	Worker	29.9	11.7	LDA,LDT1,LDT2
Building Construction	Vendor	8.87	8.40	HHDT,MHDT
Building Construction	Hauling	0.00	20.0	HHDT
Building Construction	Onsite truck	—	—	HHDT
Paving	—	—	—	—

Paving	Worker	15.0	11.7	LDA,LDT1,LDT2
Paving	Vendor	—	8.40	HHDT,MHDT
Paving	Hauling	0.00	20.0	HHDT
Paving	Onsite truck	—	—	HHDT
Architectural Coating	—	—	—	—
Architectural Coating	Worker	5.98	11.7	LDA,LDT1,LDT2
Architectural Coating	Vendor	—	8.40	HHDT,MHDT
Architectural Coating	Hauling	0.00	20.0	HHDT
Architectural Coating	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
Architectural Coating	327,746	109,249	0.00	0.00	—

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (Cubic Yards)	Material Exported (Cubic Yards)	Acres Graded (acres)	Material Demolished (Building Square Footage)	Acres Paved (acres)
Demolition	0.00	0.00	0.00	2,000	—
Site Preparation	0.00	0.00	37.5	0.00	—
Grading	41,130	0.00	20.0	0.00	—
Paving	0.00	0.00	0.00	0.00	0.91

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Exposed Area	2	61%	61%
Water Demolished Area	2	36%	36%

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
Single Family Housing	0.91	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2024	0.00	204	0.03	< 0.005
2025	0.00	204	0.03	< 0.005

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Single Family Housing	784	792	710	282,566	7,975	8,060	7,224	2,876,229

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

Hearth Type	Unmitigated (number)
Single Family Housing	—
Wood Fireplaces	0
Gas Fireplaces	0
Propane Fireplaces	0
Electric Fireplaces	0
No Fireplaces	83
Conventional Wood Stoves	0
Catalytic Wood Stoves	0
Non-Catalytic Wood Stoves	0
Pellet Wood Stoves	0

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
327746.25	109,249	0.00	0.00	—

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	180

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Single Family Housing	513,343	204	0.0330	0.0040	3,836,420

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
Single Family Housing	3,020,563	14,181,389

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
Single Family Housing	57.5	—

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
Single Family Housing	Average room A/C & Other residential A/C and heat pumps	R-410A	2,088	< 0.005	2.50	2.50	10.0
Single Family Housing	Household refrigerators and/or freezers	R-134a	1,430	0.12	0.60	0.00	1.00

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor

5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)

5.17. User Defined

Equipment Type	Fuel Type
—	—

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	19.3	annual days of extreme heat
Extreme Precipitation	2.10	annual days with precipitation above 20 mm
Sea Level Rise	0.00	meters of inundation depth
Wildfire	8.54	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider different increments of sea level rise coupled with extreme storm events. Users may select from four model simulations to view the range in potential inundation depth for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 50 meters (m) by 50 m, or about 164 feet (ft) by 164 ft.
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A

Extreme Precipitation	1	0	0	N/A
Sea Level Rise	1	0	0	N/A
Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	0	0	0	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	1	1	1	2
Sea Level Rise	1	1	1	2
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	1	1	1	2

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	35.2
AQ-PM	27.7
AQ-DPM	61.3
Drinking Water	29.0
Lead Risk Housing	27.7
Pesticides	60.1
Toxic Releases	29.3
Traffic	17.3
Effect Indicators	—
CleanUp Sites	62.4
Groundwater	54.5
Haz Waste Facilities/Generators	65.9
Impaired Water Bodies	96.3
Solid Waste	0.00
Sensitive Population	—
Asthma	83.9
Cardio-vascular	86.0
Low Birth Weights	45.3
Socioeconomic Factor Indicators	—
Education	59.6
Housing	69.9

Linguistic	29.5
Poverty	68.9
Unemployment	37.7

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	36.32747337
Employed	29.10304119
Median HI	43.73155396
Education	—
Bachelor's or higher	13.64044655
High school enrollment	8.135506224
Preschool enrollment	15.37277044
Transportation	—
Auto Access	48.06877967
Active commuting	10.66341589
Social	—
2-parent households	43.60323367
Voting	45.34838958
Neighborhood	—
Alcohol availability	52.97061465
Park access	18.88874631
Retail density	39.2403439
Supermarket access	74.40010266
Tree canopy	63.39022199

Housing	—
Homeownership	57.5003208
Housing habitability	33.63274734
Low-inc homeowner severe housing cost burden	20.08212498
Low-inc renter severe housing cost burden	3.349159502
Uncrowded housing	66.9190299
Health Outcomes	—
Insured adults	50.62235339
Arthritis	0.0
Asthma ER Admissions	9.9
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	15.1
Cognitively Disabled	82.5
Physically Disabled	60.6
Heart Attack ER Admissions	6.1
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	42.4
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—

658

Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0
Children	84.9
Elderly	49.5
English Speaking	74.0
Foreign-born	29.8
Outdoor Workers	18.9
Climate Change Adaptive Capacity	—
Impervious Surface Cover	43.8
Traffic Density	39.1
Traffic Access	60.3
Other Indices	—
Hardship	55.0
Other Decision Support	—
2016 Voting	34.9

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	65.0
Healthy Places Index Score for Project Location (b)	29.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	Yes
Project Located in a Low-Income Community (Assembly Bill 1550)	Yes
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Land Use	AQ questionnaire acreage.
Construction: Construction Phases	AQ questionnaire - demo 5 days, site prep 5 days, paving 5 days. Arch coatings phase starts 2 weeks after the start of building construction phase and lasts for the same amount of days.
Construction: Dust From Material Movement	AQ questionnaire for grading imports. BAAQMD guidance indicates use water exposed area slide on.
Operations: Hearths	AQ questionnaire indicated zero fire places.
Construction: On-Road Fugitive Dust	BAAQMD guidance appendix D recommends changing road silt loading to 0.5 g/m2. BAAQMD guidance also recommends BMP-4 be captured in the modeling by changing vehicle speeds to 15 mph.

Road Construction Emissions Model, Version 9.0.0

Daily Emission Estimates for -> Village at 2092 Oakley

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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drainage/Utilities/Sub-Grade	1.84	21.90	17.26	1.56	0.76	0.80	0.86	0.69	0.17	0.04	4,067.43	0.69	0.06	4,103.24
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (pounds/day)	1.84	21.90	17.26	1.56	0.76	0.80	0.86	0.69	0.17	0.04	4,067.43	0.69	0.06	4,103.24
Total (tons/construction project)	0.08	0.90	0.71	0.06	0.03	0.03	0.04	0.03	0.01	0.00	166.76	0.03	0.00	168.23

Notes:

Project Start Year ->	2024
Project Length (months) ->	2
Total Project Area (acres) ->	0
Maximum Area Disturbed/Day (acres) ->	0
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	0	0	0	0	200	40
Grading/Excavation	0	0	0	0	800	40
Drainage/Utilities/Sub-Grade	0	0	0	0	560	40
Paving	0	0	0	0	400	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 -> Village at 2092 Oakley

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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grading/Excavation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drainage/Utilities/Sub-Grade	0.08	0.90	0.71	0.06	0.03	0.03	0.04	0.03	0.01	0.00	166.76	0.03	0.00	152.62
Paving	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum (tons/phase)	0.08	0.90	0.71	0.06	0.03	0.03	0.04	0.03	0.01	0.00	166.76	0.03	0.00	152.62
Total (tons/construction project)	0.08	0.90	0.71	0.06	0.03	0.03	0.04	0.03	0.01	0.00	166.76	0.03	0.00	152.62

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.

Appendix B
Planning Survey Report

Application Form and Planning Survey Report

To Comply With and Receive Permit Coverage Under The East Contra Costa County Habitat Conservation Plan and Natural Community Conservation Plan

Please complete this application to apply for take authorization under the state and federal East Contra Costa County HCP/NCCP incidental take permits. The East Contra Costa County Habitat Conservancy ("Conservancy") or local jurisdiction (City of Brentwood, City of Clayton, City of Oakley, City of Pittsburg, and Contra Costa County) may request more information in order to deem the application complete.

I. PROJECT OVERVIEW

PROJECT INFORMATION	
PROJECT NAME: The Village at 2092 Oakley Road Subdivision	
PROJECT TYPE: ☒ Residential ☐ Commercial ☐ Transportation ☐ Utility ☐ Other	
PROJECT DESCRIPTION (BRIEF): Subdivide 9.99 acre Property into 83 single-family, detached residential lots, on-site parking, toddler park, & community gathering areas, as well as other improvements.	
PROJECT ADDRESS/LOCATION: 2092 Oakley Road, Oakley, CA 94561	
PARCEL/PROJECT SIZE (ACRES): 9.99 ac	
PROJECT APN(S): 037-110-031	
APPLICATION SUBMITTAL DATE:	**FINAL PSR DATE:** (City/County/Conservancy use)
LEAD PLANNER:	
JURISDICTION: ☐ City of Brentwood ☐ City of Clayton ☒ City of Oakley ☐ City of Pittsburg ☐ Contra Costa County ☐ Participating Special Entity*	
*Participating Special Entities are organizations not subject to the authority of a local jurisdiction. Such organizations may include school districts, irrigation districts, transportation agencies, local park districts, geological hazard abatement districts, or other utilities or special districts that own land or provide public services.	
DEVELOPMENT FEE ZONE: ☐ Zone I ☐ Zone II ☒ Zone III ☐ Zone IV	
See figure 9-1 of the HCP/NCCP at www.cocohcp.org for a generalized development fee zone map. Detailed development fee zone maps by jurisdiction are available from the jurisdiction.	

PROJECT APPLICANT INFORMATION	
APPLICANT'S NAME: John D'Ambrosio & Juliann D'Ambrosio, Trustees of the John D'Ambrosio Family Trust	
AUTHORIZED AGENT'S NAME AND TITLE: Owen Poole, Real Estate Services	
PHONE NO.: (925) 933-4928	**APPLICANT'S E-MAIL:** Owen@realestatesvs.com
MAILING ADDRESS: 151 Spyrock Court, Walnut Creek, CA 94595	

BIOLOGIST INFORMATION[1]	
BIOLOGICAL/ENVIRONMENTAL FIRM: Olberding Environmental, Inc.	
CONTACT NAME AND TITLE: Jeff Olberding	
PHONE NO.: (916) 985-1188	**CONTACT'S E-MAIL:** Jeff@Olberdingenv.com
MAILING ADDRESS: 193 Blue Ravine Road, Suite 165, Folsom, CA 95630	

[1] A USFWS/CDFW-approved biologist (project-specific) is required to conduct the surveys. Please submit biologist(s) approval request to the Conservancy.

II. PROJECT DETAILS

Please complete and/or provide the following attachments:

1) **Project Description**
Attach as **Attachment A: Project Description**. Provide a detailed written description that concisely and completely describes the project and location. Include the following information:
   - All activities proposed for the site or project, including roads utilized, construction staging areas, and the installation of underground facilities, to ensure the entire project is covered by the HCP/NCCP permit
   - Proposed construction dates, including details on construction phases, if applicable
   - Reference a City/County application number for the project, if applicable
   - General Best Management Practices, if applicable
   - If the project will have temporary impacts, please provide a restoration plan describing how the site will be restored to pre-project conditions, including revegetation seed mixes or plantings and timing

2) **Project Vicinity Map**
Provide a project vicinity map. Attach as **Figure 1** in **Attachment B: Figures**.

3) **Project Site Plans**
Provide any project site plans for the project. Attach as **Figure 2** in **Attachment B: Figures**.

4) **CEQA Document**
Indicate the status of CEQA documents prepared for the project. Provide additional comments below table if necessary.

Type of Document	Status	Date Completed
☒ Initial Study	In-Process	TBD
☐ Notice of Preparation		
☐ Draft EIR		
☐ Final EIR		
☐ Notice of Categorical Exemption		
☐ Notice of Statutory Exemption		
☐ Other (describe)		

IS/MND to be conducted by Raney Planning & Management, Inc.

III. EXISTING CONDITIONS AND IMPACTS

Please complete and/or provide the following attachments:

1) **Field-Verified Land Cover Map**[2]
Attach a field-verified land cover map in **Attachment B: Figures** and label as **Figure 3**. The map should contain all land cover types present on-site overlaid on aerial/satellite imagery. Map colors for the land cover types should conform to the HCP/NCCP (see *Figure 3-3: Landcover in the Inventory Area* for land cover type legend).

2) **Photographs of the Project Site**
Attach representative photos of the project site in **Attachment B: Figures** and label as **Figure 4**. Please provide captions for each photo.

[2] For PSEs and city or county public works projects, please also identify permanent and temporary impact areas by overlaying crosshatching (permanent impacts) and hatching (temporary impacts) on the land cover map.

3) Land Cover Types and Impacts and Supplemental Tables

- For all terrestrial land cover types please provide calculations to the nearest **hundredth of an acre (0.01)**. For aquatic land cover types please provide calculations to the nearest **thousandth of an acre (0.001)**.
- **Permanent Impacts** are broadly defined in the ECCC HCP/NCCP to include all areas removed from an undeveloped or habitat-providing state and includes land in the same parcel or project that is not developed, graded, physically altered, or directly affected in any way but is isolated from natural areas by the covered activity. Unless such undeveloped land is dedicated to the Preserve System or is a deed-restricted creek setback, the development mitigation fee will apply (if proposed, would require Conservancy approval).
- **Temporary Impacts** are broadly defined in the ECCC HCP/NCCP as any impact on vegetation or habitat that does not result in permanent habitat removal (i.e. vegetation can eventually recover).
- If **wetland (riparian woodland/scrub, wetland, or aquatic)** land cover types are present on the parcel but will not be impacted please discuss in the following section 4) Jurisdictional Wetlands and Waters. Wetland impact fees will only be charged if wetland features are impacted. However, development fees will apply to the entire parcel.
- **Stream** land cover type is considered a linear feature where impacts are calculated based on length impacted. The acreage within a stream, below Top of Bank (TOB), must be assigned to the adjacent land cover type(s). Insert area of impact to stream below TOB in parentheses after the Land Cover acreage number (e.g., Riparian Woodland/Scrub: 10 (0.036) – where 10 is the total impacted acreage including 0.036 acre, which is the acreage within stream TOB). Complete following supplemental **Stream Feature Detail** table to provide information for linear feet.
- **Total Impacts** acreage should be the total parcel acreage (development project) or project footprint acreage (rural infrastructure or utility project).

Table 1: Land Cover Types and Impacts

Land Cover Type	Permanent Impacts	Temporary Impacts	*Proposed for HCP/NCCP Dedication on the Parcel (Requires Conservancy Approval)* *Stream Setback*	*Preserve System Dedication*
Grassland				
Annual Grassland				
Alkali Grassland				
Ruderal				
Shrubland				
Chaparral and Scrub				
Woodland				
Oak Savannah				
Oak Woodland				
Riparian				
Riparian Woodland/Scrub				
Wetland				
Permanent Wetland				
Seasonal Wetland				
Alkali Wetland				
Aquatic				
Aquatic (Reservoir/Open Water)				
Slough/Channel				
Pond				
Stream (in linear feet)	-	-	-	-
Irrigated Agriculture				
Pasture				
Cropland				
Orchard				
Vineyard	9.99			
Other				
Nonnative woodland				
Wind turbines				
Developed (not counted toward Fees)				
Urban				
Aqueduct				
Turf				
Landfill				
TOTAL IMPACTS	9.99			

Identify any uncommon vegetation and uncommon landscape features[3]:

Supplemental to Table 1: Uncommon Vegetation and Landscape Features

	Permanent Impacts	Temporary Impacts
Uncommon Grassland Alliances		
Purple Needlegrass Grassland		
Blue Wildrye Grassland		
Creeping Ryegrass Grassland		
Wildflower Fields		
Squirreltail Grassland		
One-sided Bluegrass Grassland		
Serpentine Bunchgrass Grassland		
Saltgrass Grassland		
Alkali Sacaton Bunchgrass Grassland		
☐ Other		
Uncommon Landscape Features		
Rock Outcrops		
Caves		
Springs and seeps		
Scalds		
Sand Deposits	9.99	
☐ Mines[4]		
☒ Buildings (bat roosts)[3]	0.25	
☒ Potential nest sites (trees or cliffs)[3]	0.25	

Please provide details of impacts to stream features:

Stream Name: N/A

Watershed:

Supplemental to Table 1: Stream Feature Detail[5]

Stream Width	Stream Type[6]	Permanent Impacts (linear feet)[7]	Temporary Impacts (linear feet)[7]
☐ ≤ 25 feet wide ☐ > 25 feet wide	☐ Perennial ☐ Intermittent ☐ Ephemeral, 3rd or higher order ☐ Ephemeral, 1st or 2nd order		
☐ ≤ 25 feet wide ☐ > 25 feet wide	☐ Perennial ☐ Intermittent ☐ Ephemeral, 3rd or higher order ☐ Ephemeral, 1st or 2nd order		
☐ ≤ 25 feet wide ☐ > 25 feet wide	☐ Perennial ☐ Intermittent ☐ Ephemeral, 3rd or higher order ☐ Ephemeral, 1st or 2nd order		

[3] These acreages are for Conservancy tracking purposes. Impacts to these uncommon vegetation and landscape features should be accounted for within the land cover types in Table 1 (e.g., x acres of purple needlegrass in this supplemental table should be accounted for within annual grassland in Table 1).
[4] Insert amount/number, not acreage. Provide additional information on these features in Attachment A: Project Description.
[5] Use more than 1 row as necessary to describe impacts to streams on site.
[6] See glossary (Appendix A) for definition of stream type and order.
[7] Stream length is measured along stream centerline, based on length of impact to any part of the stream channel, TOB to TOB.

4) Summary of Land Cover Types

Please provide a written summary of descriptions for land cover types found on site including characteristic vegetation.

The Property is currently planted as a vineyard with rows of grape vines on a sandy soil substrate (Delhi sand, 2 to 9 percent slopes). There are two residences on the Property and associated outbuildings, and non-native, ornamental trees. Trees on the Property include almond, pine, and other non-native species. There is also a false water tower located in the northeast corner of the Property.

5) Jurisdictional Wetlands and Waters

If wetlands and waters are present on the project site, project proponents must conduct a delineation of jurisdictional wetlands and waters. Jurisdictional wetlands and waters are defined on pages 1-18 and 1-19 of the ECCC HCP/NCCP as the following land cover types: permanent wetland, seasonal wetland, alkali wetland, aquatic, pond, slough/channel, and stream. It should be noted that these features differ for federal and state jurisdictions. If you have identified any of these land cover types in Table 1, complete the section below.

a) Attach the wetland delineation report as **Attachment E: Wetland Delineation.** If a wetland delineation has not been completed, please explain below in section 4c.

b) Please check the following permits the project may require. Please submit copies of these permits to the Conservancy prior to the start of construction:

☐ CWA Section 404 Permit[8] ☐ CWA Section 401 Water Quality Certification

☐ Waste Discharge Requirements ☐ Lake and Streambed Alteration Agreement

c) Provide any additional information on impacts to jurisdictional wetland and waters below, including status of the permit(s):

There are no wetlands/waters on the Property.

[8] The USACE Sacramento District issued a Regional General Permit 1 (RGP) related to ECCC HCP/NCCP covered activities. The RGP is designed to streamline wetland permitting in the entire ECCC HCP/NCCP Plan Area by coordinating the avoidance, minimization, and mitigation measures in the Plan with the Corps' wetland permitting requirement. Applicants seeking authorization under this RGP shall notify the Corps in accordance with RGP general condition number 18 (Notification).

6) Species-Specific Planning Survey Requirements

Based on the land cover types found on-site and identified in Table 1, check the applicable boxes in Table 2a.

Table 2a. Species –Specific Planning Survey Requirements

Land Cover Type in Project Area	Required Survey Species	Habitat Element in Project Area	Planning Survey Requirement[9]	Info in HCP
☒ Grasslands, oak savannah, agriculture, or ruderal	☐ San Joaquin kit fox	Assumed if within modeled range of species	If within modeled range of species, identify and map potential breeding or denning habitat within the project site and a 250-ft radius around the project footprint.	pp. 6-37 to 6-38
	☒ Western burrowing owl	Assumed	Identify and map potential breeding habitat within the project site and a 500-ft radius around the project footprint. Please note the HCP requires buffers for occupied burrows. Surveys may need to encompass an area larger than the project footprint.	pp. 6-39 to 6-41
☐ Aquatic (ponds, wetlands, streams, sloughs, channels, and marshes)	☐ Giant garter snake	Aquatic habitat accessible from the San Joaquin River	Identify and map potential habitat.	pp. 6-43 to 6-45
	☐ California tiger salamander	Ponds and wetlands Vernal pools Reservoirs Small lakes	Identify and map potential breeding habitat. Document habitat quality and features. Provide the Conservancy with photo-documentation and report.	pp. 6-45
	☐ California red-legged frog	Slow-moving streams, ponds and wetlands	Identify and map potential breeding habitat. Document habitat quality and features. Provide the Conservancy with photo-documentation and report.	p. 6-46
	☐ Covered shrimp	Seasonal wetlands Vernal pools Sandstone rock outcrops Sandstone depressions	Identify and map potential habitat. Please note the HCP requires a 50 foot non-disturbance buffer from seasonal wetlands that may be occupied by covered shrimp. Surveys may need to encompass an area larger than the project footprint.	pp. 6-46 to 6-48
☒ Any	☐ Townsend's big-eared bat	Rock formations with caves Mines Abandoned buildings outside urban area	Map and document potential breeding or roosting habitat.	pp. 6-36 to 6-37
	☒ Swainson's hawk	Potential nest sites within 1,000 feet of project	Inspect large trees for presence of nest sites. Document and map.	pp. 6-41 to 6-43
	☐ Golden Eagle	Potential nest sites with ½ mile of project	Inspect large trees for presence of nest sites. Document and map.	pp. 6-38 to 6-39
Surveys for all covered species must be conducted by a qualified biologist (USFWS/CDFW project-specific approved). Please submit biologist approval request to the East Contra Costa County Habitat Conservancy. Surveys for all covered species must be conducted according to the respective USFWS or CDFW survey protocols, as identified in Chapter 6.4.3 in the HCP/NCCP.				

7) Planning Survey Species Habitat Maps

Provide Planning Survey Species Habitat Maps as required in Table 2a, attach as **Figure 5** in **Attachment B: Figures**.

[9] The planning survey requirements in this table are not comprehensive. Please refer to Chapter 6.4.3 in the ECCC HCP/NCCP for more detail.

8) Results of Species Specific Surveys

Provide a written summary describing the results of the planning surveys. Please discuss the location, quantity, and quality of suitable habitat for specified covered wildlife species on the project site.

Olberding Environmental biologist, Richard Lescalleet, conducted a survey of species habitat within the entire study area, including visible portions of the adjacent properties on April 27, 2023 at approximately 2:00pm. The purpose of the habitat survey was to evaluate wildlife habitats and the potential for any protected species to occur on or adjacent to the Property. A reconnaissance-level raptor survey was conducted on the Property. Observation points were established on the periphery of the site to view raptor activity over a thirty-minute time period. This survey was conducted with the use of binoculars and notes were taken for each species occurrence. Additionally, utility poles and other perch sites in the vicinity of the Property were observed. All raptor activity within and adjacent to the Property was recorded during the reconnaissance-level observation period. A reconnaissance-level burrowing owl survey was also conducted on the Property, to identify potential burrow sites or burrowing owl use of on-site habitat. The general presence and density of suitable burrow sites (e.g., rodent burrows) was evaluated for the Property. In addition to set observation points, transects no more than ten meters apart were walked across the entire property.

CNDDB listed 53 occurrences of burrowing owl within five miles of the Property. The closest occurrence (Occurrence #1873) was observed approximately 1.5 miles south of the Property in a fallow field just southwest of Laurel Road at Brown Road. Nine adults and three juveniles were observed in July 2007. The area surrounding the Property is historically known to provide suitable habitat for burrowing owls. Burrowing owls are known to occur within disked fields if small mammal burrows are present. The vineyard land use with sandy soil substrate on the Property could provide suitable foraging opportunities; however, no ground squirrels or burrows were observed on site. The burrows present on site were made by pocket gophers, which are too small for burrowing owls. Due to the high number occurrences in close proximity to the Property, pre-construction surveys for burrowing owls would need to be completed before construction is initiated.

The CNDDB listed 14 occurrences of Swainson's hawk within a 5-mile radius of the Property. The closest occurrence (Occurrence #1799) is located approximately 1 miles northwest of the Property. In 2012, a nest was located within a dead redwood tree on the old Dupont property which was an old brownfield. That location is currently an Amazon Logistics and Shipping facility. It is unknown if the redwood tree is still present in that location. The area surrounding the Property is historically known to provide suitable habitat for Swainson's hawk. The some of the ornamental trees on the Property and other trees within 1000 feet of the Property are of suitable size and may provide somewhat suitable nesting sites, but Swainson's hawk characteristically prefers large, tall trees, such as eucalyptus, along riparian corridors. The Property provides somewhat suitable foraging habitat within the vineyard, but the surrounding developments may deter Swainson's hawk as they prefer to forage in open habitat, such as fields. For these reasons, Swainson's hawk has a moderate potential to occur on the Property in a breeding and foraging capacity.

The CNDDB did not list the golden eagle as occurring within five miles of the Property. There is no suitable habitat for golden eagle within a ½ - mile buffer zone around the Property due to the lack of cliff-walled canyons and tall trees with sufficient open space. The Property is surrounded by a highly urbanized area making golden eagle nesting and foraging unlikely.

9) Covered and No-Take Plants

Please check the applicable boxes in Table 2b based on the land cover types found in the project area. If suitable land cover types are present on site, surveys must be conducted using approved CDFW/USFWS methods during the appropriate season for identification of covered and no-take species (see page 6-9 of the ECCC HCP/NCCP). Reference populations of covered and no-take plants should be visited, where possible, prior to conducting surveys to confirm that the plant species is visible and detectable at the time surveys are conducted. <u>In order to complete all the necessary covered and no-take plant surveys, spring, summer, and fall surveys may be required.</u>

Table 2b. Covered and No-Take Plant Species

Plant Species	Covered (C) or No-Take (N)	Associated Land Cover Type	Typical Habitat or Physical Conditions, if Known	Typical Blooming Period	Suitable Land Cover Type Present
Adobe navarretia (*Navarretia nigelliformis* ssp. *radians*) [a]	C	Annual Grassland	Generally found on clay barrens in Annual Grassland [b]	Apr–Jun	☐ Yes ☒ No
Alkali milkvetch (*Astragalus tener* ssp. *tener*)	N	Alkali grassland Alkali wetland Annual grassland Seasonal wetland	Generally found in vernally moist habitat in soils with a slight to strongly elevated pH	Mar–Jun	☐ Yes ☒ No
Big tarplant (*Blepharizonia plumosa*)	C	Annual grassland	Elevation below 1500 feet [d] most often on Altamont Series or Complex soils	Jul–Oct	☐ Yes ☒ No
Brewer's dwarf flax (*Hesperolinon breweri*)	C	Annual grassland Chaparral and scrub Oak savanna Oak woodland	Generally, restricted to grassland areas within a 500+ buffer from oak woodland and/or chaparral/scrub [d]	May–Jul	☐ Yes ☒ No
Brittlescale (*Atriplex depressa*)	C	Alkali grassland Alkali wetland	Restricted to soils of the Pescadero or Solano soil series; generally found in southeastern region of plan area [d]	May–Oct	☐ Yes ☒ No
Caper-fruited tropidocarpum (*Tropidocarpum capparideum)*	N	Alkali grassland		Mar–Apr	☐ Yes ☒ No
Contra Costa goldfields (*Lasthenia conjugens*)	N	Alkali grassland Alkali wetland Annual grassland Seasonal wetland	Generally found in vernal pools	Mar–Jun	☐ Yes ☒ No
Diablo Helianthella (*Helianthella castanea*)	C	Chaparral and scrub Oak savanna Oak woodland	Elevations generally above 650 feet [d]	Mar–Jun	☐ Yes ☒ No
Diamond-petaled poppy (*Eschscholzia rhombipetala*)	N	Annual grassland		Mar–Apr	☐ Yes ☒ No
Large-flowered fiddleneck (*Amsinckia grandiflora*)	N	Annual grassland	Generally on clay soil	Apr–May	☐ Yes ☒ No
Mount Diablo buckwheat (*Eriogonum truncatum*)	N	Annual grassland Chaparral and scrub	Ecotone of grassland and chaparral/scrub	Apr–Sep	☐ Yes ☒ No
Mount Diablo fairy-lantern (*Calochortus pulchellus*)	C	Annual grassland Chaparral and scrub Oak savanna Oak woodland	Elevations generally between 650 and 2,600[d]	Apr–Jun	☐ Yes ☒ No
Mount Diablo Manzanita (*Arctostaphylos auriculata*)	C	Chaparral and scrub	Elevations generally between 700 and 1,860 feet; restricted to the eastern and northern flanks of Mt. Diablo [d] and the vicinity of Black Diamond Mines	Jan–Mar	☐ Yes ☒ No
Recurved larkspur (*Delphinium recurvatum*)	C	Alkali grassland Alkali wetland		Mar–Jun	☐ Yes ☒ No
Round-leaved filaree (*California macrophylla*) [c]	C	Annual grassland		Mar–May	☐ Yes ☒ No
San Joaquin spearscale (*Extriplex joaquiniana*) [e]	C	Alkali grassland Alkali wetland		Apr–Oct	☐ Yes ☒ No
Showy madia (*Madia radiata*)	C	Annual grassland Oak savanna Oak woodland	Primarily occupies open grassland or grassland on edge of oak woodland	Mar–May	☐ Yes ☒ No

[a] The species *Navarretia nigelliformis* subsp. *nigelliformis* is no longer considered to occur within Contra Costa County based on specimen annotations at the UC and Jepson Herbaria at the University of California Berkeley as well as the opinions of experts in the genus. This taxon is now recognized as *Navarretia nigelliformis* subsp. *radians.* Any subspecies of *Navarretia nigelliformis* encountered as a part of botanical surveys in support of a PSR should be considered as covered under this HCP/NCCP.

[b] Habitat for the *Navarretia nigelliformis* subspecies that occurs within the inventory are is inaccurately described in the HCP/NCCP as vernal pools. The entity within the Inventory generally occupies clay barrens within Annual Grassland habitat, which is an upland habitat type.

[c] From California Native Plant Society. 2007. *Inventory of Rare and Endangered Plants* (online edition, v7-07d). Sacramento, CA. Species may be identifiable outside of the typical blooming period; a professional botanist shall determine if a covered or no take plant occurs on the project site. Reference population of covered and no-take plants should be visited, where possible, prior to conducting surveys to confirm that the plant is visible and detectable at the time surveys are conducted.

[d] See Species Profiles in Appendix D of the Final HCP/NCCP. Reference populations of covered and no-take plants should be visited, where possible, prior to conducting surveys to confirm that the plant species is visible and detectable at the time surveys are conducted.

[e] In the recent update to the Jepson eflora (JFP 2013) *Atriplex joaquinana* has been circumscribed and segregated into a new genus called *Extriplex* based on the work of Elizabeth Zacharias and Bruce Baldwin (2010). The etymology of the genus *Extriplex* means, "beyond or outside Atriplex".

10) Results of Covered and No-Take Plant Species

Provide a written summary describing the results of the planning surveys conducted as required in Table 2b. Describe the methods used to survey the site for all covered and no-take plants, including the dates and times of all surveys conducted (see Tables 3-8 and 6-5 of the ECCC HCP/NCCP for covered and no-take plants), including reference populations visited prior to conducting surveys.

If any covered or no-take plant species were found, include the following information in the results summary:

- Description and number of occurrences and their rough population size.
- Description of the "health" of each occurrence, as defined on pages 5-49 and 5-50 of the HCP/NCCP.
- A map of all the occurrences.
- Justification of surveying time window, if outside of the plant's blooming period.
- The CNDDB form(s) submitted to CDFW (if this is a new occurrence).
- A description of the anticipated impacts that the covered activity will have on the occurrence and how the project will avoid impacts to all covered and no-take plant species. If impacts to covered plant species cannot be avoided and plants will be removed by covered activity, the Conservancy must be notified and has the option to salvage the covered plants. All projects must demonstrate avoidance of all six no-take plants (see table 6-5 of the HCP/NCCP).

There are no suitable land cover types on the Property for Covered and No-Take Plant species. Therefore, plant surveys are not required.

IV. SPECIES-SPECIFIC AVOIDANCE AND MINIMIZATION REQUIREMENTS

Please complete and/or provide the following attachments:

1) Species-Specific Avoidance and Minimization for Selected Covered Wildlife
Complete the following table and check the applicable box for covered species determined by the planning surveys.

Table 3. Summary of Applicable Preconstruction Surveys, Avoidance and Minimization, and Construction Monitoring Requirements[10]

Species	Preconstruction Survey Requirements	Avoidance and Minimization Requirements	Construction Monitoring Required	Info in HCP
☐ San Joaquin kit fox	• On project footprint and 250-ft radius, map all dens (>5 in. diameter) and determine status • Provide written survey results to USFWS within 5 working days after surveying	• Monitor dens • Destroy unoccupied dens • Discourage use of occupied (non-natal) dens	• Establish exclusion zones (>50 ft for potential dens, and >100 ft for known dens) • Notify USFWS of occupied natal dens	pp. 6-37 to 6-38
☒ Western burrowing owl	• On project footprint and 500-ft radius, identify and map all owls and burrows, and determine status • Document use of habitat (e.g. breeding, foraging)	• Avoid occupied nests during breeding season (Feb-Sep) • Avoid occupied burrows during nonbreeding season (Sep – Feb) • Install one-way doors in occupied burrow (if avoidance not possible) • Monitor burrows with doors installed	• Establish buffer zones (250 ft around nests) • Establish buffer zones (160 ft around burrows)	pp. 6-39 to 6-41
☐ Giant garter snake	• Delineate aquatic habitat up to 200 ft from water's edge on each side • Document any occurrences	• Limit construction to Oct-May • Dewater habitat April 15 – Sep 30 prior to construction • Minimize clearing for construction	• Delineate 200 ft buffer around potential habitat near construction • Provide field report on monitoring efforts • Stop construction activities if snake is encountered; allow snake to passively relocate • Remove temporary fill or debris from construction site • Mandatory training for construction personnel	pp. 6-43 to 6-45
☐ California tiger salamander	• Provide written notification to USFWS and CDFW regarding timing of construction and likelihood of occurrence on site	• Allow agency staff to translocate species, if requested	• None	p. 6-45
☐ California red-legged frog	• Provide written notification to USFWS and CDFW regarding timing of construction and likelihood of occurrence on site	• Allow agency staff to translocate species, if requested	• None	p. 6-46
☐ Covered shrimp	• Establish presence/absence • Document and evaluate use of all habitat features (e.g. vernal pools, rock outcrops)	• Establish buffer near construction activities • Prohibit incompatible activities	• Establish buffer around outer edge of all hydric vegetation associated with habitat (50 ft or immediate watershed, whichever is larger) • Mandatory training for construction personnel	pp. 6-46 to 6-48
☐ Townsend's big-eared bat	• Establish presence/absence • Determine if potential sites were recently occupied (guano)	• Seal hibernacula before Nov • Seal nursery sites before April • Delay construction near occupied sites until hibernation or nursery seasons are over	• None	pp. 6-36 to 6-37
☒ Swainson's hawk	• Determine whether potential nests are occupied	• No construction within 1,000 ft of occupied nests within breeding season (March 15 - Sep 15) • If necessary, remove active nest tree after nesting season to prevent occupancy in second year.	• Establish 1,000 ft buffer around active nest and monitor compliance (no activity within established buffer)	pp. 6-41 to 6-43
☐ Golden Eagle	• Establish presence/absence of nesting eagles	• No construction within ½ mile near active nests (most activity late Jan – Aug)	• Establish ½ mile buffer around active nest and monitor compliance with buffer	pp. 6-38 to 6-39

[10] The requirements in this table are not comprehensive; they are detailed in the next section on the following page.

2) Required Preconstruction Surveys, Avoidance and Minimization, and Construction Monitoring

All preconstruction surveys shall be conducted in accordance with the requirements set forth in Section 6.4.3, Species-Level Measures, and Table 6-1 of the ECCC HCP/NCCP. Detailed descriptions of preconstruction surveys, avoidance and minimization, and construction monitoring applicable to each of the wildlife species in Table 3 are located below. Please remove the species-specific measures that do not apply to your project (highlight entire section and delete).

WESTERN BURROWING OWL

Preconstruction Surveys

Prior to any ground disturbance related to covered activities, a USFWS/CDFW- approved biologist will conduct a preconstruction survey in areas identified in the planning surveys as having potential burrowing owl habitat. The surveys will establish the presence or absence of western burrowing owl and/or habitat features and evaluate use by owls in accordance with CDFW survey guidelines (California Department of Fish and Game 1995).

On the parcel where the activity is proposed, the biologist will survey the proposed disturbance footprint and a 500-foot radius from the perimeter of the proposed footprint to identify burrows and owls. Adjacent parcels under different land ownership will not be surveyed. Surveys should take place near sunrise or sunset in accordance with CDFW guidelines. All burrows or burrowing owls will be identified and mapped. Surveys will take place no more than 30 days prior to construction. During the breeding season (February 1– August 31), surveys will document whether burrowing owls are nesting in or directly adjacent to disturbance areas. During the nonbreeding season (September 1–January 31), surveys will document whether burrowing owls are using habitat in or directly adjacent to any disturbance area. Survey results will be valid only for the season (breeding or nonbreeding) during which the survey is conducted.

Avoidance and Minimization and Construction Monitoring

This measure incorporates avoidance and minimization guidelines from CDFW's *Staff Report on Burrowing Owl Mitigation* (California Department of Fish and Game 1995).

If burrowing owls are found during the breeding season (February 1 – August 31), the project proponent will avoid all nest sites that could be disturbed by project construction during the remainder of the breeding season or while the nest is occupied by adults or young. Avoidance will include establishment of a non-disturbance buffer zone (described below). Construction may occur during the breeding season if a qualified biologist monitors the nest and determines that the birds have not begun egg-laying and incubation or that the juveniles from the occupied burrows have fledged. During the nonbreeding season (September 1 – January 31), the project proponent should avoid the owls and the burrows they are using, if possible. Avoidance will include the establishment of a buffer zone (described below).

During the breeding season, buffer zones of at least 250 feet in which no construction activities can occur will be established around each occupied burrow (nest site). Buffer zones of 160 feet will be established around each burrow being used during the nonbreeding season. The buffers will be delineated by highly visible, temporary construction fencing.

If occupied burrows for burrowing owls are not avoided, passive relocation will be implemented. Owls should be excluded from burrows in the immediate impact zone and within a 160-foot buffer zone by installing one-way doors in burrow entrances. These doors should be in place for 48 hours prior to excavation. The project area should be monitored daily for 1 week to confirm that the owl has abandoned the burrow. Whenever possible, burrows should be excavated using hand tools and refilled to prevent reoccupation (California Department of Fish and Game 1995). Plastic tubing or a similar structure should be inserted in the tunnels during excavation to maintain an escape route for any owls inside the burrow.

SWAINSON'S HAWK

Preconstruction Survey

Prior to any ground disturbance related to covered activities that occurs during the nesting season (March 15–September 15), a qualified biologist will conduct a preconstruction survey no more than 1 month prior to construction to establish whether Swainson's hawk nests within 1,000 feet of the project site are occupied. If potentially occupied nests within 1,000 feet are off the project site, then their occupancy will be determined by observation from public roads or by observations of Swainson's hawk activity (e.g., foraging) near the project site. If nests are occupied, minimization measures and construction monitoring are required (see below).

Avoidance and Minimization and Construction Monitoring

During the nesting season (March 15–September 15), covered activities within 1,000 feet of occupied nests or nests under construction will be prohibited to prevent nest abandonment. If site-specific conditions or the nature of the covered activity (e.g., steep topography, dense vegetation, limited activities) indicate that a smaller buffer could be used, the Implementing Entity will coordinate with CDFW/USFWS to determine the appropriate buffer size.

If young fledge prior to September 15, covered activities can proceed normally. If the active nest site is shielded from view and noise from the project site by other development, topography, or other features, the project applicant can apply to the Implementing Entity for a waiver of this avoidance measure. Any waiver must also be approved by USFWS and CDFW. While the nest is occupied, activities outside the buffer can take place.

All active nest trees will be preserved on site, if feasible. Nest trees, including non-native trees, lost to covered activities will be mitigated by the project proponent according to the requirements below.

Mitigation for Loss of Nest Trees

The loss of non-riparian Swainson's hawk nest trees will be mitigated by the project proponent by:

- If feasible on-site, planting 15 saplings for every tree lost with the objective of having at least 5 mature trees established for every tree lost according to the requirements listed below.

  AND either

  1) Pay the Implementing Entity an additional fee to purchase, plant, maintain, and monitor 15 saplings on the HCP/NCCP Preserve System for every tree lost according to the requirements listed below, OR

  2) The project proponent will plant, maintain, and monitor 15 saplings for every tree lost at a site to be approved by the Implementing Entity (e.g., within an HCP/NCCP Preserve or existing open space linked to HCP/NCCP preserves), according to the requirements listed below.

The following requirements will be met for all planting options:

- Tree survival shall be monitored at least annually for 5 years, then every other year until year 12. All trees lost during the first 5 years will be replaced. Success will be reached at the end of 12 years if at least 5 trees per tree lost survive without supplemental irrigation or protection from herbivory. Trees must also survive for at least three years without irrigation.
- Irrigation and fencing to protect from deer and other herbivores may be needed for the first several years to ensure maximum tree survival.
- Native trees suitable for this site should be planted. When site conditions permit, a variety of native trees will be planted for each tree lost to provide trees with different growth rates, maturation, and life span, and to provide a variety of tree canopy structures for Swainson's hawk. This variety will help to ensure that nest trees will be available in the short term (5-10 years for cottonwoods and willows) and in the long term (e.g., Valley oak, sycamore). This will also minimize the temporal loss of nest trees.
- Riparian woodland restoration conducted as a result of covered activities (i.e., loss of riparian woodland) can be used to offset the nest tree planting requirement above, if the nest trees are riparian species.
- Whenever feasible and when site conditions permit, trees should be planted in clumps together or with existing trees to provide larger areas of suitable nesting habitat and to create a natural buffer between nest trees and adjacent development (if plantings occur on the development site).

- Whenever feasible, plantings on the site should occur closest to suitable foraging habitat outside the UDA.
- Trees planted in the HCP/NCCP preserves or other approved offsite location will occur within the known range of Swainson's hawk in the inventory area and as close as possible to high-quality foraging habitat.

3) Construction Monitoring Plan

Before implementing a covered activity, the applicant will develop and submit a construction monitoring plan to the planning department of the local land use jurisdiction and the East Contra Costa County Habitat Conservancy for review and approval. Elements of a brief construction monitoring plan will include the following:

- Results of planning and preconstruction surveys.[11]
- Description of avoidance and minimization measures to be implemented, including a description of project-specific refinements to the measures or additional measures not included in the HCP/NCCP.
- Description of monitoring activities, including monitoring frequency and duration, and specific activities to be monitored.
- Description of the onsite authority of the construction monitor to modify implementation of the activity.

☒ Check box to acknowledge this requirement.

[11] If the preconstruction surveys do not trigger construction monitoring, results of preconstruction surveys should still be submitted to the local jurisdiction and the East Contra Costa County Habitat Conservancy.

V. SPECIFIC CONDITIONS ON COVERED ACTIVITIES

1) Check off the HCP conservation measures that apply to the project.

APPLIES TO ALL PROJECTS

☒ **Conservation Measure 1.11. Avoid Direct Impacts on Extremely Rare Plants, Fully Protected Wildlife Species, or Migratory Birds.** This conservation measure applies to all projects. All projects will avoid all impacts on extremely rare plants and fully protected species listed in Table 6-5 of the ECCC HCP/NCCP. See HCP pp. 6-23 to 6-25, and Table 6-5.

APPLIES TO PROJECTS THAT IMPACT COVERED PLANT SPECIES

☐ **Conservation Measure 3.10. Plant Salvage when Impacts are Unavoidable.** This condition applies to projects that cannot avoid impacts on covered plants and help protect covered plants by prescribing salvage whenever avoidance of impacts is not feasible. Project proponents wishing to remove populations of covered plants must notify the Conservancy of their construction schedule to allow the Conservancy the option of salvaging the populations. See HCP pp. 6-48 to 6-50.

APPLIES TO PROJECTS THAT INCLUDE ARE ADJACENT TO STREAMS, PONDS, OR WETLANDS

☐ **Conservation Measure 2.12. Wetland, Pond, and Stream Avoidance and Minimization.** All projects will implement measures described in the HCP to avoid and minimize impacts on wetlands, ponds, streams, and riparian woodland/scrub. See HCP pp. 6-33 to 6-35.

APPLIES TO NEW DEVELOPMENT PROJECTS

☒ **Conservation Measure 1.10. Maintain Hydrologic Conditions and Minimize Erosion.** All new development must avoid or minimize direct and indirect impacts on local hydrological conditions and erosion by incorporating the applicable Provision C.3 Amendments of the Contra Costa County Clean Water Program's (CCCCWP's) amended NPDES Permit (order no. R2-2003-0022; permit no. CAS002912). The overall goal of this measure is to ensure that new development covered under the HCP has no or minimal adverse effects on downstream fisheries to avoid take of fish listed under ESA or CESA. See HCP pp. 6-21 to 6-22.

APPLIES TO NEW DEVELOPMENT PROJECTS THAT INCLUDE OR ARE ADJACENT TO STREAMS, PONDS, OR WETLANDS

☐ **Conservation Measure 1.7. Establish Stream Setbacks.** A stream setback will be applied to all development projects covered by the HCP according to the stream types listed in Table 6-2 of the HCP. See HCP pp. 6-15 to 6-18 and Table 6-2.

APPLIES TO NEW DEVELOPMENT PROJECTS ADJACENT TO EXISTING PUBLIC OPEN SPACE, HCP PRESERVES, OR LIKELY HCP ACQUISITION SITES

☐ **Conservation Measure 1.6. Minimize Development Footprint Adjacent to Open Space.** Project applicants are encouraged to minimize their development footprint and set aside portions of their land to contribute to the HCP Preserve System. Land set aside that contributes to the HCP biological goals and objectives may be credited against development fees. See HCP pages 6-14 to 6-15.

☐ **Conservation Measure 1.8. Establish Fuel Management Buffer to Protect Preserves and Property.** Buffer zones will provide a buffer between development and wildlands that allows adequate fuel management to minimize the risk of wildlife damage to property or to the preserve. The minimum buffer zone for new development is 100 feet. See HCP pages 6-18 to 6-19.

☐ **Conservation Measure 1.9. Incorporate Urban-Wildlife Interface Design Elements.** These projects will incorporate design elements at the urban-wildlife interface to minimize the indirect impacts of development on the adjacent preserve. See HCP pp. 6-20 to 6-21.

APPLIES TO ROAD MAINTENANCE PROJECTS OUTSIDE THE UDA

☐ **Conservation Measure 1.12. Implement Best Management Practices for Rural Road Maintenance.** Road maintenance activities have the potential to affect covered species by introducing sediment and other pollutants into downstream waterways, spreading invasive weeds, and disturbing breeding wildlife. In order to avoid and minimize these impacts, BMPs described in the HCP will be used where appropriate and feasible. See HCP pp. 6-25 to 6-26.

APPLIES TO NEW ROADS OR ROAD IMPROVEMENTS OUTSIDE THE UDA

☐ **Conservation Measure 1.14. Design Requirements for Covered Roads Outside the Urban Development Area (UDA).** New roads or road improvements outside the UDA have impacts on many covered species far beyond the direct impacts of their project footprints. To minimize the impacts of new, expanded, and improved roads in agricultural and natural areas of the inventory area, road and bridge construction projects will adopt siting, design, and construction requirements described in the HCP and listed in Table 6-6. See HCP pp. 6-27 to 6-33 and Table 6-6.

APPLIES TO FLOOD CONTROL MAINTENANCE ACTIVITIES

☐ **Conservation Measure 1.13. Implement Best Management Practices for Flood Control Facility Maintenance.** Flood control maintenance activities have the potential to affect covered species by introducing sediment and other pollutants into downstream waterways and disturbing breeding wildlife. In order to avoid and minimize these impacts, BMPs described in the HCP will be used where appropriate and feasible. See HCP pp. 6-26 to 6-27.

2) **For all checked conservation measures, describe how the project will comply with each measure. Attach as Attachment C: Project Compliance to HCP Conditions.**

VI. MITIGATION MEASURES

1) **Mitigation Fee Calculator(s)**
Complete and attach the fee calculator (use permanent and/or temporary impact fee calculator as appropriate), and attach as **Attachment D: Fee Calculator(s)**.

2) **Briefly describe the amount of fees to be paid and when applicant plans to submit payment.**

Fees to be paid are associated with the 9.99 acres of Zone III land. All impacts for the proposed residential development will be permanent. The total fees for permanent impacts to 9.99 acres in a Zone III area equals $97,959.54. The applicant shall submit payment before grading permits are issued.

ATTACHMENT A: PROJECT DESCRIPTION

The Village at 2092 Oakley Road – HCP Application

Short Project Description – Construction of 83 single family lots, on-site parking, a toddler park, community gathering areas, and other improvements.

Long Project Description:

Attachment A: Project Description. Provide a detailed written description that concisely and completely describes the project and location. Include the following information:

- All activities proposed for the site or project, including roads utilized, construction staging areas, and the installation of underground facilities, to ensure the entire project is covered by the HCP/NCCP permit.

The project site is located at 2092 Oakley Road in the City of Oakley, California. The 9.25-acre parcel (APN 037-110-031) is developed with two single-family residences, one ancillary structure, and one water tower. In addition, a gravel roadway runs along the eastern boundary of the site and provides access to the single-family residence in the northeast corner of the site. The remainder of the parcel is planted with row crops. Surrounding existing uses include a mobile home park to the north; a convenience store, gas station, and an oil change service shop to the east; a shopping center to the southeast, across Empire Avenue; single-family residences and agricultural land to the south, across Oakley Road; and a mobile home park and single-family residences to the west. The project site is located within the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (HCP/NCCP). The City of Oakley General Plan designates the site as Commercial (CO) and the site is zoned Commercial (C).

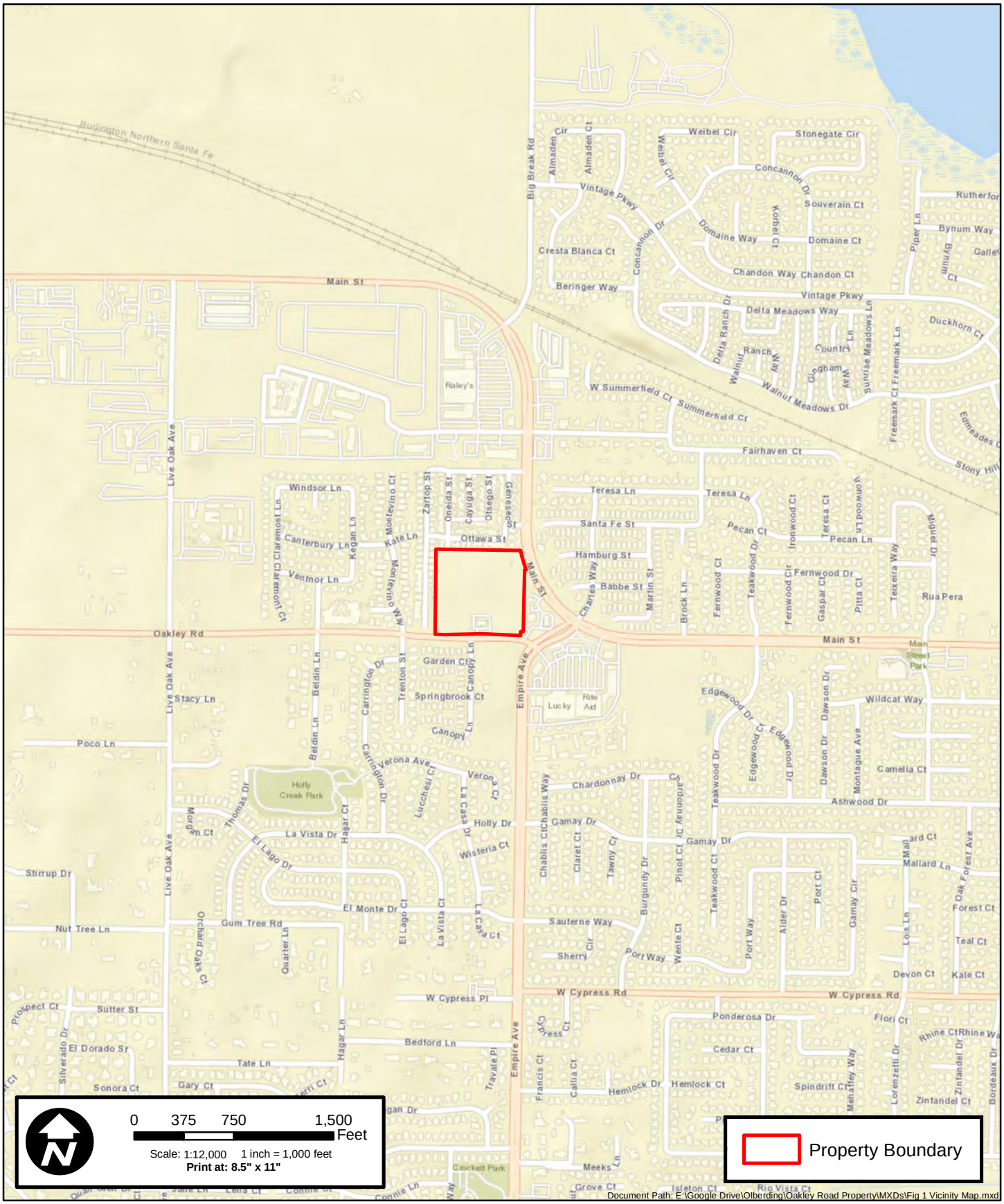
The applicant is proposing to remove the existing on-site structures and subdivide the site into 83 single-family residential lots, ranging from 2,920 square feet (sf) to 3,790 sf. The two-story single-family residences will range from 2,277 sf to 2,656 sf and each unit will include four bedrooms and three bathrooms, as well as an attached two-car garage. An additional 83 parking stalls will be provided throughout the project site. The development will include an 8,730-sf community park in the northeast corner of the project site and a 5,840-sf open space area in the southern portion. An internal roadway system will be constructed, consisting of six new streets, and primary site access will be provided by a new driveway off of Oakley Road. Emergency vehicle access will be provided by a new driveway off of Main Street.

The site is currently zoned “C” (General Commercial) and would require a General Plan Amendment (GPA 01-22) to redesignate it from Commercial (CO) to Residential Medium (RM). A Design Review (DR 07-22) for floor plans and architecture of three home types with three elevations and three color schemes, and landscaping and other improvements throughout the Project.

- **Proposed construction dates, including details on construction phases, if applicable**
  Construction is planned to start on _____

- **Reference a City/County application number for the project, if applicable –** Project plans were submitted to the City of Oakley (GPA 01-22, RZ 03-22, FDP 01-22, TM 04-22, DR 07-22) last updated December 2, 2022.
- **General Best Management Practices, if applicable** – During construction, the project will adhere to City and Bay Area Air Quality Management District BMPs and other requirements to ensure temporary impacts associated with grading construction are minimized. Typical BMPs to limit dust, noise, and traffic will be incorporated into the project grading and construction plans.
- **If the Project will have temporary impacts,** please provide a restoration plan describing how the site will be restored to pre-project conditions, including revegetation seed mixes or plantings and timing – Not Applicable. See attached design plans.

ATTACHMENT B: FIGURES



Document Path: E:\Google Drive\Olberding\Oakley Road Property\MXDs\Fig 1 Vicinity Map.mxd

Figure 1: Project Vicinity Map
2092 Oakley Road Property
Oakley, California

OLBERDING -ENVIRONMENTAL-

193 Blue Ravine Road, Ste. 165
Folsom, CA 95630
Phone: (916) 985-1188

Revision Date: 5/9/2023

THE VILLAGE AT 2092 OAKLEY ROAD

OAKLEY, CA

MARCH 8, 2023

SHEET INDEX

SHEET TITLE	SHEET NUMBER
DRB	
COVER SHEET	CS
DEVELOPMENT PLAN	1
COVER SHEET - CIVIL	1
EXISTING CONDITIONS AND CONSTRAINTS MAP	2
TYPICAL STREET SECTIONS - PRIVATE	3
TYPICAL STREET SECTIONS - PUBLIC	4
PRELIMINARY SITE PLAN	5
PRELIMINARY GRADING AND DRAINAGE PLAN	6
GRADING SECTIONS	7
GRADING SECTIONS	8
OFFISTE WORK	9
STORMWATER CONTROL PLAN	10
ILLUSTRATIVE OVERALL PLAN	L-1.1
PRELIMINARY LANDSCAPE PLAN	L-1.2
WALL AND FENCE PLAN	L-2.1
WALL AND FENCE DETAILS	L-2.2
WALL AND FENCE DETAILS	L-2.3
TYPICAL HOUSE CLUSTER ENLARGEMENT	L-3
HOUSE CLUSTER AND OPEN SPACE ENLARGEMENT	L-4
TYPICAL TREE PLANTING AT PARKING AREA CONCEPT	L-5
OPEN SPACE ENLARGEMENT	L-6
PROJECT ENTRY ENLARGEMENT	L-7
PROPOSED PLANT PALETTE	L-8
SITE AMENITIES	L-9.1
SITE AMENITIES	L-9.2
CONSTRUCTION DETAILS	L-10
IRRIGATION DETAILS	L-11.1
IRRIGATION DETAILS	L-11.2
PLANTING DETAILS	L-12
CONCEPTUAL OAKLEY ROAD PERSPECTIVE	A00
CONCEPTUAL STREETSCENE	A0.1
CONCEPTUAL PERSPECTIVES	A0.2
PLAN 1 FRONT ELEVATIONS	A01
PLAN 1 SPANISH EXTERIOR ELEVATIONS	A02
PLAN 1 SPANISH FLOOR PLANS	A03
PLAN 1 SPANISH ROOF PLAN	A04
PLAN 1 BUNGALOW EXTERIOR ELEVATIONS	A05
PLAN 1 BUNGALOW FLOOR PLANS	A06
PLAN 1 BUNGALOW ROOF PLAN	A07
PLAN 1 FARMHOUSE EXTERIOR ELEVATIONS	A08
PLAN 1 FARMHOUSE FLOOR PLANS	A09
PLAN 1 FARMHOUSE ROOF PLAN	A10
PLAN 2 FRONT ELEVATIONS	A11
PLAN 2 SPANISH EXTERIOR ELEVATIONS	A12
PLAN 2 SPANISH FLOOR PLANS	A13
PLAN 2 SPANISH ROOF PLAN	A14
PLAN 2 BUNGALOW EXTERIOR ELEVATIONS	A15
PLAN 2 BUNGALOW FLOOR PLANS	A16
PLAN 2 BUNGALOW ROOF PLAN	A17
PLAN 2 FARMHOUSE EXTERIOR ELEVATIONS	A18
PLAN 2 FARMHOUSE FLOOR PLANS	A19
PLAN 2 FARMHOUSE ROOF PLAN	A20
PLAN 3 FRONT ELEVATIONS	A21
PLAN 3 SPANISH EXTERIOR ELEVATIONS	A22
PLAN 3 SPANISH FLOOR PLANS	A23
PLAN 3 SPANISH ROOF PLAN	A24
PLAN 3 BUNGALOW EXTERIOR ELEVATIONS	A25
PLAN 3 BUNGALOW FLOOR PLANS	A26
PLAN 3 BUNGALOW ROOF PLAN	A27
PLAN 3 FARMHOUSE EXTERIOR ELEVATIONS	A28
PLAN 3 FARMHOUSE FLOOR PLANS	A29
PLAN 3 FARMHOUSE ROOF PLAN	A30
SAMPLE ENHANCED ELEVATIONS	A31
SAMPLE ENHANCED ELEVATIONS	A32
SITE ACCESS EXHIBIT	A33

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

THE VILLAGE AT 2092 OAKLEY ROAD
DEVELOPMENT PLAN

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

MARCH 8, 2023 SCALE: 1"=30'

LEGEND

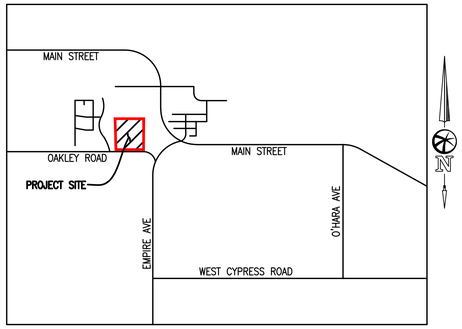
- BOUNDARY LINE
- LOT LINE
- CURB
- RIGHT-OF-WAY LINE
- 1'-2' RETAINING WALL/CURB
- ASPHALT CONCRETE PAVEMENT
- PARK AREA
- PROPOSED BIORETENTION BASIN
- PROPOSED SIDEWALK
- ADA PATH OF TRAVEL

N

30 15 0 30 60 90
SCALE IN FEET
GRAPHIC SCALE: 1"=30'

Bellecci
Intelligent Infrastructure
925 • 685 • 4569 bellecci.com

SHEET 1 OF 1
JOB NO. 220056



VICINITY MAP

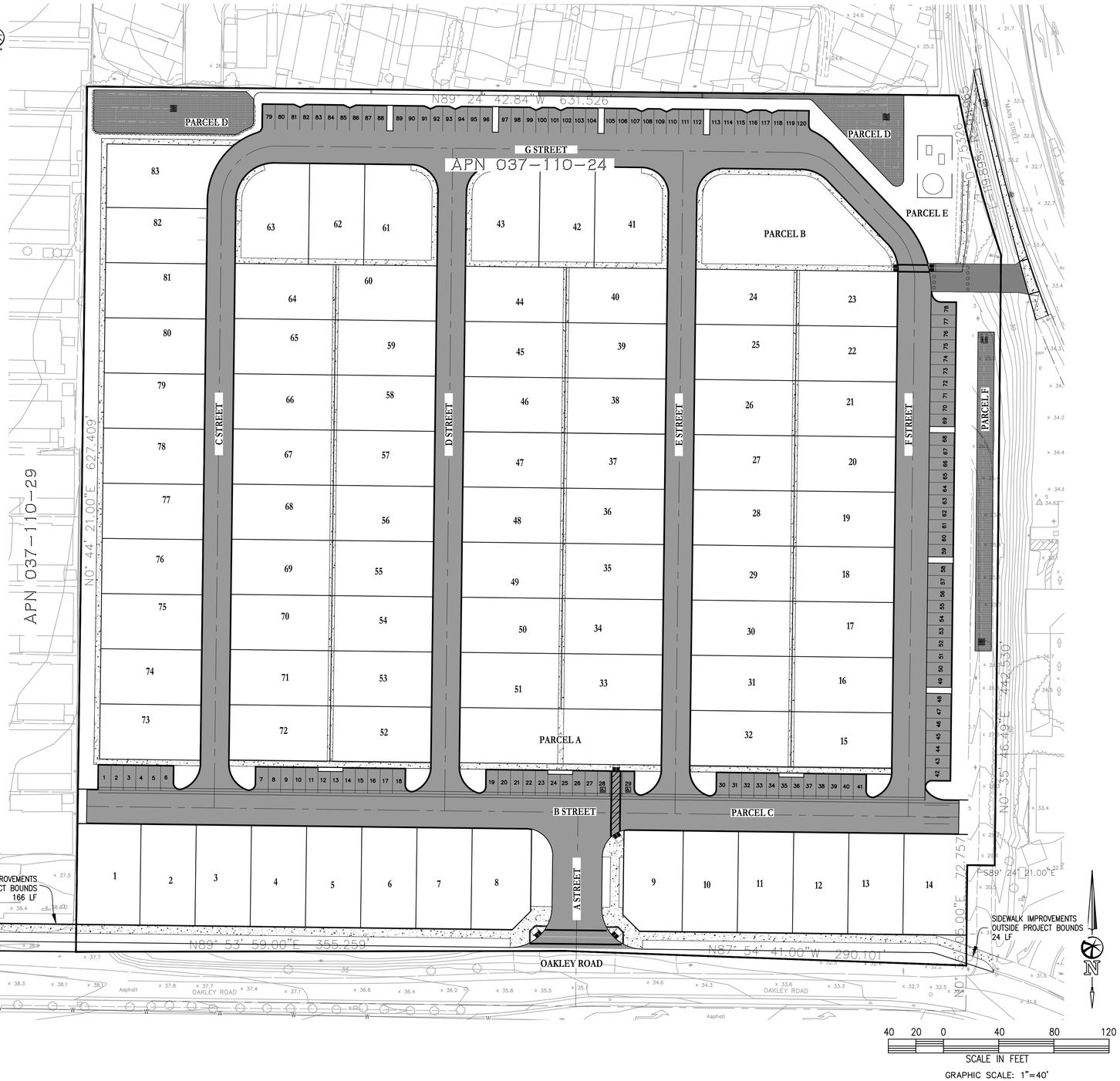
NO SCALE

SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
COVER SHEET

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

MARCH 8, 2023 SCALE: 1"=40'



SHEET INDEX

1. COVER SHEET
2. EXISTING CONDITIONS AND CONSTRAINTS MAP
3. TYPICAL STREET SECTIONS –PRIVATE
4. TYPICAL STREET SECTIONS –PUBLIC
5. PRELIMINARY SITE PLAN
6. PRELIMINARY GRADING AND DRAINAGE PLAN
7. GRADING SECTIONS
8. GRADING SECTIONS
9. OFFSITE WORK
10. STORMWATER CONTROL PLAN

TOTAL PROPOSED LOTS	83

PARCEL NAME	AREA (SF)	USAGE	HOA MAINTAINED
PARCEL A	5840	PARK	YES
PARCEL B	8730	PARK	YES
PARCEL C	80698	PRIVATE STREETS	YES
PARCEL D	7070	BIORETENTION	YES
PARCEL E	60725	EX OPEN SPACE & EASEMENTS	YES
PARCEL F	1611	BIORETENTION	YES

GENERAL NOTES

OWNER/DEVELOPER:	JOHN D'AMBROSIO DAN COSGROVE – MANAGING PARTNER LLC APPLIED 3130 BALFOUR ROAD SUITE D #269 BRENTWOOD, CA 94513 (925)–325–9247
ENGINEER:	BELLECCI & ASSOCIATES, INC. 2290 DIAMOND BLVD #100 CONCORD, CA 94520 (925)–685–4569
A.P.N.:	037–110–031
SITE AREA:	9.99 ACRES
SMALLEST LOT SIZE:	2920 SF
LARGEST LOT SIZE:	3790 SF
AVERAGE LOT SIZE:	2986 SF
DENSITY:	8.3 DU/AC
EXISTING GENERAL PLAN:	COMMERCIAL
PROPOSED GENERAL PLAN:	RESIDENTIAL: LOW
EXISTING ZONING:	C
PROPOSED ZONING:	P–1
EXISTING USE:	VACANT
PROPOSED USE:	SINGLE FAMILY RESIDENTIAL
SERVICES: WATER SUPPLY– SANITARY SEWER– STORM DRAIN– GAS & ELECTRIC– FIRE– TELEPHONE– CABLE TV–	 DIABLO WATER DISTRICT IRONHOUSE SANITARY DISTRICT CITY OF OAKLEY PACIFIC GAS & ELECTRIC EAST CONTRA COSTA FIRE PROTECTION DISTRICT AT&T COMCAST
FLOODING:	SITE FALLS WITHIN FIRM PANEL NUMBERS 06013C 0355G, AREA OF MINIMAL FLOOD HAZARD – DATED MARCH 21, 2017
TOPOGRAPHY:	AERIAL TOPOGRAPHY PROVIDED BY: 360 AERIAL SURVEYS DATED JUNE 10, 2022
BASIS OF ELEVATION:	ELEVATIONS SHOWN ARE BASED 1988 NAVD
BASIS OF BEARINGS:	CALIFORNIA COORDINATE SYSTEM, ZONE III (NAD 83).

NOTES:

THE OWNER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS ON THE LANDS SHOWN ON THIS MAP

AT THIS POINT THERE IS NO PLANNED PHASES BUT THE OWNER STILL HAS DISCRETION TO PHASE THE PROJECT AS NECESSARY

SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
EXISTING CONDITIONS AND CONSTRAINTS

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

MARCH 8, 2023 SCALE: 1"=30'

NOTES:

1. THE OWNER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS ON THE LANDS SHOWN ON THIS MAP
2. FORMER CALTRANS ROW ABANDONED PER CALTRANS RELINQUISHMENT 6489 OR 102

LEGEND

- PREVIOUS BOUNDARY
- NEW BOUNDARY
- OH — EX. OH POWER LINES
- EX. JOINT POLES

APN 037-110-24

N89° 24' 43"W 631.53'

L=51.952, R=1045.529
Δ=2.8470

P.O.B. 25X45 LEASE AREA

RANDOM EASEMENT?

LEASE AREA

P.O.B. OF ℄ 15' ACCESS & UTILITY EASE

P.O.C. OF ℄ 15' ACCESS & UTILITY EASE

℄ 15' ACCESS & UTILITY EASE

EXISTING BUILDING TO BE REMOVED

6' UTIL EASE

8" TREE

MULTI" TREE 18

6' UTIL EASE

6" TREE

EXISTING TREES TO BE REMOVED

EXISTING TREES TO BE PROTECTED AND REMAIN

MAIN STREET

L=119.895, R=
Δ=7.5326°

20" TREE

30" TREE

Asphalt

EXISTING FENCE

APN 037-110-29

N0° 44' 21"E 627.41'

EXISTING TREE TO BE REMOVED

15" TREE

EXISTING BUILDING TO BE REMOVED

EXISTING TREES TO BE REMOVED

16" TREE

22" TREE

17" TREE

26" TREE

14" TREE

MULTI" TREE 10, 12, 12, 12

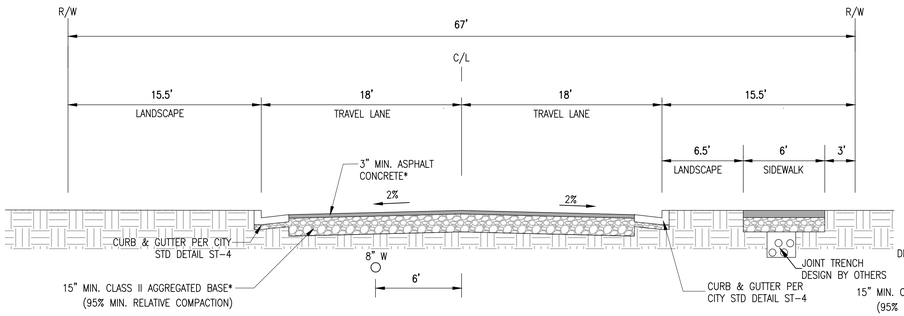
SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
TYPICAL STREET SECTIONS

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

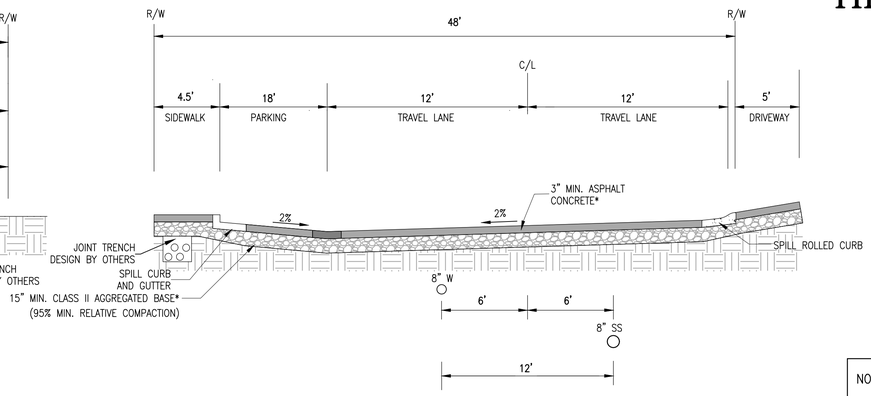
BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

MARCH 8, 2022

NOTES:
THE OWNER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS ON THE LANDS SHOWN ON THIS MAP



A STREET (PRIVATE)
NOT TO SCALE

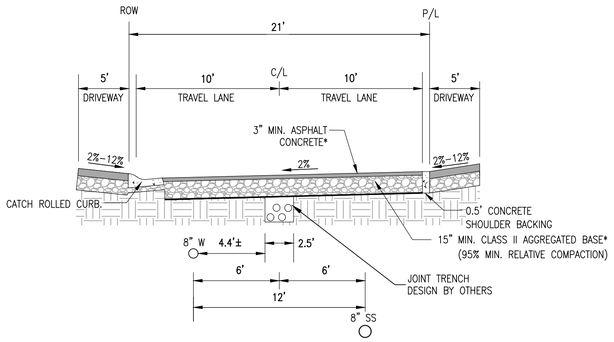


B STREET (PRIVATE)
NOT TO SCALE

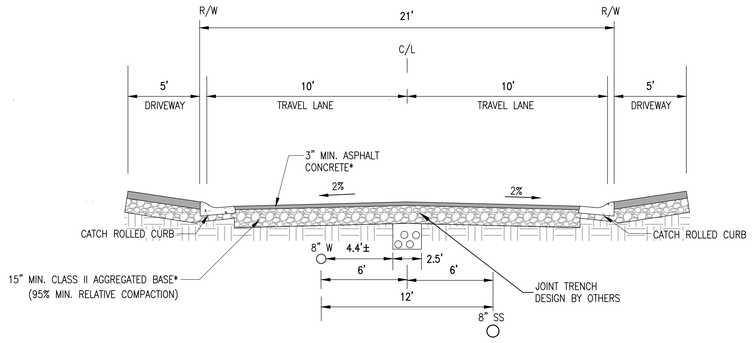
NOTES:

* = AC AND AB SECTIONS TO BE BASED ON ROADWAY AND R VALUES

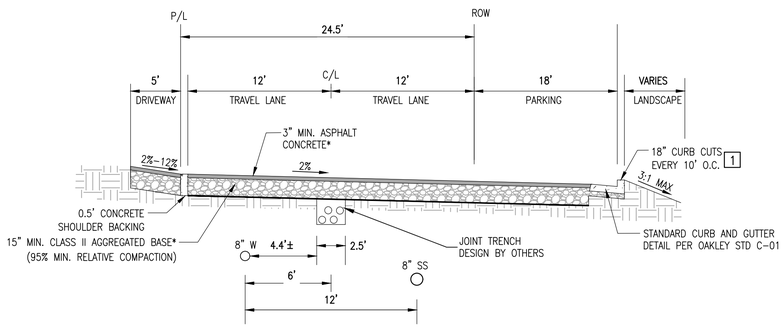
1. RIP RAP OR SPLASH BLOCK TO BE USED ALONG WATER PATH OF TRAVEL



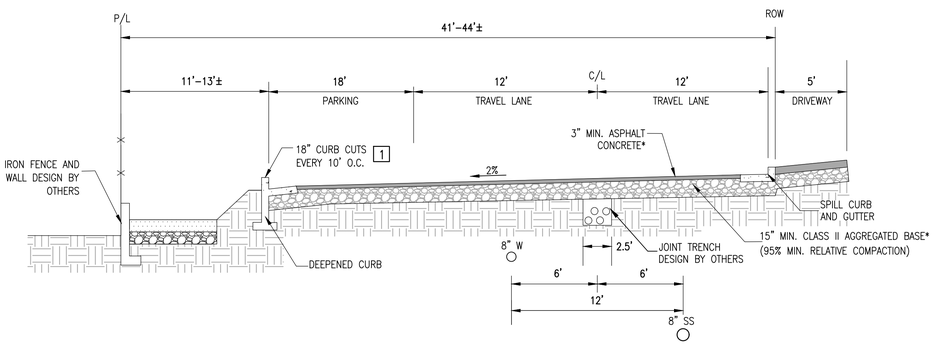
C STREET (PRIVATE)
NOT TO SCALE



D & E STREET (PRIVATE)
NOT TO SCALE



F STREET (PRIVATE)
NOT TO SCALE



G STREET (PRIVATE)
NOT TO SCALE

Bellecci
Intelligent Infrastructure
925 • 685 • 4569 bellecci.com

SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
TYPICAL STREET SECTIONS

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

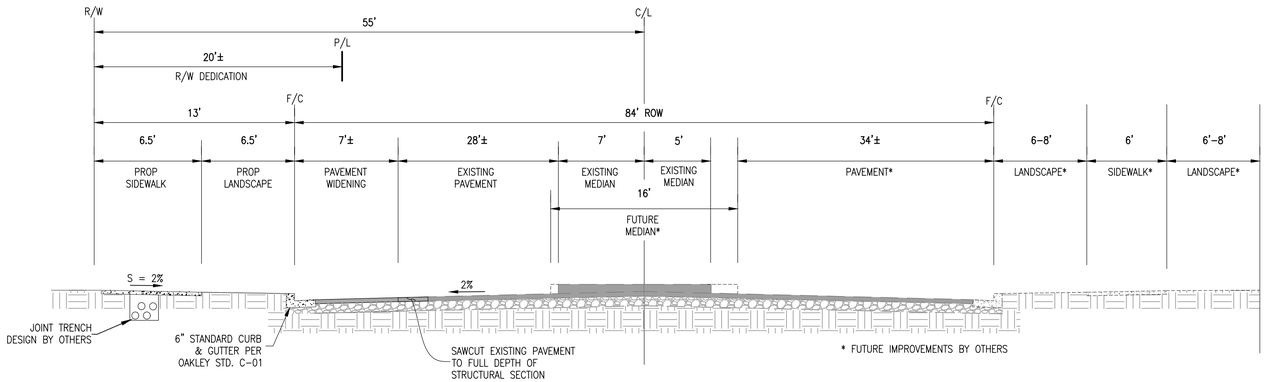
BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

MARCH 8, 2022

NOTES:
THE OWNER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS ON THE LANDS SHOWN ON THIS MAP

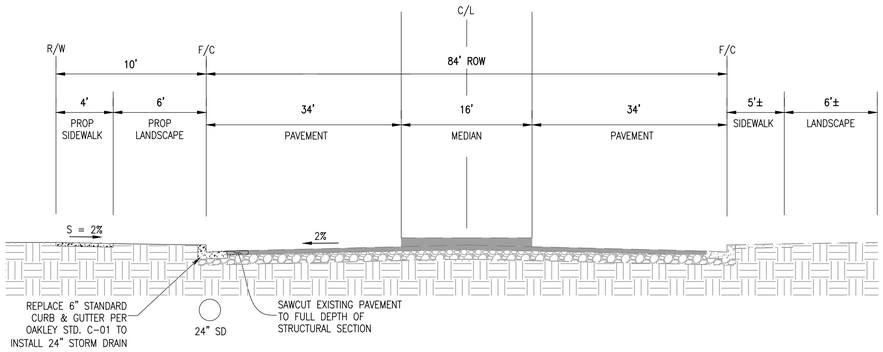
LEGEND

- IMPROVEMENTS BY PROJECT
- EXISTING CONDITIONS
- FUTIRE IMPROVEMENTS BY OTHERS



OAKLEY ROAD (PUBLIC)

NOT TO SCALE



MAIN STREET (PUBLIC)

NOT TO SCALE

Bellecci
Intelligent Infrastructure
925 • 685 • 4569 bellecci.com

SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
SITE PLAN

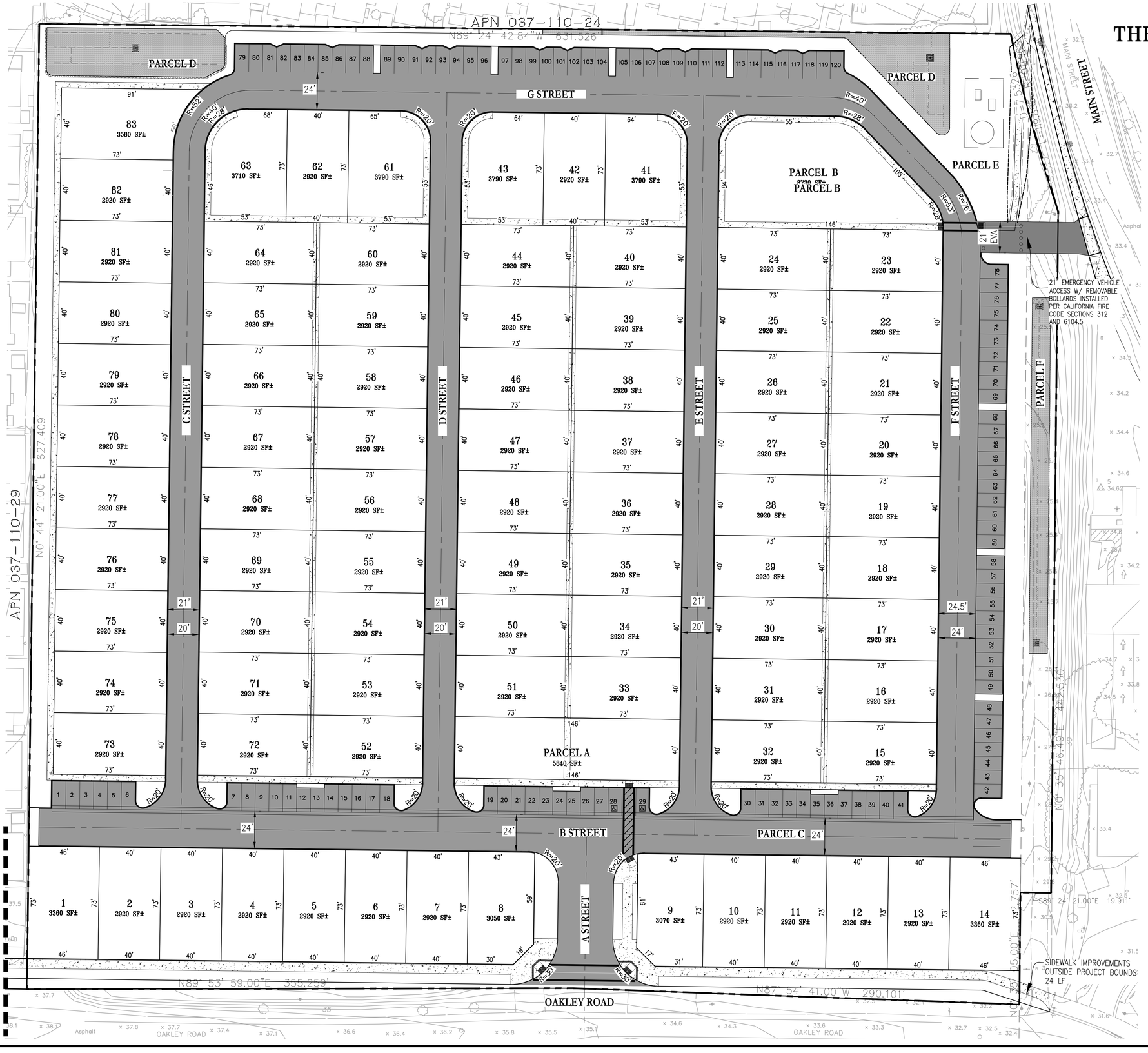
CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

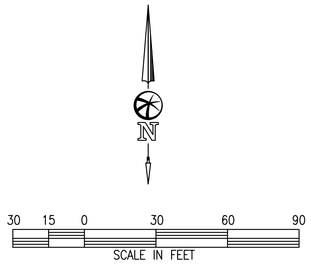
BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

MARCH 8 2022 SCALE: 1"=30'

NOTES:

THE OWNER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS ON THE LANDS SHOWN ON THIS MAP

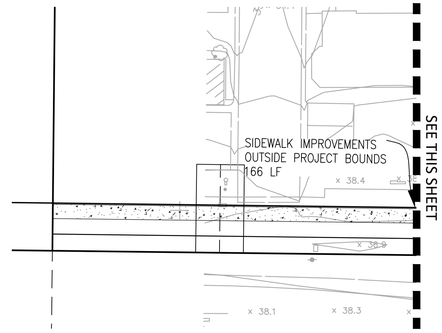




GRAPHIC SCALE: 1"=30'

LEGEND

PROPOSED	DESCRIPTION
— — —	SUBDIVISION BOUNDARY
———	LOT LINE
1	LOT NUMBER
3,000 SF±	LOT AREA IN SQUARE FEET



SIDEWALK IMPROVEMETS

Bellecci
Intelligent Infrastructure
925 • 685 • 4569 bellecci.com

SHEET 5 OF 10

JOB NO. 220056

SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
GRADING & UTILITY PLAN

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

MARCH 8, 2022 SCALE: 1"=30'

NOTES:

THE OWNER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS ON THE LANDS SHOWN ON THIS MAP

N

30 15 0 30 60 90
SCALE IN FEET
GRAPHIC SCALE: 1"=30'

LEGEND

EXISTING	PROPOSED	DESCRIPTION
		SUBDIVISION BOUNDARY
		CENTERLINE
W EX W	W W	WATER MAIN
SS EX SS	SS SS	SANITARY SEWER PIPE
		SANITARY SEWER MANHOLE
EX SD	SD	STORM DRAIN PIPE
		STORM DRAIN MANHOLE
		STORM DRAIN CATCH BASIN

NOTES

1. ALL STREET GRADES TO BE 0.75% MINIMUM
2. EXISTING TOPOGRAPHIC INFORMATION SHOWN IS BASED ON A TOPOGRAPHIC SURVEY IN 2022
3. ALL ELEVATIONS ARE BASED ON 1988 NAVD
4. GRADING QUANTITIES CALCULATIONS ARE IN PROGRESS

Bellecci
Intelligent Infrastructure
925 • 685 • 4569 bellecci.com

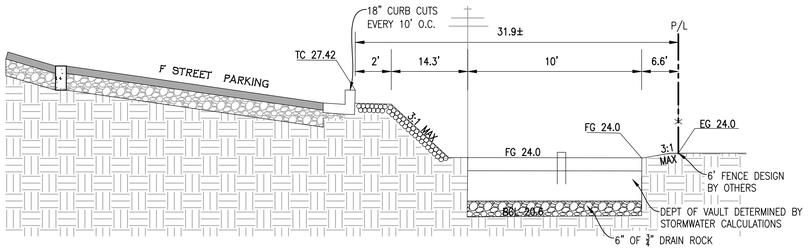
SHEET 6 OF 10
JOB NO. 220056

SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
GRADING SECTIONS

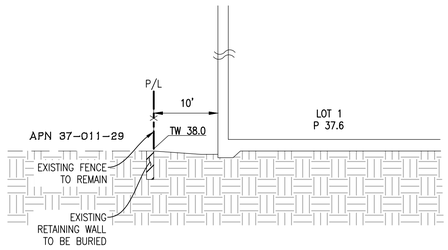
CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

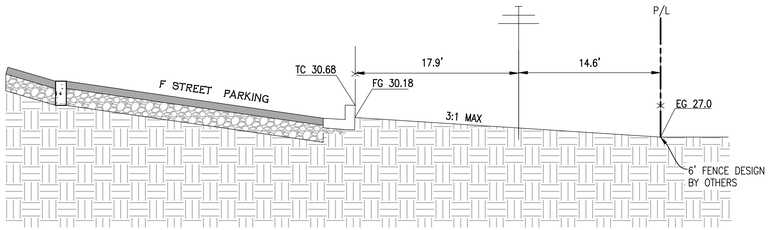
MARCH 8, 2022



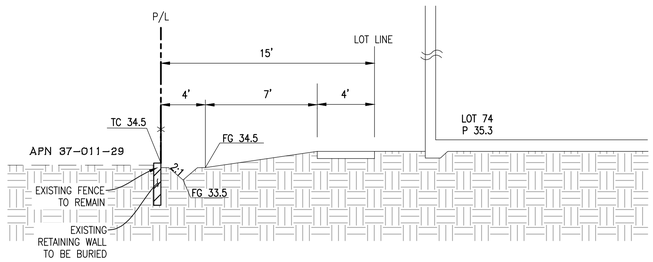
SECTION A–A
N.T.S.



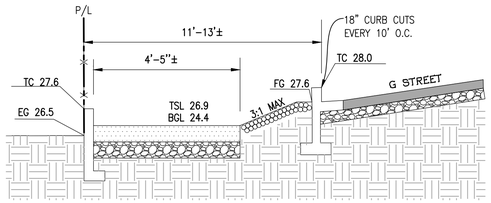
SECTION D–D
N.T.S.



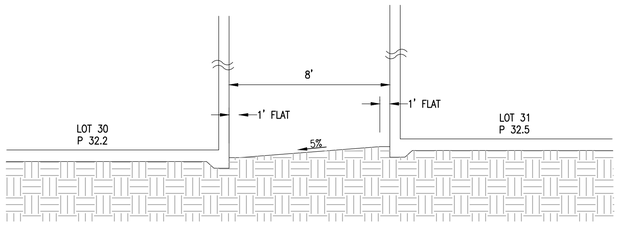
SECTION B–B
N.T.S.



SECTION E–E
N.T.S.



SECTION F–F
N.T.S.



SECTION H–H
N.T.S.

Bellecci
Intelligent Infrastructure
925 • 685 • 4569 bellecci.com

SHEET 7 OF 10

JOB NO. 220056

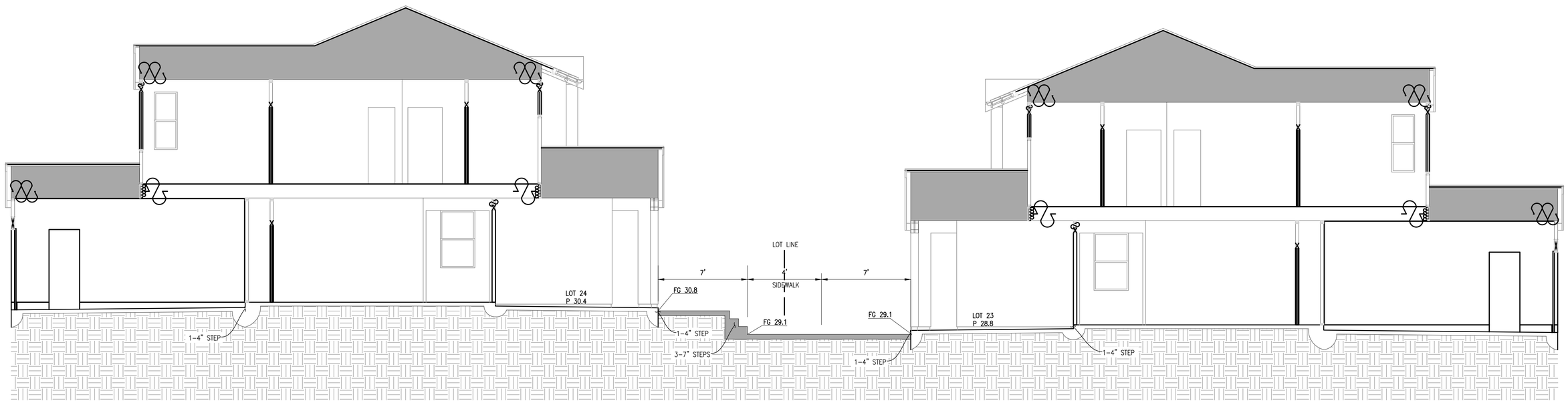
SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
GRADING SECTIONS

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

MARCH 8, 2022

SECTION C-C
N.T.S.



SECTION G-G
N.T.S.

SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
OFFSITE WORK

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

MARCH 8, 2023 SCALE: 1"=30'

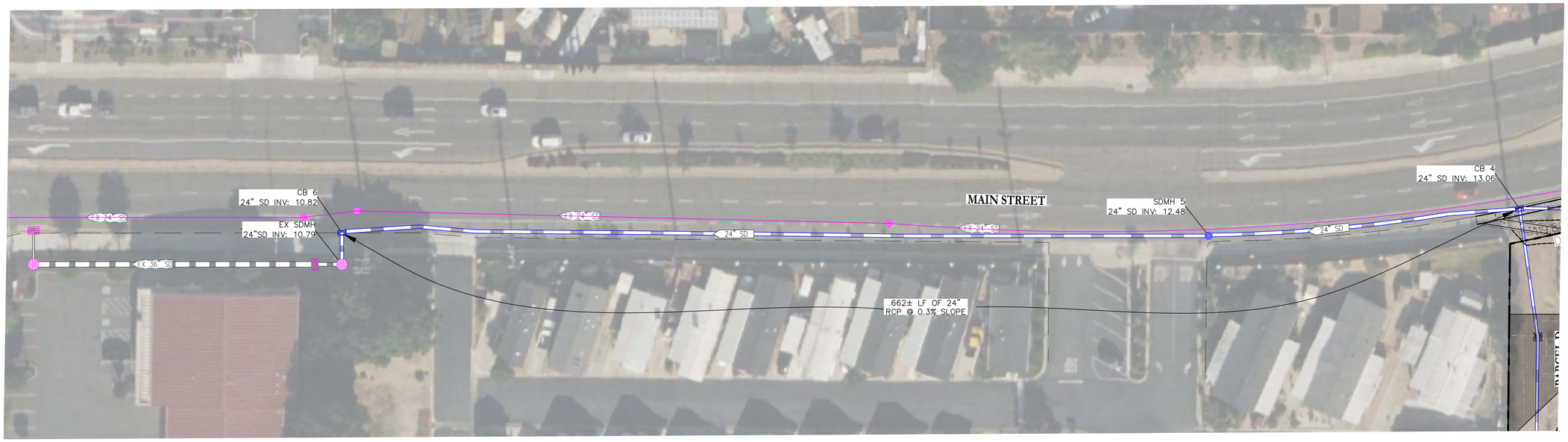
NOTES:

THE OWNER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS ON THE LANDS SHOWN ON THIS MAP

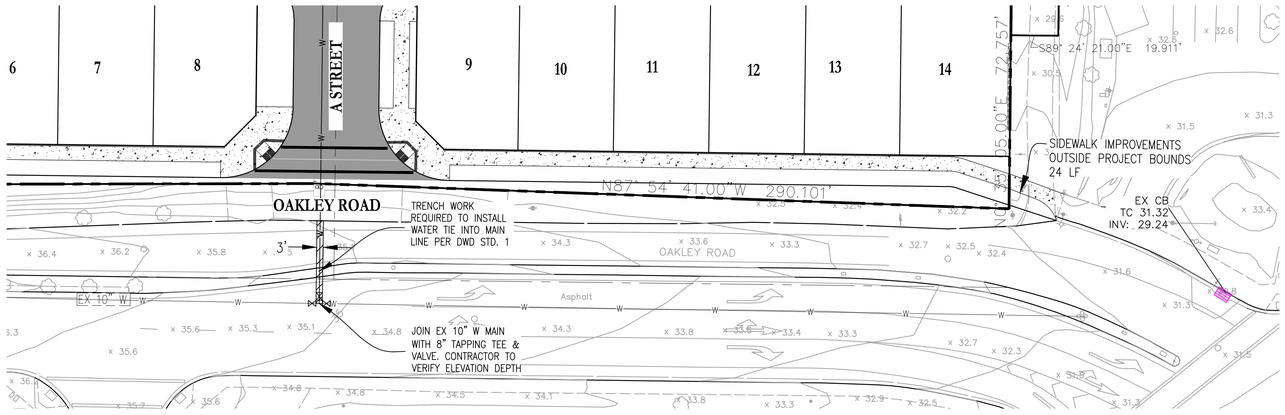
LEGEND

EXISTING	PROPOSED	DESCRIPTION
		SUBDIVISION BOUNDARY
		CENTERLINE
W EX W W	W W	WATER MAIN
SS EX SS SS	SS SS	SANITARY SEWER PIPE
		SANITARY SEWER MANHOLE
EX SD	SD	STORM DRAIN PIPE
		STORM DRAIN MANHOLE
		STORM DRAIN CATCH BASIN

30 15 0 30 60 90
SCALE IN FEET
GRAPHIC SCALE: 1"=30'



DETAIL A. OFFSITE STORM DRAIN CONNECTION



30 15 0 30 60 90
SCALE IN FEET
GRAPHIC SCALE: 1"=30'

DETAIL B. OFFSITE WATER CONNECTION

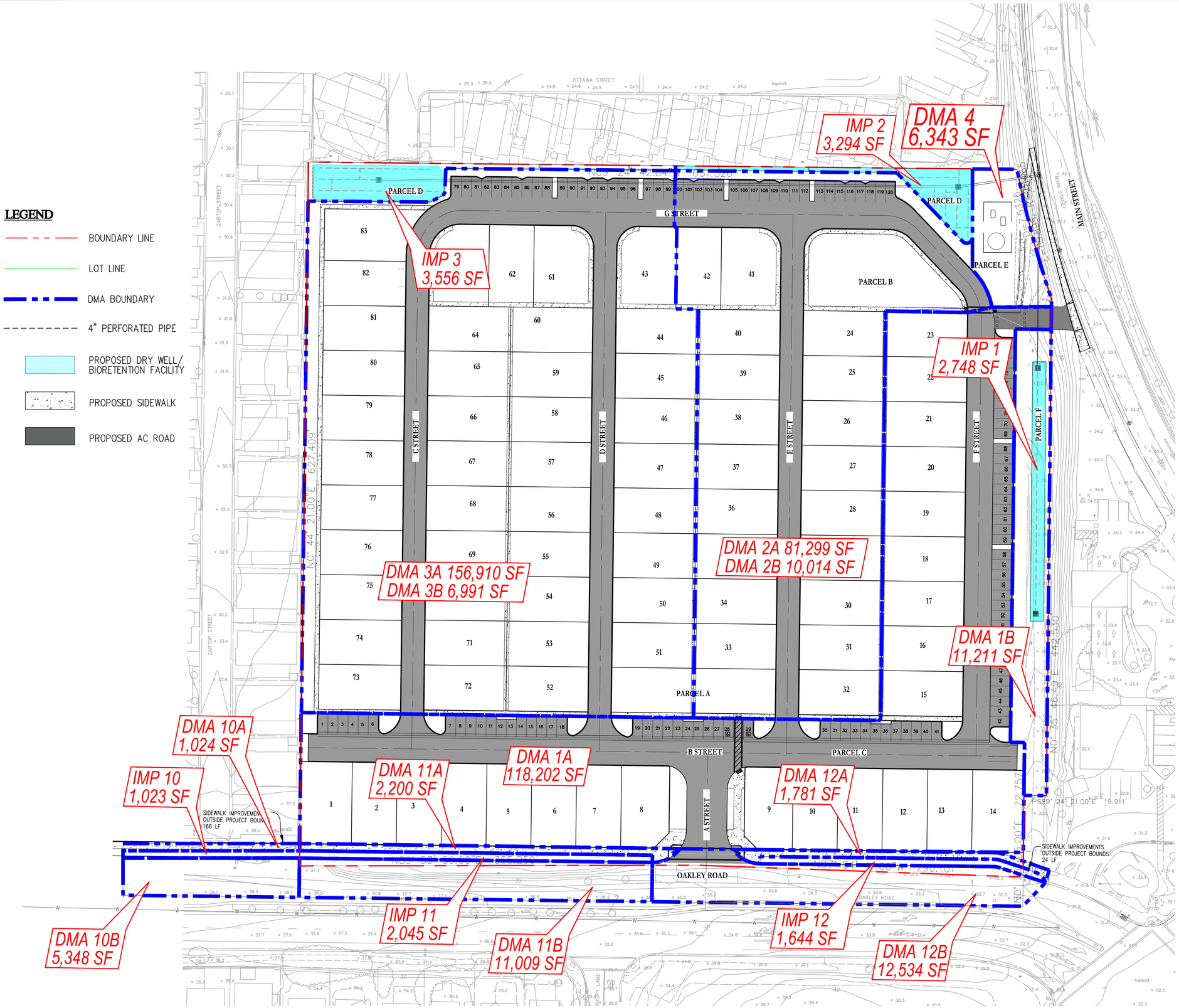
SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
STORM WATER CONTROL PLAN EXHIBIT

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA
MARCH 8, 2023 SCALE: 1"=30'

LEGEND

- BOUNDARY LINE
- LOT LINE
- DMA BOUNDARY
- 4" PERFORATED PIPE
- PROPOSED DRY WELL/ BIORETENTION FACILITY
- PROPOSED SIDEWALK
- PROPOSED AC ROAD



I. Self-Treating Areas

DMA Name	Area (sq ft)
DMA 4	6343

IV. Areas Draining to IMPs

IMP Name: IMP1 (Soil Type: A)

IMP Type: Dry Well
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA 1A	118,202	Concrete or Asphalt	1.00	118,202				
DMA 1B	11,211	Landscape	0.10	1,121				
		Total		119,323				
					Area	0.020	1.000	2,386	2,748
					Volume	0.068	1.000	8,114	8,244

IMP Name: IMP2 (Soil Type: A)

IMP Type: Bioretention Facility
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA 2A	81,299	Concrete or Asphalt	1.00	81,299				
DMA 2B	10,014	Landscape	0.10	1,001				
		Total		82,300				
					Area	0.040	1.000	3,292	3,294

IMP Name: IMP3 (Soil Type: A)

IMP Type: Dry Well
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA 3A	156,910	Concrete or Asphalt	1.00	156,910				
DMA 3B	6,991	Landscape	0.10	699				
		Total		157,609				
					Area	0.020	1.000	3,152	3,556
					Volume	0.068	1.000	10,717	11,024

IMP Name: DMA10 (Soil Type: A)

IMP Type: Dry Well
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA 10A	1,024	Concrete or Asphalt	1.00	1,024				
DMA 10B	5,348	Concrete or Asphalt	1.00	5,348				
		Total		6,372				
					Area	0.020	1.000	127	1,023
					Volume	0.068	1.000	433	511

IMP Name: DMA11 (Soil Type: A)

IMP Type: Dry Well
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA11A	2,200	Concrete or Asphalt	1.00	2,200				
DMA11B	11,009	Concrete or Asphalt	1.00	11,009				
		Total		13,209				
					Area	0.020	1.000	264	2,045
					Volume	0.068	1.000	898	1,022

IMP Name: DMA12 (Soil Type: A)

IMP Type: Dry Well
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA12A	1,781	Concrete or Asphalt	1.00	1,781				
DMA12B	12,534	Concrete or Asphalt	1.00	12,534				
		Total		14,315				
					Area	0.020	1.000	286	1,644
					Volume	0.068	1.000	973	986

30 15 0 30 60 90
SCALE IN FEET
GRAPHIC SCALE: 1"=30'

Bellecci
Intelligent Infrastructure
925 • 685 • 4569 bellecci.com

SHEET 10 OF 10
JOB NO. 200056

Illustrative Overall Plan

L-1.1

THE VILLAGE AT 2092 OAKLEY ROAD Oakley, California

MARCH 8, 2023

R3 STUDIOS

WATER TREATMENT PLANTING: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

FLOWERING DROUGHT-TOLERANT SHRUBS AND GROUNCOVER: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

4'-0" WIDE CONCRETE WALKWAY: REFER TO DETAIL 1 SHEET L-10

HOMEOWNER PRIVATE YARD (TYPICAL)

SCREEN TREE: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

CONCRETE DRIVEWAY: REFER TO PLANS PREPARED BY BELLECCI CIVIL ENGINEERS

TYPICAL HOUSE CLUSTER ENLARGEMENT:
REFER TO SHEET L-3

STREET TREE: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

HOUSE CLUSTER AND OPEN SPACE ENLARGEMENT:
REFER TO SHEET L-4

OAKLEY ROAD STREET TREE: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

FLOWERING DROUGHT-TOLERANT GROUNDCOVER: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

OPEN SPACE ENLARGEMENT:
REFER TO SHEET L-6

EMERGENCY VEHICLE ACCESS: REFER TO PLANS PREPARED BY BELLECCI CIVIL ENGINEERS

TREES UNDER POWER LINES: MAXIMUM HEIGHT OF 25'-0", REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

DRY WELL: REFER TO PLANS PREPARED BY BELLECCI CIVIL ENGINEERS

DROUGHT-TOLERANT SHRUBS AND GROUNCOVER ON SLOPES: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

TYPICAL TREE PLANTING AT PARKING AREA CONCEPT:
REFER TO SHEET L-5

PROJECT ENTRY ENLARGEMENT:
REFER TO SHEET L-7

PLAN VIEW
Scale: 1"=40'-0"

0' 20' 40' 80'

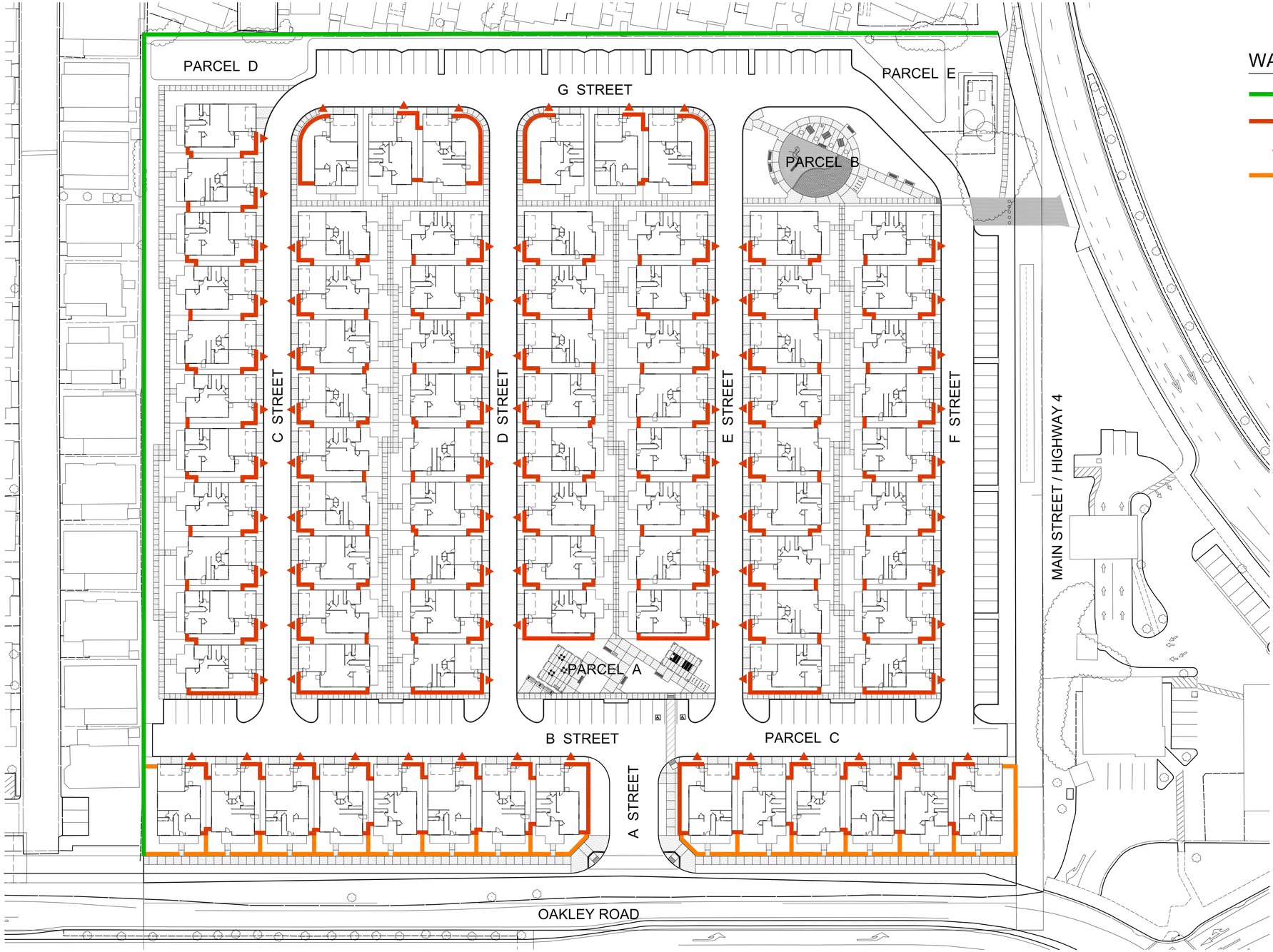
Preliminary Landscape Plan

L-1.2

THE VILLAGE AT 2092 OAKLEY ROAD Oakley, California

MARCH 8, 2023

R3 STUDIOS



WALL & FENCE SCHEDULE

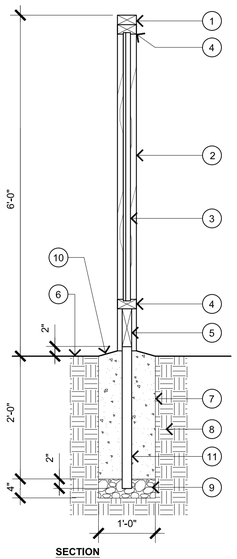
- WOOD FENCE (6'-0" TALL): REFER DETAIL/IMAGE 1 SHEET L-2.2
- WOOD FENCE WITH LATTICE (6'-0" TALL): REFER DETAIL/IMAGE 2 SHEET L-2.2
- WOOD GATE WITH LATTICE (6'-0" TALL): REFER DETAIL/IMAGE 3 SHEET L-2.2
- LOW PICKET FENCE AND GATE: REFER IMAGE 4 SHEET L-2.2

PLAN VIEW
Scale: 1"=40'-0"

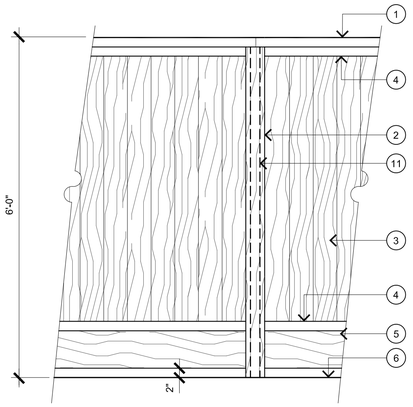
0' 20' 40' 80'

Wall and Fence Plan

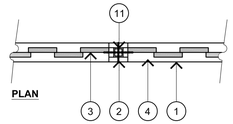
L-2.1



SECTION



ELEVATION



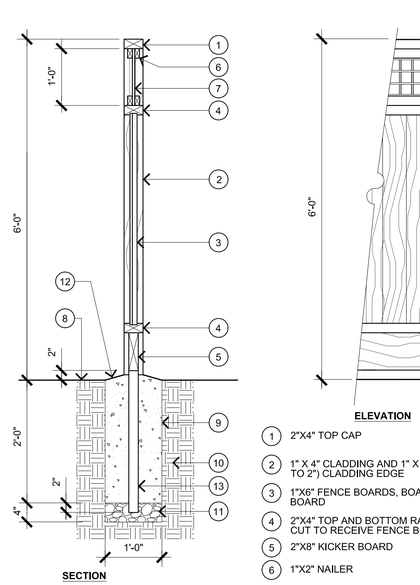
1. 2"X4" TOP CAP
2. 1" X 4" CLADDING AND 1" X 4" (RIPPED TO 2") CLADDING EDGE
3. 1"X6" FENCE BOARDS, BOARD ON BOARD
4. 2"X4" TOP AND BOTTOM RAILS RABBET CUT TO RECEIVE FENCE BOARDS
5. 2"X8" KICKER BOARD
6. FINISH GRADE, GRADE TO SLOPE AWAY FROM FENCE
7. CONCRETE FOOTING
8. COMPACTED SUBGRADE OR ENGINEERED FILL PER SOILS REPORT
9. CLASS II AGGREGATE SUB BASE
10. SLOPE TOP OF FOOTING TO DRAIN AT GRADE
11. SCHEDULE 2" SQUARE GALVANIZED STEEL PIPE, 8' LENGTH @ 8' O.C.

NOTES:

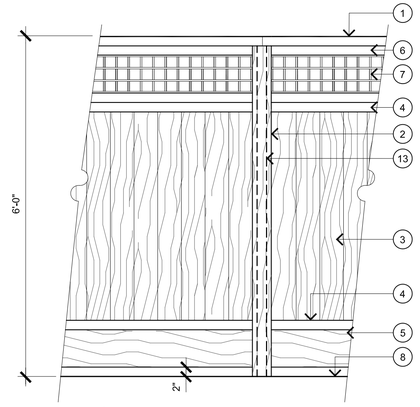
- ALL POSTS & KICKER SHALL BE PRESSURE TREATED CEDARTONE. ALL OTHER WOOD SHALL BE CONSTRUCTION HEART REDWOOD OR RED CEDAR AS SELECTED BY OWNER.
- ALL SCREWS SHALL BE HOT DIPPED GALVANIZED

SCALE : 3/4"=1'-0"

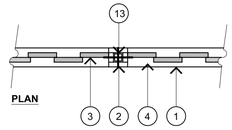
1 WOOD FENCE



SECTION



ELEVATION



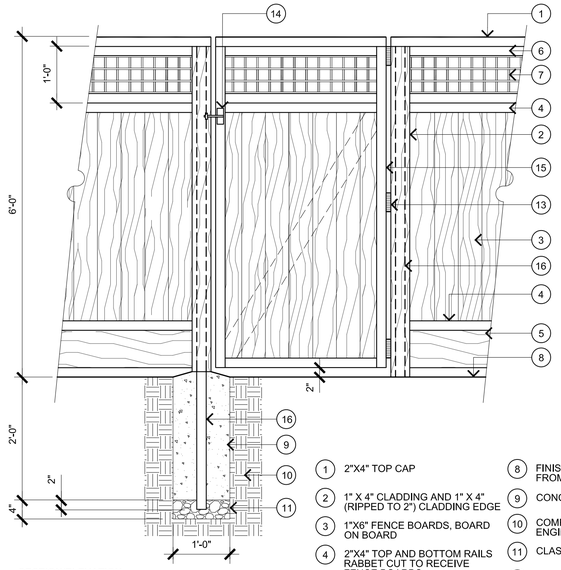
1. 2"X4" TOP CAP
2. 1" X 4" CLADDING AND 1" X 4" (RIPPED TO 2") CLADDING EDGE
3. 1"X6" FENCE BOARDS, BOARD ON BOARD
4. 2"X4" TOP AND BOTTOM RAILS RABBET CUT TO RECEIVE FENCE BOARDS
5. 2"X8" KICKER BOARD
6. 1"X2" NAILER
7. HORIZONTAL WOOD PRIVACY LATTICE
8. FINISH GRADE, GRADE TO SLOPE AWAY FROM FENCE
9. CONCRETE FOOTING
10. COMPACTED SUBGRADE OR ENGINEERED FILL PER SOILS REPORT
11. CLASS II AGGREGATE SUB BASE
12. SLOPE TOP OF FOOTING TO DRAIN AT GRADE
13. SCHEDULE 2" SQUARE GALVANIZED STEEL PIPE, 8' LENGTH @ 8' O.C.

NOTES:

- ALL POSTS & KICKER SHALL BE PRESSURE TREATED CEDARTONE. ALL OTHER WOOD SHALL BE CONSTRUCTION HEART REDWOOD OR RED CEDAR AS SELECTED BY OWNER.
- ALL SCREWS SHALL BE HOT DIPPED GALVANIZED.

SCALE : 3/4"=1'-0"

2 WOOD FENCE WITH LATTICE



SECTION/ELEVATION

1. 2"X4" TOP CAP
2. 1" X 4" CLADDING AND 1" X 4" (RIPPED TO 2") CLADDING EDGE
3. 1"X6" FENCE BOARDS, BOARD ON BOARD
4. 2"X4" TOP AND BOTTOM RAILS RABBET CUT TO RECEIVE FENCE BOARDS
5. 2"X8" KICKER BOARD
6. 1"X2" NAILER
7. HORIZONTAL WOOD PRIVACY LATTICE
8. FINISH GRADE, GRADE TO SLOPE AWAY FROM FENCE
9. CONCRETE FOOTING
10. COMPACTED SUBGRADE OR ENGINEERED FILL PER SOILS REPORT
11. CLASS II AGGREGATE SUB BASE
12. SLOPE TOP OF FOOTING TO DRAIN AT GRADE
13. HEAVY DUTY SELF-CLOSING HINGE (TYPICAL OF 3)
14. GATE LATCH
15. 2"X4" GATE FRAME AROUND AND ACROSS. CROSS TO BE LOCATED ON INSIDE (HOMEOWNER SIDE) OF GATE
16. SCHEDULE 2" SQUARE GALVANIZED STEEL PIPE, 8' LENGTH @ 8' O.C.

NOTES:

- ALL POSTS & KICKER SHALL BE PRESSURE TREATED CEDARTONE. ALL OTHER WOOD SHALL BE CONSTRUCTION HEART REDWOOD OR RED CEDAR AS SELECTED BY OWNER.
- ALL SCREWS SHALL BE HOT DIPPED GALVANIZED.
- METAL HARDWARE TO BE ZINC-PLATED STEEL, BLACK ENAMEL FINISH OR APPROVED EQUAL.
- CONTRACTOR TO PROVIDE CUT SHEETS FOR GATE HARDWARE (LATCH AND HINGES) TO OWNER FOR APPROVAL.

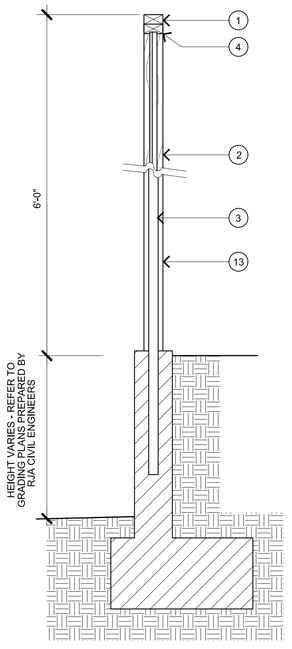
SCALE : 3/4"=1'-0"

3 WOOD GATE WITH LATTICE

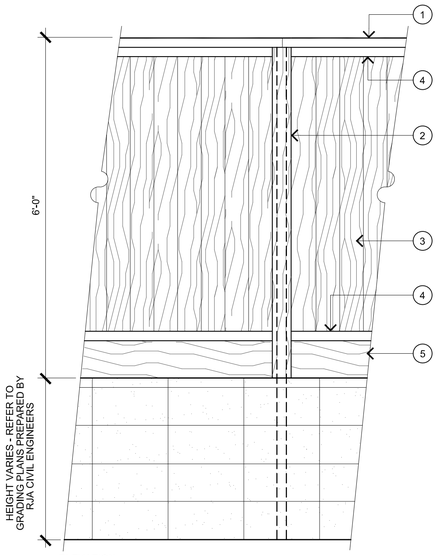
4 LOW PICKET FENCE

Wall and Fence Details

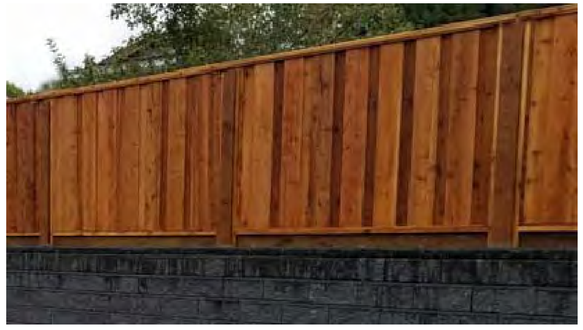
L-2.2

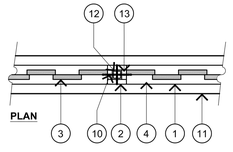


SECTION



ELEVATION





PLAN

BLOCK RETAINING WALL:

- SIZE TO BE 8X8X16 BLOCKS WITH 2X8X16 CAP
- FINISH TO BE SHOT BLAST
- COLOR TO BE 101

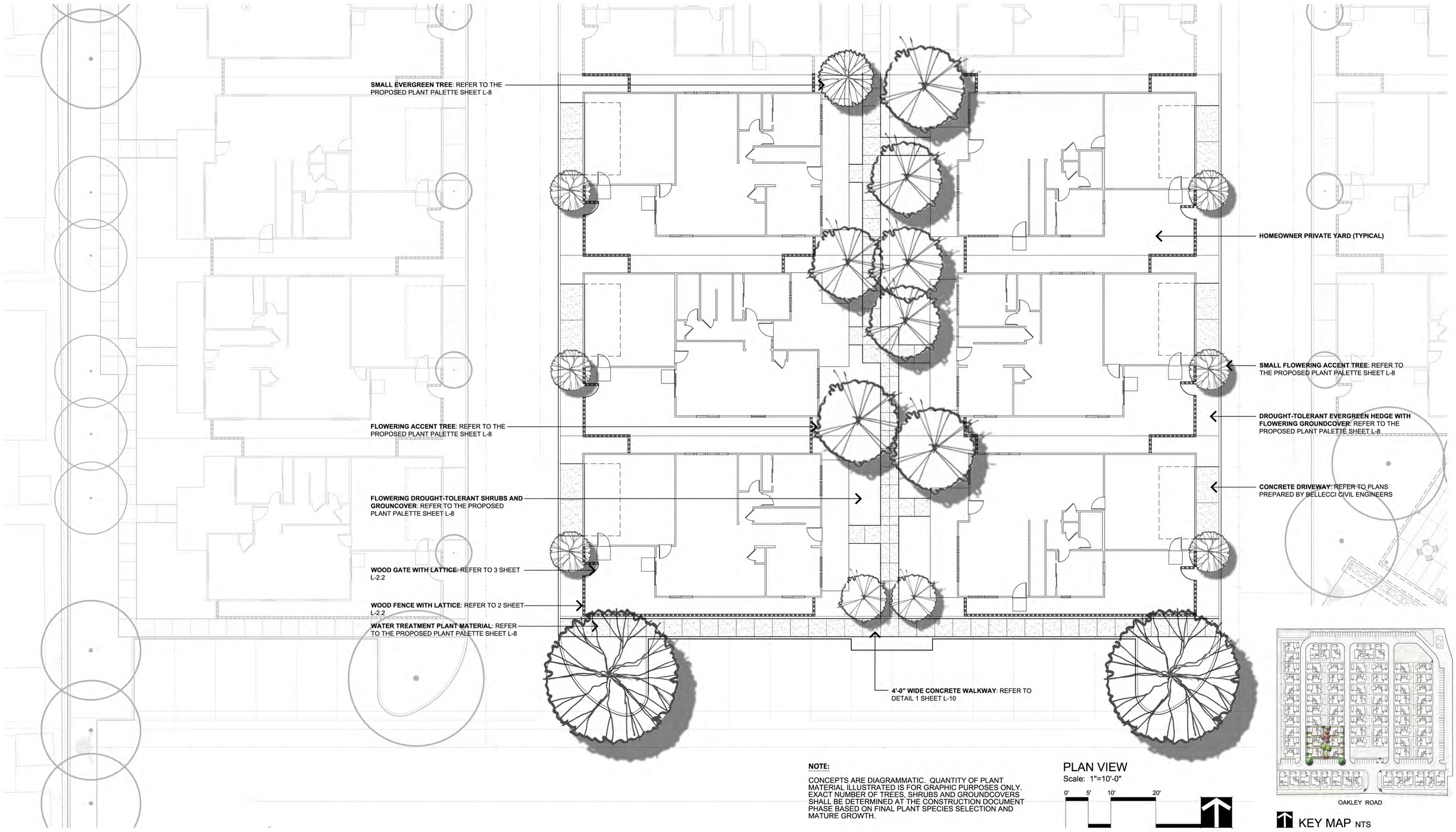
1. 2"X4" TOP CAP
2. 1" X 4" CLADDING
3. 1"X6" FENCE BOARDS, BOARD ON BOARD
4. 2"X4" TOP AND BOTTOM RAILS RABBET CUT TO RECEIVE FENCE BOARDS
5. 2"X8" KICKER BOARD
6. FINISH GRADE, GRADE TO SLOPE AWAY FROM FENCE
7. CONCRETE FOOTING
8. COMPACTED SUBGRADE OR ENGINEERED FILL PER SOILS REPORT
9. CLASS II AGGREGATE SUB BASE
10. 1/2" CARRIAGE BOLT, WASHER AND NUT THROUGH BOTH CLADDING BOARDS AND PIPE. 18" O.C. BOTH WAYS
11. BLOCK RETAINING WALL- REFER TO PLANS PREPARED BY BELLECCI CIVIL ENGINEERS
12. SCHEDULE 2" SQUARE GALVANIZED STEEL PIPE, 8' LENGTH @ 8' O.C.
13. 1" X 4" (RIPPED TO 2") CLADDING EDGE

NOTES:

- ALL POSTS & KICKER SHALL BE PRESSURE TREATED CEDARTONE. ALL OTHER WOOD SHALL BE CONSTRUCTION HEART REDWOOD OR RED CEDAR AS SELECTED BY OWNER.
- ALL SCREWS SHALL BE HOT DIPPED GALVANIZED
- GRADE CHANGES SHALL OCCUR AT POSTS

4 WOOD FENCE OVER RETAINING WALL (IF REQUIRED)

SCALE : 3/4"=1'-0"



NOTE:

CONCEPTS ARE DIAGRAMMATIC. QUANTITY OF PLANT MATERIAL ILLUSTRATED IS FOR GRAPHIC PURPOSES ONLY. EXACT NUMBER OF TREES, SHRUBS AND GROUNDCOVERS SHALL BE DETERMINED AT THE CONSTRUCTION DOCUMENT PHASE BASED ON FINAL PLANT SPECIES SELECTION AND MATURE GROWTH.

PLAN VIEW
Scale: 1"=10'-0"

0' 5' 10' 20'

KEY MAP NTS

Typical House Cluster Enlargement

L-3

THE VILLAGE AT 2092 OAKLEY ROAD Oakley, California

MARCH 8, 2023

R3 STUDIOS

HOMEOWNER PRIVATE YARD (TYPICAL)

4'-0" WIDE CONCRETE WALKWAY: REFER TO DETAIL 1 SHEET L-10

FLOWERING DROUGHT-TOLERANT SHRUBS AND GROUNCOVER: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

STAINED WOOD PERGOLA: REFER TO IMAGE SHEET L-9.2

TABLE AND CHAIRS: REFER TO IMAGE SHEET L-9.1

WASTE RECEPTACLE: REFER TO IMAGE SHEET L-9.1

MAILBOX STATION: REFER TO IMAGE SHEET L-9.2

BENCH: REFER TO IMAGE SHEET L-9.1

STREET TREE: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

WOOD GATE WITH LATTICE: REFER TO 3 SHEET L-2.2

WOOD FENCE WITH LATTICE: REFER TO 2 SHEET L-2.2

STAINED WOOD PERGOLA: REFER TO IMAGE SHEET L-9.2

LARGE CANOPY TREE: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

DINING TABLES: REFER TO IMAGE SHEET L-9.1

BICYLE RACK: 5 RACKS IN THIS LOCATION WITH PARKING FOR 10 BICYCLES, REFER TO IMAGE SHEET L-9.1

NOTE:

CONCEPTS ARE DIAGRAMMATIC. QUANTITY OF PLANT MATERIAL ILLUSTRATED IS FOR GRAPHIC PURPOSES ONLY. EXACT NUMBER OF TREES, SHRUBS AND GROUNDCOVERS SHALL BE DETERMINED AT THE CONSTRUCTION DOCUMENT PHASE BASED ON FINAL PLANT SPECIES SELECTION AND MATURE GROWTH.

PLAN VIEW
Scale: 1"=10'-0"

0' 5' 10' 20'

KEY MAP NTS

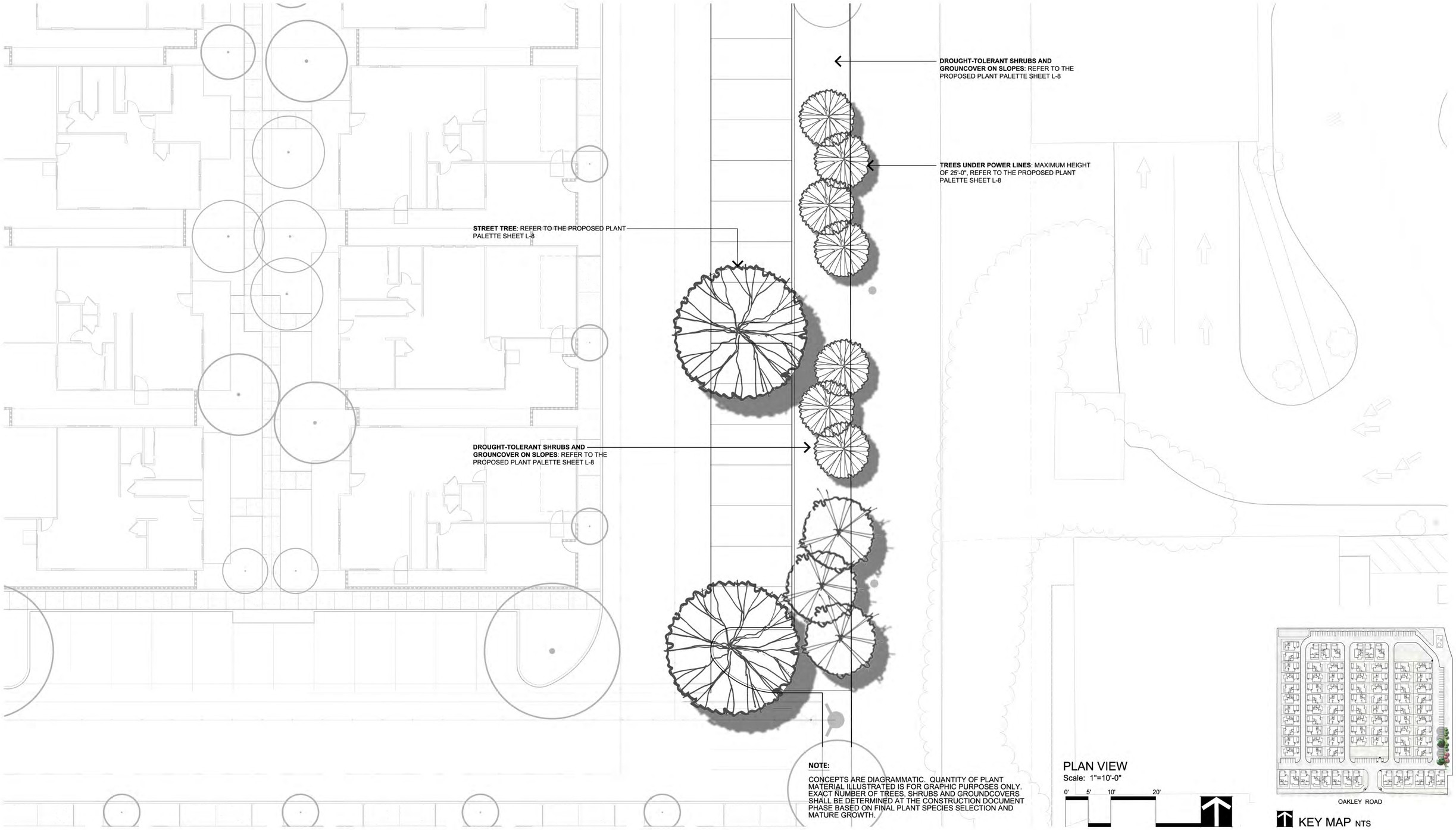
House Cluster and Open Space Enlargement

L-4

THE VILLAGE AT 2092 OAKLEY ROAD Oakley, California

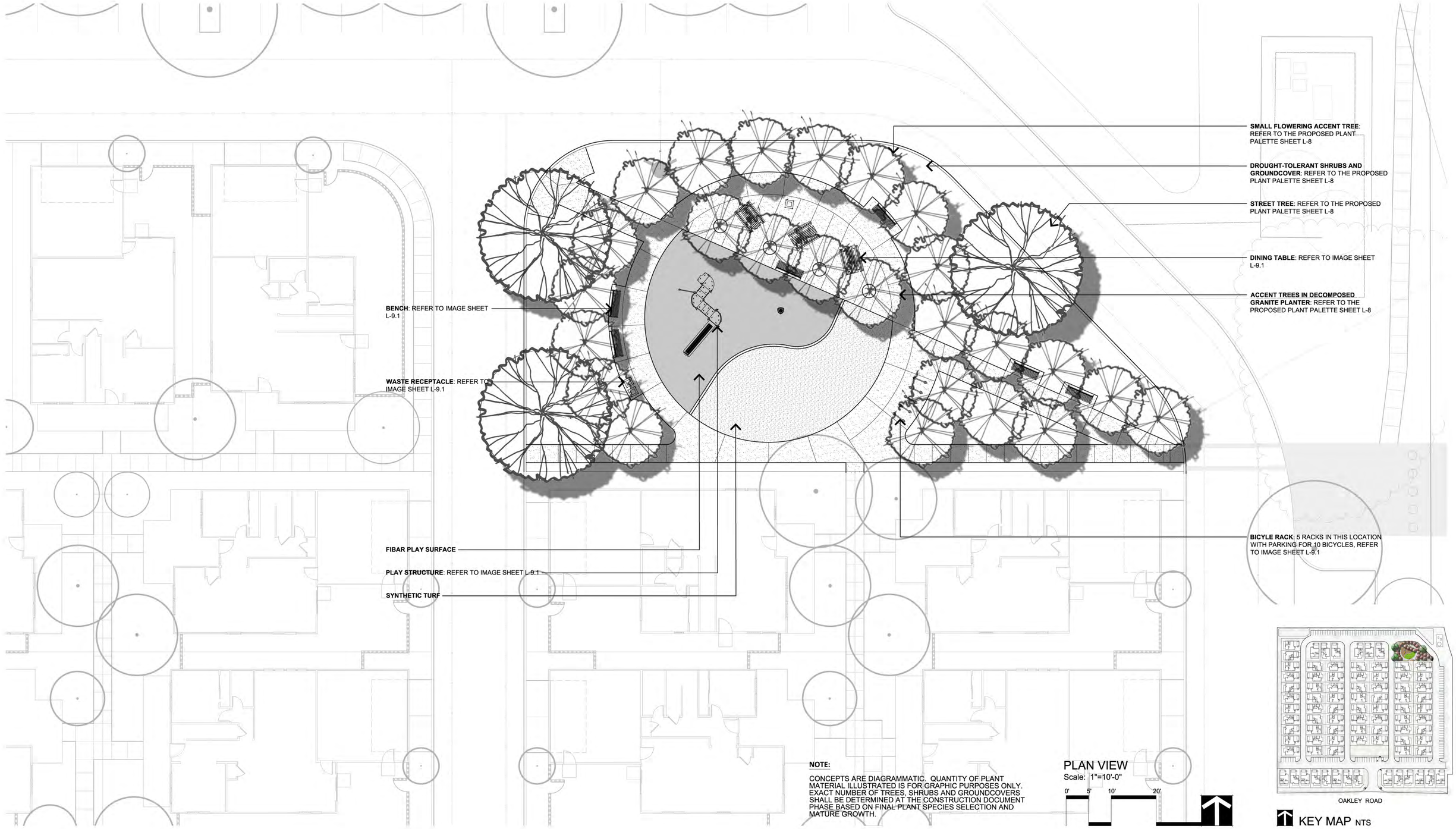
MARCH 8, 2023

R3 STUDIOS



Typical Tree Planting at Parking Area Concept

L-5



NOTE:

CONCEPTS ARE DIAGRAMMATIC. QUANTITY OF PLANT MATERIAL ILLUSTRATED IS FOR GRAPHIC PURPOSES ONLY. EXACT NUMBER OF TREES, SHRUBS AND GROUNDCOVERS SHALL BE DETERMINED AT THE CONSTRUCTION DOCUMENT PHASE BASED ON FINAL PLANT SPECIES SELECTION AND MATURE GROWTH.

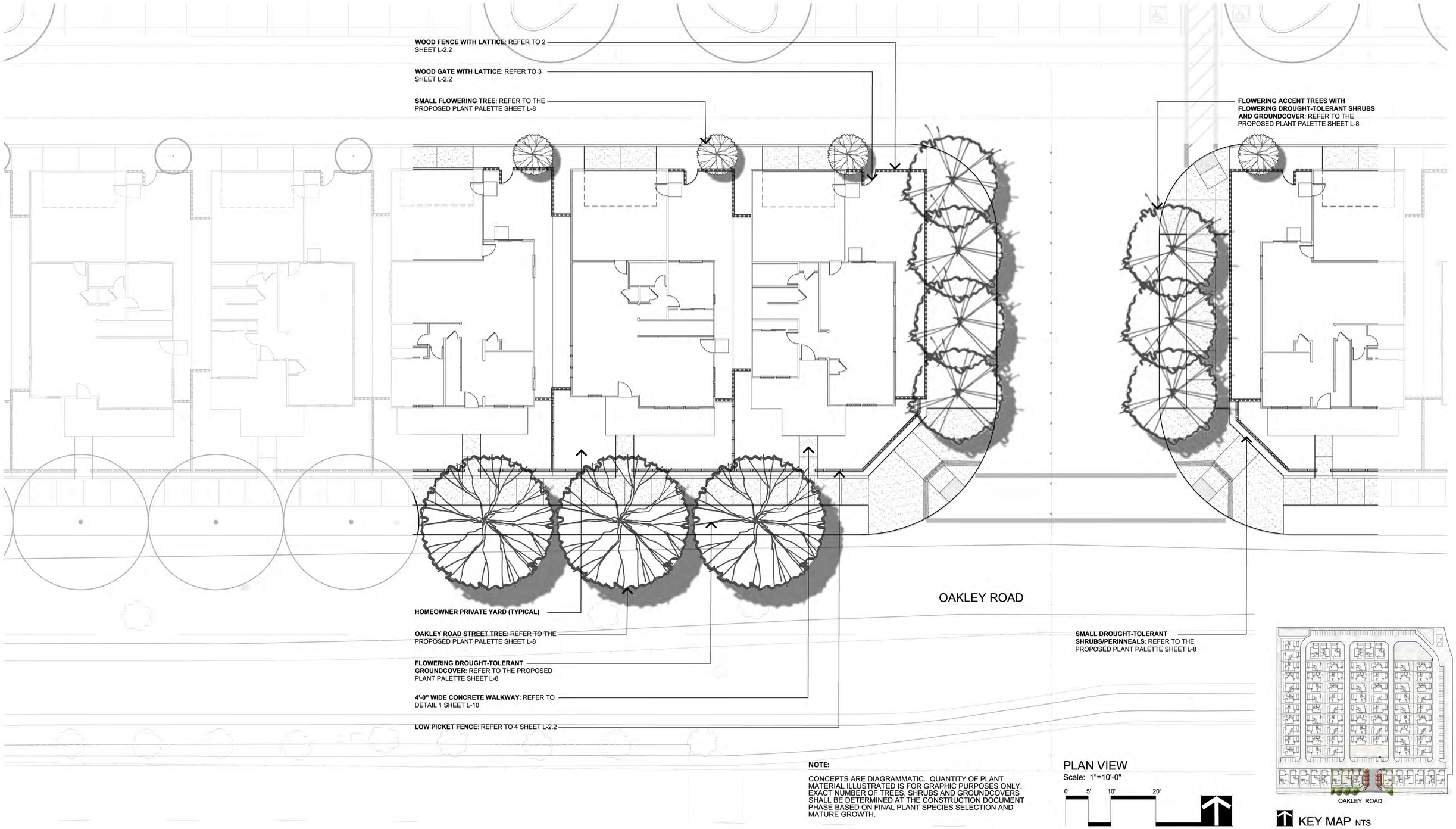
PLAN VIEW
Scale: 1"=10'-0"

0' 5' 10' 20'

KEY MAP NTS

Open Space Enlargement

L-6



NOTE:

CONCEPTS ARE DIAGRAMMATIC. QUANTITY OF PLANT MATERIAL ILLUSTRATED IS FOR GRAPHIC PURPOSES ONLY. EXACT NUMBER OF TREES, SHRUBS AND GROUNDCOVERS SHALL BE DETERMINED AT THE CONSTRUCTION DOCUMENT PHASE BASED ON FINAL PLANT SPECIES SELECTION AND MATURE GROWTH.

PLAN VIEW
Scale: 1"=10'-0"

0' 5' 10' 20'

KEY MAP NTS

Project Entry Enlargement

L-7

PROPOSED PLANT PALETTE

BOTANICAL NAME	COMMON NAME	MINIMUM CONTAINER SIZE	SPACING	WULCOLS
OAKLEY ROAD STREET TREE:				
QUERCUS SUBER	CORK OAK	24" BOX	N/A	M
EVERGREEN TREES:				
GEIJERA PARVIFLORA	AUSTRALIAN WILLOW	24" BOX	N/A	M
LAURUS NOBILIS 'SARATOGA'	SARATOGA BAY LAUREL	24" BOX	N/A	L
MAGNOLIA 'BRACKEN'S BROWN BEAUTY'	MAGNOLIA	24" BOX	N/A	M
PRUNUS CAROLINIANA	NCN	24" BOX	N/A	L
RHAPHIOLEPIS INDICA 'MAGNIFICENT'	PINK INDIAN HAWTHORNE	24" BOX	N/A	L
ACCENT TREES:				
X CHITALPIA TASHKENTENSIS 'PINK DAWN'	PINK DAWN CHITALPA	24" BOX	N/A	M
CERCIS CANADENSIS SPECIES	EASTERN REDBUD	24" BOX	N/A	M
CHIONANTHUS RETUSUS	FRINGE TREE	24" BOX	N/A	M
LAGERSTROEMIA FAUREI SPECIES	CRAPE MYRTLE	24" BOX	N/A	L
MALUS SPECIES	FLOWERING CRAB APPLE	24" BOX	N/A	M
PRUNUS SPECIES	FLOWERING PLUM/CHERRY	24" BOX	N/A	L
BACKGROUND/FOUNDATION SHRUB A:				
ARCTOSTAPHYLOS SPECIES	MANZANITA	5 GALLON	3' O.C.	L
BACCHARIS SPECIES	COYOTE BRUSH	5 GALLON	3' O.C.	L
BUXUS SPECIES	BOXWOOD	5 GALLON	3' O.C.	M
CALLISTEMON 'BETTER JOHN'	DWARF BOTTLBRUSH	5 GALLON	3' O.C.	L
CISTUS SPECIES	ROCKROSE	5 GALLON	4'-6" O.C.	L
COPROSMA SPECIES	NCN	5 GALLON	4' O.C.	L
ESCALLONIA SPECIES	ESCALLONIA	5 GALLON	3' O.C.	M
HESPERALOE SPECIES	NCN	5 GALLON	2' O.C.	L
LEUCOPHYLLUM SPECIES	NCN	5 GALLON	2' O.C.	L
LIGUSTRUM TEXANUM	WAXLEAF PRIVET	5 GALLON	2' O.C.	M
PHLOMIS FRUTICOSA	JERUSALEM SAGE	5 GALLON	3' O.C.	L
PITTOSPORUM SPECIES	NCN	5 GALLON	3' O.C.	L
RHAPHIOLEPIS SPECIES	INDIAN HAWTHORNE	5 GALLON	3'-5' O.C.	M
ROSMARINUS SPECIES	ROSEMARY	5 GALLON	3' O.C.	L
INTERMEDIATE SHRUB B:				
ABELIA 'KALEIDISCOPE'	ABELIA	1 GALLON	3'-6" O.C.	L
COLEONEMA PULLCHELLUM 'SUNSET GOLD'	GOLDEN BREATH OF HEAVEN	1 GALLON	4' O.C.	M
CORREA SPECIES	AUSTRALIAN FUCHSIA	1 GALLON	3' O.C.	L
DIETES SPECIES	FORTNIGHT LILY	1 GALLON	3' O.C.	L
GALVEZIA 'FIRECRACKER'	NCN	1 GALLON	3' O.C.	L
LAVANDULA SPECIES	LAVENDER	1 GALLON	3' O.C.	L
LIRIOPE GIGANTEA	LILY TURF	1 GALLON	2' O.C.	M
LOMANDRA SPECIES	NCN	1 GALLON	VARIES	L
MUHLENBERGIA SPECIES	DEER GRASS	1 GALLON	4' O.C.	L
NANDINA SPECIES	HEAVENLY BAMBOO	1 GALLON	2' O.C.	L
PITTOSPORUM SPECIES	NCN	1 GALLON	2' O.C.	L
PENNISETUM SPECIES	FOUNTAIN GRASS	1 GALLON	3' O.C.	L
POLYGALA FRUTICOSA 'PETITE BUTTERFLY'	COMPACT SWEET PEA	5 GALLON	30" O.C.	L
ROSA SPECIES	SHRUB ROSE	1 GALLON	3' O.C.	M
SALVIA GREGGII SPECIES	SAGE	1 GALLON	3' O.C.	L
YUCCA SPECIES	YUCCA	1 GALLON	3' O.C.	L
FOREGROUND SHRUB C:				
AGAPHANTHUS SPECIES	LILY OF THE NILE	1 GALLON	VARIES	M
CALLANDRINIA 'JAZZ TIME'	NCN	1 GALLON	30" O.C.	L
DIANELLA SPECIES	FLAX LILY	1 GALLON	30" O.C.	L
GREVILLEA SPECIES	GRELLIVEA	1 GALLON	2' O.C.	L
HEMEROCALLIS SPECIES	EVERGREEN DAYLILY	1 GALLON	2' O.C.	M
LAVANDULA SPECIES	LAVENDER	1 GALLON	3' O.C.	L
LIRIOPE SPECIES	LILY TURF	1 GALLON	2' O.C.	M
NANDINA SPECIES	HEAVENLY BAMBOO	1 GALLON	3' O.C.	L
TEUCRIUM SPECIES	GERMANDER	1 GALLON	2' O.C.	L
ZAUSCHNERIA CALIFORNICA	CALIFORNIA FUCHSIA	1 GALLON	VARIES	L

BOTANICAL NAME	COMMON NAME	MINIMUM CONTAINER SIZE	SPACING	PLANTING ZONE	WULCOLS
GROUNDCOVER D:					
ARCTOSTAPHYLOS UVA-URSI	BEARBERRY	1 GALLON	3' O.C.		L
CEANATHUS SPECIES	WILD LILAC	1 GALLON	18" O.C.		L
CISTUS SALVIIFOLIUS	ROCKROSE	1 GALLON	2' O.C.		L
CONVOLVULUS SABATIUS	GROUND MORNING GLORY	1 GALLON	3' O.C.		L
COPROSMA KIRKII SPECIES	NCN	1 GALLON	18" O.C.		L
COTONEASTER SPECIES	COTONEASTER	1 GALLON	18" O.C.		L
EREMOPHILA SPECIES	EMU BUSH	1 GALLON	2' O.C.		L
LANTANA SPECIES	LANTANA	1 GALLON	4' O.C.		L
ROSA SPECIES	GROUNDCOVER ROSE	2 GALLON	2' O.C.		L
TEUCRIUM SPECIES	GERMANDER	1 GALLON	2' O.C.		L
WESTRINGIA SPECIES	WESTRINGIA	1 GALLON	VARIES		L
ZAUSCHNERIA CANUM 'EVERETT'S CHOICE'	EVERETT'S CALIFORNIA FUCHSIA	1 GALLON	VARIES		L
STORM WATER TREATMENT SHRUBS AND GRASSES E:					
CHONDROPETALUM SPECIES	NCN	1 GALLON	MIX EVENLY	BASIN FLOOR	L
JUNCUS PATENS	RUSH	1 GALLON	MIX EVENLY	BASIN FLOOR	L
LEYMUS SPECIES	NCN	1 GALLON	MIX EVENLY	BASIN FLOOR	L
MIMULUS AURANTIACUS	MONKEY FLOWER	1 GALLON	MIX EVENLY	BASIN FLOOR	L
MUHLENBERGIA RIGENS	DEER GRASS	1 GALLON	MIX EVENLY	BASIN FLOOR	L

STORM WATER TREATMENT PLANTING NOTES:

STORM WATER TREATMENT SHRUBS AND GRASSES APPROVED PER THE C.3 HANDBOOK APPENDIX D PLANT LIST.

PG&E APPROVED TREES WITHIN DISTRIBUTION LINE F:
(NO TREES TO BE PLANTED WITHING 10' OF POWER POLE BASE)

AESCULUS CALIFORNICA	BUCKEYE	15 GALLON	N/A	L
CALLISTEMON SPECIES	BOTTLEBRUSH	15 GALLON	N/A	L
ERIOBOTRYA SPECIES	LOQUAT	15 GALLON	N/A	L
LAGERSTROEMIA SPECIES	CRAPE MYRTLE	15 GALLON	N/A	M
PRUNUS CERASIFERA 'KRAUTER VESUVIUS'	PURPLE LEAF PLUM	15 GALLON	N/A	L

NOTES

WATER CONSERVATION STATEMENT:

PLANT MATERIAL HAS BEEN CHOSEN FOR WATER CONSERVING AND REDUCED MAINTENANCE CHARACTERISTICS. A MAXIMUM OF 25% OF NON-TURF PLANS WILL HAVE A MODERATE IRRIGATION WATER REQUIREMENT AND A MINIMUM OF 50% OF NON-TURF PLANTS WILL HAVE A LOW TO VERY LOW IRRIGATION WATER REQUIREMENT.

I HAVE COMPLIED WITH THE CRITERIA OF CITY OF OAKLEY WATER EFFICIENT LANDSCAPE ORDINANCE AND APPLIED THEM FOR THE EFFICIENT USE OF WATER IN THE LANDSCAPE AND IRRIGATION DESIGN PLAN.

IRRIGATION NOTE:

A FULLY AUTOMATIC IRRIGATION SYSTEM SHALL BE PROPOSED FOR THE PROJECT UTILIZING WATER CONSERVING METHODS. IRRIGATION SHALL BE INSTALLED THROUGHOUT THE BIO-RETENTION AREAS TO PROVIDE SUPPLEMENTAL IRRIGATION IN THE DRY MONTHS WITH REDUCED IRRIGATION DURING SEASONAL RAINFALL OR WET MONTHS.

MINIMUM TREE CLEARANCE NOTE:

1. SMALL TREES (15' TALL/WIDE) SHALL BE PLACED A MINIMUM OF 6' FROM BUILDINGS AND A MINIMUM OF 2' FROM EDGES OF PAVING, CURBS OR WALLS.
2. MEDIUM TREES (25' TALL/WIDE) SHALL BE PLACED A MINIMUM OF 10' FROM BUILDINGS AND A MINIMUM OF 3' FROM PAVING, CURBS OR WALLS.
3. LARGE TREES (ABOVE 25' TALL/WIDE) SHALL BE PLACED A MINIMUM OF 15' FROM BUILDINGS AND A MINIMUM OF 3' FROM PAVING, CURBS OR WALLS.
4. 5' MINIMUM FROM JOINT TRENCH, WATER LINES, WATER METERS AND FIRE HYDRANTS.
5. 8' MINIMUM FROM SANITARY SEWER AND STORM DRAINS.
6. ALL TREES PLANTED WITHIN 5'-0" OF FUTURE CURBS, SIDEWALK, WALLS AND ALL UTILITIES, SHALL INCLUDE A ROOT BARRIER.

LANDSCAPE NOTES:

PLANT PALETTE IS FOR REFERENCE ONLY, NOT ALL TREES, SHRUBS, GRASSES, AND GROUNDCOVER LISTED WILL BE UTILIZED IN THE PREPARATION OF CONSTRUCTION DOCUMENTS. ADDITIONAL PLANTS MAY BE SUBSTITUTED DUE TO AVAILABILITY AND CONTAINER SIZE. PLANT MATERIAL SHALL BE SELECTED AT THE DESCRETION OF THE LANDSCAPE ARCHITECT.

PLACE 3" OF COMPOSTED NON-FLOATABLE MULCH IN AREAS BETWEEN STORM WATER PLANTINGS AND SIDE SLOPES.

A WEED BARRIER (2 OZ. POLYSPUN WEED BARRIER FABRIC AVAILABLE FROM PRO FABRIC SUPPLY, WWW.PROFABRICSUPPLY.COM, OR APPROVED EQUAL) SHALL BE INSTALLED AS A WARNING BARRIER TO PREVENT ALTERATION TO THE SILVA CELLS, INSTALL DIRECTLY ON TOP OF THE SILVA CELL LIMITS.

LANDSCAPING SHALL BE OF THE TYPE AND SITUATED IN LOCATIONS TO MAXIMIZE OBSERVATION WHILE PROVIDING THE DESIRED DEGREE OF AESTHETICS. LANDSCAPING SHOULD BE TRIMMED SO AS NOT TO PROVIDE CONCEALMENT OPPORTUNITIES OR MEANS TO ACCESS ROOF. SECURITY PLANTING MATERIALS ARE ENCOURAGED ALONG PROPERTY LINE AND UNDER VULNERABLE WINDOWS.

ALL TRANSFORMERS AND UTILITY BOXES TO BE SCREENED WITH EVERGREEN SHRUBS.

BENCH

FINISH TO BE BRONZE

WASTE RECEPTACLE

FINISH TO BE BRONZE

BICYCLE RACK

FINISH TO BE BRONZE

DINING TABLE

FINISH TO BE BRONZE

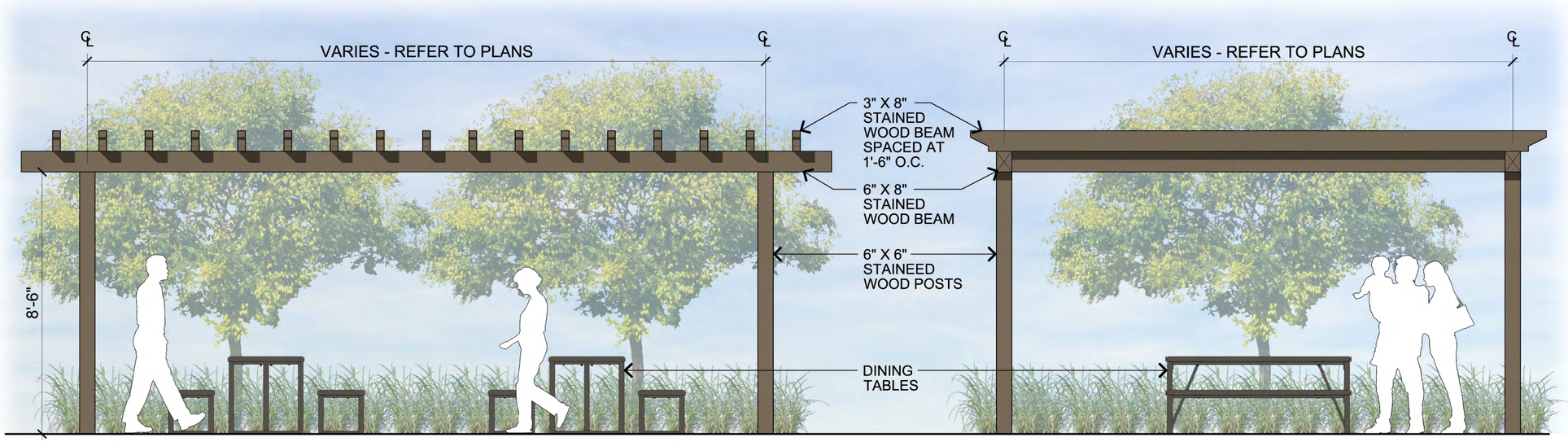
TABLES AND CHAIRS

FINISH TO BE BRONZE

PLAY STRUCTURE

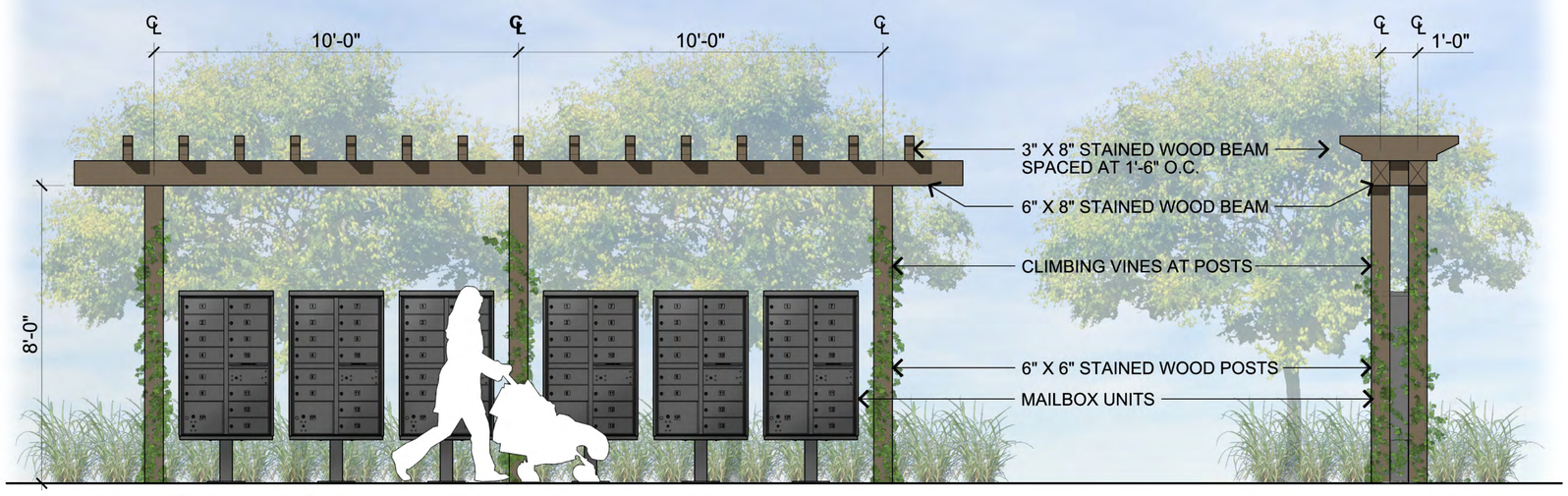
Site Amenities

L-9.1



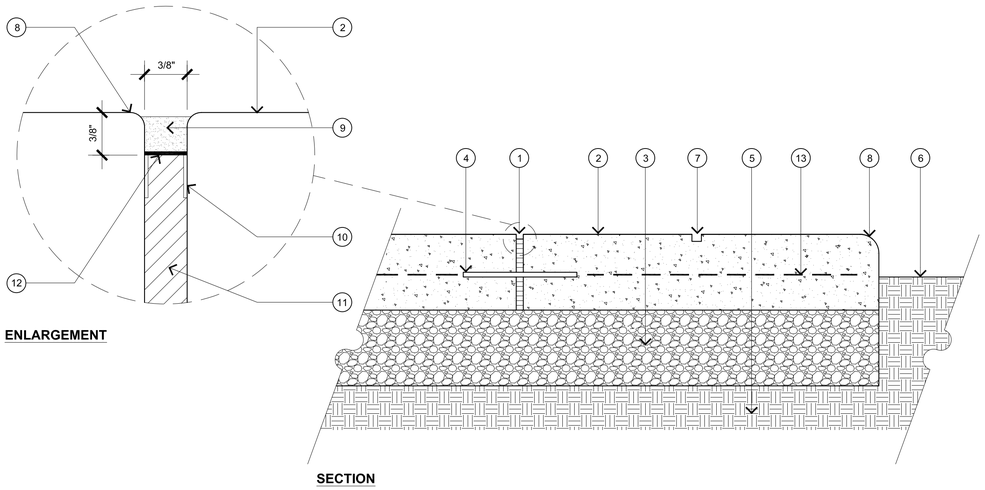
STAINED WOOD PERGOLA

SCALE: 1/2" - 1'-0"



MAILBOX STATION

SCALE: 1/2" - 1'-0"



ENLARGEMENT

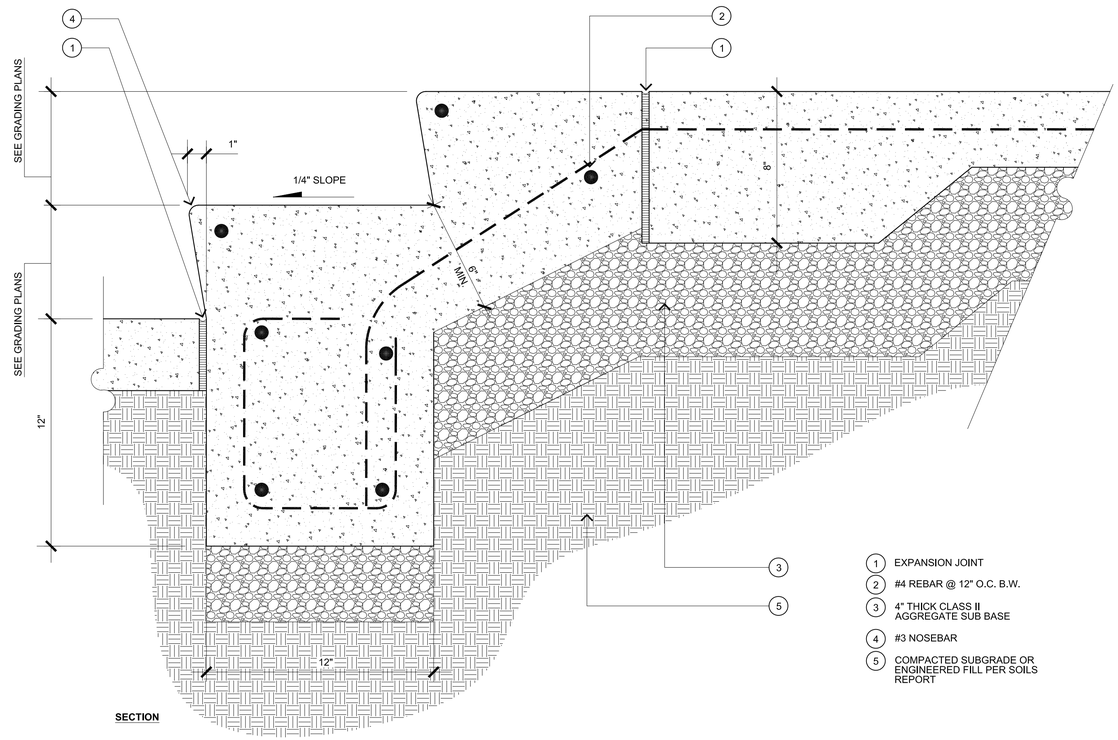
SECTION

1. 3/8" EXPANSION JOINT WITH SEALANT & BACKER ROD. EXPANSION JOINTS SHALL OCCUR EVERY 25' C.C. EACH WAY- REFER TO PLAN FOR LOCATIONS
2. 4" THICK CONCRETE PAVING
3. 4" THICK CLASS II AGGREGATE SUB BASE
4. #4 X 24" LONG DOWELS @ 24" O.C.
5. 90% COMPACTED SUB GRADE
6. FINISH GRADE AT PLANTING AREA 1" BELOW AT TURF AREAS, 2" AT SHRUB AND GROUNDCOVER AREAS
7. SCORED JOINT- 1" DEEP X 1/8" WIDE SAWCUT @ 12"C.C. EACH WAY, REFER TO PLANS FOR LOCATIONS (TYP.)
8. RADIUSED EDGE
9. SEALANT - ALSO INSTALL WHERE PAVING ABUTS TO BUILDING FOUNDATIONS
10. PVC CAP
11. EXPANSION MATERIAL
12. BOND BREAKER TAPE
13. #3 REBAR @ 18" O.C. BOTH WAYS

NOTE:
CONCRETE MIX SHALL BE LOW SHRINK.

1 CONCRETE PAVING

SCALE : 3"=1'-0"

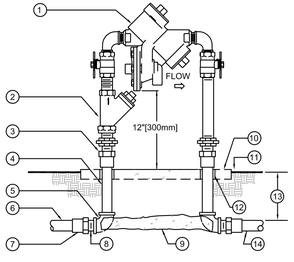


SECTION

1. EXPANSION JOINT
2. #4 REBAR @ 12" O.C. B.W.
3. 4" THICK CLASS II AGGREGATE SUB BASE
4. #3 NOSEBAR
5. COMPACTED SUBGRADE OR ENGINEERED FILL PER SOILS REPORT

2 CONCRETE STEPS (AS NEEDED)

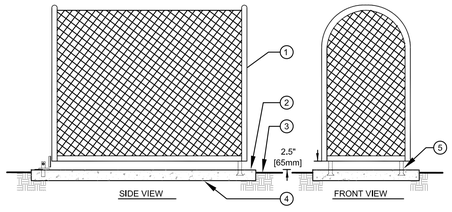
SCALE : 3"=1'-0"



1. REDUCED PRESSURE BACKFLOW ASSEMBLY.
2. YB "Y" STRAINER SYSTEM (AS REQUIRED).
3. WROUGHT COPPER MALE ADAPTER-2 TOTAL (SOLDER x THREAD CONNECTION).
4. COPPER TYPE "K" PIPE (LENGTH AS REQUIRED).
5. WROUGHT COPPER 90° ELBOW-2 TOTAL (SOLDER x THREAD CONNECTION).
6. PVC MAIN LINE TO POINT OF CONNECTION.
7. BUSH AS NECESSARY FOR SIZE TRANSITION.
8. SCHEDULE 40 PVC MALE ADAPTER-2 TOTAL.
9. CONCRETE SUPPORT BLOCK.
10. CONCRETE PAD-SEE ENCLOSURE DETAIL.
11. FINISH GRADE.
12. PVC SLEEVE BOTH SIDES.
13. REFER TO IRRIGATION LEGEND
14. PVC MAIN LINE TO IRRIGATION SYSTEM.

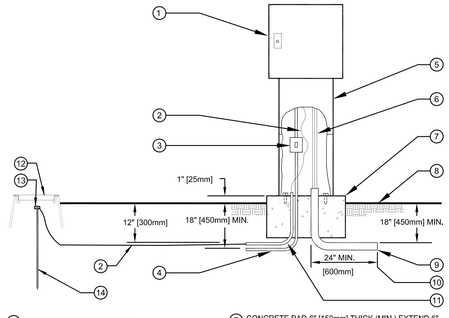
NOTES:
1. INSTALL A FREEZE PREVENTATIVE BLANKET AROUND BACKFLOW ASSEMBLY. BLANKET SHALL BE GREEN.
2. DO NOT SOLDER CONNECT FITTINGS WHILE THREADED INTO BACKFLOW ASSEMBLY. THIS MAY CAUSE DAMAGE TO DEVICE.
3. NIPPLES AND FITTINGS TO BE SAME IPT SIZE AS BACKFLOW ASSEMBLY.
4. PROVIDE A STAINLESS STEEL ENCLOSURE TO COMPLETELY ENCLOSE DEVICE. INSTALL ENCLOSURE TO CONCRETE BASE AS DIRECTED BY MANUFACTURER.

1 REDUCED PRESSURE BACKFLOW ASSEMBLY
SCALE: NONE



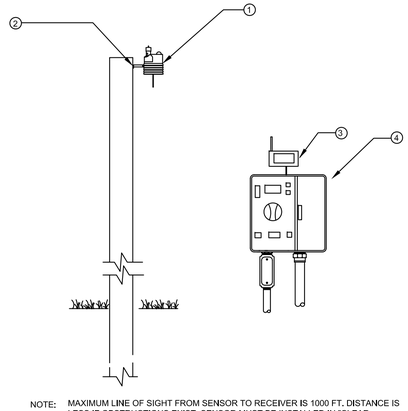
1. STAINLESS STEEL ENCLOSURE TO COMPLETELY ENCLOSE DEVICE
2. SET PAD 1/2" [13MM] ABOVE FINISH GRADE
3. FINISH GRADE
4. 6" [150mm] THICK CONCRETE PAD FOR ENCLOSURE SUPPORT TO EXTEND 6" [150mm] BEYOND ENCLOSURE ON ALL SIDES. CONCRETE TO HAVE MEDIUM BROOM FINISH.
5. MOUNTING BRACKETS (STANDARD WITH ENCLOSURE) TO BE SET INTO CONCRETE PAD. PROVIDE LOCKING TAB TO ACCEPT PADLOCK PER MANUFACTURER'S INSTRUCTION.

2 BACKFLOW ASSEMBLY ENCLOSURE
SCALE: NONE



1. IRRIGATION CONTROLLER.
2. #6 BARE COPPER GROUND WIRE.
3. 120 VOLT LOCKABLE WEATHERPROOF ON/OFF SWITCH PROVIDED UNDER IRRIGATION CONTRACT.
4. 120 VOLT A.C. ELECTRICAL SERVICE FROM SOURCE TO CONTROLLER LOCATION PROVIDED BY CONTRACTOR. IRRIGATION CONTRACTOR TO PROVIDE RIGID STEEL CONDUIT FROM SERVICE STUB-OUT TO CONTROLLER GCFI SWITCH AND COMPLETE ELECTRICAL SERVICE TO CONTROLLER.
5. PEDESTAL ENCLOSURE.
6. LOW VOLTAGE CONTROL WIRING.
7. CONCRETE PAD-6" [150mm] THICK (MIN.) EXTEND 6" [150mm] BEYOND EACH SIDE AND BACK, 24" [600mm] IN FRONT AND 1" [25mm] ABOVE FINISH GRADE.
8. FINISH GRADE.
9. SCHEDULE 40 GREY PVC ELECTRICAL CONDUIT WITH SWEEP ELL FOR LOW VOLTAGE WIRE.
10. 24" MIN. [600mm] AND OR 12" [300mm] BEYOND HARDSCAPE.
11. 1 1/2" [40mm] PVC SWEEP ELL FOR GROUND WIRE.
12. 6" ROUND BLACK PLASTIC BOX WITH T-LID FOR GROUND ROD.
13. CADWELD CONNECTIONS
14. 8' LONG COPPER GROUND ROD. LOCATE A MINIMUM OF 10' AWAY FROM CONTROLLER.

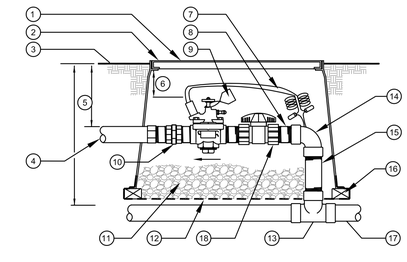
3 CONTROLLER - PEDESTAL MOUNT
SCALE: NONE



NOTE: MAXIMUM LINE OF SIGHT FROM SENSOR TO RECEIVER IS 1000 FT. DISTANCE IS LESS IF OBSTRUCTIONS EXIST, SENSOR MUST BE INSTALLED IN "CLEAR SPACE" WHERE IT IS EXPOSED TO UNOBSTRUCTED RAINFALL AND IS CLEAR OF IRRIGATION SPRAY.

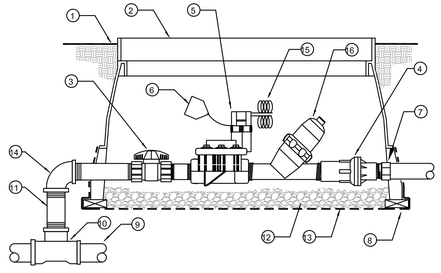
1. WIRELESS CLIMATE SENSOR TRANSMITTER
2. SUITABLE POST, POLE, OR GUTTER MOUNT. MOUNT IN LOCATION WHERE SENSOR CAN RECEIVE FULL SUN, IS OPEN TO RAINFALL AND OUT OF SPRINKLER SPRAY PATTERN
3. SENSOR RECEIVER
4. CONTROLLER

4 WIRELESS WEATHER SENSOR
SCALE: NONE



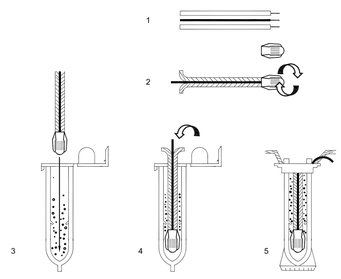
1. REMOTE CONTROL VALVE WITH FLOW CONTROL AND MANUAL BLEED (PRESSURE REGULATOR WHERE SHOWN ON PLANS).
2. USE A 14" X 19" RECTANGULAR PLASTIC VALVE BOX WITH BOLT DOWN LID FOR 1" VALVES. FOR 1.5" AND LARGER VALVES INSTALL BALL VALVE WITHIN A SEPARATE 10" ROUND BOX OR ONE BALL VALVE PER MANIFOLD OF VALVES, GATE VALVE SIZE SHALL BE SAME AS LARGEST VALVE WITHIN MANIFOLD. ONE VALVE PER BOX- NO EXCEPTIONS. INSTALL BOX AS SHOWN IN BOX INSTALLATION DETAIL.
3. FINISH GRADE.
4. PVC LATERAL LINE.
5. REFER TO IRRIGATION SPECS.
6. 3" [75mm] MIN. 6" [150mm] MAX.
7. VALVE CONTROL WIRE- PROVIDE SEAL PACKS AT ALL SPLICES AND 3' [1m] OF EXCESS UF WIRE IN A 1" [25mm] DIAMETER COIL.
8. SCHEDULE 80 PVC NIPPLE (4 TOTAL).
9. VALVE I.D. TAG (CONTROLLER AND STATION NUMBER).
10. SCHEDULE 80 PVC THREADED UNION.
11. PEA GRAVEL OR 3/4" DRAIN ROCK- 4" [100mm] DEEP BELOW VALVE (NO SOIL IN VALVE BOX).
12. 19 GAUGE 1/2" [12mm] SQUARE WIRE MESH.
13. UPC APPROVED SCHEDULE 40 PVC TEE.
14. SCHEDULE 80 PVC 90° ELBOW (TxT).
15. SCHEDULE 80 PVC NIPPLE- LENGTH AS REQUIRED.
16. BRICK-1 EACH CORNER.
17. PVC MAIN LINE.
18. SCHEDULE 80 PVC UNION BALL VALVE (ONE PER VALVE).

5 REMOTE CONTROL VALVE
SCALE: NONE



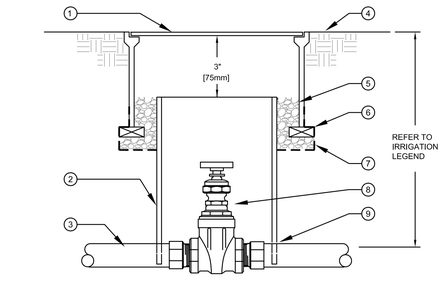
1. FINISH GRADE
2. JUMBO RECTANGULAR PLASTIC VALVE BOX WITH BOLT DOWN LID. ONE VALVE PER BOX- NO EXCEPTIONS. INSTALL BOX AS SHOWN IN BOX INSTALLATION DETAIL.
3. SCHEDULE 80 PVC UNION BALL VALVE (ONE PER VALVE)
4. PRESSURE REGULATOR (INCLUDED IN DRIP ZONE KIT)
5. REMOTE CONTROL VALVE DRIP ZONE KIT. (SHALL INCLUDE VALVE, FILTER AND A 40 PSI PRESSURE REDUCING VALVE)
6. VALVE I.D. TAG (CONTROLLER AND STATION NUMBER).
7. SCHEDULE 40 MALE ADAPTER
8. BRICK-1 EACH CORNER.
9. PVC MAIN LINE.
10. UPC APPROVED SCHEDULE 40 PVC TEE.
11. SCHEDULE 80 PVC NIPPLE-(4-TOTAL) LENGTH AS REQUIRED.
12. PEA GRAVEL OR 3/4" [20mm] DRAIN ROCK - 4" [102mm] DEEP BELOW VALVE (NO SOIL IN VALVE BOX).
13. 19 GAUGE 1/2" [13mm] SQUARE WIRE MESH.
14. SCHEDULE 80 PVC 90° ELBOW (TxT).
15. VALVE CONTROL WIRE- PROVIDE 3M-DBY SEAL PACKS AT ALL SPLICES AND 3' [1m] OF EXCESS UF WIRE IN A 1" [25mm] DIAMETER COIL.
16. Y-FILTER (INCLUDED IN DRIP ZONE KIT)

6 REMOTE CONTROL VALVE (DRIPZONE)
SCALE: NONE



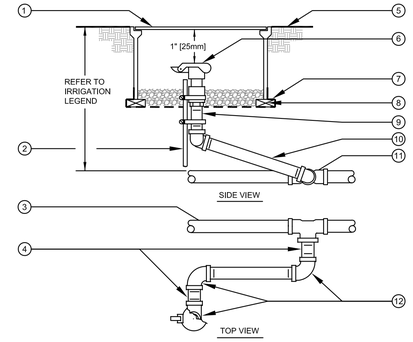
INSTRUCTIONS:
1. STRIP WIRES APPROXIMATELY 1/2" (13 mm) TO EXPOSE WIRE.
2. TWIST CONNECTOR AROUND WIRES CLOCKWISE UNTIL HAND TIGHT, DO NOT OVERTIGHTEN.
3. INSERT WIRE ASSEMBLY INTO PLASTIC TUBE UNTIL WIRE CONNECTOR SNAPS PAST LIP IN BOTTOM OF TUBE.
4. PLACE WIRES WHICH EXIT TUBE IN WIRE EXIT HOLES AND CLOSE CAP UNTIL IT SNAPS.
5. INSPECT FINAL SPLICE ASSEMBLY TO BE SECURE AND FINISHED.

7 WEATHERPROOF WIRE SPLICE ASSEMBLY
SCALE: NONE



1. 10" ROUND PLASTIC VALVE BOX WITH BOLT DOWN LID.
2. 8" [200mm] CLASS 160 OR SCHEDULE 40 PVC PIPE (NOTCH TO FIT OVER MAIN LINE PIPE).
3. PVC MAIN LINE.
4. FINISH GRADE.
5. PEA GRAVEL OR 3/4" [20mm] DRAIN ROCK - 4" [100mm] DEEP (NO SOIL IN VALVE BOX).
6. BRICK-2 TOTAL.
7. 19 GAUGE 1/2" [13mm] SQUARE WIRE MESH.
8. GATE VALVE.
9. MALE ADAPTER. REFER TO LEGEND FOR FITTING TYPE.

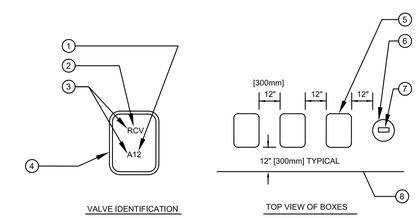
8 GATE VALVE
SCALE: NONE



1. 10" ROUND PLASTIC VALVE BOX WITH BOLT DOWN LID.
2. 1 1/4" x 1 1/4" x 3/16" [30mm x 30mm x 5mm] ANGLE IRON 30" [760mm] LONG W/2 STAINLESS STEEL STRAPS (ONE AROUND QCV).
3. PVC MAIN LINE.
4. 3" [75mm] LONG SCHEDULE 80 PVC THREADED NIPPLE.
5. FINISH GRADE.
6. QUICK COUPLING VALVE.
7. 19 GAUGE 1/2" [13mm] SQUARE WIRE MESH.
8. BRICK - 2 TOTAL.
9. SCHEDULE 80 PVC THREADED NIPPLE.
10. 10" [250mm] LONG SCHEDULE 80 PVC THREADED NIPPLE.
11. UPC APPROVED SCHEDULE 40 PVC TEE OR ELBOW.
12. SCHEDULE 80 PVC THREADED 90° ELL.

NOTE:
NIPPLES AND FITTINGS TO BE SAME SIZE AS VALVE IPT INLET THREAD SIZE.

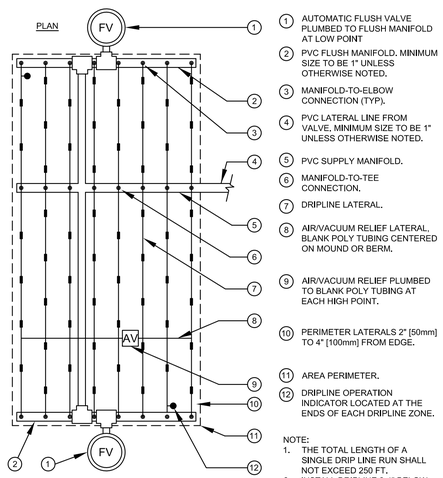
9 QUICK COUPLING VALVE
SCALE: NONE



1. CONTROLLER AND STATION
2. VALVE TYPE
3. HEAT BRAND LETTERS AND NUMBERS INTO LID.
4. VALVE BOX COVER
5. RECTANGULAR VALVE BOX
6. ROUND VALVE BOX FOR QCV AND GATE VALVE.
7. HEAT BRAND LETTERS AND NUMBERS INTO LID (TYPICAL).
8. EDGE OF LAWN, WALK, FENCE, CURB, ETC.

INSTRUCTIONS:
1. CENTER VALVE BOX OVER REMOTE CONTROL VALVE TO FACILITATE SERVICING VALVE.
2. SET BOXES 1" [25mm] ABOVE FINISH GRADE OR MULCH COVER IN GROUND COVER/SHRUB AREA AND FLUSH WITH FINISH GRADE IN TURF AREA.
3. SET RCV AND VALVE BOX ASSEMBLY IN GROUND COVER/SHRUB AREA WHERE POSSIBLE. INSTALL IN LAWN ONLY IF GROUND COVER DOES NOT EXIST ADJACENT TO LAWN.
4. SET BOXES PARALLEL TO EACH OTHER AND PERPENDICULAR TO EDGE OF LAWN, WALK, FENCE, CURB, ETC.
5. AVOID HEAVILY COMPACTING SOIL AROUND VALVE BOXES TO PREVENT COLLAPSE AND DEFORMATION OF VALVE BOX SIDES.
6. INSTALL EXTENSION BY VALVE BOX MANUFACTURER AS REQUIRED TO COMPLETELY ENCLOSE ASSEMBLY FOR EASY ACCESS.

10 VALVE BOX INSTALLATION
SCALE: NONE

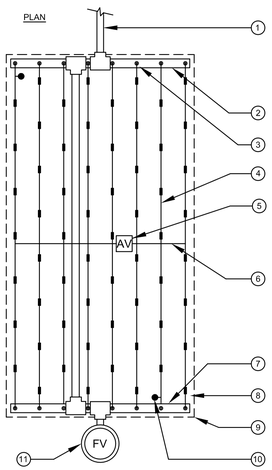


1. AUTOMATIC FLUSH VALVE PLUMBED TO FLUSH MANIFOLD AT LOW POINT
2. PVC FLUSH MANIFOLD. MINIMUM SIZE TO BE 1" UNLESS OTHERWISE NOTED.
3. MANIFOLD-TO-ELBOW CONNECTION (TYP).
4. PVC LATERAL LINE FROM VALVE. MINIMUM SIZE TO BE 1" UNLESS OTHERWISE NOTED.
5. PVC SUPPLY MANIFOLD.
6. MANIFOLD-TO-TEE CONNECTION.
7. DRIPLINE LATERAL.
8. AIR/VACUUM RELIEF LATERAL, BLANK POLY TUBING CENTERED ON MOUND OR BERM.
9. AIR/VACUUM RELIEF PLUMBED TO BLANK POLY TUBING AT EACH HIGH POINT.
10. PERIMETER LATERALS 2" [50mm] TO 4" [100mm] FROM EDGE.
11. AREA PERIMETER.
12. DRIPLINE OPERATION INDICATOR LOCATED AT THE ENDS OF EACH DRIPLINE ZONE.

NOTE:
1. THE TOTAL LENGTH OF A SINGLE DRIP LINE RUN SHALL NOT EXCEED 250 FT.
2. INSTALL DRIPLINE 2-4" BELOW GRADE AND STAKE DOWN EVERY 4' OR AS REQUIRED.

1 TORO DL 2000 CENTER FEED LAYOUT

SCALE: NONE

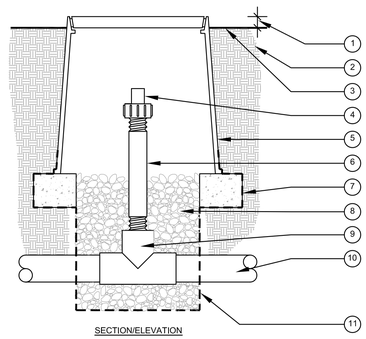


1. PVC LATERAL LINE FROM VALVE. MINIMUM SIZE TO BE 1" UNLESS OTHERWISE NOTED.
2. PVC FLUSH MANIFOLD. MINIMUM SIZE TO BE 1" UNLESS OTHERWISE NOTED.
3. MANIFOLD-TO-ELBOW CONNECTION (TYP).
4. DRIPLINE LATERAL.
5. AIR/VACUUM RELIEF VALVE PLUMBED TO BLANK 5/8" [16mm] TUBING AT EACH HIGH POINT.
6. AIR/VACUUM RELIEF LATERAL, BLANK 5/8" [16mm] POLY TUBING CENTERED ON MOUND OR BERM.
7. PVC FLUSH MANIFOLD.
8. PERIMETER LATERALS 2" [50mm] TO 4" [100mm] FROM EDGE.
9. AREA PERIMETER.
10. DRIP OPERATION INDICATOR LOCATED AT THE ENDS OF EACH DRIPLINE ZONES.
11. AUTOMATIC FLUSH VALVE PLUMBED TO FLUSH MANIFOLD AT LOW POINT.

NOTE:
1. THE TOTAL LENGTH OF A SINGLE DRIP LINE RUN SHALL NOT EXCEED 250 FT.
2. INSTALL DRIPLINE 2-4" BELOW GRADE AND STAKE DOWN EVERY 4' OR AS REQUIRED.

2 TORO DL 2000 END FEED LAYOUT

SCALE: NONE



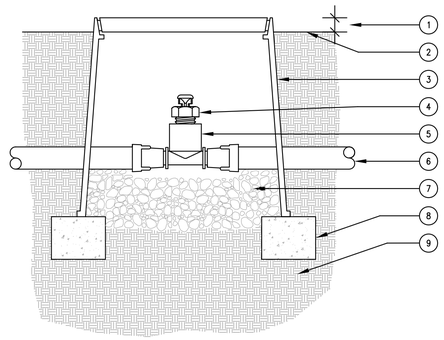
SECTION/ELEVATION

1. 1" [25mm] ABOVE FINISH GRADE.
2. NATIVE SOIL.
3. FINISH GRADE.
4. FLUSH VALVE.
5. ROUND PLASTIC VALVE BOX. REFER TO IRRIGATION SPECS FOR BOX SIZE. HEAT BRAND "FV" ON LID IN 2" [50mm] HIGH CHARACTERS.
6. 3/4" [20mm] SCH 80 PVC NIPPLE (LENGTH AS REQUIRED).
7. BRICK - 2 TOTAL
8. PEA GRAVEL 18" (450mm) DEEP.
9. PVC TEE (SxSxT) WITH 3/4" [20mm] THREADED OUTLET.
10. PVC PIPING.
11. 19 GAUGE 1/2" [13mm] SQUARE WIRE MESH.

NOTE:
USE ONE FLUSH VALVE FOR EVERY 7 GPM PER ZONE. LOCATE AT LOW POINTS. FLUSH RATE IS 0.8 GPM. FLUSH PRESSURE IS 2 PSI.

3 TORO DL 2000 FLUSH VALVE (PVC TEE)

SCALE: NONE



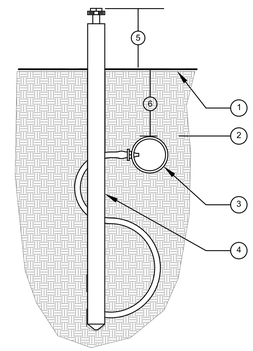
SECTION/ELEVATION

1. 1" ABOVE FINISH GRADE.
2. FINISH GRADE.
3. 6" ROUND PLASTIC VALVE BOX. HEAT BRAND "AR" ON LID IN 1" HIGH CHARACTERS.
4. TORO DL2000 AIR/VACUUM RELIEF VALVE (YD-500-34).
5. TORO LOC-EZE X 1/2" FPT TEE (FTF16).
6. TORO DL2000 TUBING (RGP-XX-XXX) OR TORO BLUE STRIPE POLY TUBING (EHD1645-XXX) AIR-RELIEF LATERAL.
7. PEA GRAVEL SUMP (6" DEEP).
8. BRICK SUPPORTS (2 COMMON BRICKS REQUIRED).
9. NATIVE SOIL PER SPECIFICATIONS.

NOTE:
USE ONE AIR/RELIEF VALVE FOR EVERY 7 GPM PER ZONE. LOCATE AT HIGH POINTS.

4 TORO DL 2000 AIR VACUUM RELIEF VALVE

SCALE: NONE

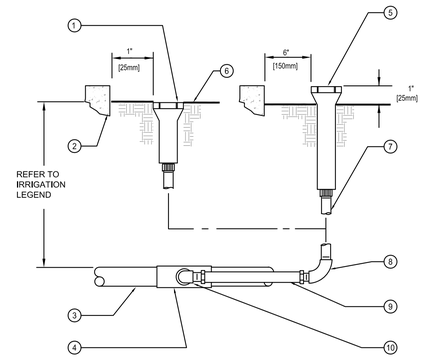


SECTION/ELEVATION

1. FINISH GRADE.
2. SOIL BACKFILL.
3. DRIPLINE.
4. OPERATION INDICATOR. USE ONE PER ZONE AND LOCATED AT FLUSH END OF ZONE.
5. 2"-3" [50mm - 75mm] ABOVE FINISH GRADE.
6. REFER TO IRRIGATION LEGEND.

5 TORO DL 2000 OPERATION INDICATOR

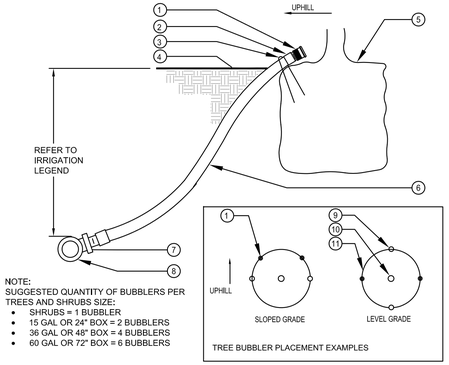
SCALE: NONE



1. POP-UP LAWN SPRAY SPRINKLER
2. WALL, WALK, CURB OR BUILDING
3. PVC LATERAL LINE
4. UPC APPROVED SCHEDULE 40 PVC TEE OR ELBOW
5. POP-UP SHRUB SPRAY SPRINKLER OR BUBBLER
6. FINISH GRADE
7. 1/2" [13mm] SCHEDULE 80 PVC THREADED NIPPLE (LENGTH AS REQUIRED).
8. 1/2" [13mm] SCHEDULE 40 PVC THREADED 90° ELL.
9. 1/2" [13mm] FLEXIBLE IPS HOSE 6" [150mm] LONG WITH MALE ADAPTERS OR 1/2" [13mm] FLEXIBLE SWING JOINT (1/2" x 6") [13mm x 150mm] WITH A MINIMUM PRESSURE RATING OF 100 PSI [690kPa].
10. 1/2" [13mm] SCHEDULE 40 PVC STREET ELL.

6 POP-UP SPRAY SPRINKLER RISER

SCALE: NONE

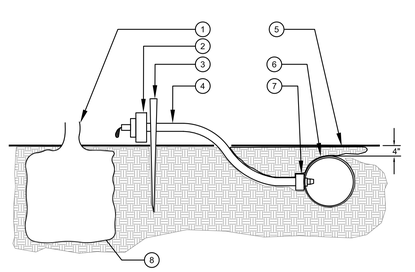


NOTE:
SUGGESTED QUANTITY OF BUBBLERS PER TREES AND SHRUBS SIZE:
- SHRUBS = 1 BUBBLER
- 15 GAL OR 24" BOX = 2 BUBBLERS
- 36 GAL OR 48" BOX = 4 BUBBLERS
- 60 GAL OR 72" BOX = 6 BUBBLERS

1. BUBBLER (TO BE INSTALLED ON TOP OF ROOTBALL).
2. 1/2" [13mm] SCH. 40 MALE ADAPTER.
3. 6" [150mm] STEEL STAPLE.
4. FINISH GRADE.
5. TREE OR SHRUB ROOTBALL.
6. 1/2" [13mm] IPS FLEXIBLE PVC.
7. PVC TEE (SST), ELBOW (ST) OR FEMALE ADAPTER.
8. PVC LATERAL LINE.
9. TREE STAKES.
10. TREE OR SHRUB.
11. EDGE OF ROOTBALL (TYPICAL).

7 TREE AND SHRUB BUBBLER

SCALE: NONE

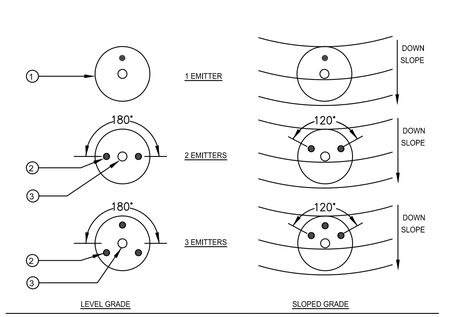


NOTE:
TO INSERT BARBED CONNECTOR INTO POLYETHYLENE TUBING, USE INSERTION TOOL. WHERE POLYETHYENE TUBING CAN BE PLACED ADJACENT TO SHRUB ROOTBALL, A BARBED EMITTER MAY BE INSTALLED DIRECTLY INTO POLYETHYENE TUBING AND DISTRIBUTION TUBING ELIMINATED. POINT OF WATER EMISSION FROM BARBED EMITTER MUST DRIP WATER DIRECTLY ON ROOTBALL.

1. SHRUB STEM.
2. EMITTER REFER TO EMITTER SCHEDULE FOR QUANTITY OF EMITTERS PER PLANT.
3. TUBING SUPPORT STAKE (SALCO DTS-200-400)
4. 1/4" TUBING DO NOT EXCEED 3' [1m] IN LENGTH.
5. FINISH GRADE.
6. SALCO PVC FLEX HOSE. INSTALL 4" [100mm] BELOW FINISH GRADE.
7. BARBED MALE ADAPTER.
8. EDGE OF ROOTBALL.

8 SALCO FLEX TUBING EMITTER PLACEMENT

SCALE: NONE



1. EDGE OF ROOTBALL (TYPICAL)
2. EMITTER OR DISTRIBUTION TUBE OUTLET (TYPICAL)
3. SHRUB STEM (TYPICAL)

EMITTER SCHEDULE

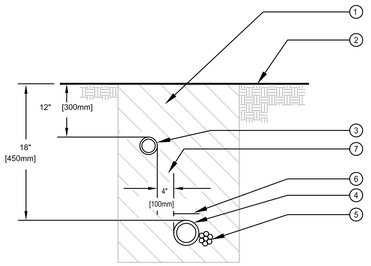
PLANT SIZE	EMITTER SPECIFACATION	FLOW (GPH)/PER EMITTER OR OUTLET	QUANTITY OF EMITTERS PER SHRUB/TREE
1 GALLON SHRUBS	USE SLV-PS-CV-1	1 GPH	2
5 GALLON SHRUBS	USE SLV-PS-CV-2	2 GPH	2
15 GALLON	USE SLV-PS-CV-2	2 GPH	3

MAXIMUM AMOUNT OF FLOW PER DRIP TUBING RUN IS 240 GPH

9 SALCO EMITTER PLACEMENT AND

SCALE: NONE

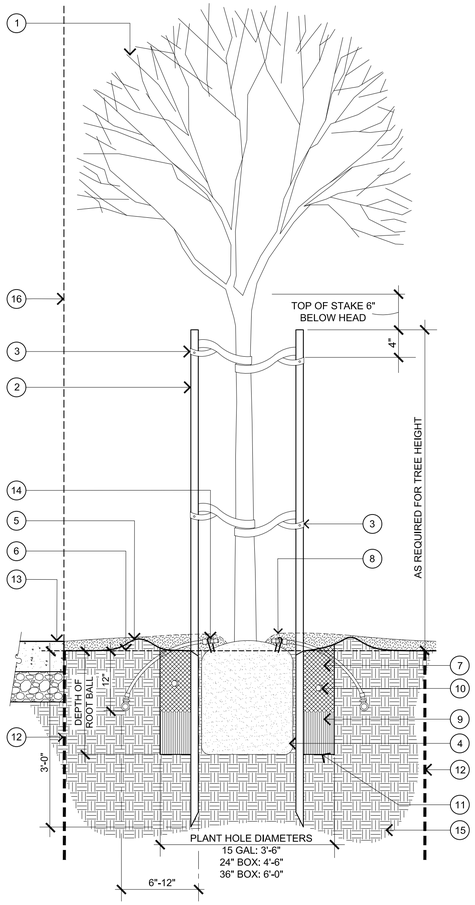
NOTES:
1. ALL MAIN SUPPLY LINES AND LATERAL LINES SHALL BE PLACED IN SLEEVES UNDER PAVED SURFACES. INSTALL LOW VOLTAGE WIRES WITHIN A SEPARATE CONDUIT UNDER PAVED SURFACES. DO NOT TAPE WIRES WITHIN CONDUIT.



1. CLEAN BACKFILL MATERIAL.
2. FINISH GRADE.
3. LATERAL LINE.
4. MAIN LINE.
5. LOW VOLTAGE CONTROL WIRE, TAPE AND BUNDLE TUBING OR WIRING AT 10 FT. INTERVALS. WIRING SHALL BE LAID OUT LOOSELY IN THE TRENCH.
6. DETECTABLE WARNING TAPE OVER MAIN LINE - 3" [75mm] ABOVE PIPE.
7. TYPICAL DISTANCE BETWEEN PIPES.

10 TRENCHING

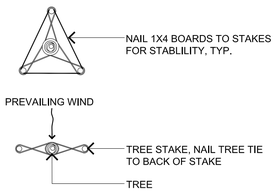
SCALE: NONE



1. TREE: REFER TO PLANTING PLAN FOR LOCATION AND PLANTING LEGEND FOR SPECIES
2. LODGE POLE PINE TREE STAKES: 3"X10' LONG TREE STAKES FOR WINDY CONDITIONS AND 36" BOX AND LARGER TREES
3. TREE TIE: WONDER TREE-TIE(800-910-2810) MODEL# W14-46, W24-84 OR APPROVED EQUAL. LOOP IN A FIGURE EIGHT AND NAIL TO BACK OF STAKE WITH GALVANIZED THREADED NAILS. ALLOW 3" OF MOVEMENT OF TREE IN ALL DIRECTIONS.
4. TREE ROOTBALL SET ON 12" LAYER UNDISTURBED NATIVE SOIL. DO NOT PENETRATE ROOTBALL WITH STAKES. TAMP SOIL TO 85% RELATIVE COMPACTION. SET CROWN OF ROOTBALL 2" ABOVE FINISH GRADE.
5. 3" EARTH BERM FOR WATER BASIN
6. FINISH GRADE, SET 1" BELOW AT TURF AREAS AND 2" AT SHRUB AND GROUNDCOVER AREAS
7. BACK FILL MIX: (TOP 12 INCHES ONLY): 70% PULVERIZED NATIVE SOIL, 30% NITROGEN FORTIFIED FIR OR REDWOOD SAWDUST.
8. BARK MULCH: 3" DEPTH, KEEP CLEAR FROM TRUNK OF TREE
9. PULVERIZED NATIVE SOIL
10. FERTILIZER TABS (21 GRAM, 20-10-5):
    - 15 GAL: 6 TABS
    - 24" BOX: 8 TABS
    - 36" BOX: 12 TABS
11. PLANTING HOLE, PULVERIZED NATIVE SOIL BELOW 12" FROM FINISHED GRADE; SCARIFY WALLS
12. ROOT BARRIER(AS NEEDED): REFER TO PLANTING NOTES AND SPECIFICATIONS
13. PAVING: REFER TO PLAN
14. 1/4 GPM IRRIGATION BUBBLER, OFFSET FROM TREE TUCKED TO ROOTBALL
15. COMPACTED SUBGRADE OR ENGINEERED FILL PER SOILS REPORT
16. BUILDING OR WALL

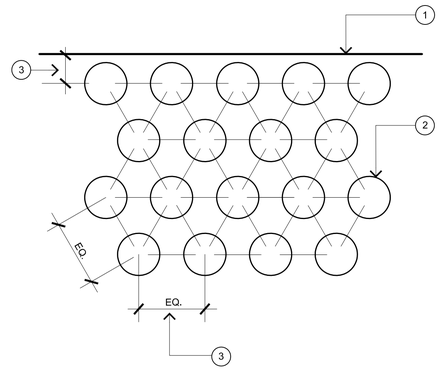
NOTES:

ALL PLANTING AREAS TO BE TREATED WITH PRE-EMERGENT.



1 TREE STAKING

N.T.S.



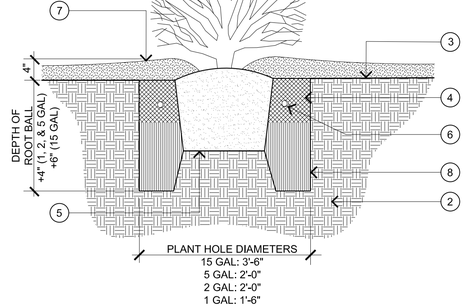
1. EDGE OF PAVING, HEADER, FACE OF BUILDING, WALL, ETC.
2. GROUNDCOVER OR SHRUB: REFER TO PLANTING PLAN FOR LOCATION AND PLANTING LEGEND FOR SPECIES
3. GROUNDCOVER AND SHRUB SPACING PER PLANTING PLAN AND LEGEND

NOTES:

- ALL PLANTS SHALL BE PLANTED AT EQUAL SPACING (TRIANGULAR) UNLESS OTHERWISE SPECIFIED ON THE PLANS
- CENTERLINE OF PLANTS SHALL BE 1/2 OF EQUAL SPACING MINIMUM FROM EDGE OF PLANTING AREA
- INFILL PLANTS AS REQUIRED TO MAINTAIN SPACING AT IRREGULAR EDGES
- KEEP MULCH CLEAR OF PLANT BASE
- ALL PLANTING AREAS TO BE TREATED WITH PRE-EMERGENT

2 GROUNDCOVER PLANTING

N.T.S.



1. SHRUB: REFER TO PLANTING PLAN FOR LOCATION AND PLANTING LEGEND FOR SPECIES
2. COMPACTED SUBGRADE OR ENGINEERED FILL PER SOILS REPORT
3. FINISH GRADE
4. BACK FILL MIX: (1/2 DEPTH OF ROOT BALL HEIGHT): 70% PULVERIZED NATIVE SOIL, 30% NITROGEN FORTIFIED FIR OR REDWOOD SAWDUST.
5. SHRUB ROOTBALL SET ON LIGHTLY TAMPED SOIL. SET CROWN OF ROOTBALL 1" ABOVE FINISH GRADE.
6. FERTILIZER TABS (21 GRAM, 20-10-5):
    - 1 GALLON: 1 TAB
    - 2 GALLON: 2 TABS
    - 5 GAL: 3 TABS
    - 15 GAL: 5 TABS
7. BARK MULCH: 3" DEPTH, KEEP CLEAR FROM ROOT BALL CROWN
8. PULVERIZED NATIVE SOIL

NOTES:

ALL PLANTING AREAS TO BE TREATED WITH PRE-EMERGENT

3 SHRUB PLANTING

N.T.S.

Planting Details

L-12

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

CONCEPTUAL OAKLEY ROAD PERSPECTIVE
A00

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

CONCEPTUAL STREETSCENE
A0.1

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

PASEO VIEW

ENTRY OPEN SPACE

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

CONCEPTUAL PERSPECTIVES
A0.2

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

EXTERIOR MATERIALS

SPANISH ELEVATION

STUCCO WALL FINISH
STUCCO PORCH
ARCHED ENTRY
FOAM WINDOW TRIM
CONCRETE S-TILE ROOFING
DECORATIVE GABLE ACCENT

BUNGALOW ELEVATION

STUCCO WALL FINISH
STUCCO o/ FOAM WINDOW TRIM
STUCCO PORCH COLUMNS w/
STONE VENEER
CONCRETE ROOF TILE
DECORATIVE GABLE ACCENT

FARMHOUSE ELEVATION

STUCCO WALL FINISH
STUCCO o/ FOAM WINDOW TRIM
BOARD AND BATT SIDING
WOOD WINDOW TRIM
ASPHALT COMPOSITION SHINGLE ROOF
WOOD PORCH POSTS w/ WOOD TRIM

SPANISH

FARMHOUSE

BUNGALOW

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

0 1' 2' 3' 4' 8'

PLAN 1 FRONT ELEVATIONS
A01

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

SPANISH REAR ELEVATION

SPANISH RIGHT ELEVATION

SPANISH LEFT ELEVATION

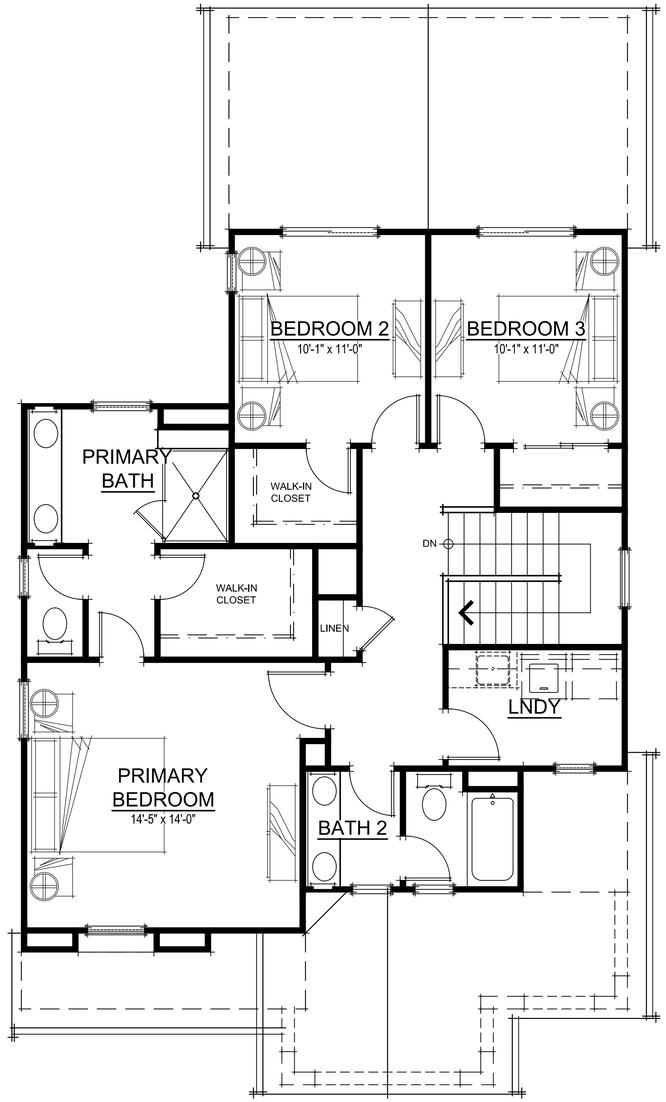
SPANISH FRONT ELEVATION

0 1' 2' 3' 4' 8'

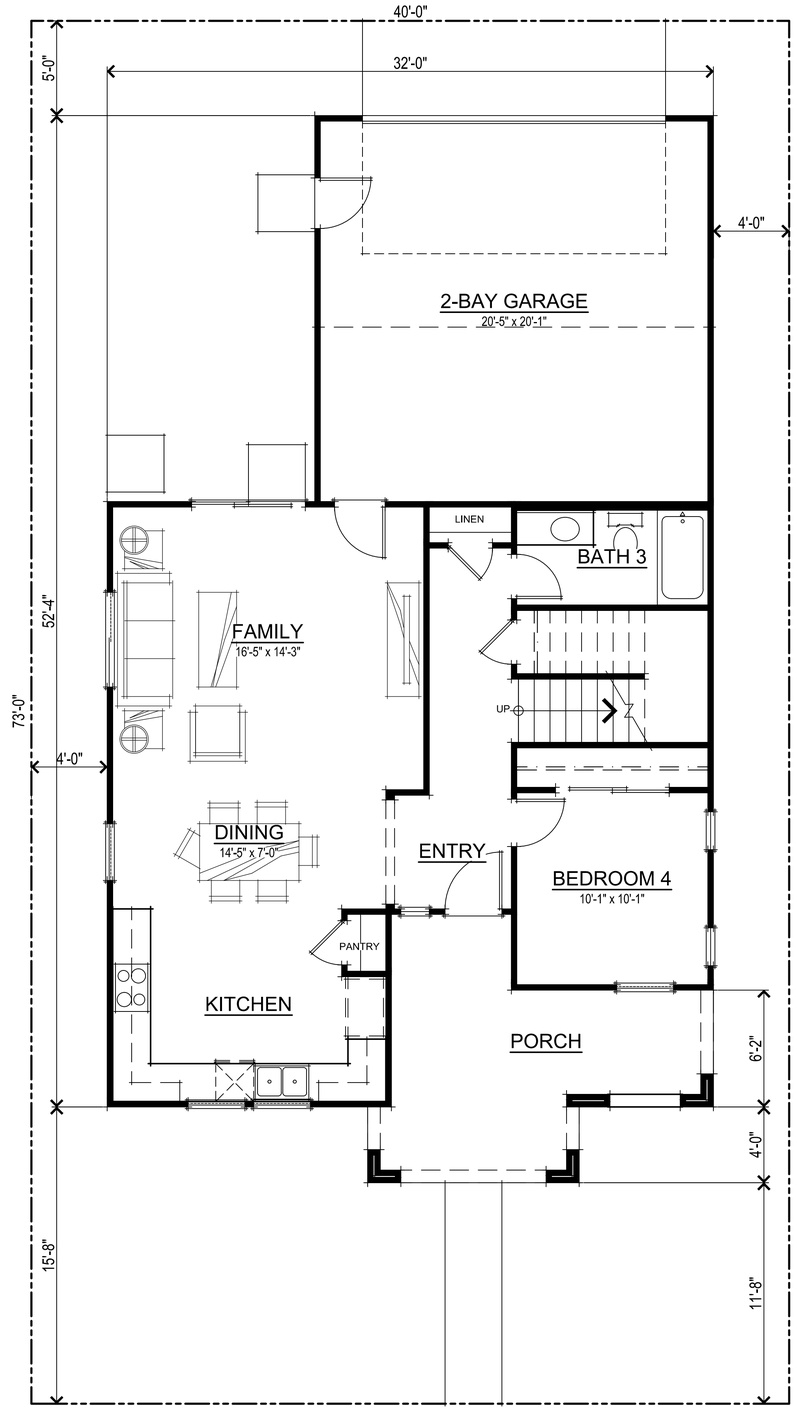
399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

PLAN 1 SPANISH EXTERIOR ELEVATIONS
A02

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SECOND FLOOR PLAN



FIRST FLOOR PLAN

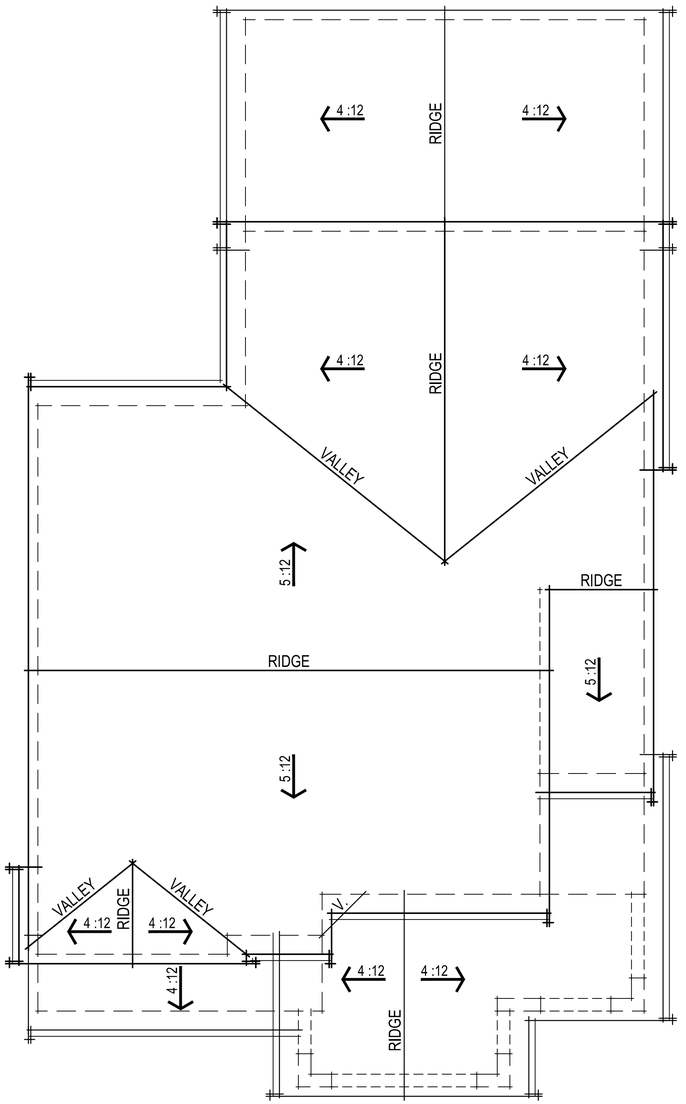
0 1' 2' 3' 4' 8'

SQUARE FOOTAGES	
FIRST FLOOR	892 SQ. FT.
SECOND FLOOR	956 SQ. FT.
TOTAL LIVING	1848 SQ. FT.
2-BAY GARAGE	429 SQ. FT.

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

PLAN 1 SPANISH FLOOR PLANS
A03

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SPANISH ROOF PLAN

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

PLAN 1 SPANISH ROOF PLAN
A04

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

BUNGALOW REAR ELEVATION

BUNGALOW RIGHT ELEVATION

BUNGALOW LEFT ELEVATION

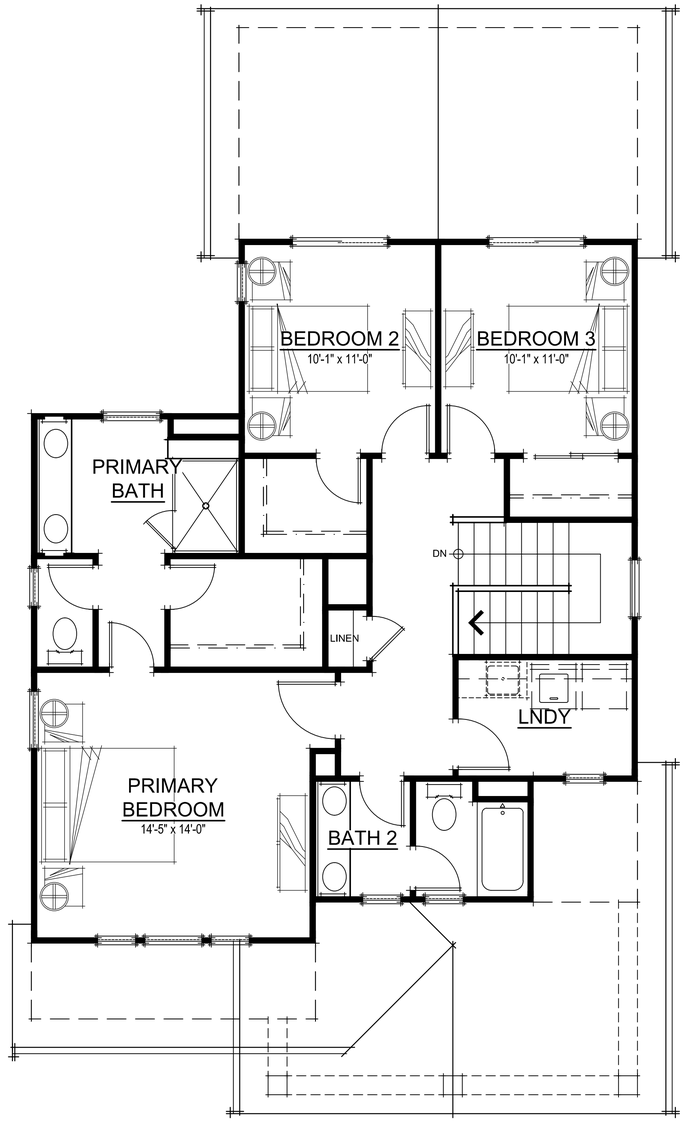
BUNGALOW FRONT ELEVATION

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

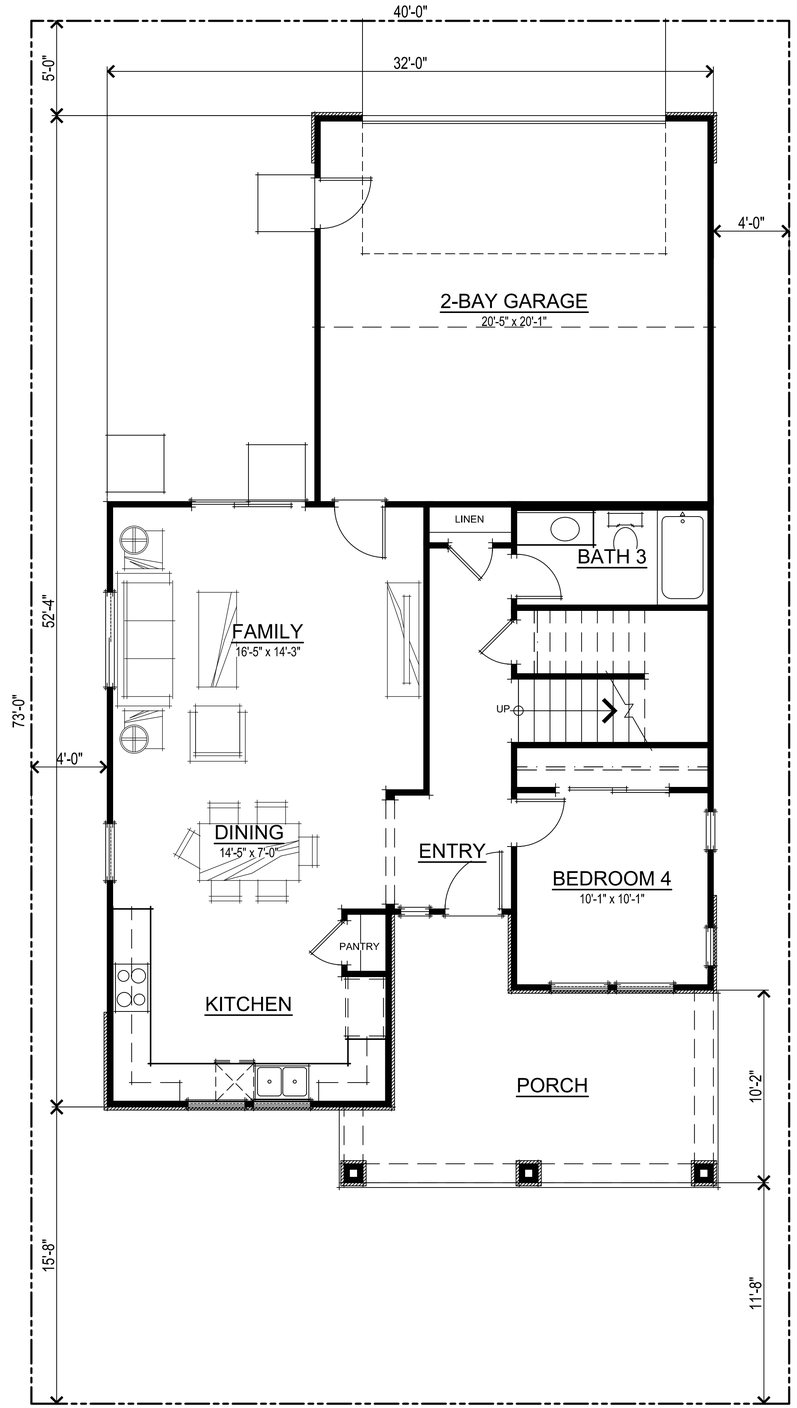
0 1' 2' 3' 4' 8'

PLAN 1 BUNGALOW EXTERIOR ELEVATIONS
A05

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SECOND FLOOR PLAN



FIRST FLOOR PLAN

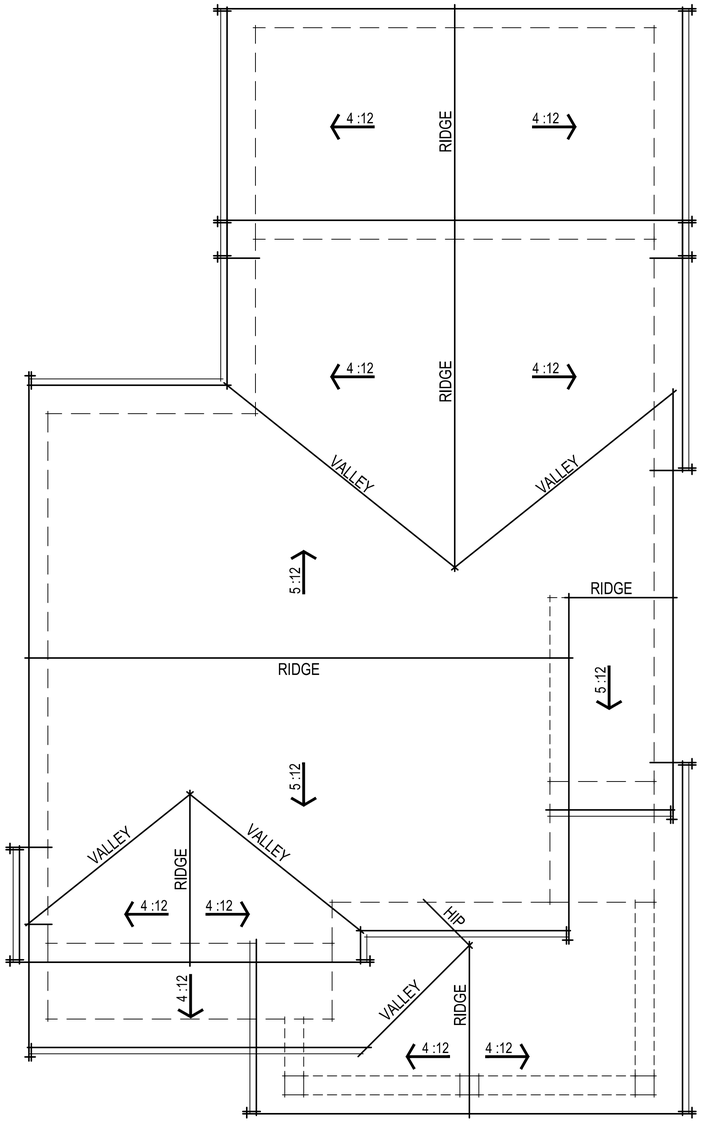
0 1' 2' 3' 4' 8'

SQUARE FOOTAGES	
FIRST FLOOR	892 SQ. FT.
SECOND FLOOR	956 SQ. FT.
TOTAL LIVING	1848 SQ. FT.
2-BAY GARAGE	429 SQ. FT.

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

PLAN 1 BUNGALOW FLOOR PLANS
A06

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



BUNGALOW ROOF PLAN

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

PLAN 1 BUNGALOW ROOF PLAN
A07

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

FARMHOUSE REAR ELEVATION

FARMHOUSE RIGHT ELEVATION

FARMHOUSE LEFT ELEVATION

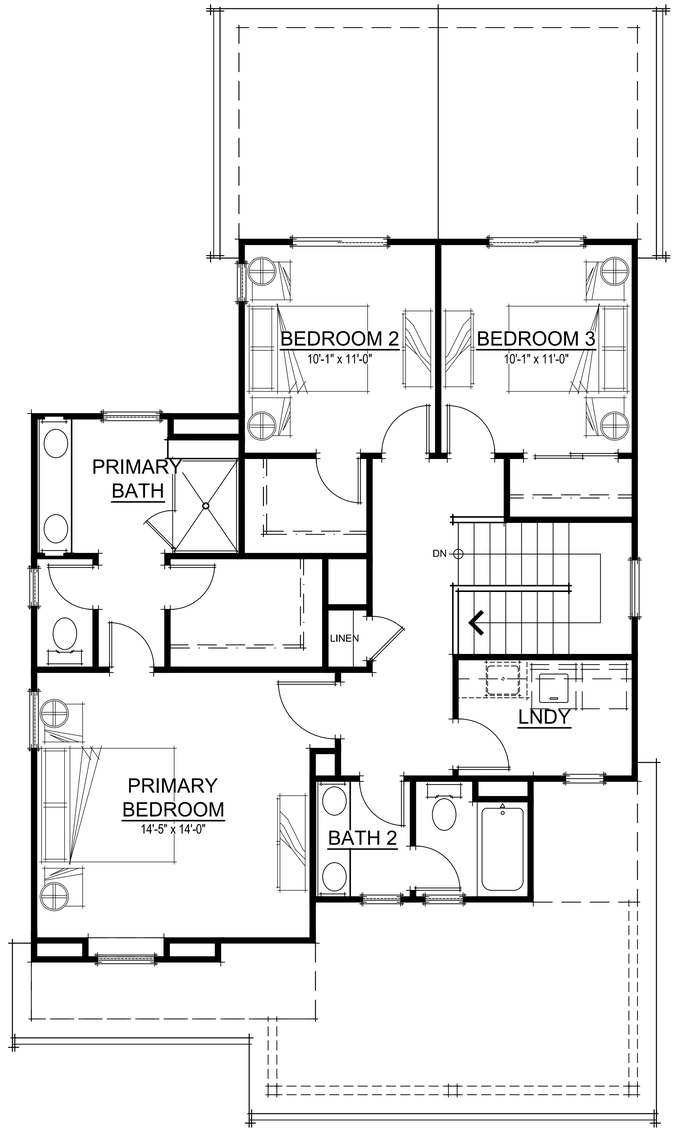
FARMHOUSE FRONT ELEVATION

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

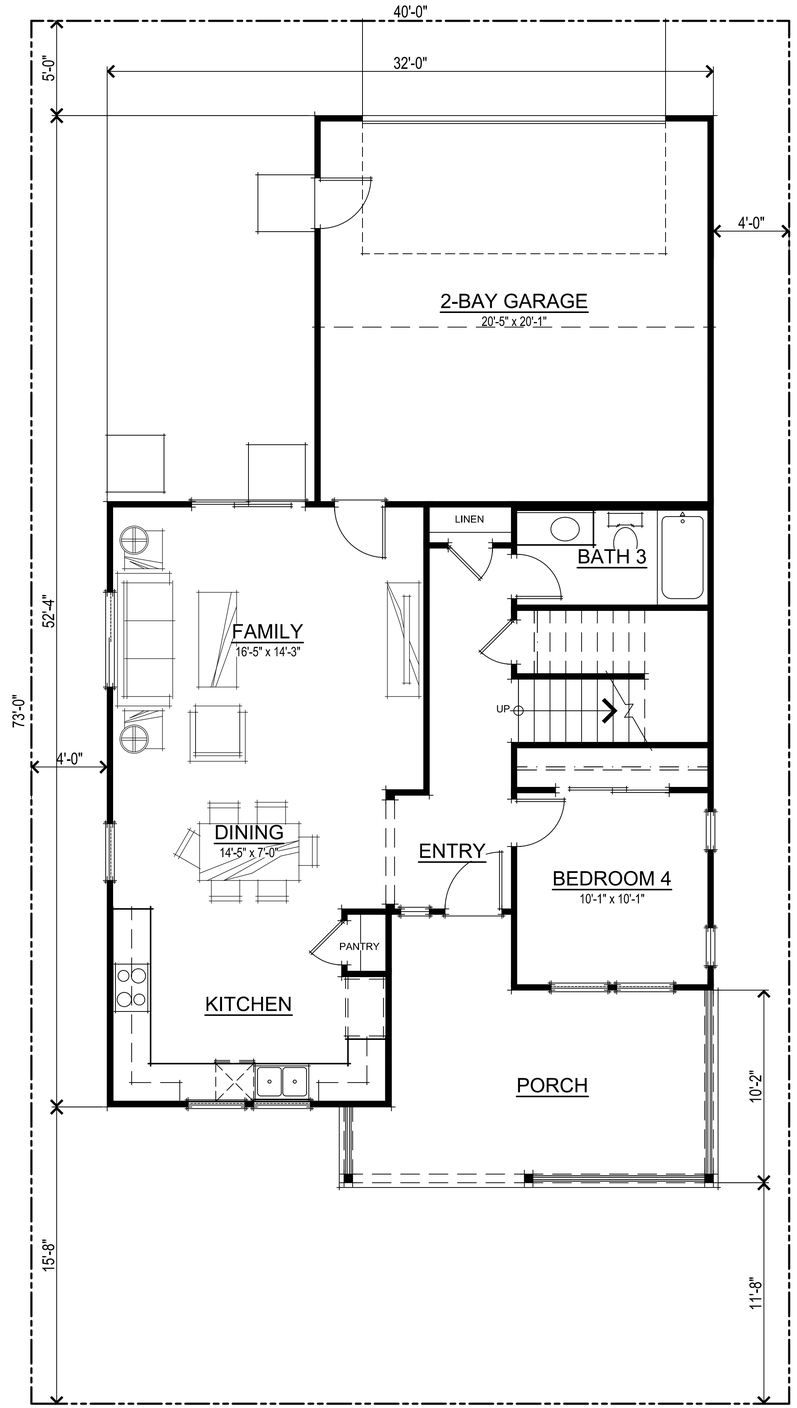
0 1' 2' 3' 4' 8'

PLAN 1 FARMHOUSE EXTERIOR ELEVATIONS
A08

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SECOND FLOOR PLAN



FIRST FLOOR PLAN

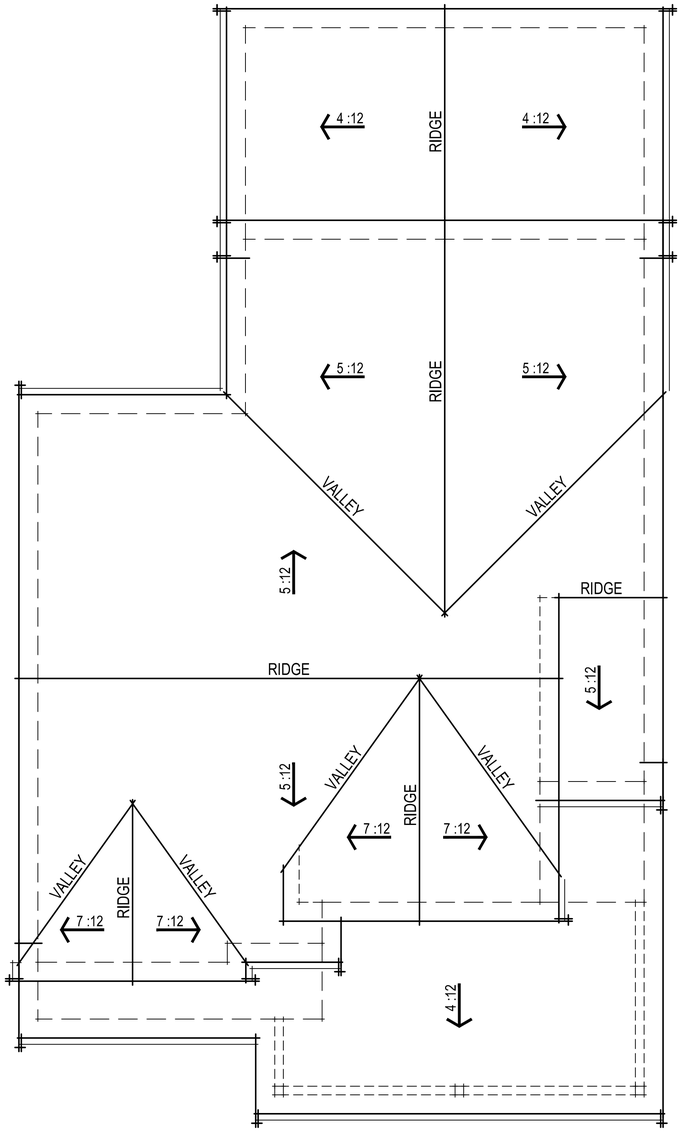
0 1' 2' 3' 4' 8'

SQUARE FOOTAGES	
FIRST FLOOR	892 SQ. FT.
SECOND FLOOR	956 SQ. FT.
TOTAL LIVING	1848 SQ. FT.
2-BAY GARAGE	429 SQ. FT.

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

PLAN 1 FARMHOUSE FLOOR PLANS
A09

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



FARMHOUSE ROOF PLAN

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

PLAN 1 FARMHOUSE ROOF PLAN
A10

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

EXTERIOR MATERIALS

SPANISH ELEVATION

STUCCO WALL FINISH
STUCCO PORCH
ARCHED ENTRY
FOAM WINDOW TRIM
CONCRETE S-TILE ROOFING
DECORATIVE GABLE ACCENT

BUNGALOW ELEVATION

STUCCO WALL FINISH
STUCCO o/ FOAM WINDOW TRIM
STUCCO PORCH COLUMNS w/
STONE VENEER
CONCRETE ROOF TILE
DECORATIVE GABLE ACCENT

FARMHOUSE ELEVATION

STUCCO WALL FINISH
STUCCO o/ FOAM WINDOW TRIM
BOARD AND BATT SIDING
WOOD WINDOW TRIM
ASPHALT COMPOSITION SHINGLE ROOF
WOOD PORCH POSTS w/ WOOD TRIM

SPANISH

FARMHOUSE

BUNGALOW

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

0 1' 2' 3' 4' 8'

PLAN 2 FRONT ELEVATIONS
A11

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

SPANISH REAR ELEVATION

SPANISH RIGHT ELEVATION

SPANISH LEFT ELEVATION

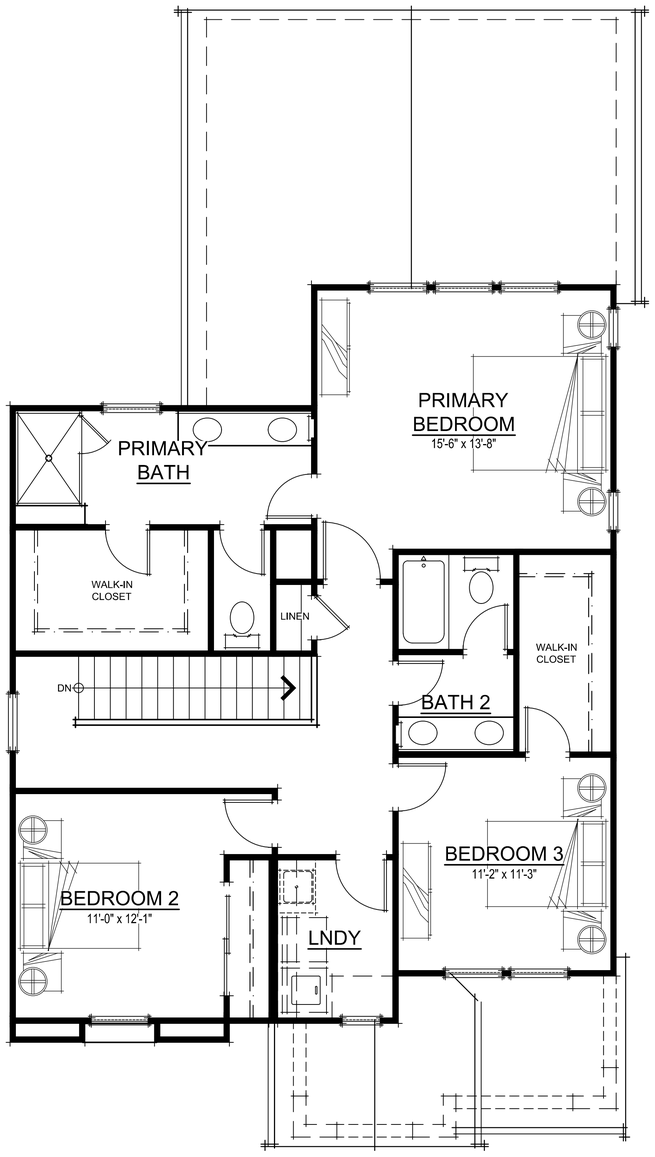
SPANISH FRONT ELEVATION

399.203
The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

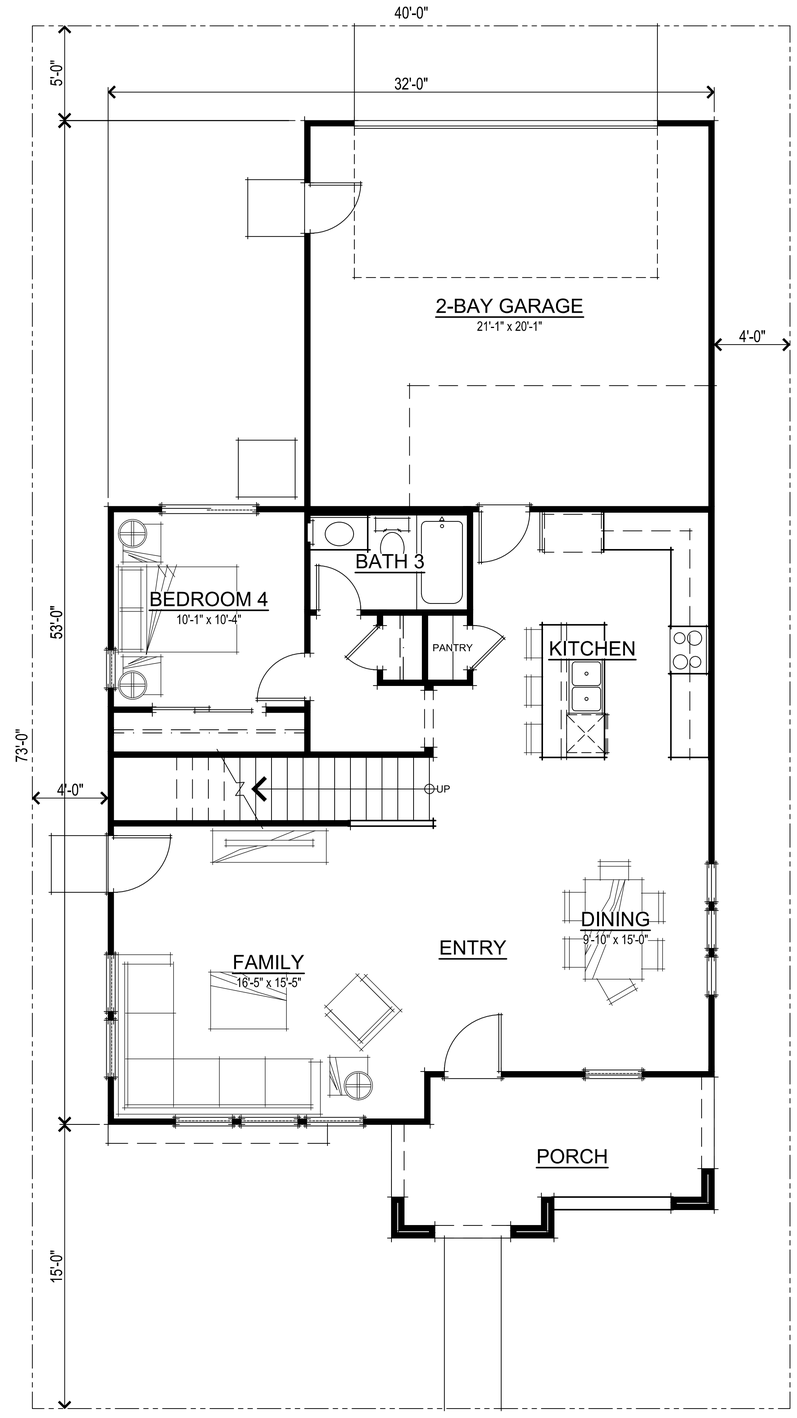
0 1' 2' 3' 4' 8'

PLAN 2 SPANISH EXTERIOR ELEVATIONS
A12

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SECOND FLOOR PLAN



FIRST FLOOR PLAN

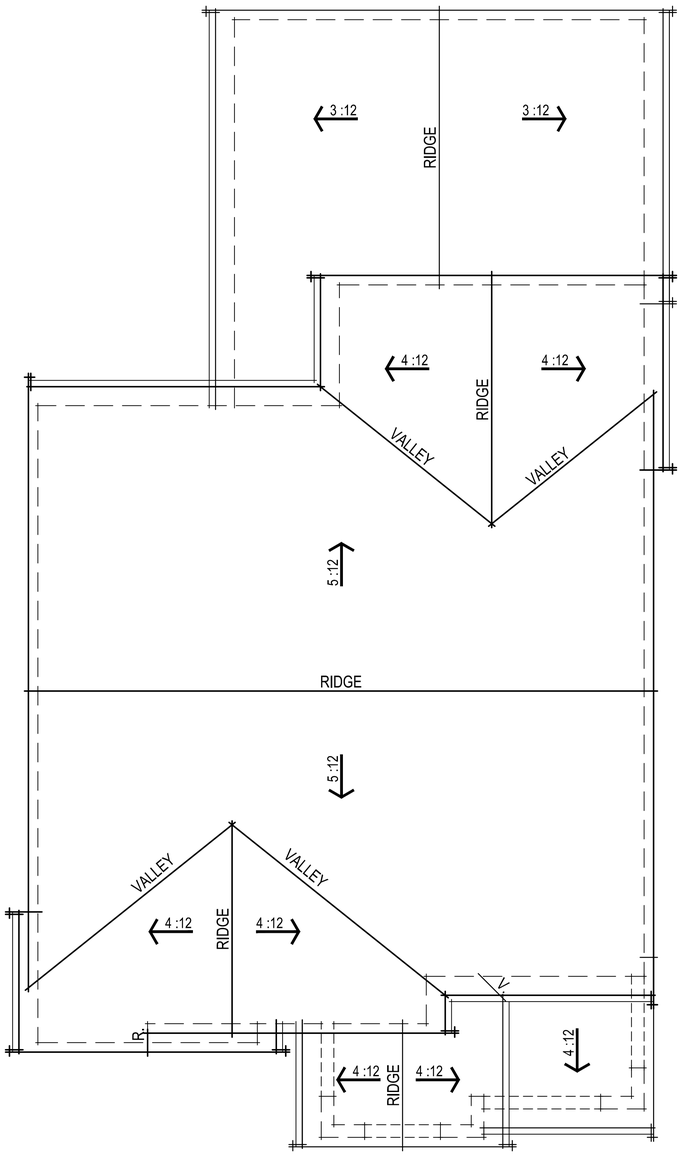
PLAN 2 SQUARE FOOTAGES	
FIRST FLOOR	1006 SQ. FT.
SECOND FLOOR	1077 SQ. FT.
TOTAL LIVING	2083 SQ. FT.
2-BAY GARAGE	441 SQ. FT.

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

PLAN 2 SPANISH FLOOR PLANS
A13

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SPANISH ROOF PLAN

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

PLAN 2 SPANISH ROOF PLAN
A14

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

BUNGALOW REAR ELEVATION

BUNGALOW RIGHT ELEVATION

BUNGALOW LEFT ELEVATION

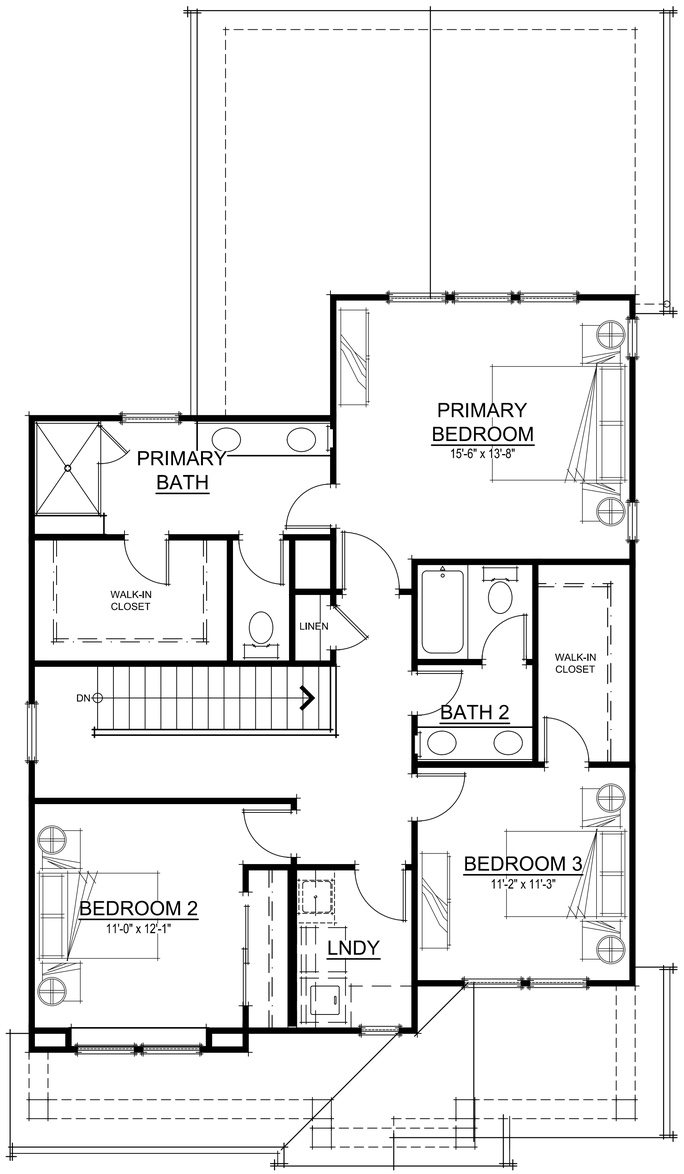
BUNGALOW FRONT ELEVATION

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

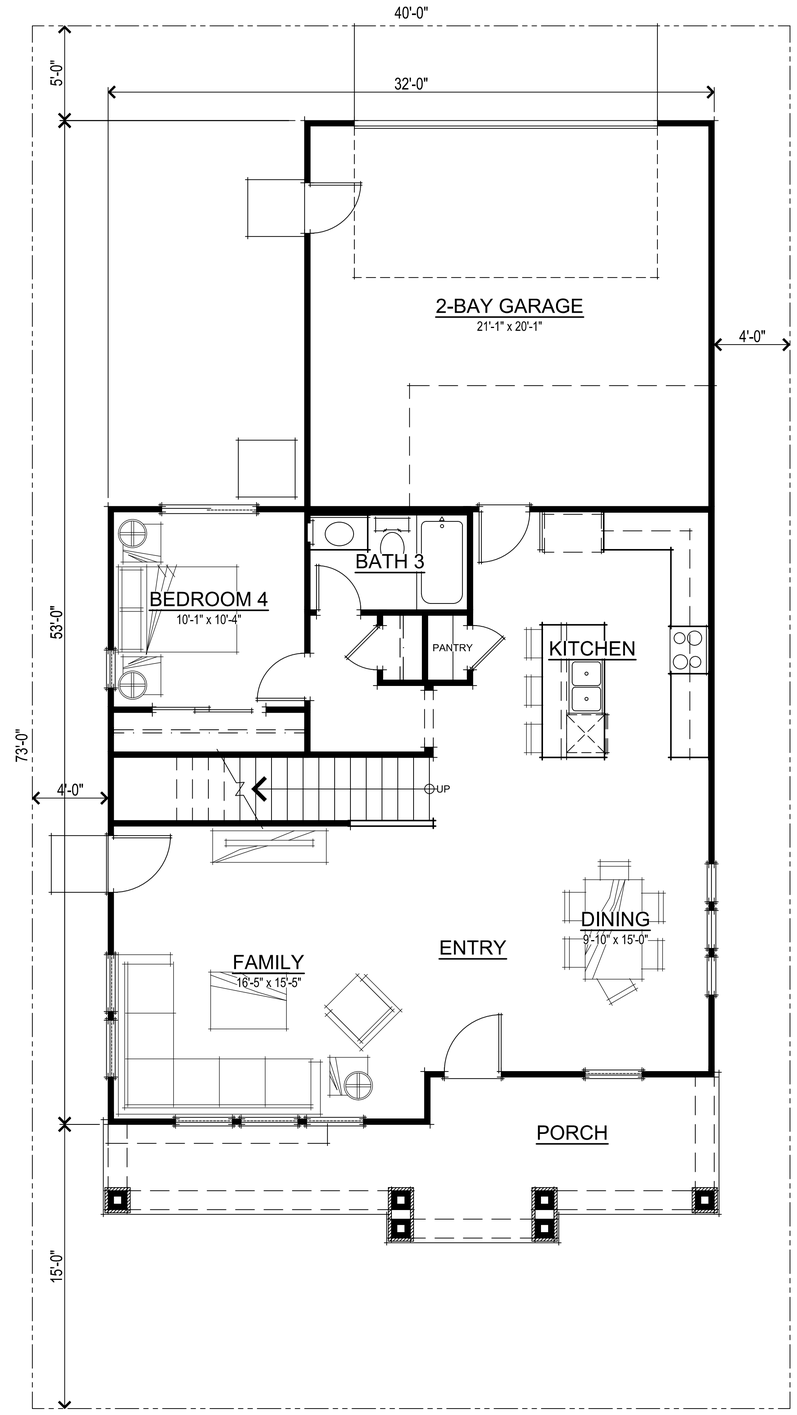
0 1' 2' 3' 4' 8'

PLAN 2 BUNGALOW EXTERIOR ELEVATIONS
A15

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SECOND FLOOR PLAN



FIRST FLOOR PLAN

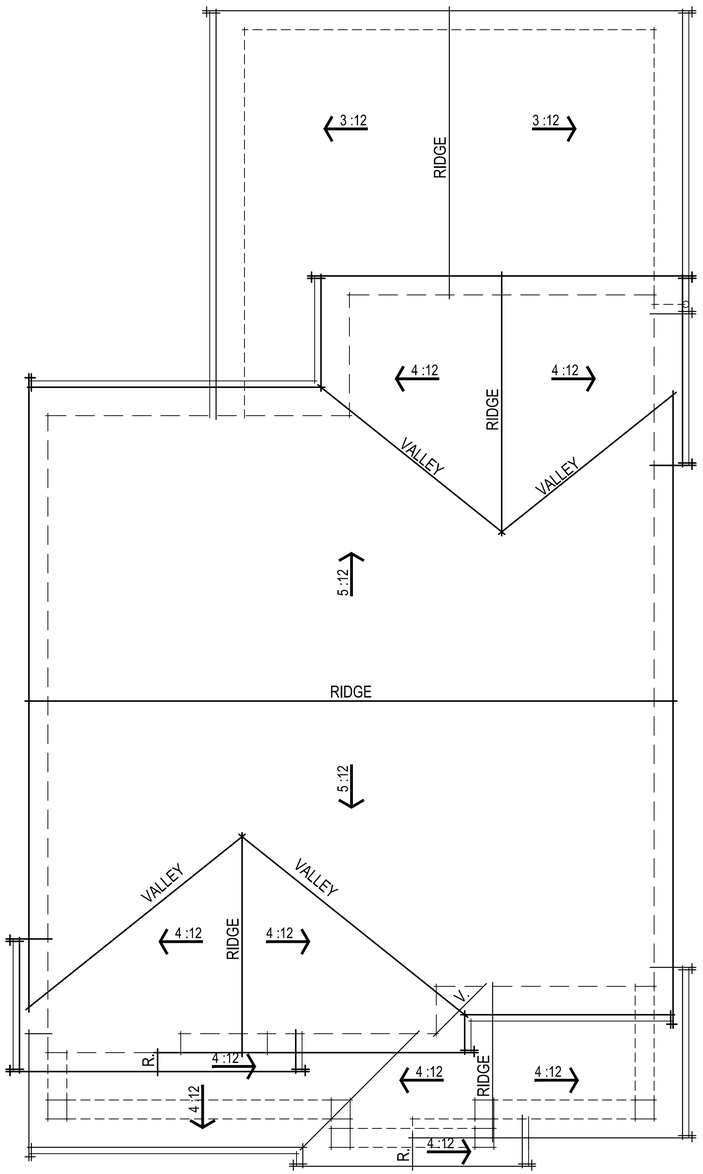
PLAN 2 SQUARE FOOTAGES	
FIRST FLOOR	1006 SQ. FT.
SECOND FLOOR	1077 SQ. FT.
TOTAL LIVING	2083 SQ. FT.
2-BAY GARAGE	441 SQ. FT.

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

PLAN 2 BUNGALOW FLOOR PLANS
A16

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



BUNGALOW ROOF PLAN

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

PLAN 2 BUNGALOW ROOF PLAN
A17

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

FARMHOUSE REAR ELEVATION

FARMHOUSE RIGHT ELEVATION

FARMHOUSE LEFT ELEVATION

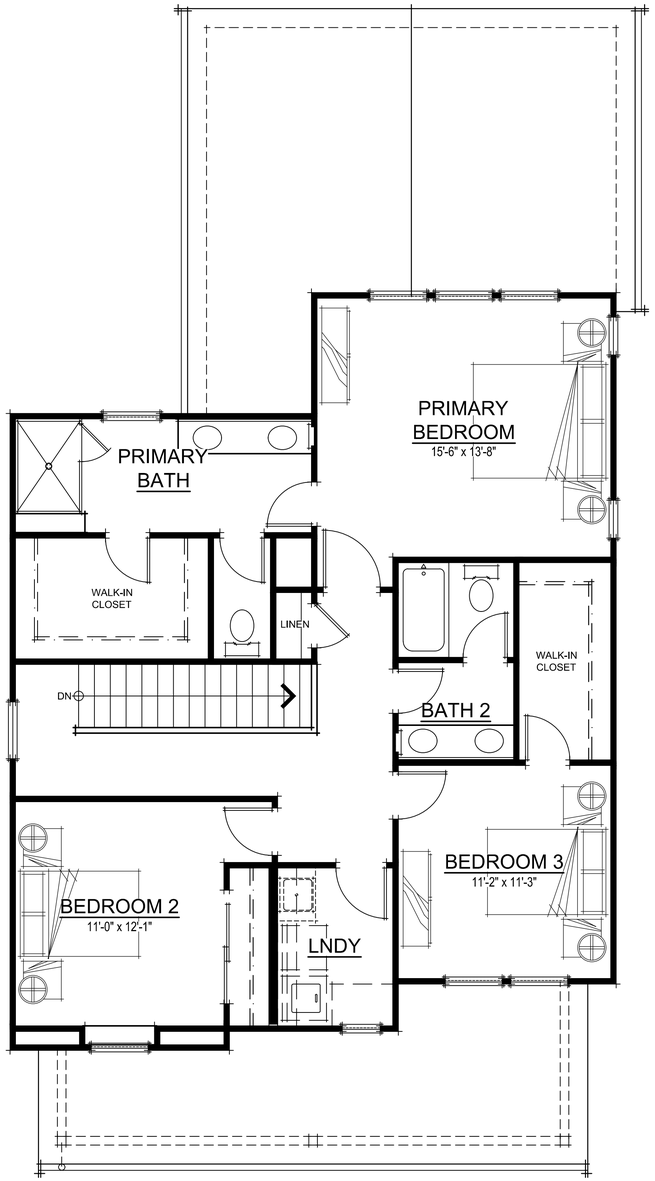
FARMHOUSE FRONT ELEVATION

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

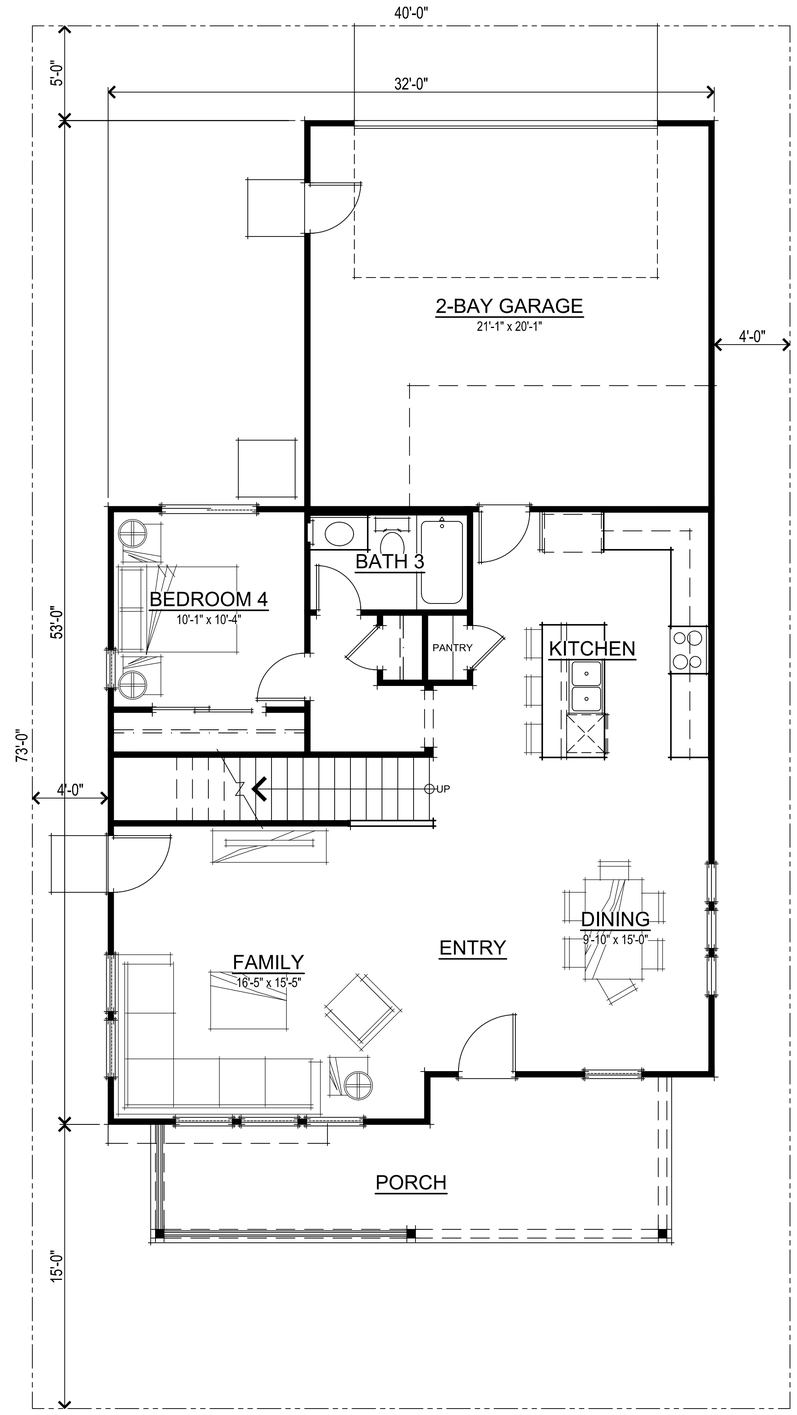
0 1' 2' 3' 4' 8'

PLAN 2 FARMHOUSE EXTERIOR ELEVATIONS
A18

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SECOND FLOOR PLAN



FIRST FLOOR PLAN

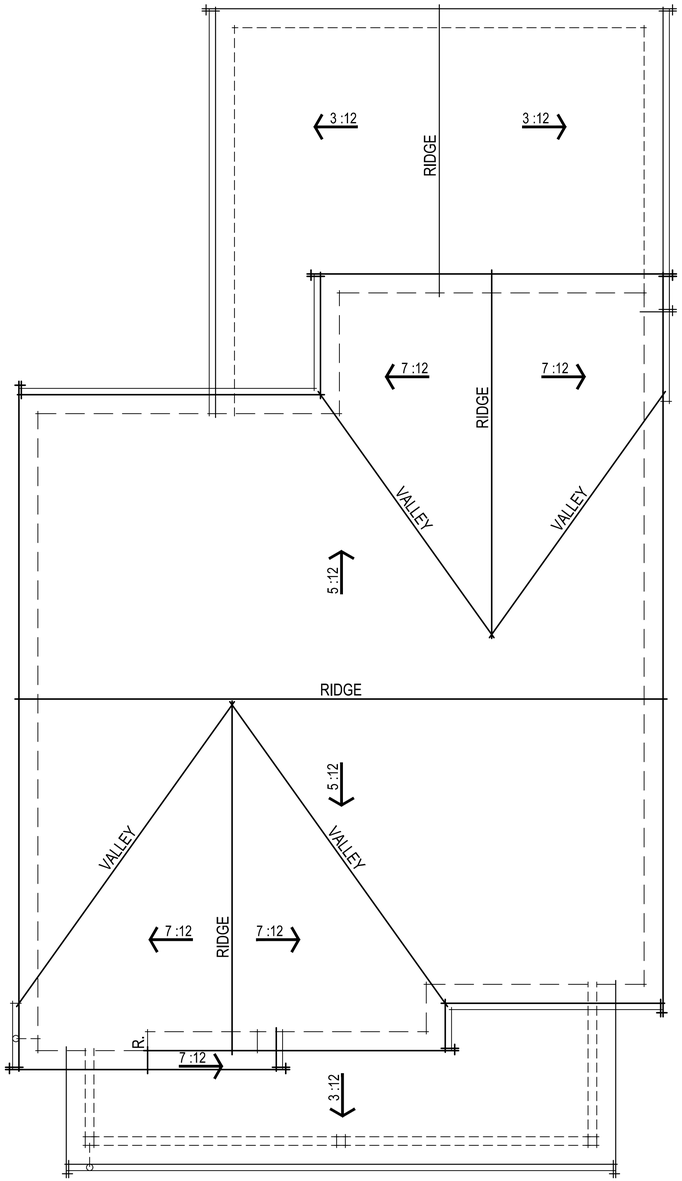
PLAN 2 SQUARE FOOTAGES	
FIRST FLOOR	1006 SQ. FT.
SECOND FLOOR	1077 SQ. FT.
TOTAL LIVING	2083 SQ. FT.
2-BAY GARAGE	441 SQ. FT.

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

PLAN 2 FARMHOUSE FLOOR PLANS
A19

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



FARMHOUSE ROOF PLAN

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

PLAN 2 FARMHOUSE ROOF PLAN
A20

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

EXTERIOR MATERIALS

SPANISH ELEVATION

STUCCO WALL FINISH
STUCCO PORCH
ARCHED ENTRY
FOAM WINDOW TRIM
CONCRETE S-TILE ROOFING
DECORATIVE GABLE ACCENT

BUNGALOW ELEVATION

STUCCO WALL FINISH
STUCCO o/ FOAM WINDOW TRIM
STUCCO PORCH COLUMNS w/
STONE VENEER
CONCRETE ROOF TILE
DECORATIVE GABLE ACCENT

FARMHOUSE ELEVATION

STUCCO WALL FINISH
STUCCO o/ FOAM WINDOW TRIM
BOARD AND BATT SIDING
WOOD WINDOW TRIM
ASPHALT COMPOSITION SHINGLE ROOF
WOOD PORCH POSTS w/ WOOD TRIM

SPANISH

FARMHOUSE

BUNGALOW

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

0 1' 2' 3' 4' 8'

PLAN 3 FRONT ELEVATIONS
A21

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

SPANISH REAR ELEVATION

SPANISH RIGHT ELEVATION

SPANISH LEFT ELEVATION

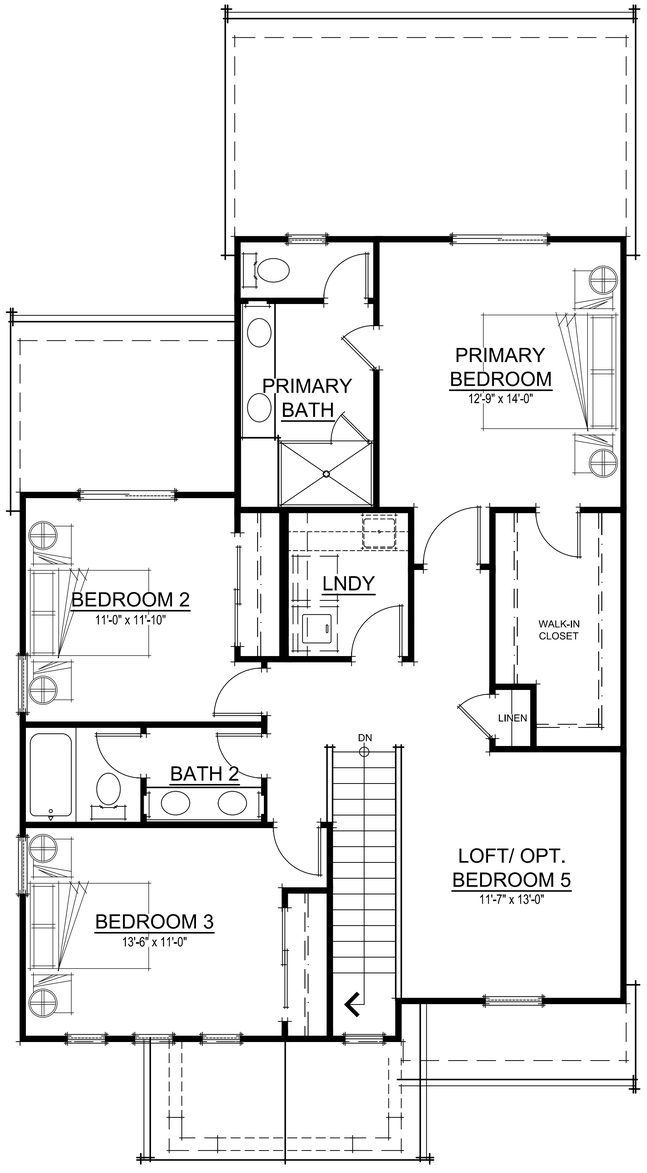
SPANISH FRONT ELEVATION

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

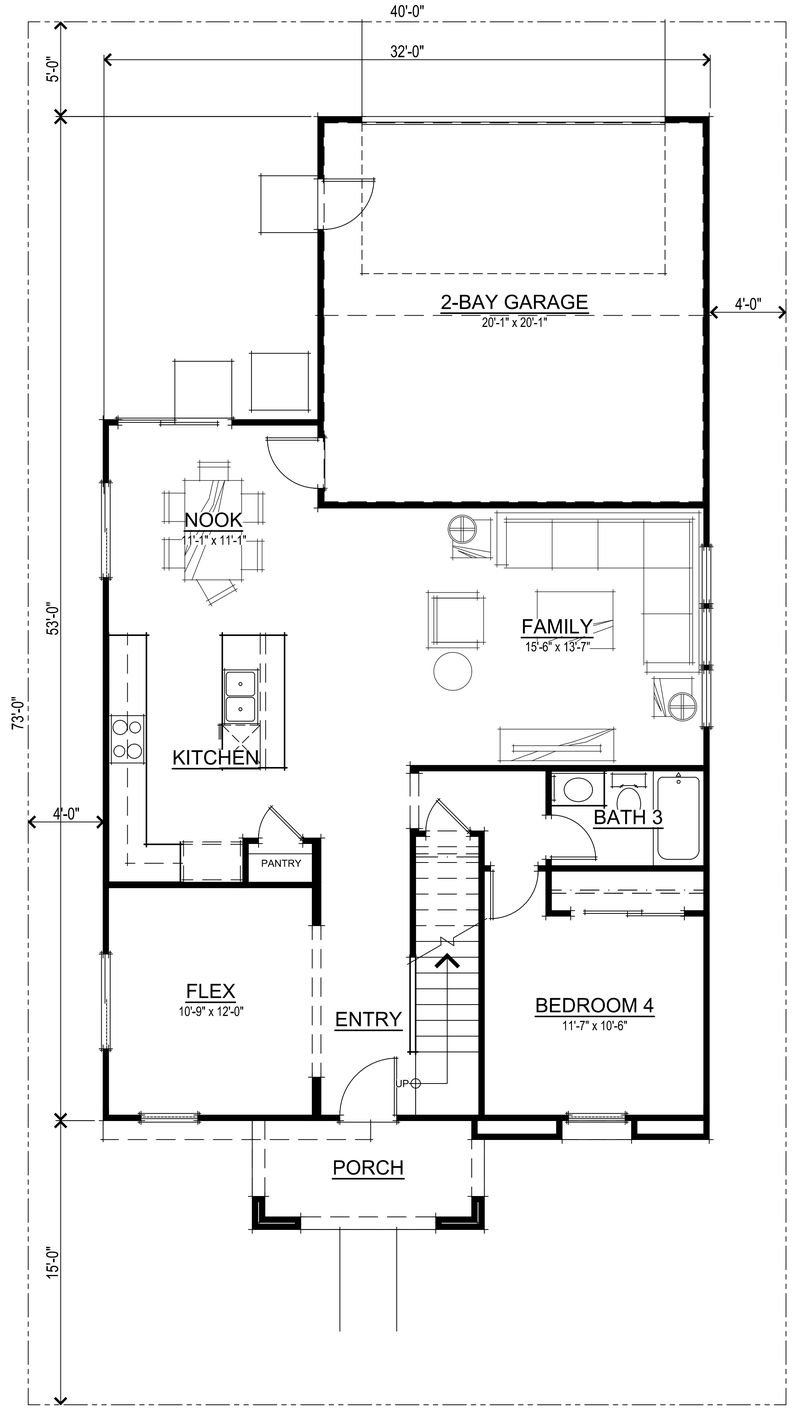
0 1' 2' 3' 4' 8'

PLAN 3 SPANISH EXTERIOR ELEVATIONS
A22

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SECOND FLOOR PLAN



FIRST FLOOR PLAN

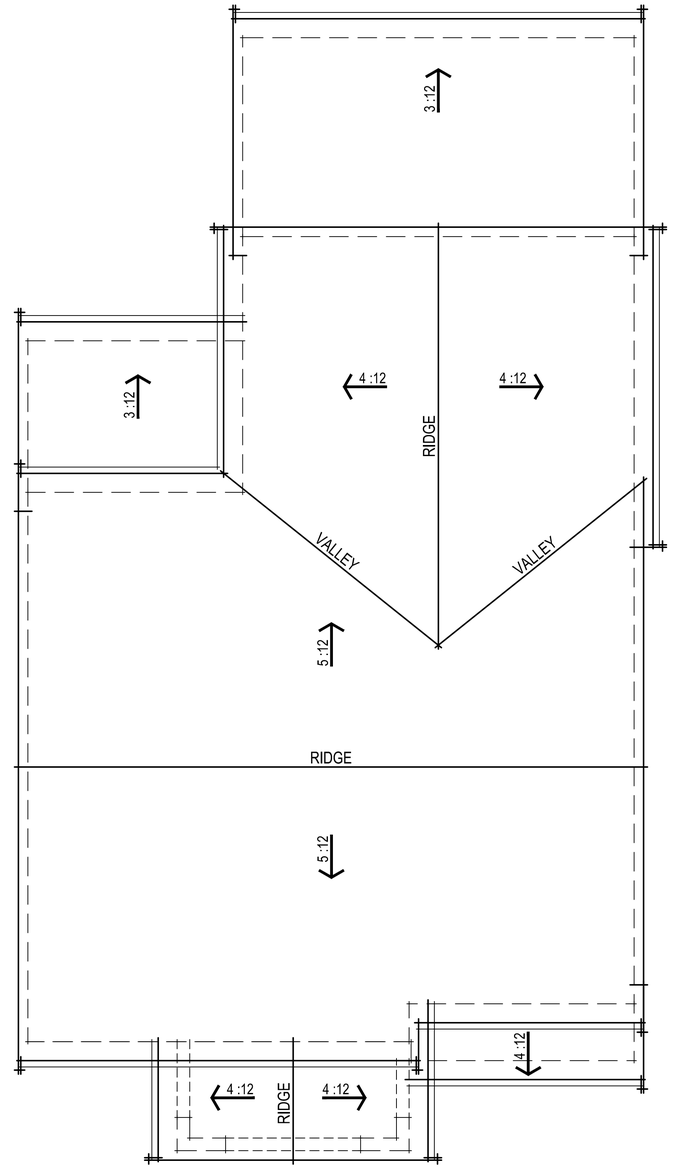
PLAN 3 SQUARE FOOTAGES	
FIRST FLOOR	1095 SQ. FT.
SECOND FLOOR	1141 SQ. FT.
TOTAL LIVING	2236 SQ. FT.
2-BAY GARAGE	420 SQ. FT.

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

PLAN 3 SPANISH FLOOR PLANS
A23

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SPANISH ROOF PLAN

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

PLAN 3 SPANISH ROOF PLAN
A24

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

BUNGALOW REAR ELEVATION

BUNGALOW RIGHT ELEVATION

BUNGALOW LEFT ELEVATION

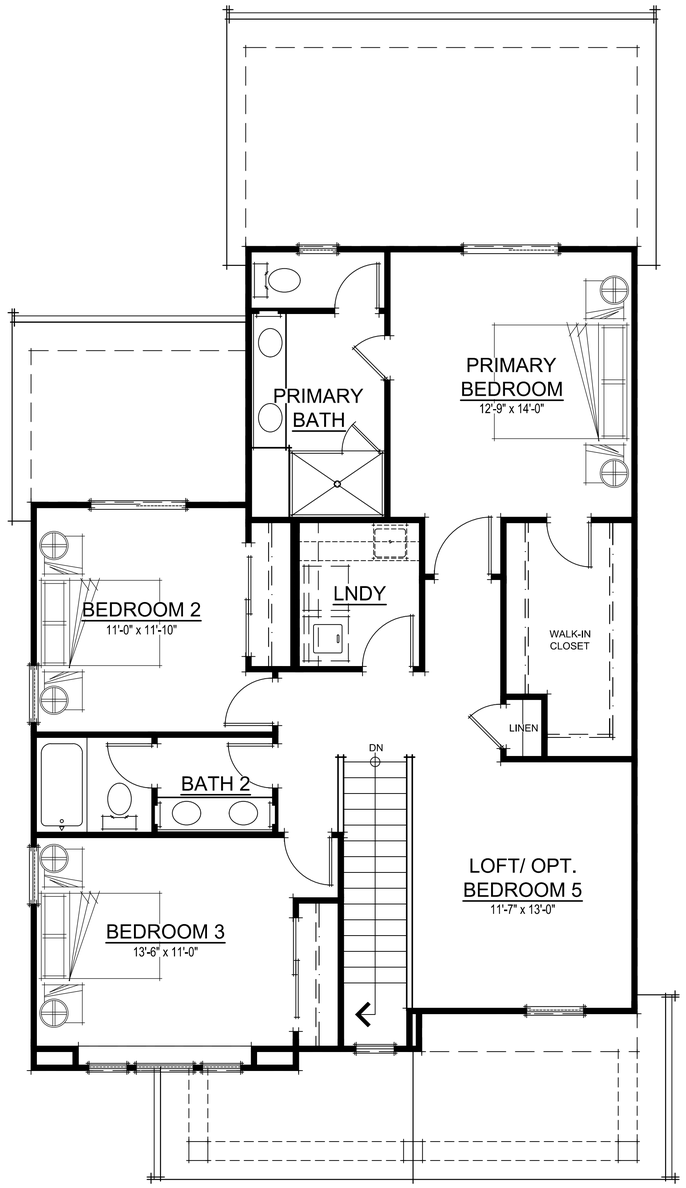
BUNGALOW FRONT ELEVATION

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

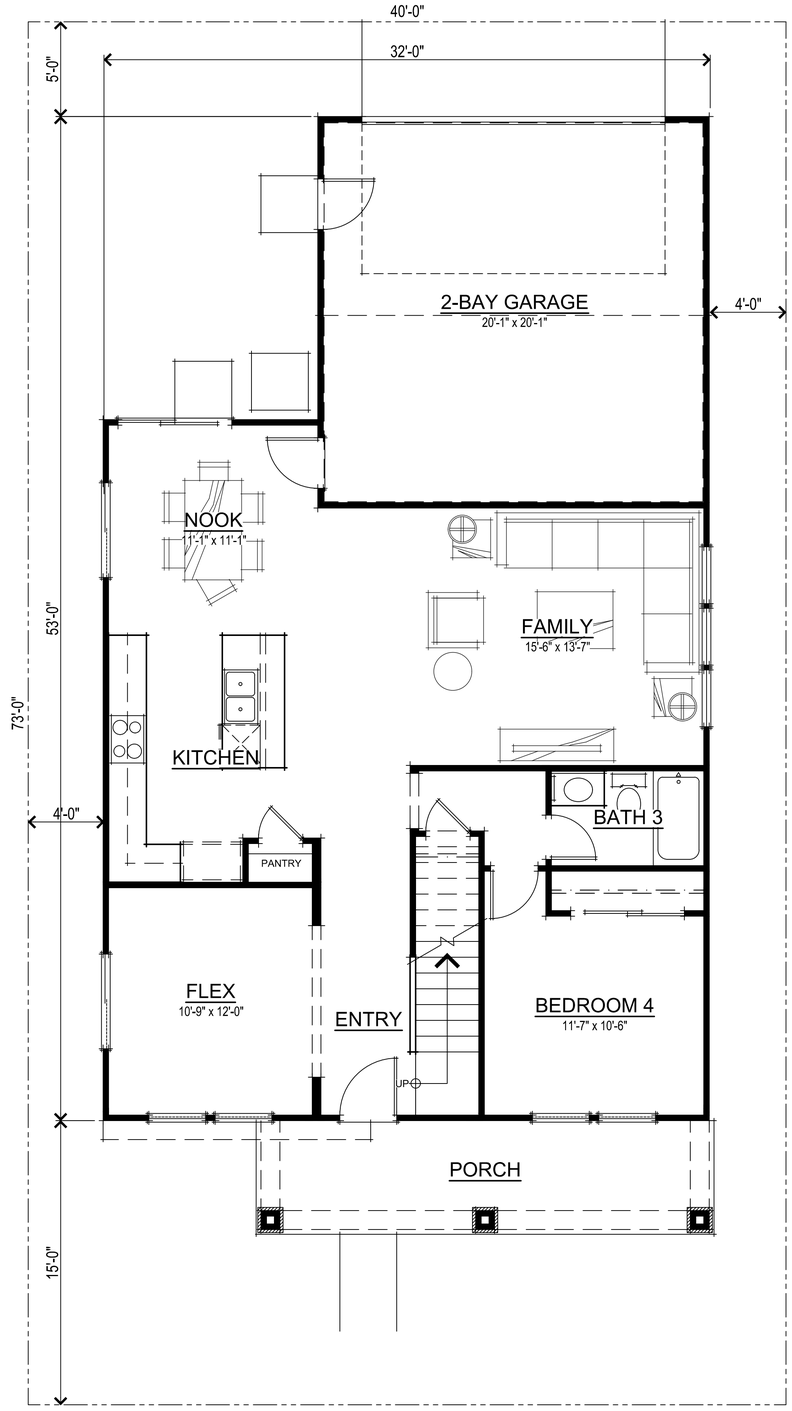
0 1' 2' 3' 4' 8'

PLAN 3 BUNGALOW EXTERIOR ELEVATIONS
A25

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SECOND FLOOR PLAN



FIRST FLOOR PLAN

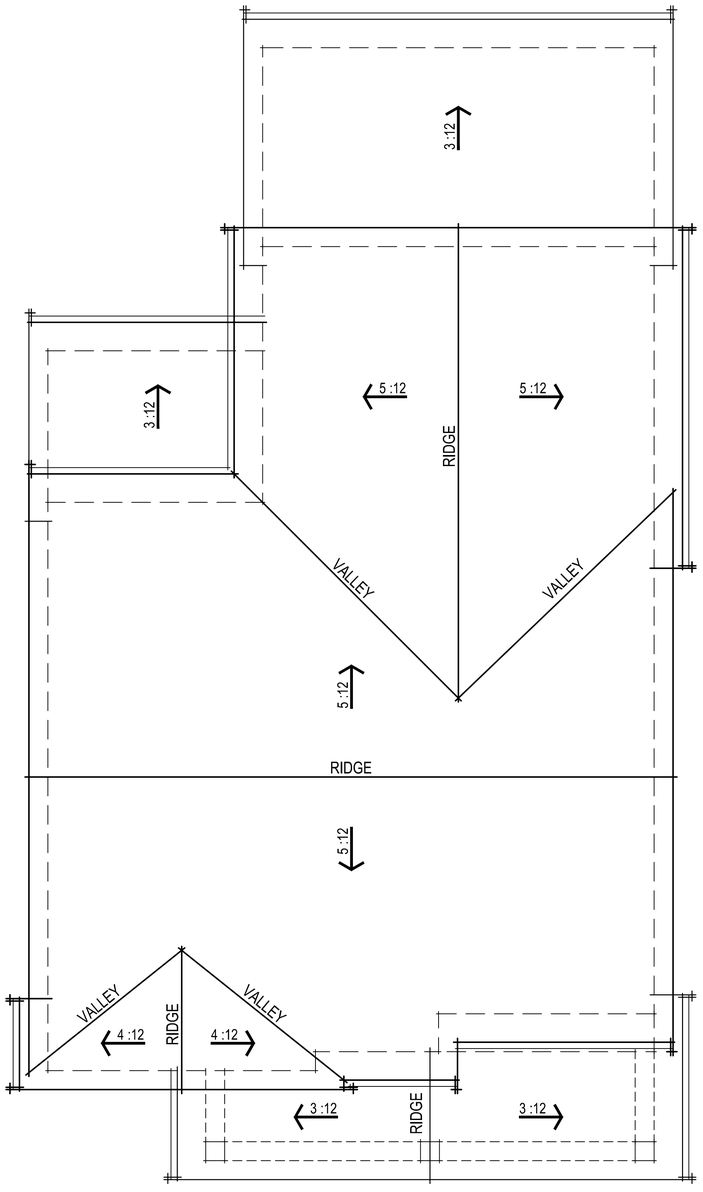
PLAN 3 SQUARE FOOTAGES	
FIRST FLOOR	1095 SQ. FT.
SECOND FLOOR	1141 SQ. FT.
TOTAL LIVING	2236 SQ. FT.
2-BAY GARAGE	420 SQ. FT.

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

PLAN 3 BUNGALOW FLOOR PLANS
A26

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



BUNGALOW ROOF PLAN

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

PLAN 3 BUNGALOW ROOF PLAN
A27

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

FARMHOUSE REAR ELEVATION

FARMHOUSE RIGHT ELEVATION

FARMHOUSE LEFT ELEVATION

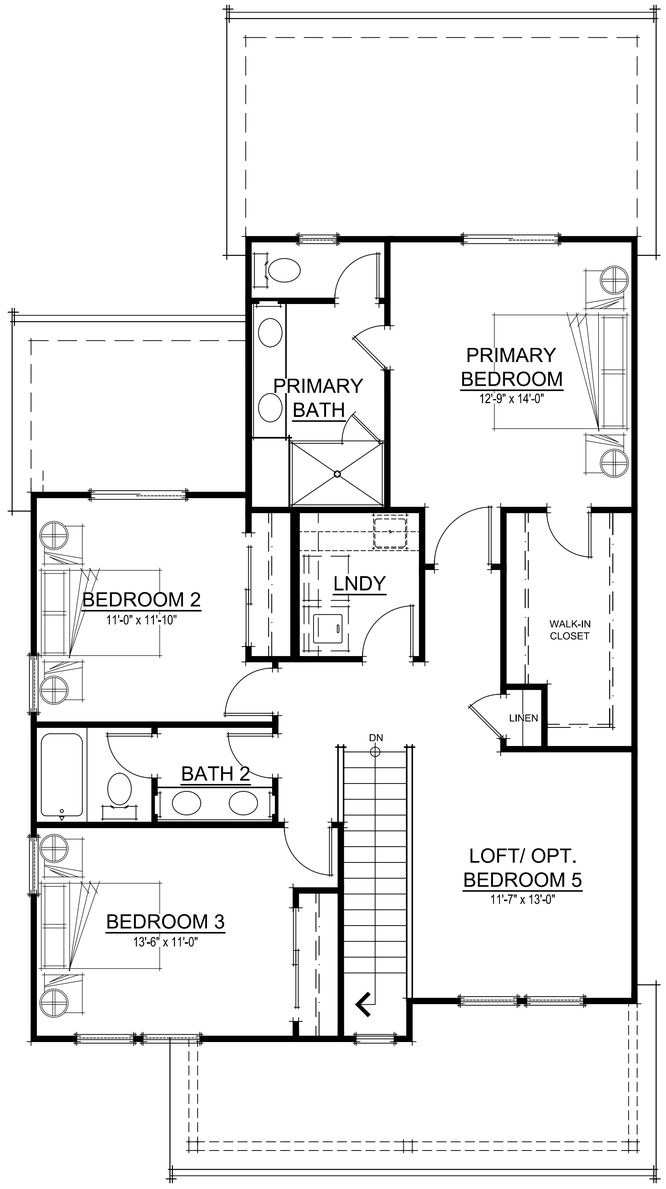
FARMHOUSE FRONT ELEVATION

0 1' 2' 3' 4' 8'

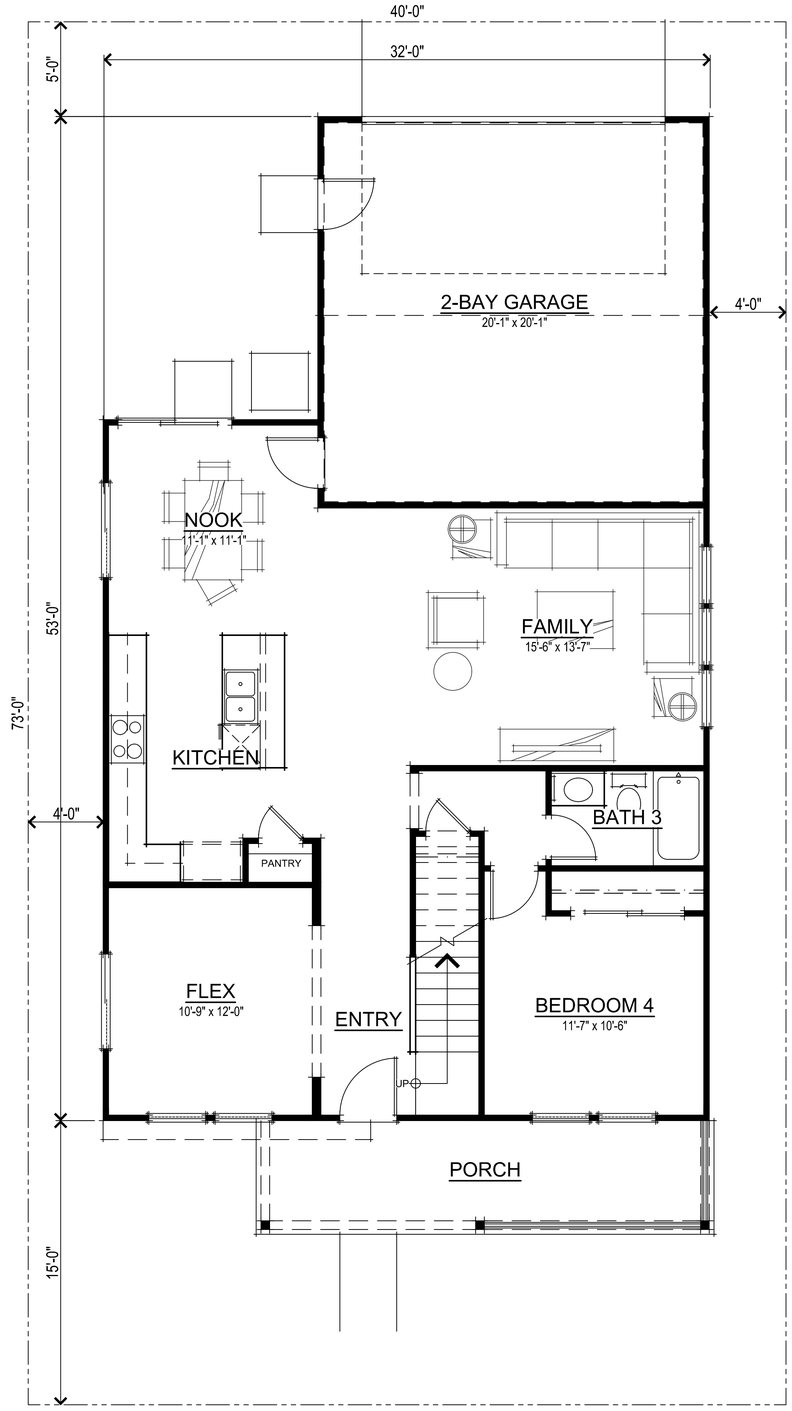
399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

PLAN 3 FARMHOUSE EXTERIOR ELEVATIONS
A28

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



SECOND FLOOR PLAN



FIRST FLOOR PLAN

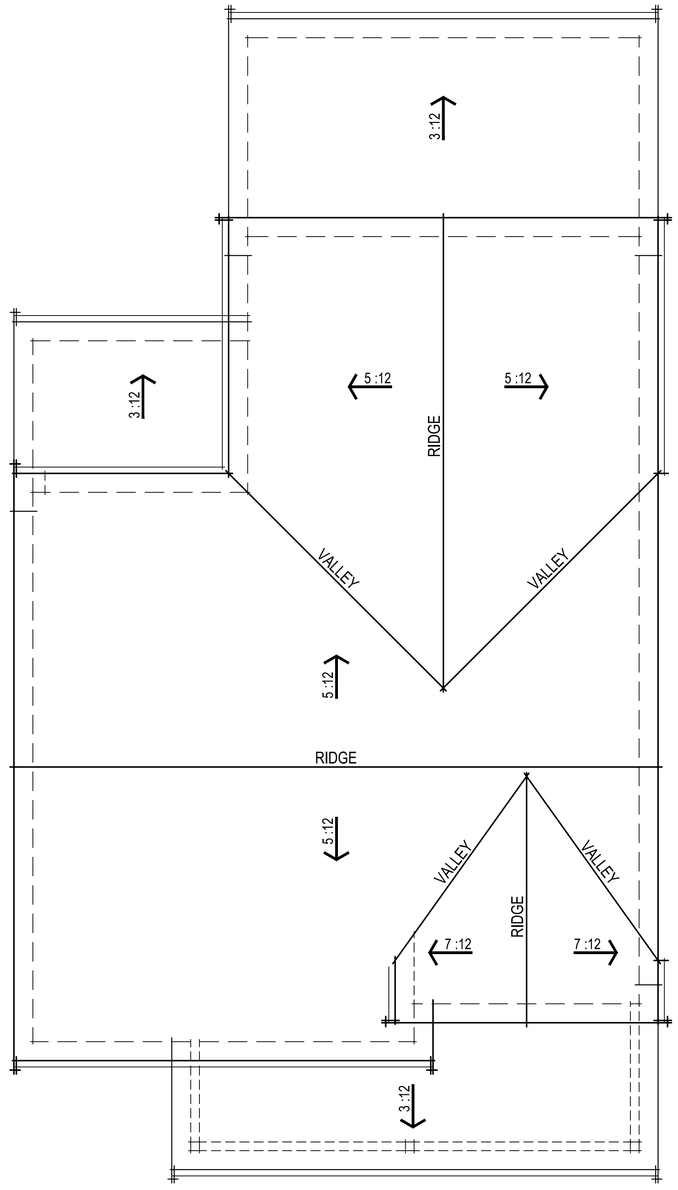
PLAN 3 SQUARE FOOTAGES	
FIRST FLOOR	1095 SQ. FT.
SECOND FLOOR	1141 SQ. FT.
TOTAL LIVING	2236 SQ. FT.
2-BAY GARAGE	420 SQ. FT.

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

PLAN 3 FARMHOUSE FLOOR PLANS
A29

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



FARMHOUSE ROOF PLAN

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

PLAN 3 FARMHOUSE ROOF PLAN
A30

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

BUNGALOW LEFT ELEVATION

SPANISH LEFT ELEVATION

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

SAMPLE ENHANCED ELEVATIONS
A31

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

FARMHOUSE LEFT ELEVATION

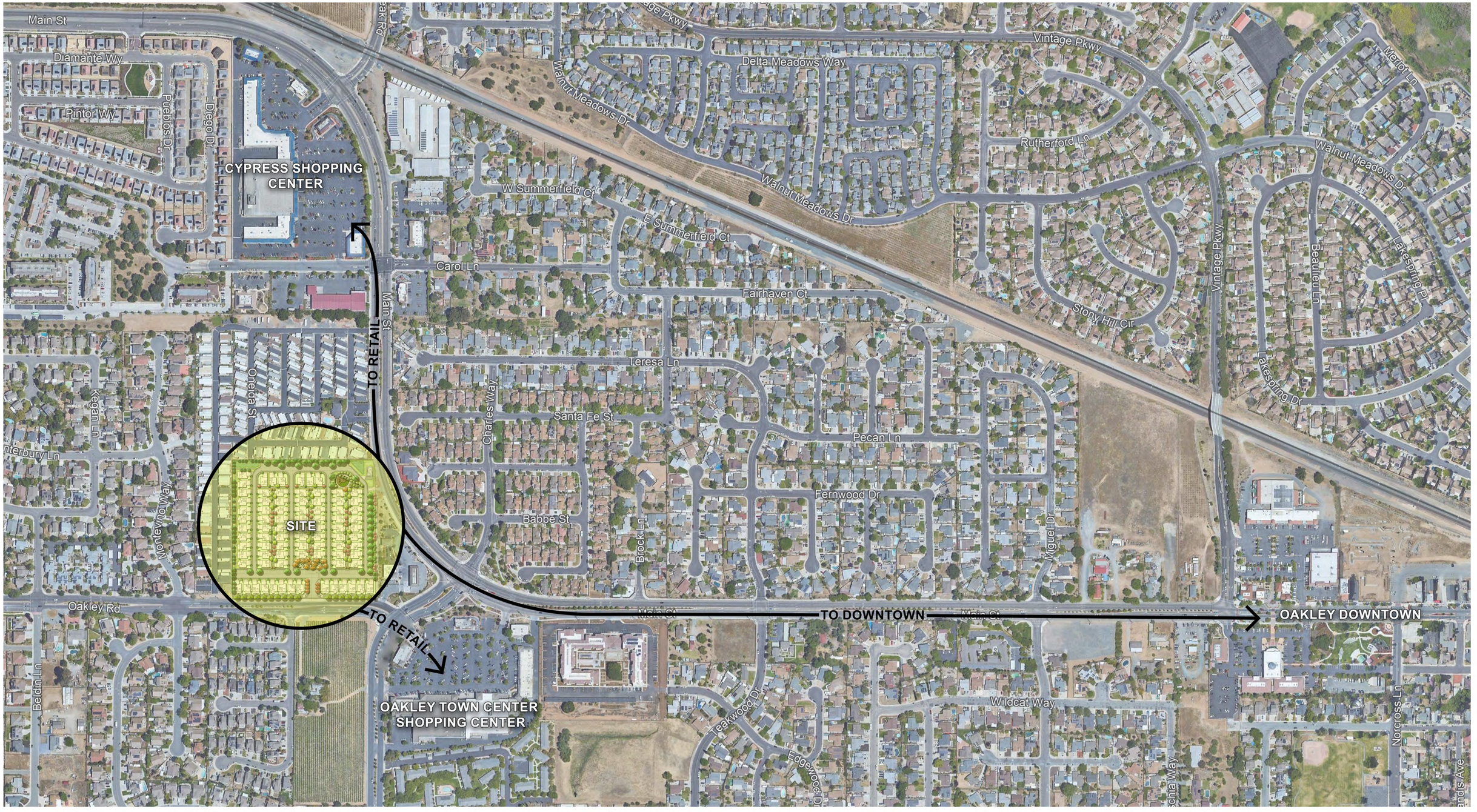
SPANISH LEFT ELEVATION

0 1' 2' 3' 4' 8'

399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

SAMPLE ENHANCED ELEVATIONS
A32

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com



399.203 The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

SITE ACCESS EXHIBIT
A33

SDG Architects, Inc.
3361 Walnut Blvd. Suite 120
Brentwood, CA 94513
925.634.7000 | sdgarchitectsinc.com

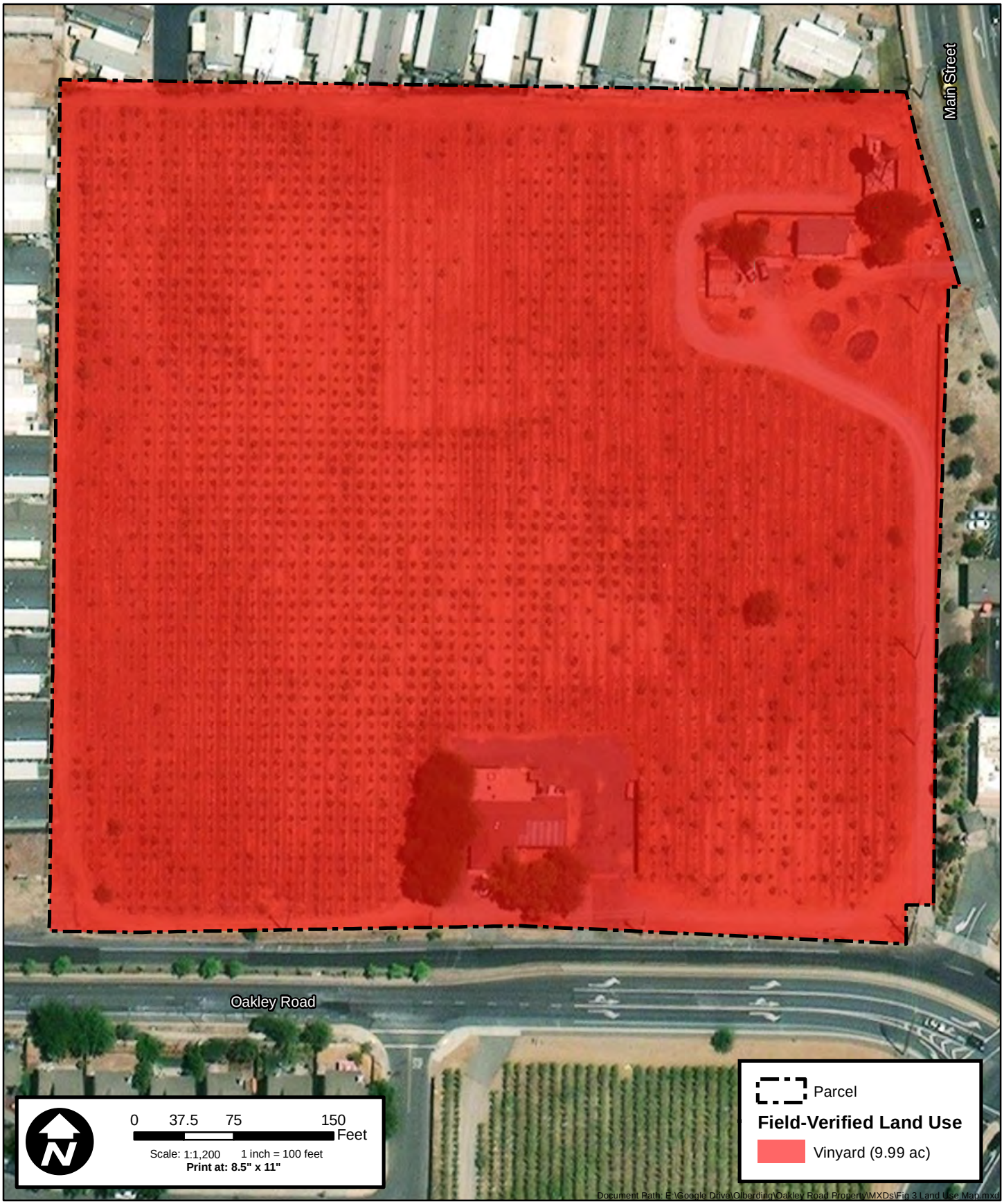


Figure 3: Field Verified Land Use Map
2092 Oakley Road Property
Oakley, California

OLBERDING -ENVIRONMENTAL-

193 Blue Ravine Road, Ste. 165
Folsom, CA 95630
Phone: (916) 985-1188

Revision Date: 5/9/2023

1. Panorama of the Property taken from the current residence in the northeast corner of the Property facing west. Rows of grape vines currently occupy the land.

2. View of the Property from the south east corner of the Property near Oakley Road and the adjacent shopping center driveway (7-Eleven).

3. Rows of grapes with a solitary almond tree on the Property.

4. Property had sandy soils. One of the residences on the Property in the background located along Oakley Road on the south side of the Property.

5. The second residence on the Property in the northeast corner.

6. Rows of grape vines on the Property facing north towards the mobile home park north of the property.

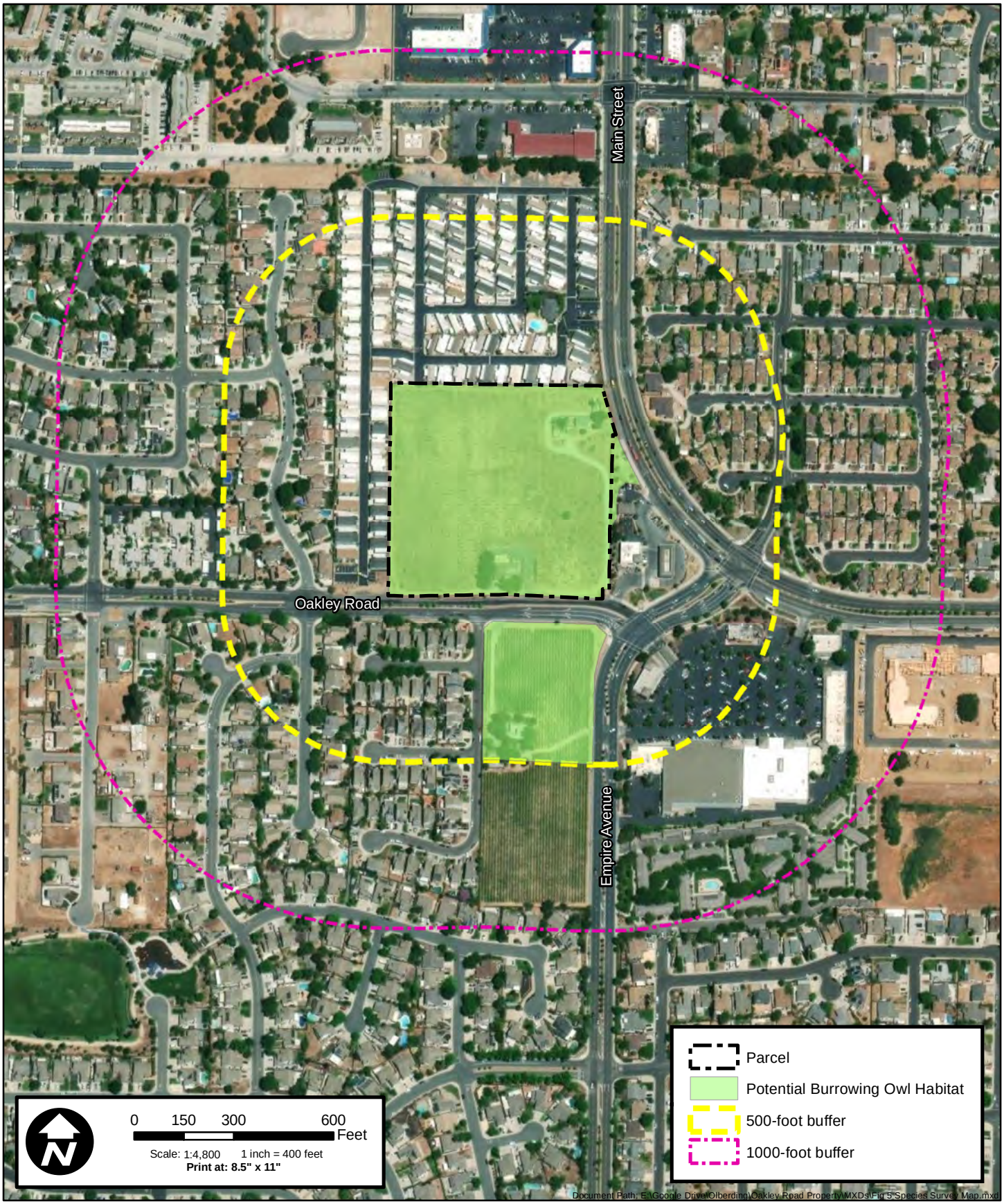


Figure 5: Planning Survey Species Habitat Map
2092 Oakley Road Property
Oakley, California

OLBERDING
-ENVIRONMENTAL-

193 Blue Ravine Road, Ste. 165
Folsom, CA 95630
Phone: (916) 985-1188

Revision Date: 5/9/2023

ATTACHMENT C: PROJECT COMPLIANCE TO HCP CONDITIONS

Attachment C – Project Compliance to HCP Conditions
East Contra Costa County HCP/NCCP Application

Page 14 of the East Contra Costa County HCP/NCCP Application addresses:

SPECIFIC CONDITIONS ON COVERED ACTIVITIES

1) Check off the HCP conservation measures that apply to the project.
2) For all checked conservation measures, describe how the project will comply with each measure. Attach as Attachment C: Project Compliance to HCP Conditions.

APPLIES TO ALL PROJECTS

Conservation Measure 1.11. Avoid Direct Impacts on Extremely Rare Plants, Fully Protected Wildlife Species, or Migratory Birds. This conservation measure applies to all projects. All projects will avoid all impacts on extremely rare plants and fully protected species listed in Table 6-5 of the ECCC HCP/NCCP. See HCP pp. 6-23 to 6-25, and Table 6-5

Response: As indicated on page 14 of the The Village at 2092 Oakley Road HCP Application, there are two applicable Conservation Measure, Conservation Measure 1.11 and Conservation Measure 1.10. Conditions associated with meeting Conservation Measure 1.11 include protection for extremely rare plants and fully protected species listed in Table 6-5 of the ECCC HCP/NCCP. See HCP pp. 6-23 to 6-25, and Table 6-5 of the HCP/NCCP document (http://www.co.contracosta.ca.us/depart/cd/water/HCP/archive/final-hcp-rev/pdfs/Ch06conditions.pdf). There are two avian species that may occur on the proposed project site – western burrowing owl and Swainson's hawk. Neither were sighted during a April 2023 biological survey of the site.

During the April 27, 2023 biological survey of the site, the biologist, Richard Lescalleet, conducted a visual survey to search for signs of active nesting by raptors or passerine birds. The survey began from the periphery of the Property where the area was scanned with binoculars for approximately 30 minutes to look for birds leaving or returning to nesting sites prior to walking among the trees. Following the stationary visual survey, each individual tree was approached for a closer inspection to search for nest sites. Trees within 50-feet of the project boundary were also visually inspected for active bird nests. If project construction-related activities would take place during the nesting season (February 1 through August 31), preconstruction surveys for nesting passerine birds and raptors (birds of prey) within the Property and any large trees adjacent to the Property should be conducted by a competent biologist within 14 days prior to the commencement of the tree removal or site grading activities. If any bird listed under the Migratory Bird Treaty Act is found to be nesting within the project site or within the area of influence, an adequate protective buffer zone should be established by a qualified biologist to protect the nesting site. This buffer shall be a minimum of 75 feet from the project activities for passerine birds, and a minimum of 200 feet for raptors. The distance shall be determined by a competent biologist based on the site conditions (topography, if the nest is in a line of sight of the construction and the sensitivity of the birds nesting). The nest site(s) shall be monitored by a competent biologist periodically to see if the bird's behavior indicates stress caused by construction activities that may lead to nest abandonment and if the protective buffer needs to be increased. Once the young have fledged and are flying well enough to avoid project construction zones (typically by August), the project can proceed without further regard to the nest site(s).

APPLIES TO NEW DEVELOPMENT PROJECTS

Conservation Measure 1.10. Maintain Hydrologic Conditions and Minimize Erosion. All new development must avoid or minimize direct and indirect impacts on local hydrological conditions and erosion by incorporating the applicable Provision C.3 Amendments of the Contra Costa County Clean Water Program's (CCCCWP's) amended NPDES Permit (order no. R2-2003-0022; permit no. CAS002912). The overall goal of this measure is to ensure that new development covered under the HCP has no or minimal adverse effects on downstream fisheries to avoid take of fish listed under ESA or CESA. See HCP pp. 6-21 to 6-22.

Response: During construction and grading, standard BMPs and SWPPP protocols will be implemented to minimize erosion and storm water pollution including the use of silt fence and wattles where appropriate.

ATTACHMENT D: FEE CALCULATOR(S)

ECCC HCP/NCCP 2023 Fee Calculator Worksheet
Permanent Impacts

PROJECT APPLICANT: John D'Ambrosio & Juliann D'Ambrosio, Trustees of the John D'Ambrosio Family Trust

PROJECT NAME: The Villages at 2092 Oakley Road Subdivision

APN(s): 037-110-031

JURISDICTION: City of Oakley

DATE: May 9, 2023

DEVELOPMENT FEE		**PERMANENT IMPACTS (ACRES)**		**2023 FEE/ACRE** *subject to change* [1]		
See appropriate ordinance or HCP/NCCP Figure 9-1 to determine Fee Zone	Fee Zone 1		x	$19,611.52	=	$0.00
	Fee Zone 2		x	$39,223.04	=	$0.00
	Fee Zone 3	9.99	x	$9,805.76	=	$97,959.54
	Fee Zone 4[2]		x	$29,417.28	=	$0.00
				Development Fee Total	=	**$97,959.54**

WETLAND MITIGATION FEE		**PERMANENT IMPACTS (ACRES)**		**2023 FEE/ACRE** *subject to change* [1]		
Impacts to riparian/scrub, wetlands, ponds, aquatic, and slough/channel are charged both a wetland mitigation fee and a development fee. Please also include these impact acres to development fee above [3]	Riparian woodland / scrub		x	$110,667.08	=	$0.00
	Perennial Wetland		x	$167,718.29	=	$0.00
	Seasonal Wetland		x	$392,489.03	=	$0.00
	Alkali Wetland		x	$396,778.59	=	$0.00
	Ponds		x	$215,976.51	=	$0.00
	Aquatic (open water)		x	$107,988.87	=	$0.00
	Slough / Channel		x	$154,206.78	=	$0.00
	STREAMS	**PERMANENT IMPACTS (LINEAR FEET)**		**2023 FEE/LINEAR FT** *subject to change* [1]		
	Streams 25 feet wide or less		x	$569.07	=	$0.00
	Streams greater than 25 feet wide		x	$854.23	=	$0.00
				Wetland Mitigation Fee Total	=	**$0.00**

FEE REDUCTION[4]			
	Development Fee reduction for land in lieu of fee	=	
	Development Fee reduction (up to 33%) for permanent assessments	=	
	Wetland Mitigation Fee reduction for wetland restoration/creation performed by applicant	=	
	Reduction Total	=	**$0.00**

FINAL FEE CALCULATION[6]			
	Development Fee Total		$97,959.54
	Wetland Mitigation Fee Total	+	$0.00
	Mitigation Fee Subtotal	=	**$97,959.54**
	Contribution to Recovery[5]	+	
	TOTAL AMOUNT TO BE PAID	=	**$97,959.54**

[1] Development fees are adjusted annually (no later than March 15 of each year) according to a formula that includes both a Home Price Index (HPI) and a Consumer Price Index (CPI). The Wetland Mitigation Fees are adjusted according to a CPI.

[2] Fee Zone 4 is not shown on Figure 9-1 of the HCP/NCCP but refers to the fee applicable to those few covered acitivities located in northeastern Antioch (p. 9-21).

[3] Per Chapter 9.3.1 of the HCP/NCCP, for every acre of impact on wetlands, streams, ponds, and riparian woodland/scrub, applicants will pay the appropriate development fee (according to fee zone) towards land acquisition and the conservation program as a whole, as well as a wetland mitigation fee to cover the costs of successful restoration or creation.

[4] Fee reductions must be reviewed and approved by the Conservancy.

[5] Participating Special Entities (PSEs) are required to pay fees over and above permanent and temporary impact mitigation fees to cover indirect costs of extending permit coverage, including a portion of the costs of the initial preparation of the Plan, and a portion of the costs of conservation actions designed to contribute to species recovery. This amount will be determined in accordance with the Contribution to Recovery Implementation Policy adopted by the Conservancy Governing Board on December 8, 2014.

[6] The Conservancy conducted the periodic fee audit required by the HCP/NCCP in 2023. Action by the County and participating cities is pending, which could result in adjustments to some or all fees

ATTACHMENT E: WETLAND DELINEATION (if applicable)

Appendix C
CNDDB Search Results

CALIFORNIA DEPARTMENT OF FISH and WILDLIFE **RareFind**

Query Summary:
Quad IS (Brentwood (3712186) OR Antioch North (3812117) OR Antioch South (3712187) OR Bouldin Island (3812115) OR Jersey Island (3812116) OR Woodward Island (3712185) OR Tassajara (3712177) OR Byron Hot Springs (3712176) OR Clifton Court Forebay (3712175))
AND Other Status CONTAINS (CDFW_FP-Fully Protected OR CDFW_SSC-Species of Special Concern OR CDFW_WL-Watch List)

Print Close

CNDDB Element Query Results

Scientific Name	Common Name	Taxonomic Group	Element Code	Total Occs	Returned Occs	Federal Status	State Status	Global Rank	State Rank	CA Rare Plant Rank	Other Status	Habitats
Agelaius tricolor	tricolored blackbird	Birds	ABPBXB0020	955	11	None	Threatened	G1G2	S2	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_EN-Endangered, USFWS_BCC-Birds of Conservation Concern	Freshwater marsh, Marsh & swamp, Swamp, Wetland
Ambystoma californiense pop. 1	California tiger salamander - central California DPS	Amphibians	AAAAA01181	1271	213	Threatened	Threatened	G2G3T3	S3	null	CDFW_WL-Watch List, IUCN_VU-Vulnerable	Cismontane woodland, Meadow & seep, Riparian woodland, Valley & foothill grassland, Vernal pool, Wetland
Ammodramus savannarum	grasshopper sparrow	Birds	ABPBXA0020	27	1	None	None	G5	S3	null	CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern	Valley & foothill grassland
Anniella pulchra	Northern California legless lizard	Reptiles	ARACC01020	383	7	None	None	G3	S2S3	null	CDFW_SSC-Species of Special Concern, USFS_S-Sensitive	Chaparral, Coastal dunes, Coastal scrub
Antrozous pallidus	pallid bat	Mammals	AMACC10010	420	1	None	None	G4	S3	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern, USFS_S-Sensitive	Chaparral, Coastal scrub, Desert wash, Great Basin grassland, Great Basin scrub, Mojavean desert scrub, Riparian woodland, Sonoran desert scrub, Upper montane coniferous forest, Valley & foothill grassland
Aquila chrysaetos	golden eagle	Birds	ABNKC22010	325	14	None	None	G5	S3	null	BLM_S-Sensitive, CDF_S-Sensitive, CDFW_FP-Fully Protected, CDFW_WL-Watch List, IUCN_LC-Least Concern	Broadleaved upland forest, Cismontane woodland, Coastal prairie, Great Basin grassland, Great Basin scrub, Lower montane coniferous forest, Pinon & juniper woodlands, Upper montane coniferous forest, Valley &

												foothill grassland
Archoplites interruptus	Sacramento perch	Fish	AFCQB07010	5	1	None	None	G1	S1	null	AFS_TH-Threatened, CDFW_SSC-Species of Special Concern, IUCN_EN-Endangered	Aquatic, Sacramento/San Joaquin flowing waters, Sacramento/San Joaquin standing waters
Arizona elegans occidentalis	California glossy snake	Reptiles	ARADB01017	260	1	None	None	G5T2	S2	null	CDFW_SSC-Species of Special Concern	null
Athene cunicularia	burrowing owl	Birds	ABNSB10010	2011	124	None	None	G4	S3	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern, USFWS_BCC-Birds of Conservation Concern	Coastal prairie, Coastal scrub, Great Basin grassland, Great Basin scrub, Mojavean desert scrub, Sonoran desert scrub, Valley & foothill grassland
Buteo regalis	ferruginous hawk	Birds	ABNKC19120	107	2	None	None	G4	S3S4	null	CDFW_WL-Watch List, IUCN_LC-Least Concern	Great Basin grassland, Great Basin scrub, Pinon & juniper woodlands, Valley & foothill grassland
Circus hudsonius	northern harrier	Birds	ABNKC11011	54	2	None	None	G5	S3	null	CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern, USFWS_BCC-Birds of Conservation Concern	Coastal scrub, Great Basin grassland, Marsh & swamp, Riparian scrub, Valley & foothill grassland, Wetland
Elanus leucurus	white-tailed kite	Birds	ABNKC06010	184	7	None	None	G5	S3S4	null	BLM_S-Sensitive, CDFW_FP-Fully Protected, IUCN_LC-Least Concern	Cismontane woodland, Marsh & swamp, Riparian woodland, Valley & foothill grassland, Wetland
Emys marmorata	western pond turtle	Reptiles	ARAAD02030	1424	61	None	None	G3G4	S3	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_VU-Vulnerable, USFS_S-Sensitive	Aquatic, Artificial flowing waters, Klamath/North coast flowing waters, Klamath/North coast standing waters, Marsh & swamp, Sacramento/San Joaquin flowing waters, Sacramento/San Joaquin standing waters, South coast flowing waters, South coast standing waters, Wetland
Eremophila alpestris actia	California horned lark	Birds	ABPAT02011	94	5	None	None	G5T4Q	S4	null	CDFW_WL-Watch List, IUCN_LC-Least Concern	Marine intertidal & splash zone communities, Meadow & seep
Falco mexicanus	prairie falcon	Birds	ABNKD06090	451	5	None	None	G5	S4	null	CDFW_WL-Watch List, IUCN_LC-Least Concern	Great Basin grassland, Great Basin scrub, Mojavean desert scrub, Sonoran desert scrub,

												Valley & foothill grassland
Falco peregrinus anatum	American peregrine falcon	Birds	ABNKD06071	73	1	Delisted	Delisted	G4T4	S3S4	null	CDF_S-Sensitive, CDFW_FP-Fully Protected	null
Geothlypis trichas sinuosa	saltmarsh common yellowthroat	Birds	ABPBX1201A	112	4	None	None	G5T3	S3	null	CDFW_SSC-Species of Special Concern, USFWS_BCC-Birds of Conservation Concern	Marsh & swamp
Lanius ludovicianus	loggerhead shrike	Birds	ABPBR01030	110	2	None	None	G4	S4	null	CDFW_SSC-Species of Special Concern, IUCN_NT-Near Threatened	Broadleaved upland forest, Desert wash, Joshua tree woodland, Mojavean desert scrub, Pinon & juniper woodlands, Riparian woodland, Sonoran desert scrub
Lasiurus frantzii	western red bat	Mammals	AMACC05080	128	2	None	None	G4	S3	null	CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern	Cismontane woodland, Lower montane coniferous forest, Riparian forest, Riparian woodland
Laterallus jamaicensis coturniculus	California black rail	Birds	ABNME03041	303	22	None	Threatened	G3T1	S2	null	BLM_S-Sensitive, CDFW_FP-Fully Protected, IUCN_EN-Endangered	Brackish marsh, Freshwater marsh, Marsh & swamp, Salt marsh, Wetland
Masticophis flagellum ruddocki	San Joaquin coachwhip	Reptiles	ARADB21021	96	1	None	None	G5T2T3	S3	null	CDFW_SSC-Species of Special Concern	Chenopod scrub, Valley & foothill grassland
Melospiza melodia maxillaris	Suisun song sparrow	Birds	ABPBXA301K	36	6	None	None	G5T3	S3	null	CDFW_SSC-Species of Special Concern	Marsh & swamp, Wetland
Melospiza melodia pop. 1	song sparrow ("Modesto" population)	Birds	ABPBXA3013	92	31	None	None	G5T3?Q	S3?	null	CDFW_SSC-Species of Special Concern	Artificial flowing waters, Freshwater marsh, Riparian forest, Riparian scrub, Riparian woodland, Sacramento/San Joaquin flowing waters, Sacramento/San Joaquin standing waters
Nannopterum auritum	double-crested cormorant	Birds	ABNFD01020	39	1	None	None	G5	S4	null	CDFW_WL-Watch List, IUCN_LC-Least Concern	Riparian forest, Riparian scrub, Riparian woodland
Neotoma fuscipes annectens	San Francisco dusky-footed woodrat	Mammals	AMAFF08082	42	1	None	None	G5T2T3	S2S3	null	CDFW_SSC-Species of Special Concern	Chaparral, Redwood
Phrynosoma blainvillii	coast horned lizard	Reptiles	ARACF12100	784	1	None	None	G4	S4	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern	Chaparral, Cismontane woodland, Coastal bluff scrub, Coastal scrub, Desert wash, Pinon & juniper woodlands, Riparian scrub, Riparian

												woodland, Valley & foothill grassland
Rana draytonii	California red-legged frog	Amphibians	AAABH01022	1685	184	Threatened	None	G2G3	S2S3	null	CDFW_SSC-Species of Special Concern, IUCN_VU-Vulnerable	Aquatic, Artificial flowing waters, Artificial standing waters, Freshwater marsh, Marsh & swamp, Riparian forest, Riparian scrub, Riparian woodland, Sacramento/San Joaquin flowing waters, Sacramento/San Joaquin standing waters, South coast flowing waters, South coast standing waters, Wetland
Reithrodontomys raviventris	salt-marsh harvest mouse	Mammals	AMAFF02040	144	7	Endangered	Endangered	G1G2	S1S2	null	CDFW_FP-Fully Protected, IUCN_EN-Endangered	Marsh & swamp, Wetland
Taxidea taxus	American badger	Mammals	AMAJF04010	594	11	None	None	G5	S3	null	CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern	Alkali marsh, Alkali playa, Alpine, Alpine dwarf scrub, Bog & fen, Brackish marsh, Broadleaved upland forest, Chaparral, Chenopod scrub, Cismontane woodland, Closed-cone coniferous forest, Coastal bluff scrub, Coastal dunes, Coastal prairie, Coastal scrub, Desert dunes, Desert wash, Freshwater marsh, Great Basin grassland, Great Basin scrub, Interior dunes, Ione formation, Joshua tree woodland, Limestone, Lower montane coniferous forest, Marsh & swamp, Meadow & seep, Mojavean desert scrub, Montane dwarf scrub, North coast coniferous forest, Oldgrowth, Pavement plain, Redwood, Riparian forest, Riparian scrub, Riparian woodland, Salt marsh, Sonoran desert scrub, Sonoran thorn woodland, Ultramafic, Upper montane coniferous forest, Upper

												Sonoran scrub, Valley & foothill grassland

CALIFORNIA DEPARTMENT OF FISH and WILDLIFE **RareFind**

Query Summary:
Quad IS (Brentwood (3712186) OR Antioch North (3812117) OR Antioch South (3712187) OR Bouldin Island (3812115) OR Jersey Island (3812116) OR Woodward Island (3712185) OR Tassajara (3712177) OR Byron Hot Springs (3712176) OR Clifton Court Forebay (3712175))
AND CA Rare Plant Rank IS (1A OR 1B OR 1B.1 OR 1B.2 OR 1B.3 OR 2A OR 2B OR 2B.1 OR 2B.2 OR 2B.3)

Print Close

CNDDB Element Query Results

Scientific Name	Common Name	Taxonomic Group	Element Code	Total Occs	Returned Occs	Federal Status	State Status	Global Rank	State Rank	CA Rare Plant Rank	Other Status	Habitats
Amsinckia grandiflora	large-flowered fiddleneck	Dicots	PDBOR01050	9	4	Endangered	Endangered	G1	S1	1B.1	SB_UCBG-UC Botanical Garden at Berkeley	Cismontane woodland, Valley & foothill grassland
Arctostaphylos auriculata	Mt. Diablo manzanita	Dicots	PDERI04040	17	10	None	None	G2	S2	1B.3	SB_UCSC-UC Santa Cruz	Chaparral, Cismontane woodland
Arctostaphylos manzanita ssp. laevigata	Contra Costa manzanita	Dicots	PDERI04273	10	2	None	None	G5T2	S2	1B.2	SB_UCSC-UC Santa Cruz	Chaparral
Astragalus tener var. tener	alkali milk-vetch	Dicots	PDFAB0F8R1	65	4	None	None	G2T1	S1	1B.2	SB_UCSC-UC Santa Cruz	Alkali playa, Valley & foothill grassland, Vernal pool, Wetland
Atriplex cordulata var. cordulata	heartscale	Dicots	PDCHE040B0	66	2	None	None	G3T2	S2	1B.2	BLM_S-Sensitive	Chenopod scrub, Meadow & seep, Valley & foothill grassland
Atriplex depressa	brittlescale	Dicots	PDCHE042L0	60	11	None	None	G2	S2	1B.2	null	Alkali playa, Chenopod scrub, Meadow & seep, Valley & foothill grassland, Vernal pool, Wetland
Atriplex minuscula	lesser saltscale	Dicots	PDCHE042M0	52	1	None	None	G2	S2	1B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Alkali playa, Chenopod scrub, Valley & foothill grassland
Blepharizonia plumosa	big tarplant	Dicots	PDAST1C011	53	24	None	None	G1G2	S1S2	1B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Valley & foothill grassland
Brasenia schreberi	watershield	Dicots	PDCAB01010	43	1	None	None	G5	S3	2B.3	IUCN_LC-Least Concern	Marsh & swamp, Wetland
Calochortus pulchellus	Mt. Diablo fairy-lantern	Monocots	PMLIL0D160	52	16	None	None	G2	S2	1B.2	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Chaparral, Cismontane woodland, Riparian woodland, Valley & foothill grassland
Carex comosa	bristly sedge	Monocots	PMCYP032Y0	31	1	None	None	G5	S2	2B.1	IUCN_LC-Least Concern	Coastal prairie, Freshwater marsh, Marsh & swamp, Valley & foothill grassland, Wetland

Centromadia parryi ssp. congdonii	Congdon's tarplant	Dicots	PDAST4R0P1	96	10	None	None	G3T2	S2	1B.1	BLM_S-Sensitive, SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Valley & foothill grassland
Chloropyron molle ssp. molle	soft salty bird's-beak	Dicots	PDSCR0J0D2	27	1	Endangered	Rare	G2T1	S1	1B.2	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Marsh & swamp, Salt marsh, Wetland
Cicuta maculata var. bolanderi	Bolander's water-hemlock	Dicots	PDAPI0M051	17	3	None	None	G5T4T5	S2?	2B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Marsh & swamp, Salt marsh, Wetland
Cryptantha hooveri	Hoover's cryptantha	Dicots	PDBOR0A190	4	1	None	None	GH	SH	1A	null	Interior dunes, Valley & foothill grassland
Delphinium recurvatum	recurved larkspur	Dicots	PDRAN0B1J0	119	4	None	None	G2?	S2?	1B.2	BLM_S-Sensitive, SB_SBBG-Santa Barbara Botanic Garden	Chenopod scrub, Cismontane woodland, Valley & foothill grassland
Downingia pusilla	dwarf downingia	Dicots	PDCAM060C0	132	2	None	None	GU	S2	2B.2	null	Valley & foothill grassland, Vernal pool, Wetland
Eriogonum nudum var. psychicola	Antioch Dunes buckwheat	Dicots	PDPGN0849Q	1	1	None	None	G5T1	S1	1B.1	null	Interior dunes
Eriogonum truncatum	Mt. Diablo buckwheat	Dicots	PDPGN085Z0	7	3	None	None	G1	S1	1B.1	SB_UCBG-UC Botanical Garden at Berkeley	Chaparral, Coastal scrub, Valley & foothill grassland
Eryngium jepsonii	Jepson's coyote-thistle	Dicots	PDAPI0Z130	19	1	None	None	G2	S2	1B.2	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Valley & foothill grassland, Vernal pool
Eryngium racemosum	Delta button-celery	Dicots	PDAPI0Z0S0	26	1	None	Endangered	G1	S1	1B.1	null	Riparian scrub, Wetland
Eryngium spinosepalum	spiny-sepaled button-celery	Dicots	PDAPI0Z0Y0	108	1	None	None	G2	S2	1B.2	BLM_S-Sensitive, SB_SBBG-Santa Barbara Botanic Garden	Valley & foothill grassland, Vernal pool, Wetland
Erysimum capitatum var. angustatum	Contra Costa wallflower	Dicots	PDBRA16052	4	4	Endangered	Endangered	G5T1	S1	1B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Interior dunes
Eschscholzia rhombipetala	diamond-petaled California poppy	Dicots	PDPAP0A0D0	12	3	None	None	G1	S1	1B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden, SB_UCBG-UC Botanical Garden at Berkeley	Valley & foothill grassland
Extriplex joaquinana	San Joaquin spearscale	Dicots	PDCHE041F3	127	47	None	None	G2	S2	1B.2	BLM_S-Sensitive, SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Alkali playa, Chenopod scrub, Meadow & seep, Valley & foothill grassland
Fritillaria liliacea	fragrant fritillary	Monocots	PMLIL0V0C0	82	1	None	None	G2	S2	1B.2	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden, USFS_S-Sensitive	Cismontane woodland, Coastal prairie, Coastal scrub, Ultramafic, Valley & foothill grassland
Helianthella castanea	Diablo helianthella	Dicots	PDAST4M020	107	19	None	None	G2	S2	1B.2	SB_CalBG/RSABG-California/Rancho	Broadleaved upland forest,

											Santa Ana Botanic Garden	Chaparral, Cismontane woodland, Coastal scrub, Valley & foothill grassland
Hesperolinon breweri	Brewer's western flax	Dicots	PDLIN01030	29	12	None	None	G2	S2	1B.2	null	Chaparral, Cismontane woodland, Ultramafic, Valley & foothill grassland
Hibiscus lasiocarpos var. occidentalis	woolly rose-mallow	Dicots	PDMAL0H0R3	173	60	None	None	G5T3	S3	1B.2	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden, SB_UCBG-UC Botanical Garden at Berkeley	Freshwater marsh, Marsh & swamp, Wetland
Lasthenia conjugens	Contra Costa goldfields	Dicots	PDAST5L040	36	1	Endangered	None	G1	S1	1B.1	SB_UCBG-UC Botanical Garden at Berkeley	Alkali playa, Cismontane woodland, Valley & foothill grassland, Vernal pool, Wetland
Lathyrus jepsonii var. jepsonii	Delta tule pea	Dicots	PDFAB250D2	133	38	None	None	G5T2	S2	1B.2	SB_BerrySB-Berry Seed Bank, SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Freshwater marsh, Marsh & swamp, Wetland
Lilaeopsis masonii	Mason's lilaeopsis	Dicots	PDAPI19030	198	119	None	Rare	G2	S2	1B.1	null	Freshwater marsh, Marsh & swamp, Riparian scrub, Wetland
Limosella australis	Delta mudwort	Dicots	PDSCR10030	59	45	None	None	G4G5	S2	2B.1	null	Brackish marsh, Freshwater marsh, Marsh & swamp, Riparian scrub, Wetland
Madia radiata	showy golden madia	Dicots	PDAST650E0	100	2	None	None	G3	S3	1B.1	BLM_S-Sensitive, SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden, SB_SBBG-Santa Barbara Botanic Garden	Cismontane woodland, Valley & foothill grassland
Malacothamnus hallii	Hall's bush-mallow	Dicots	PDMAL0Q0F0	46	1	None	None	G2	S2	1B.2	BLM_S-Sensitive, SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Chaparral, Coastal scrub, Ultramafic
Navarretia nigelliformis ssp. radians	shining navarretia	Dicots	PDPLM0C0J2	102	4	None	None	G4T2	S2	1B.2	BLM_S-Sensitive	Cismontane woodland, Valley & foothill grassland, Vernal pool, Wetland
Oenothera deltoides ssp. howellii	Antioch Dunes evening-primrose	Dicots	PDONA0C0B4	10	9	Endangered	Endangered	G5T1	S1	1B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden, SB_UCBG-UC Botanical Garden at Berkeley	Interior dunes
Plagiobothrys hystriculus	bearded popcornflower	Dicots	PDBOR0V0H0	15	1	None	None	G2	S2	1B.1	null	Valley & foothill grassland, Vernal pool, Wetland

Potamogeton zosteriformis	eel-grass pondweed	Monocots	PMPOT03160	20	1	None	None	G5	S3	2B.2	null	Marsh & swamp, Wetland
Puccinellia simplex	California alkali grass	Monocots	PMPOA53110	80	6	None	None	G2	S2	1B.2	BLM_S-Sensitive	Chenopod scrub, Meadow & seep, Valley & foothill grassland, Vernal pool
Scutellaria galericulata	marsh skullcap	Dicots	PDLAM1U0J0	39	3	None	None	G5	S2	2B.2	null	Lower montane coniferous forest, Marsh & swamp, Meadow & seep, Wetland
Scutellaria lateriflora	side-flowering skullcap	Dicots	PDLAM1U0Q0	13	1	None	None	G5	S2	2B.2	IUCN_LC-Least Concern	Marsh & swamp, Meadow & seep, Wetland
Senecio aphanactis	chaparral ragwort	Dicots	PDAST8H060	98	2	None	None	G3	S2	2B.2	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden, SB_CRES-San Diego Zoo CRES Native Gene Seed Bank	Chaparral, Cismontane woodland, Coastal scrub
Sidalcea keckii	Keck's checkerbloom	Dicots	PDMAL110D0	50	1	Endangered	None	G2	S2	1B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Cismontane woodland, Ultramafic, Valley & foothill grassland
Spergularia macrotheca var. longistyla	long-styled sand-spurrey	Dicots	PDCAR0W062	22	9	None	None	G5T2	S2	1B.2	null	Marsh & swamp, Meadow & seep
Symphyotrichum lentum	Suisun Marsh aster	Dicots	PDASTE8470	175	73	None	None	G2	S2	1B.2	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden, SB_USDA-US Dept of Agriculture	Brackish marsh, Freshwater marsh, Marsh & swamp, Wetland
Tropidocarpum capparideum	caper-fruited tropidocarpum	Dicots	PDBRA2R010	20	8	None	None	G1	S1	1B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden, USFS_S-Sensitive	Valley & foothill grassland
Viburnum ellipticum	oval-leaved viburnum	Dicots	PDCPR07080	39	2	None	None	G4G5	S3?	2B.3	null	Chaparral, Cismontane woodland, Lower montane coniferous forest

CALIFORNIA DEPARTMENT OF FISH and WILDLIFE **RareFind**

Query Summary:
Quad IS (Brentwood (3712186) OR Antioch North (3812117) OR Antioch South (3712187) OR Bouldin Island (3812115) OR Jersey Island (3812116) OR Woodward Island (3712185) OR Tassajara (3712177) OR Byron Hot Springs (3712176) OR Clifton Court Forebay (3712175))
AND Federal Listing Status IS (Endangered OR Threatened OR Proposed Endangered OR Proposed Threatened OR Candidate) OR State Listing Status IS (Endangered OR Threatened OR Candidate Endangered OR Candidate Threatened)

Print Close

CNDDB Element Query Results

Scientific Name	Common Name	Taxonomic Group	Element Code	Total Occs	Returned Occs	Federal Status	State Status	Global Rank	State Rank	CA Rare Plant Rank	Other Status	Habitats
Acipenser medirostris pop. 1	green sturgeon - southern DPS	Fish	AFCAA01031	14	2	Threatened	None	G2T1	S1	null	AFS_VU-Vulnerable, IUCN_EN-Endangered	Aquatic, Estuary, Marine bay, Sacramento/San Joaquin flowing waters
Agelaius tricolor	tricolored blackbird	Birds	ABPBXB0020	955	11	None	Threatened	G1G2	S2	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_EN-Endangered, USFWS_BCC-Birds of Conservation Concern	Freshwater marsh, Marsh & swamp, Swamp, Wetland
Ambystoma californiense pop. 1	California tiger salamander - central California DPS	Amphibians	AAAAA01181	1271	213	Threatened	Threatened	G2G3T3	S3	null	CDFW_WL-Watch List, IUCN_VU-Vulnerable	Cismontane woodland, Meadow & seep, Riparian woodland, Valley & foothill grassland, Vernal pool, Wetland
Amsinckia grandiflora	large-flowered fiddleneck	Dicots	PDBOR01050	9	4	Endangered	Endangered	G1	S1	1B.1	SB_UCBG-UC Botanical Garden at Berkeley	Cismontane woodland, Valley & foothill grassland
Apodemia mormo langei	Lange's metalmark butterfly	Insects	IILEPH7012	1	1	Endangered	None	G5T1	S1	null	null	Interior dunes
Bombus crotchii	Crotch bumble bee	Insects	IIHYM24480	437	1	None	Candidate Endangered	G2	S2	null	IUCN_EN-Endangered	null
Bombus occidentalis	western bumble bee	Insects	IIHYM24252	306	4	None	Candidate Endangered	G3	S1	null	IUCN_VU-Vulnerable, USFS_S-Sensitive	null
Branchinecta conservatio	Conservancy fairy shrimp	Crustaceans	ICBRA03010	53	1	Endangered	None	G2	S2	null	IUCN_EN-Endangered	Valley & foothill grassland, Vernal pool, Wetland
Branchinecta longiantenna	longhorn fairy shrimp	Crustaceans	ICBRA03020	23	5	Endangered	None	G1	S2	null	IUCN_EN-Endangered	Valley & foothill grassland, Vernal pool, Wetland
Branchinecta lynchi	vernal pool fairy shrimp	Crustaceans	ICBRA03030	796	21	Threatened	None	G3	S3	null	IUCN_VU-Vulnerable	Valley & foothill grassland, Vernal pool, Wetland
Buteo swainsoni	Swainson's hawk	Birds	ABNKC19070	2561	71	None	Threatened	G5	S4	null	BLM_S-Sensitive, IUCN_LC-Least Concern	Great Basin grassland, Riparian forest, Riparian woodland, Valley & foothill grassland
Chloropyron molle ssp. molle	soft salty bird's-beak	Dicots	PDSCR0J0D2	27	1	Endangered	Rare	G2T1	S1	1B.2	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Marsh & swamp, Salt marsh, Wetland
Eryngium racemosum	Delta button-celery	Dicots	PDAPI0Z0S0	26	1	None	Endangered	G1	S1	1B.1	null	Riparian scrub, Wetland
Erysimum capitatum var. angustatum	Contra Costa wallflower	Dicots	PDBRA16052	4	4	Endangered	Endangered	G5T1	S1	1B.1	SB_CalBG/RSABG-California/Rancho	Interior dunes

											Santa Ana Botanic Garden	
Hypomesus transpacificus	Delta smelt	Fish	AFCHB01040	29	12	Threatened	Endangered	G1	S1	null	AFS_TH-Threatened, IUCN_CR-Critically Endangered	Aquatic, Estuary
Lasthenia conjugens	Contra Costa goldfields	Dicots	PDAST5L040	36	1	Endangered	None	G1	S1	1B.1	SB_UCBG-UC Botanical Garden at Berkeley	Alkali playa, Cismontane woodland, Valley & foothill grassland, Vernal pool, Wetland
Laterallus jamaicensis coturniculus	California black rail	Birds	ABNME03041	303	22	None	Threatened	G3T1	S2	null	BLM_S-Sensitive, CDFW_FP-Fully Protected, IUCN_EN-Endangered	Brackish marsh, Freshwater marsh, Marsh & swamp, Salt marsh, Wetland
Lepidurus packardi	vernal pool tadpole shrimp	Crustaceans	ICBRA10010	330	2	Endangered	None	G4	S3	null	IUCN_EN-Endangered	Valley & foothill grassland, Vernal pool, Wetland
Masticophis lateralis euryxanthus	Alameda whipsnake	Reptiles	ARADB21031	167	18	Threatened	Threatened	G4T2	S2	null	null	Chaparral, Cismontane woodland, Coastal scrub, Valley & foothill grassland
Oenothera deltoides ssp. howellii	Antioch Dunes evening-primrose	Dicots	PDONA0C0B4	10	9	Endangered	Endangered	G5T1	S1	1B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden, SB_UCBG-UC Botanical Garden at Berkeley	Interior dunes
Oncorhynchus mykiss irideus pop. 11	steelhead - Central Valley DPS	Fish	AFCHA0209K	31	2	Threatened	None	G5T2Q	S2	null	AFS_TH-Threatened	Aquatic, Sacramento/San Joaquin flowing waters
Rana boylii pop. 4	foothill yellow-legged frog - central coast DPS	Amphibians	AAABH01054	178	1	Proposed Threatened	Endangered	G3T2	S2	null	BLM_S-Sensitive, USFS_S-Sensitive	Aquatic, Riparian forest, Riparian scrub, Riparian woodland, South coast flowing waters
Rana draytonii	California red-legged frog	Amphibians	AAABH01022	1685	184	Threatened	None	G2G3	S2S3	null	CDFW_SSC-Species of Special Concern, IUCN_VU-Vulnerable	Aquatic, Artificial flowing waters, Artificial standing waters, Freshwater marsh, Marsh & swamp, Riparian forest, Riparian scrub, Riparian woodland, Sacramento/San Joaquin flowing waters, Sacramento/San Joaquin standing waters, South coast flowing waters, South coast standing waters, Wetland
Reithrodontomys raviventris	salt-marsh harvest mouse	Mammals	AMAFF02040	144	7	Endangered	Endangered	G1G2	S1S2	null	CDFW_FP-Fully Protected, IUCN_EN-Endangered	Marsh & swamp, Wetland
Riparia riparia	bank swallow	Birds	ABPAU08010	299	1	None	Threatened	G5	S3	null	BLM_S-Sensitive, IUCN_LC-Least Concern	Riparian scrub, Riparian woodland
Sidalcea keckii	Keck's checkerbloom	Dicots	PDMAL110D0	50	1	Endangered	None	G2	S2	1B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Cismontane woodland, Ultramafic, Valley & foothill grassland
Spirinchus thaleichthys	longfin smelt	Fish	AFCHB03010	46	9	Candidate	Threatened	G5	S1	null	IUCN_LC-Least Concern	Aquatic, Estuary
Thaleichthys pacificus	eulachon	Fish	AFCHB04010	10	1	Threatened	None	G5	S1	null	IUCN_LC-Least Concern	Aquatic, Klamath/North coast flowing waters

Thamnophis gigas	giant gartersnake	Reptiles	ARADB36150	373	11	Threatened	Threatened	G2	S2	null	IUCN_VU-Vulnerable	Marsh & swamp, Riparian scrub, Wetland
Vulpes macrotis mutica	San Joaquin kit fox	Mammals	AMAJA03041	1020	32	Endangered	Threatened	G4T2	S2	null	null	Chenopod scrub, Valley & foothill grassland

Appendix D
Preliminary Arborist Report

Atlas Tree Service, Inc.

September 15, 2022

Arborist Report

Prepared For: Dan Cosgrove
Mercantile Systems, Inc.
9040 Brentwood Blvd.
Brentwood, CA 94513

Location: 2092 Oakley Road
Oakley, Ca. 94561

On September 12, 2022 Atlas Tree Service, Inc. conducted a survey and assessment of the trees on the above referenced property for future development construction. These trees have been tagged with numbered metal disks and assessed using the guide provided in the book "Trees and Development" by Matheny and Clark.

There are a total of 16 living trees on this property: 1 Native and 15 Non-Natives.

The Native tree:

1 *Juglans nigra* (Black Walnut)

The Non-Native trees:

2 *Pinus radiate* (Monterey Pine)
2 *Cinnamomum camphora* (Camphor)
1 *Sabal palmetto* (Cabbage Palmetto Palm)
3 *Morus alba* (Fruitless Mulberry)
1 *Juniperus chinensis* (Hollywood Juniper)
3 *Prunus dulcis* (Almond)
1 *Pinus pinea* (Italian Stone Pine)
1 *Acer saccharinum* (Silver Maple)
1 *Pinus halepensis* (Alleppo Pine)

P.O. Box 23343 · Pleasant Hill, CA 94523 · 925-687-3631 · Fax 925-687-2465 · www.atlastreeservice.com

Observation/Recommendations:

These trees are listed by species, common name, diameter in inches, conditions and suitability for Preservations. Conditions ranges are 1-5 from Severe Decline to Excellent ratings. All the trees that are listed have a condition of 3 or less with poor location and I recommend removing them. Long term wise, I feel the need for these trees to be removed due to poor location and suitability. None of the trees on this property are listed on the Registry of Significant Trees. This property appears to be an old vineyard with two existing residences and out buildings. All of these trees show signs of drought stress and age.

Recommendations:

Two of the Non-Native Pines #756 and #757 can be preserved. All of the other trees will need to be removed due to their location and or poor conditions.

Roots:

During construction it is vital that the roots of trees to be preserved be protected. Roots provide 4 vital functions. They anchor the tree and hold it upright. They absorb water and nutrients and conduct them to the trunk where they are transported throughout the tree. Roots store water and starch for later use. They also synthesize hormones that act as growth regulators and are used to protect the tree from pathogens and at times even animals eating the leaves. Some researchers compare the roots to a brain.

Care should be taken to avoid crushing or tearing roots during grading or trenching. Many species are also negatively impacted by fill over their root zone and may need measures to avoid this damage. This is best accomplished by establishing a Tree Protection Zone or TPZ. This is a fenced area wherein little or no construction activity is allowed.

Preservation Recommendations:

- Provide protective fencing to establish a TPZ as recommended by the Project Arborist. Fencing may be specified by city ordinance.
- There should be no activity within the TPZ without prior approval of Project Arborist.
- As feasible underground utility lines should be routed so as to avoid possible damage to any trees' roots.
- If necessary trenching within the TPZ should be done by hand or pneumatic tools. Roots less than 3" dia. may be cut cleanly. Roots greater than 3" should be preserved.

- If there is to be 1.5' or more of fill over 33%or more of the root zone implement an aeration system approved by the Project Arborist.
- Some trimming may be needed to avoid damage by construction equipment. This work should be done by or under the direction of a Certified Arborist.
- There should be no parking or storing of materials within the TPZ.
- Do not allow concrete washout or dumping of any toxic materials within the TPZ.

By following these recommendations there will be little or no impact to the protected trees.

Tag #	Species	Common Name	Dia. In inches	Condition	Suitability for Preservation
#745	*Pinus radiata*	Monterey Pine	14"	2	Poor/location
#746	*Pinus radiata*	Monterey Pine	14"	2	Poor/location
#747	*Cinnamomum camphora*	Camphor	Multi 10"	3	Poor
#748	*Sabal palmetto*	Cabbage Palmetto Palm	24"	3	Poor
#749	*Cinnamomum camphora*	Camphor	Multi 8"	3	Poor/location
#750	*Morus alba*	Mulberry Fruitless	29"	3	Poor
#751	*Morus alba*	Mulberry Fruitless	27"	3	Poor
#752	*Morus alba*	Mulberry Fruitless	15"	2	Poor
#753	*Juniperus chinensis*	Hollywood Juniper	8"	2	Poor
#754	*Prunus dulcis*	Almond	26"	2	Poor
#755	*Prunus dulcis*	Almond	Multi 6"	2	Poor
#756	*Pinus halepensis*	Alleppo Pine	Multi 12",17"	2	Moderate
#757	*Pinus pinea*	Italian Stone Pine	27"	3	Moderate
#758	*Prunus dulcis*	Almond	16"	1	Poor
#759	*Juglans nigra*	Black Walnut	Multi 8"	1	Poor
#760	*Acer saccharinum*	Silver Maple	Multi 12"	2	Poor

Condition Rate	Overall vigor	Canopy density	Amount of deadwood	History of failure	Pests	Extent of decay
1	Severe decline	<20%	Large;major scaffold branches	More than one scaffold	Infested	Major-conks and cavities
2	Declining	20-60%	Twig and branch dieback	Scaffold branches	Infestation of significant pests	One to a few conks;small cavities
3	Low	60-90%	Small twigs	Small branches	Minor	Present at pruning wounds
4	Good	90-100%	Little or none	None	Minor	Present at pruning wounds
5	Excellent	100%	None	None	None,or insignificant	Absent

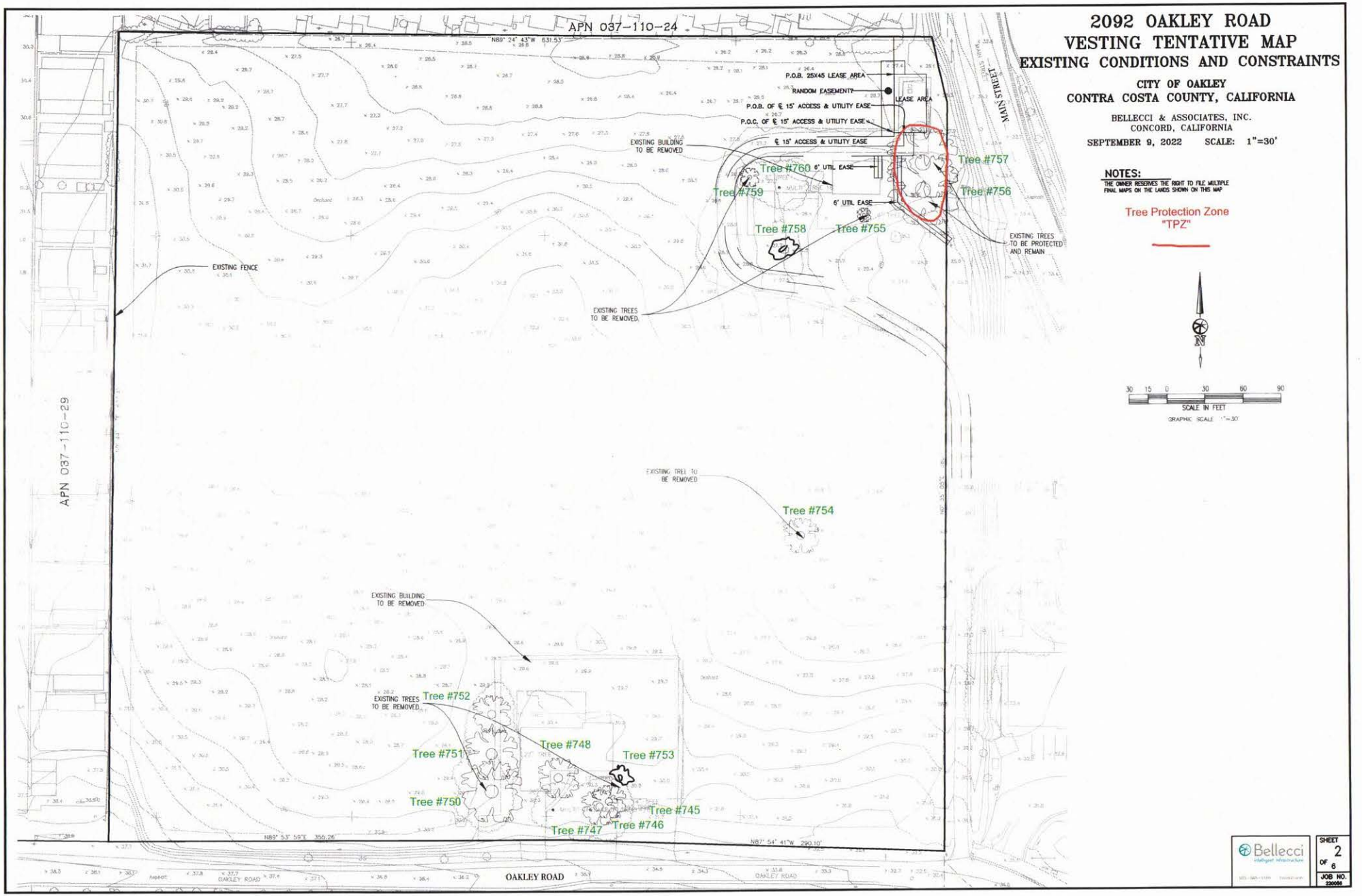
If you have any questions you can reach me at my office (925) 687-3631.

Respectfully Submitted,

Jarred Juarez

Jarred Juarez
Certified Arborist
WE-13341A

JJ:prj



2092 OAKLEY ROAD
VESTING TENTATIVE MAP
EXISTING CONDITIONS AND CONSTRAINTS

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

SEPTEMBER 9, 2022 **SCALE: 1"=30'**

NOTES:
THE OWNER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS ON THE LANDS SHOWN ON THIS MAP

Tree Protection Zone
"TPZ"

N

30 15 0 30 60 90
SCALE IN FEET
GRAPHIC SCALE 1"=30'

Bellecci
intelligent infrastructure

SHEET 2 OF 6
JOB NO. 220056

Appendix E
Historic Evaluation

September 28, 2023

Rod Stinson
Raney Planning and Management, Inc.
1501 Sports Drive, Suite A
Sacramento, CA 95834

Re: The Results of an Historical Evaluation of the Property at 2092 Oakley Road, Oakley, Contra Costa County

Dear Mr. Stinson

Enclosed are the appropriate DPR523 forms which document our research and findings of our historical evaluation of the property 2092 Oakley Road, Oakley. In short, the property is a good example of a small farm/vineyard in the Oakley area that has been used for over 100 years. The property meets Criterion 1 for its association with the viticulture industry in Contra Costa County and the 1936 house meets Criterion 3 as a good example of a Depression-era small, farmhouse. However, the integrity aspects of the property and its surroundings have degraded to the point that it no longer qualifies for inclusion on the California Register of Historic Resources and the property may be released for development.

Please contact us if you have questions.

Sincerely,

Eileen Barrow

Eileen Barrow
Senior Associate

PRIMARY RECORD

Primary #:
HRI #:
Trinomial:
Other Listings:
NRHP Status Code:
Review Code: **Reviewer:** **Date:** **Resource Name or #:** 2092 Oakley Road

P1. Other Identifier:

P2. Location: Unrestricted **a. County:** Contra Costa

b. USGS 7.5' Quad: Brentwood **Date:** 1978

T 2 **N/R** 2 **E**; SE **1/4 of** SE **1/4 of Sec.**; 22 **MDBM** (measured from the NW section corner)

c. Address: 2092 Oakley Road **City:** Oakley **Zip:** 94561

d. UTM: Zone: 10 611202**mE** 4206445**mN** (NAD 83)

e. Other Locational Information: From the center of Oakley, take Highway 4 (Main Street) west for one mile. The property is at the northwest corner of the intersection of Highway 4, Empire Avenue, and Oakley Road.

P3a. Description: The property contains two single-family houses, an outbuilding, and a vineyard. One of the houses was constructed in 1936 and is the subject of this evaluation. The other house was constructed in 1967 and was not considered eligible for inclusion on the California Register of Historic Resources.

The house is a single-story, wood-framed building on a simple rectangular plan. The roof is front-gabled with composite shingles. The cladding is wood and appears to be drop siding with a false bevel. There are no additions to the building.

The façade is asymmetrical with an inset porch on the northeast corner with a gable-roofed extension protruding from the inset. A waist-high wall which encloses the porch is clad in the same siding as the house and the supports are simple posts. There is a small, decorative vent at the apex of the gable. Description continued on Continuation Sheet, page 2.

P3b. Resource Attributes: HP2. Single Family Property; HP4. Ancillary Building; HP33. Farm

P4. Resources Present: Buildings

P5. Photograph or Drawing: **P5b. Description of Photo:** View of the front of the house, facing west.

P6. Date Constructed/Age and Sources:
1936

P7. Owner and Address:
John Dambrosio
3130 Balfour Road #269
Brentwood, CA 94513

P8. Recorded by:
Eileen Barrow
Tom Origer & Associates
P.O. Box 1531
Rohnert Park, CA 94927

P9. Date Recorded:
September 2023

P10. Type of Survey:
Intensive

P11. Report Citation:
None

P12. Attachments: Continuation Sheet (13), Building, Structure, and Object Record, Location Map

P3a. Description: (continued from Primary Sheet)

Windows throughout the building have been updated to vinyl.

Behind the house is a small gabled shed with an attached shed-roofed double-bay carport.

Most of the property is planted with vineyard.

There is another house on the property constructed in 1967 that is not considered potentially important, as well as a cell tower that resembles a water tower.

View of house facing northwest.

View of shed and carport facing northwest.

B1. Historic Name: None

B2. Common Name: None

B3. Original Use: Residence

B4. Present Use: Residence

B5. Architectural Style: Vernacular

B6. Construction History: Review of archival evidence showed that the house was constructed in 1936 by Ben Romiti, the then property owner (Romiti 2010).

B7. Moved? No **Date:** NA **Original Location:** NA

B8. Related Features: See the description on the Primary Record and Continuation Sheets (pages 1-3).

B9a. Architect: None

B9b. Builder: Ben Romiti (see Continuation Sheets [pages 8 and 9]).

B10. Significance: **Theme:** Contra Costa County Agriculture - Viticulture **Area:** Oakley, Contra Costa County
Period of Significance: 1936-1973
Property Type: Farm
Applicable Criteria: Criterion 1 and Criterion 3
Context Statement (see Continuation Sheet 15 through 21)

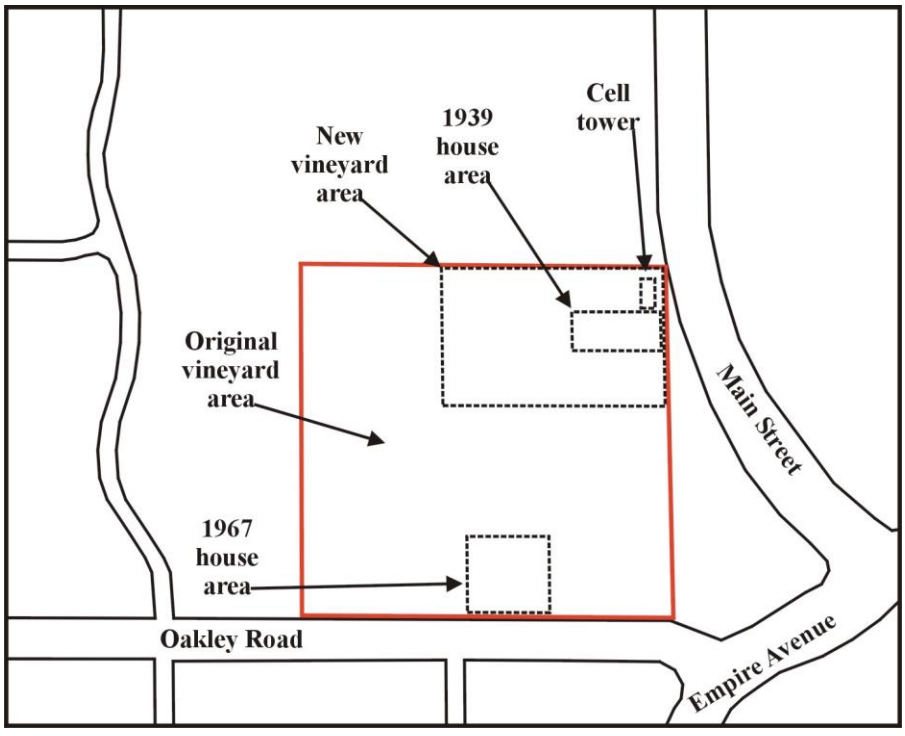
B11. Additional Resource Attributes:

B12. References:
See Continuation Sheets pages 13 through 15.

B13. Remarks:

B14. Evaluator: E. Barrow
Date of Evaluation: September 2023

North ⇑



Historical Context Statement

Oakley lies in eastern Contra Costa County, not far from the Sacramento-San Joaquin Delta. The environs of present-day Oakley are shown on the 1871 county map (Figure 1), where the future Oakley townsite is shown as a square and the study location as a circle. Extensive delta marshlands are also shown, though much of the marsh was reclaimed later in the century.

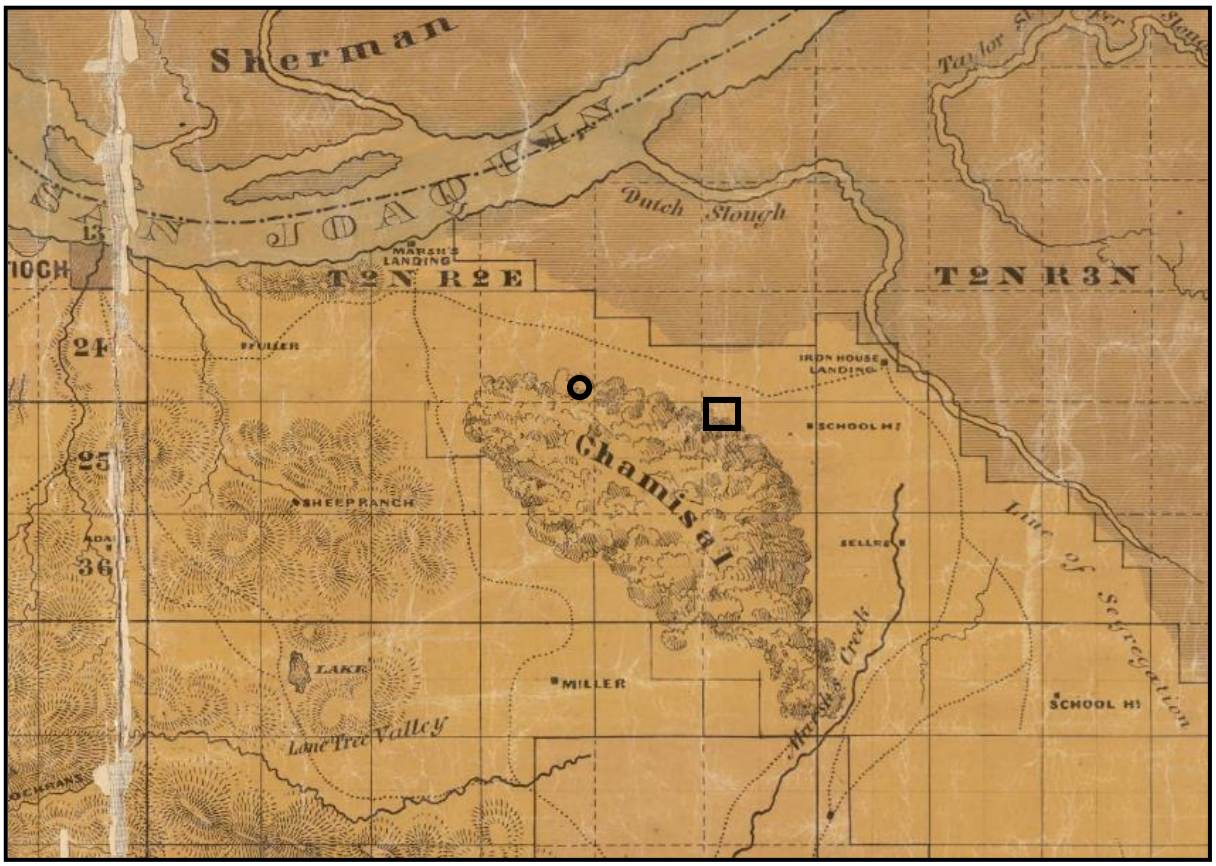


Figure 1. Map of eastern Contra Costa County, 1871 (Contra Costa County Board of Supervisors 1871)

The first permanent, non-native settler in this area was John Marsh, who purchased the Los Meganos land grant in 1837 and moved on to the land in 1838. He also established a landing on the San Joaquin River (US District Court 1861). Over time, Marsh acquired more than 50,000 acres but his holdings were reduced to the original grant of 13,316 acres by the State Lands Commission in the 1850s.

Historical maps filed with the 1852 land grant case in which Marsh's ownership was challenged show that Marsh had a pier, a house, and two other buildings (Whitcher 1853a, 1853b) (see Figure 2). Reports that he also had a slaughterhouse and smokehouse at the landing are consistent with the expansive cattle enterprise he developed.

An article appearing in the *California Farmer and Journal of Useful Sciences* (1856) described Marsh's ranch, which by this time was situated some eight miles south of the landing:

> Between the grove and the house is a vineyard filled with young und thrifty vines of the finest varieties of grapes, together with fig, almond, apple, pear and plum trees. In rear of the adobe is another extensive vineyard. The two vineyards will probably yield this year twenty tons of grapes. Though much of the Rancho is admirably adapted to cultivation, its proprietor has preferred to devote it to the purpose of raising cattle. The stock of cattle at present upon the place is six thousand, and the annual increase is estimated at fifteen hundred.

Figure 2. Portions of maps filed with the Meganos land grant case (Whitcher 1953a, 1953b).

Marsh was murdered just a month after the article appeared. His estate went to his son, Charles, and daughter, Alice.

The 1850 Census data for Contra Costa County was lost en route to the Census Bureau, and while the California census of 1852 substitutes for the population census, agriculture and industry data are not available. Agricultural data for subsequent decades show that in eastern Contra Costa County, the initial focus was on ranged animals with limited production of grain, butter, and wool (United States Bureau of the Census 1860). Ten years later, the census shows a shift toward more grain production. For example, James O'Hara, who at one time owned much of the surrounding Oakley land, reported owning just two horses but had produced 2,000 bushels of winter wheat and 500 bushels of barley (United States Bureau of Census [USBC] 1870). Limited orchard products and wine were also reported in 1870, and by 1880, many reported growing apple orchards and vineyards (USBC 1880).

This shift was not a localized trend, as discussed by Olmstead and Rhode (2003) Their data show that in 1879, over 75 percent of California's croplands produced wheat and barley while fruit, nuts, vegetables, and cotton were grown on about five percent. However, "Between 1890 and 1914, the California farm economy fundamentally and swiftly shifted from large-scale ranching and grain-growing operations to smaller-scale, intensive fruit cultivation" Olmstead and Rhode (2003:3).

In the Oakley area, where farmers were ridiculed as "sandlappers" for attempting to cultivate the deep Oakley sand, the introduction of vineyards and fruit and nut orchards was slow but had a lasting influence on the area's economy. James O'Hara is credited with first planting almond and fruit trees in the Oakley area (Munro-Fraser 1926:172). O'Hara was an early settler in the Oakley area and owned quite a bit of land that was originally railroad grant land.

The town itself was not founded until after the turn of the century. Randolph Marsh wrote in 1916, "Shortly after this [1897] I got a line on the Haven nineteen-acre lot across the road in section 25. Associating N. A. Norcross with myself, we purchased that property, platted and recorded it-and Oakley was on the map" (Marsh 1917:401). In 1901, Marsh and Norcross recorded a plat map of the town where lots were laid out on a 10-block grid (Contra Costa County Recorder 1901). Lands donated to the San Francisco and San Joaquin Valley Railway cut through Block 10 at the northeast end of the map.

The *Antioch Ledger* (1914) declared "The almond is king in Eastern Contra Costa County" as it reported that another 100 acres of almonds had been planted near Oakley, and by 1916, advertisements touted Oakley as the "home of fruits, grapes, and almonds" (*Byron Times* 1916, cited in Stanford, *et al.* 2011).

Theme - Contra Costa County Viticulture

Especially germane to this study is viticulture. The beginning of viticulture in California dates to the Spanish and Mexican mission period with the first vineyards planted for use in making sacramental wine. Later, wine for general consumption was also being produced by the missions using grapes that became commonly known as "Mission grapes." The mission grapes grew well, but generally resulted in wines notable only for their blandness (although those from the northern missions were more highly regarded).

As settlement spread throughout California, so too did the cultivation of grapes for wine and for the table. French winemaker Jean-Louis Vignes imported vines from Bordeaux in 1833, establishing the El Aliso vineyard and winery in what is now downtown Los Angeles. Vignes is considered by many to be the founder of California's wine industry. In Napa County, George Yount is credited with planting the first grapes in the Napa Valley in 1838. His vines came from cuttings taken from Vallejo's vineyard in Sonoma County, where General Mariano Vallejo continued cultivation of the Sonoma Mission vineyards after secularization in 1834.

Southern California was the first notable grape-growing and wine-making region in California, but by the late 1870s, Sonoma and Napa counties outpaced the south as Italian immigrants brought their expertise to the region. The 1880s witnessed many acres of land planted with vineyards that were previously used for orchards and dairy lands. Data regarding the growth of vineyards and wine production in Northern California were presented by Thomas Pinney (1989) in his book on the history of American winemaking. Using figures from the California State Board of Agriculture, Pinney shows that from 1860 to 1890, "…Los Angeles's share of the state's total [gallons of wine] sank from nearly two-thirds to less than a tenth; in the same span the Bay Area counties saw their share rise from little more than a tenth to near two-thirds, an almost symmetrical exchange" (Pinney 1989:311). Of Contra Costa County, Pinney (1989: 259) writes that "Dr. John Marsh had a small vineyard in 1846, from which he made wine. Besides Mission vines he had Isabella and Catawba."

During the 1850s, phylloxera, an aphid-like insect, attacked vineyards in both Europe and California. Northern California was not affected until later in the century, with the insect reaching Contra Costa County between 1880 and 1890 (Contra Costa County Agriculture and Weights & Measures 2012). Up until that time, vines were planted using their own roots but phylloxera forced many growers to replant their vineyards, grafting the desirable European grape vines onto the more resistant American rootstock. Most grape vines planted today are grafted.

In 1920, another blow was struck to the California wine industry when the United States Congress passed the 18th Amendment to the Constitution which forbade the manufacture, sale, or transportation of intoxicating liquors. While many states had already enacted statewide sanctions, the federal government's actions virtually ended all wine production, except for the few winemakers who were able to obtain permits to make wines used for medicinal and sacramental purposes.

Ironically, while wine production plummeted, the state saw a dramatic increase in the number of acres planted with grapes. State records show that in 1920, there were 410,000 acres of grapes growing statewide: in 1930, there were 570,000 acres of grapes with only 200,000 of those being wine grapes (Peninou 1998:264). Grape growers switched from premium wine grapes to grapes that traveled better as Prohibition created a new demand for these grapes in the East.

> California grape growers planted hearty, thick-skinned grapes that could be shipped easily and used for small-scale and home wine making. Much of the California wine-grape crop was shipped to Chicago and New York in newly developed refrigerated boxcars. The grapes were bought right off the train by wholesalers, who resold them in immigrant neighborhoods. The home-made wine was then distributed to smaller cities and towns, where it was sometimes called "dago red" [Muscatine, Amerine, and Thompson 1984].

Prohibition lasted until 1933, disrupting not only the legal production of wine but also having a far-reaching effect on consumers. Pinney (1989:442) describes the daunting task vintners faced after 1933:

> The immediate question for the winemakers looking over the desolate scene left behind by the Dry years was to educate the American public in the renewed use of wine. If they were older Americans, they had forgotten what the civilized use of wine was; if they were younger, they had never known. …a hard and bitter labor faced the American winegrowers: their vineyards were debased, their wineries decayed, their markets confused by arbitrary and unpredictable barriers, and their public ill-instructed and corrupted by the habits of a hard-drinking bootleg style.

To those factors affecting California's wine industry, add the depressed economy of the 1930s and the onset of World War II. Before Prohibition, California had more than 700 bonded wineries. That number dropped to 140 by 1933 and in 1960, nearly 30 years after the repeal of Prohibition, the number of wineries was just 271 (Peninou 1998:264). It took another 25 years (in the mid-1980s) before the number of wineries reached pre-Prohibition levels.

Though Napa and Sonoma County have become famous for their wines, there was still an importance for grapes grown in the surrounding counties to support their industry. Author, Frederick J. Hulaniski wrote in 1917, "The vineyards of Contra Costa County have become famous the world over. The soil and climatic conditions are peculiarly favorable to the successful growing of dry-wine grapes, out of which has emerged a great industry. Vineyards have quadrupled in twenty years, the acreage increasing from 1500 to over 6000" (Hulaniski 1917:91). Indeed, the sand hills of eastern Contra Costa County proved to be valuable vineyard lands as growers adopted a dry-root method for their vines where the deep, well-drained sands allowed roots to spread, readily. The lack of moisture resulted in "vines [producing] small, concentrated berries with thick skins. This, in turn, leads to concentrated wines with firm tannins and excellent structure" (Wine-searcher 2023). Growing in sand was also beneficial during the phylloxera infestation. An article published in Scientific American in 1882 discussed the benefits of sandy soil in fighting the disease (Scientific American 1882), and other studies concurred over the years:

> The soil and the climate may also affect the resistance by favoring or hindering the approach, dissemination, or activity of the insect. For instance, sand of a certain fineness is an obstacle to the insect in going from the surface of the ground to the root of the vines and from one vine to another [Husmann 1910:15].
>
> Planting grapes on phylloxera-resistant rootstocks or *where soil is sandy* are the only completely effective methods for controlling grape phylloxera" [emphasis added] [University of California Agriculture and Natural Resources 2022].

During the Depression, many Contra Costa County growers moved on to other crops, but there were several Oakley growers of Italian descent who maintained their vineyards. The Romiti family was among the hardy few who stayed.

Architectural Context – Vernacular

Though vernacular architecture is difficult to define because this term can be all-encompassing, this is typically defined as a simple construct of building that can be specific to a region, period, or culture. Vernacular buildings are not designed by architects but rely on the use of local, historical, or cultural knowledge to construct buildings. Later in time when catalogs became available, people would model buildings after those seen if they did not order kits. Originally, the term "vernacular" was used by colonialists to describe the local buildings of the colonies, but more recently in the United States, it is used as a term that incorporates several types of modest, simple, buildings that were constructed without the design of an architect. Because the definition of vernacular architecture is so broad, it has been argued that the definitions that exist are "non-definitions" and some have even said that vernacular buildings are not architecture (Pevsner 1963:15; Upton and Vlach 2002:xv).

Vernacular houses are of simple design and are constructed with inexpensive materials. The buildings are primarily utilitarian but may have some decorative elements. Vernacular buildings often incorporate local environmental knowledge to make the buildings more comfortable to live in depending on the types of elements. For example, in places where the climate is warm, houses often had summer kitchens constructed near the rear of the building so that cooking wouldn't warm the house when temperatures were high.

Property History

Guiseppi (Joe) Romiti emigrated from Italy in 1902 and Clementina Frediani arrived in 1903 (Ancestry.com 1903, 1909). Both settled in Jackson, California, where they married in 1905 (Ancestry.com 1905). The Romitis helped run a family boarding house and while in Jackson, they had three daughters. In 1911, the Romitis left Jackson and purchased the property at 530 O'Hara Avenue in Oakley, where they raised almonds (Romiti 2010). In Oakley, they added four boys to their family. In addition to the 10 acres on O'Hara Avenue, the Romitis purchased 30 more acres of almond trees across the street to the west. When the Romitis moved to Oakley, family from Jackson followed and those relatives owned businesses such as the Oakley Hotel and the Del Porto Garage. The Romitis were known as a generous family which is evidenced by their donation of six of the 30-acres of almonds to the city to construct a school and their donation of the property at 530 O'Hara Avenue for the construction of a new fire station many years later (Romiti 2010).

Joe died in 1921. Though this left Clementina alone with the children ranging in age from 13 years old to six months, she had the support and help of friends and family. Clementina and her children maintained the almond orchards on O'Hara Avenue. Clementina stayed at the O'Hara Avenue property until her death in 1955.

In 1930, the Romitis' son Ben purchased a 10-acre parcel at 2092 Oakley Road for $4,000. The property was already planted with grape vines when Ben bought the property (Brinkley 2018). The exact age of the vineyard is unknown but is estimated to be about 140 years. Based on an aerial photo from 1939, there appears to be part of an orchard on the property as well, as a 2.5-acre area in the northeast corner of the property surrounding the house has different vegetation suggesting larger plants (see Figure 3).

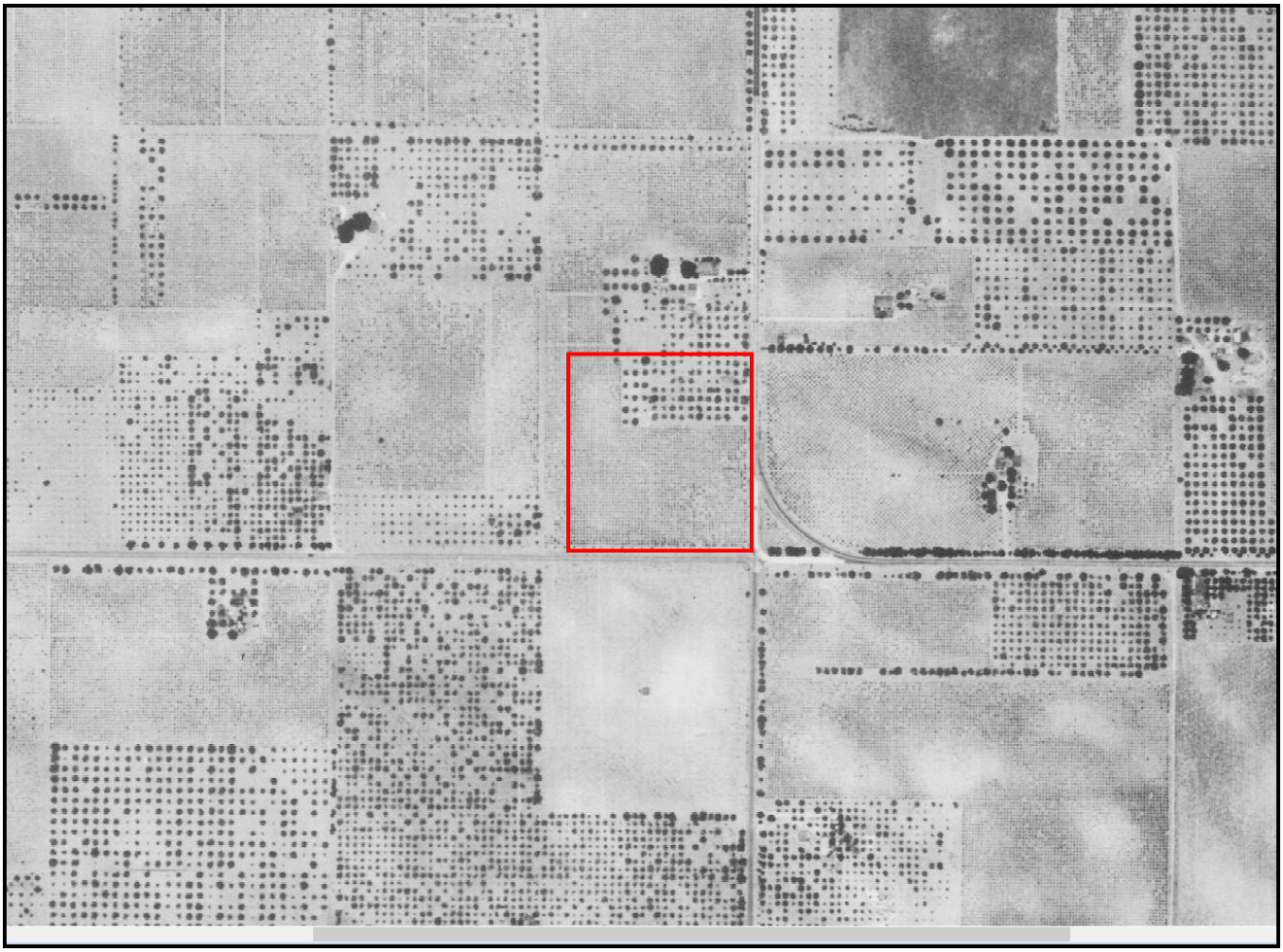


Figure 3. View of the subject property (UCSB 1939).

The Romiti vineyard is typical of the old Oakley vineyards planted on their own roots and head trained. The sand in which they are planted is resistant to phylloxera making grafted vines unnecessary. Oakley growers take pride in their own-rooted, head-trained vines. Head-trained vines are plants where the "branches" of the vines are trained out from the main trunk.

The house on the property at 2092 Oakley Road was built in 1936 by Ben Romiti. Ben's niece, Marlene, quoted Ben as saying, "If you live in Oakley why would you want to live at any other place?" (Romiti 2010). Ben farmed the 10-acre property until his death at 95 in 2007. In addition to farming the property, Ben worked for 26 years for Contra Costa County Public Works (Legacy.com 2007). The property passed to Ben's sons, Frank and Bernard, who decided that they did not want to continue farming the land and they sold the property in 2019.

Statement of Significance
This complex was evaluated for inclusion on the California Register of Historical Resources (California Register). Briefly, a resource eligible for the California Register is one that meets one of the following criteria.

1. Is associated with events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States.

2. Is associated with the lives of persons important to local, California, or national history.

3. Embodies the distinctive characteristics of a type, period, region or method of construction, or represents the work of a master, or possesses high artistic values.

4. Has yielded, or may be likely to yield, information important to the prehistory or history of the local area, California, or the nation.

In addition to meeting one or more of the above criteria, eligibility for both the California Register requires that a resource retains sufficient integrity to convey a sense of its significance or importance. Seven elements are considered key in considering a property's integrity: location, design, setting, materials, workmanship, feeling, and association.

The context used for this property was Contra Costa County Agriculture - Viticulture. The following conclusions were reached regarding the property's eligibility for the California Register as an individual resource.

Criterion 1. The property at 2092 Oakley Road is associated with the most important aspect of Contra Costa County's economy, agriculture. Viticulture played a major role in the county's agricultural development. To meet Criterion 1, the property at 2092 Oakley Road would need to be an exemplary model of a resource type related to viticulture. The Romiti family grew wine grapes for nearly 100 years. The vineyard on the property predates the ownership period of the Romitis and is still present to this day. Given the longevity and endurance of the vineyard, it is our opinion that the vineyard is exemplary of a small vineyard in Contra Costa County; therefore, Criterion 1 is met.

Criterion 2. The property at 2092 Oakley Road is best associated with Ben Romiti, who owned and farmed the property for over 60 years. Ben Romiti was a locally notable person, as were many of his family members. Though he was well known and well respected, archival research did not show that Ben was a particularly significant individual on his own merits; rather it was the sum of the Romiti family's contributions that made an impact on the Oakley community. Because of this, it is our opinion that Criterion 2 is not met.

Criterion 3. Criterion 3 speaks to the architectural significance of a property. It appears that the house on the property was constructed in 1936 by Ben Romiti. Ben also had built the house on the property that was constructed in 1967, which is not viewed as an important building. The original house is a simple vernacular building that is indicative of a small, mid-Depression era house in a farming community. There have been few changes to the building (such as additions) and the biggest change has been the replacement of the original windows. It is our opinion that the original house is a good example of a simple Great Depression-era farmhouse in the Oakley vicinity; therefore, Criterion 3 is met.

Criterion 4. This property does not meet Criterion 4. Criterion 4 generally applies to archaeological resources or resources that, through the study of construction details, can provide information that cannot be obtained in other ways. The house and outbuilding possess no intrinsic qualities that could answer questions or provide important information about our history.

Integrity
As the property meets Criterion 1 for its association with the viticulture industry in Contra Costa County and the house meets Criteria 3 as an example of a simple, vernacular, Depression-era house. Our discussion will now turn to the integrity of the property.

Location. The property retains the integrity of location as the house has not been moved and the vineyards are in place as they were over a hundred years ago. The property retains the integrity of location.

Design. Though the property was not designed per se, it did have a layout which has been altered. Review of the 1939 aerial photo (see Figure 3) showed that during the early part of the Romiti ownership, there was a 2.5-acre area of the parcel that was comprised of an orchard and the Romiti house, with the remaining 6.5 acres comprising the old vineyard. In 1967, 0.5 acres of old vineyard was removed to construct the house at the southern end of the property. Based on review of more recent aerial photos, the orchard suffered from neglect and between 1993 and 2002, it was removed and replaced with new grape vines (GoogleEarth 1993 and 2002). In addition, a cell tower designed as a faux water tank sits in the northeast corner of the property. To summarize, the original orchard has been removed and replaced with new grape vines, a half-acre of the original grape vines was removed to construct a single-family house, and a cell tower was added to the northeast corner of the property.

Setting. The house that was constructed in 1967 required the removal of a half-acre of grape vines (approx. 8% of the property). Though not a significant amount of area, it not only removed the grapes but imposed a new feature on the landscape. The original orchard was removed, which in and of itself is not a horrible change, but new grapes were added creating again altering the landscape. Finally, the faux water tower was added at the northeast corner of the property. The setting of the property has been compromised.

In addition, the setting of the surrounding properties has drastically changed. An aerial photo taken in 1939 shows that the subject property as well as the surrounding parcels were all agricultural properties (see Figure 3). The following aerial photo taken in 2021 shows the property is surrounded by residential and commercial development, with the exception of the parcel directly to the south which is comprised of agricultural land (see Figure 4). In addition, Oakley Road and Main Street are no longer small, two-lane roads, but have been widened into four-lane thoroughfares.

This property's integrity of setting is greatly diminished due to the changes within and surrounding the parcel.

Materials. The house still largely retains its materials as the siding appears to be original and there are no additions. The major exception is the replacement of the windows from wood-framed to vinyl. Because this is the only change to the house, it is our opinion that the building largely retains the integrity of materials.

Workmanship. This aspect of integrity is the "physical evidence of the crafts of a particular culture or people during any given period in history." As Ben Romiti was not known as a craftsman, and the house is a simple vernacular building, it does not have any workmanship to express. Therefore, this is not an applicable integrity consideration for this property.

Feeling. Though most of the vineyard is intact as is the original house, this property no longer retains the integrity of feeling. Between the intrusions of the newer house and cell tower on the property, and the roar of the busy streets and the commercial and residential developments that nearly completely envelope this property, it no longer retains the feeling of a small farm in the Oakley vicinity. Because of the surrounding development, including the widening of Oakley Road and Main Street, this property no longer retains the integrity of feeling.

Figure 4. View of the subject property (GoogleEarth 2021).

Association. This integrity consideration mostly applies to the property's eligibility for inclusion under Criterion 1 for its association with the important event of viticulture in Contra Costa County. The property retains the original 100+ year old grape vines and the original house built by Ben Romiti in 1936. These features must convey the important historical theme of viticulture for it to have the integrity of association. Though most people think of the vast lands and palatial wineries of Napa and Sonoma counties when considering vineyards and the wine industry, the industry was very different nearly 100 years ago when the Romitis purchased this property. The house, though small and simple, is a good example of its time and the vineyards are still present. Because of this, it is our opinion that the property retains the integrity of association.

A property cannot simply meet the necessary criteria for inclusion on the California Register, it must also retain sufficient integrity to convey its significance. Though the property retains integrity of location, materials, and association, it does not retain integrity of design, setting, or feeling (the integrity element of workmanship does not apply). Typically for a property to retain sufficient integrity to be listed on the California it should retain most if not all of the integrity considerations. Though the property retains its integrity of association, which is an important integrity consideration for a property to be listed under Criterion 1, the degradation of the element of setting and the changes that took place on the property itself to affect the element of design precludes this property from retaining sufficient integrity to convey its importance. Therefore, it is our opinion that this property does not retain sufficient integrity to be listed on the California Register.

Conclusion

Research and field examination of the property at 2092 Oakley Road has shown that there are no features or buildings on the property that are eligible for inclusion on the California Register as the property no longer retains the integrity of design, setting, and feeling necessary to reflect a small agricultural property in the Oakley vicinity.

References.

Ancestry.com
1903 Arriving Passenger and Crew Lists, New York, Clementina Frediani, August 1903. Available online at https://www.ancestry.com/

1905 California, Amador County Marriage Record for Guiseppe Romiti and Clementina Frediani. Available online at https://www.ancestry.com/

1909 California Naturalization Records for Giuseppe Romiti. Available online at https://www.ancestry.com/

Antioch Ledger
1914 The Almond Orchards. *Antioch Ledger*, 7 February 1914.

Brinkely, L.
2018 Vineyard bought for $4,000 up for sale in Oakley for $5M. Interview available online at erhttps://abc7news.com/oakley-vineyard-vinyard-for-sale-in-romiti-family/3252543/.

Byron Times
1916 Oakley - home of fruits, grapes, and almonds. Fifth Booster Edition.

California Department of Transportation
2007 *A Historical Context and Archaeological Research Design for Agricultural Properties in California*. Division of Environmental Analysis, California Department of Transportation, Sacramento, California.

California Farmer and Journal of Useful Sciences
1856 A California Home. *California Farmer and Journal of Useful Sciences,* 15 August 1856.

Contra Costa County Agriculture and Weights & Measures
2012 *Contra Costa County Agriculture and Weights & Measures Newsletter*. Summer 2012. Concord, California.

Contra Costa County Board of Supervisors
1871 Topographical Map of Contra Costa County. Britton & Rey, San Francisco. Available online at https://digitallibrary.californiahistoricalsociety.org/islandora/object/islandora%3A1528.

Contra Costa County Recorder
1901 Map A of the Town of Oakley.

Contra Costa Winegrowers Association
2023 History. Available online at https://ccwinegrowers.com/history/.

Emanuels, G.
1986 *California's Contra Costa County: An Illustrated History*. Panorama West Books. Fresno, California.

GoogleEarth
1993 Aerial view of the property at 2092 Oakley Road, Oakley, California. Accessed via the GoogleEarth Pro Application on August 24, 2023.

2002 Aerial view of the property at 2092 Oakley Road, Oakley, California. Accessed via the GoogleEarth Pro Application on August 24, 2023.

Grimmer, A.
2017 *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings.* National Park Service, Washington, D.C.

Hulaniski, F. (Editor)
1917 *The History of Contra Costa County*. The Elms Publishing, Berkeley.

Husmann, G.
1910 *Grape Investigations in the Vinifera Regions of the United States with Reference to Resistant Stocks, Direct Producers, and Viniferas.* Bureau of Plant Industry Bulletin 172, United States Department of Agriculture, Washington, DC.

Kukulich, T.
2018 Historic Oakley vineyard up for sale. *The Press Hometown News,* 12 April 2018. Available online at https://www.thepress.net/news/historic-oakley-vineyard-up-for-sale/article_2c2e5c9e-3e7d-11e8 -aca4-f3d1a7c04eae.html

Legacy.com
2007 Ben S. Romiti. Accessed from https://www.legacy.com/us/obituaries/eastbaytimes/name/ben-romiti-obituary?id=24545055 on August 24, 2023.

Lyman, G.
1930 *John Marsh, Pioneer: The Life Story of a Trail-Blazer on Six Frontiers*. Scribner, New York.

Marsh, R.
1917 Oakley and Sand Lands. In *The History of Contra Costa County,* edited by F. Hulaniski, pp. 399-403.

McAlester, V. and L. McAlester
1988 *A Field Guide to American Houses*. Alfred A. Knopf. New York.

Munro-Fraser, J.
1926 *History of Contra Costa County, California.* Historic Record Company, Los Angelos.

Muscatine, D., M. Amerine, B. Thompson
1984 *The University of California/Sotheby Book of California Wine*. University of California Press, Berkeley.

National Park Service
1997 *How to Apply the National Register Criteria for Evaluation.* National Register Bulletin 15. <https://www.nps.gov/nr/publications/bulletins/nrb15/>

Office of Historic Preservation (OHP)
1995 *Instructions for Recording Historical Resources.* California Office of Historic Preservation, Sacramento.

Olmstead, A. and P. Rhode
2003 The Evolution of California Agriculture 1850-2000. In *California Agriculture: Dimensions and Issues*, edited by J. Siebert, pp. 1-28. University of California Giannini Foundation of Agricultural Economics, Division of Agriculture and Natural Resources.

Peninou, E.
1998 *History of the Sonoma Viticulture District*. Nomis Press, Santa Rosa.

Pevsner, N.
1963 *An Outline of European Architecture.* Penguin Books. London.

Pinney, T.
1989 *A History of Wine in America From the Beginnings To Prohibition.* University of California Press, Berkeley.

Romiti, M.
2010 Fire Station Groundbreaking at 530 O'Hara. Accessed from

Scientific American
1882 Resistance of Grape Vines to Phylloxera in Sandy Soil. *Scientific American.* Volume 13, Supplemental Issue 319.

Smith & Elliott
1879 *Illustrations of Contra Costa Co., California: with Historical Sketch.* Smith & Elliott. Oakland.

Stanford, B., Grossinger R., Askevold R., Whipple A., Leidy R., Beller E., Salomon M., Striplen C.
2011 *East Contra Costa County Historical Ecology Study.* Historical Ecology Program, SFEI Publication #648, San Francisco Estuary Institute, Oakland.

United States Bureau of Census
1860 Products of Agriculture, Township No. 3, Contra Costa County.

1870 Products of Agriculture, Township No. 3, Contra Costa County.

1880 Products of Agriculture, Township No. 3, Contra Costa County.

United States District Court, Northern District California
1861 Case file for United States vs. John Marsh. Case No. 107, Northern District of California. Documents Pertaining to the Adjudication of Private Land Claims in California, Berkeley Library Digital Collections, BANC MSS Land Case Files 107 ND, UC Berkeley.

University of California Agriculture and Natural Resources
2022 Grape phylloxera-*Daktulosphaira vitifoliae*. Agriculture and Natural Resources, University of California Statewide Integrated Pest Management Program. Available online at https://ipm.ucanr.edu/PMG/GARDEN/FRUIT/PESTS/grapephylloxera.html

University of California Santa Barbara (UCSB)
1939 Flight C 5750. Frame 268-31. Accessed from https://mil.library.ucsb.edu/ap_indexes/FrameFinder/ on May 15, 2023.

Upton, D. and M. Vlach
2002 *Common Places: Readings in American Vernacular Architecture*. The University of Georgia Press. Athens, Georgia.

Whitcher J.
1853a *Map of the Rancho Los Meganos, California*. United States District Court, Northern District. One file at the Bancroft Library, UC Berkeley.

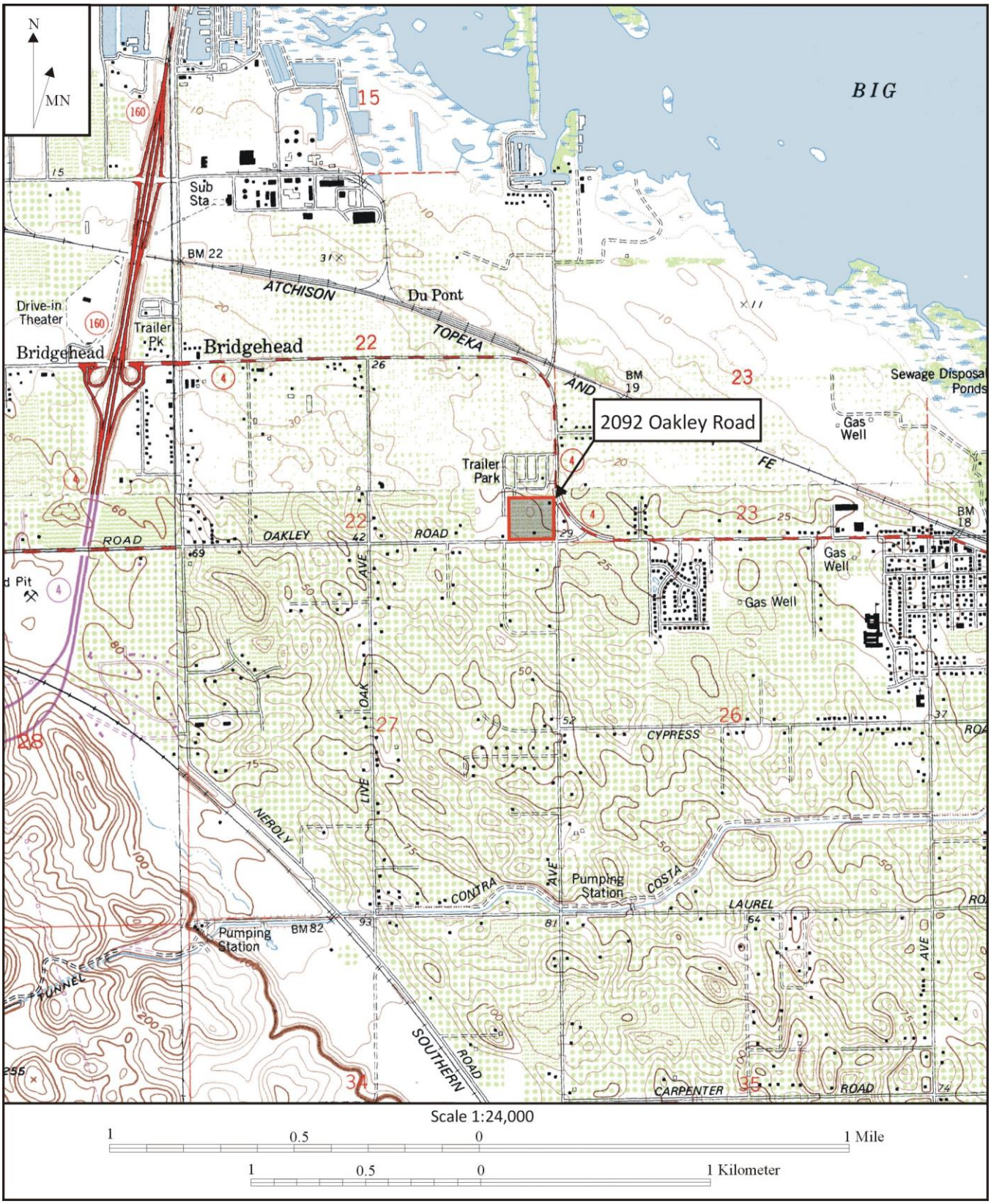
1853b *U.S. v. John Marsh, Land Case No. 107 [Los Meganos].* United States District Court, Northern District. One file at the Bancroft Library, UC Berkeley.

Wine-searcher
2023 Contra Costa County Wine. Available online at https://www.wine-searcher.com/regions-contra+costa+county.

LOCATION MAP

Primary #:
HRI #:
Trinomial:

Page 16 **of** 16
Resource Name or #: 2092 Oakley Road
Map Name: Brentwood and Jersey Island **Scale:** 7.5’ **Date of Map:** 1978



Appendix F
Geotechnical Investigation

GEOTECHNICAL INVESTIGATION

PASEO RESIDENTIAL SUBDIVISION
2092 OAKLEY ROAD
OAKLEY, CALIFORNIA

for
John D'Ambrosio Family Trust
November 9, 2022

BGG Project No. G289.01

Via E-Mail

November 9, 2022
BGG Project No. G289.01

Dan Cosgrove
John D'Ambrosio Family Trust
c/o Mercantile Systems, Inc.
9040 Brentwood Boulevard
Brentwood, California 94513

Subject: **Geotechnical Investigation**
Paseo Residential Subdivision
2092 Oakley Road
Oakley, California

Dear Mr. Cosgrove:

Baez Geotechnical Group (BGG) has completed a geotechnical investigation for the subject Paseo residential subdivision in Oakley, California. The approximately 9.7-acre site is located at the northwest corner of the intersection of Oakley Road and Main Street, as shown on Plate 1, Vicinity Map. It is our understanding that the proposed residential development will contain 80 new two-story, alley-loaded homes with private backyards. Other improvements will include Asphalt Concrete (AC) paved streets and alleys, 63 guest parking spaces, two parks, and bioretention areas. Some of the proposed building pads may be graded with imported fill to raise the pad elevations, but the extent of elevation increase has not yet been determined. The site is otherwise relatively flat, hence minor grading is anticipated.

PURPOSE AND SCOPE OF SERVICES

The purpose of our geotechnical investigation was to evaluate the subject site with respect to soil and groundwater conditions, and to provide geotechnical recommendations for the design and construction of the proposed improvements. The scope of our services included a review of available geologic literature covering the site, field exploration, field percolation testing, laboratory testing, engineering analyses, and preparation of this report.

FIELD EXPLORATION, PERCOLATION TESTING AND LABORATORY TESTING

Our field exploration consisted of drilling borings and advancing cone penetrometer tests at the site on September 30, 2022, in the locations shown on Plate 2, Site Plan. The borings were drilled using a truck-mounted drill rig equipped with solid flight augers and were grouted upon completion with agency observation. Materials encountered in the borings were visually classified in the field and logs were recorded. Bulk soil samples and driven Standard Penetration Test (SPT) and Modified California split spoon tube soil samples were obtained for laboratory testing. The

5236 REDWOOD ROAD, HUGHSON, CA 95326 | P.O. BOX 296, OAKDALE, CA 95361 | 355 EARHART WAY, LIVERMORE, CA 94551 | (209) 602-6

boring logs, showing soil classifications and blow counts, are contained in Appendix A. Field percolation testing was performed at the bottom of borings B3 and B5 at depths of 7-feet and 4-feet bgs, respectively.

Cone Penetrometer Tests (CPTs) were performed in two locations and advanced to depths of 50-feet bgs for CPT1 and 80-feet bgs for CPT2, due to auger refusal. Pore pressure dissipation and shear wave velocity measurements were recorded in CPT2. The CPT data graphs are attached as Appendix B and the locations of the CPTs are shown on Plate 2, Site Plan.

Laboratory testing included tests for in-situ moisture, sieve analysis, hydrometer, consolidation/swell, two-point direct shear, R-Value, and corrosion. A tube soil sample obtained from boring B2 at a depth of 3.5 to 4 feet bgs was found to have a friction angle of 28 degrees and cohesion of 60 psf. A mixture of soil from the upper 4-feet from borings B1 and B3 was found to have an R-Value of 67. Some of the laboratory test results are summarized below and within the boring logs, and the complete laboratory test results are contained in Appendix C.

LABORATORY TEST RESULTS – SIEVES, HYDROMETERS

Location	Soil Type	% Gravel	% Sand	% Fines	% Clay
B4: 3-3.5 feet	SM – Silty Sand	Zero	84	16	7
B2: 5.5-6 feet	SM – Silty Sand	Zero	85	15	5
B1: 13.5-15 feet	CL – Silty Clay	---	---	91	---
B2: 13.5-15 feet	SM – Silty Sand	---	---	15	---
B4: 18.5-20 feet	SM – Silty Sand	---	---	37	---

Note: % Fines = Percent Passing No. 200 sieve (silt and clay particles), % Clay = Percent smaller than 2 microns

The consolidation/swell tests consisted of loading relatively undisturbed tube soil samples with an initial seating load approximately equivalent to the in-situ overburden pressure, then loading the samples with a 1,000 psf or 2,000 psf surcharge load, and subsequently saturating the samples. The amount of long-term consolidation or swell was recorded after applying the surcharge load and again after saturation. The following is a summary of the consolidation/swell test results.

LABORATORY TEST RESULTS – CONSOLIDATION/SWELL

Location	Soil Type	Surcharge Load	Consolidation or Swell (1)	Consolidation or Swell (2)
B1: 1.5-2 feet	SM – Silty Sand	1,000 psf	-0.2%	-0.5%
B3: 2-2.5 feet	SM – Silty Sand	1,000 psf	-0.1%	Zero
B1: 2-2.5 feet	SM – Silty Sand	2,500 psf	-0.1%	-2.0%
B3: 2.5-3 feet	SM – Silty Sand	2,500 psf	-0.1%	-0.8%

(1) Consolidation or swell percent after adding surcharge load
(2) Additional consolidation or swell after saturation

A soil sample from B1 at a depth of 4.5 to 5 feet was submitted to Cerco Analytical, a state certified analytical laboratory, for corrosion testing. The tests indicate that the soils are considered mildly corrosive to buried metals and not corrosive to reinforced concrete in contact with the ground. The corrosion test results and a brief evaluation are contained in Appendix D.

GEOTECHNICAL FINDINGS

SITE DESCRIPTION

At the time of our field exploration, the site contained a mature grape vineyard and two residences, one in the northeast corner of the site and one near the middle of the southern property line. The site is situated at about 10-feet elevation lower than Main Street and about 8-feet lower than Oakley Road. Some mature landscape trees are located around the residences. The site is relatively flat with surface elevations of about 20-feet above mean sea level (MSL).

SUBSURFACE CONDITIONS

The upper five feet of the site is mantled by the Dehli sand soil series, according to the USDA Web Soil Survey. These soils reportedly contain 100 percent particles passing the No. 4 sieve (contain no gravel), have 5 to 15 percent fines (silt-sized and clay-sized particles), are nonplastic, and are in Hydrologic Group A. Additionally, the soils are reported to have infiltration rates between 6 to 20 inches per hour.

The following is a general description of the soils encountered in our borings and CPTs. More detailed descriptions of the subsurface soil conditions observed at the site are contained in the boring logs in Appendix A and the CPT interpretation graphs in Appendices E and F.

- Upper 5 to 15 feet: Medium dense silty sand grading to dense silty sand with depth.
- 5 to 15 feet deep to about 20 to 30 feet deep: The soil below the upper silty sands consists of alternating layers and lenses of dense silty sand, stiff clay, and stiff silty clay.
- Between 20 to 30 feet deep down to 50 to 65 feet deep: Stiff clay.
- Below 65 feet deep to 80 feet deep: Alternating layers and lenses of dense silty sand, stiff clay, and stiff silty clay.

FIELD PERCOLATION TESTING

Field percolation testing was performed at locations P1 and P2 for the proposed bioretention basins. The percolation tests were performed at depths of 4-feet and 7-feet below the ground surface (bgs) and the test locations are shown on Plate 2, Site Plan. Borings were drilled to the specified percolation test depths at each location and the soils encountered in the borings were classified and logged. Open-ended PVC pipes were utilized for percolation testing by setting the pipes into the boreholes, adding a 2-inch layer of clean gravel, and filling the pipes with water to saturate the soil. Approximately 2-feet vertical head of water was then added into the pipes and the rate of the water level drop in the pipes was monitored until stabilized rates were observed and recorded. The following is a summary of the percolation rates recorded during our testing:

SUMMARY OF FIELD PERCOLATION RATES

Test Location	Depth of Test (feet, bgs)	Soil Type at Bottom of Boring/Test Depth	Infiltration Rate (inches/hour)
P1 (B3)	7	SM – Silty Sand	27
P2 (B5)	4	SM – Silty Sand	24

The stormwater management system designer should determine the appropriate rate to be used for site drainage design purposes. An appropriate safety factor should be applied to the field percolation rates.

GROUNDWATER

According to the California Water Data Library website, one well is located within about 2 miles from the site. Groundwater levels in this nearby well, which is at an elevation of 30 feet MSL, have reportedly varied between about 20 to 40-feet deep since 2010, with the highest levels reported in the winter and lower levels measured in the summer. Groundwater was reported in CPT2 at a depth of 27 feet bgs during our field exploration. Numerous factors contribute to groundwater level fluctuations including precipitation, irrigation, and well pumping. A detailed evaluation of these and other factors, which may be responsible for groundwater fluctuations, was beyond the scope of this investigation.

RELEVANT GEOLOGIC HAZARDS

The site is located within a seismically active region and will experience seismic shaking from nearby and distant earthquakes. The site modified peak ground acceleration (PGA), according to the Structural Engineers Association of California (SEAOC) website, is 0.66g based on ASCE7-22, which will likely be the adopted standard for the California Building Code (CBC) in the near future. The site is not located within a seismic hazard zone mapped for earthquake faults by the California Geological Survey. Hence, the likelihood for surface fault rupture to occur at the site is nil.

The site is located within a California mapped seismic hazard zone for liquefaction. Liquefaction is the temporary transformation of saturated, loose to medium dense, sandy and silty soils from a solid state to a liquid state due to strong ground shaking during a major earthquake. We performed liquefaction analyses utilizing CLiq liquefaction assessment software (version 3.5.2.5, 2022) by GeoLogismiki. We utilized the Idriss and Boulanger (2014) analyses method, a moment magnitude (Mmax) of 7.0 and a peak ground acceleration (PGA) of 0.66g. The analyses were performed using depths to groundwater of 20-feet and 25-feet, and our analysis results are contained in Appendices E and F, respectively. The lateral spreading analyses assumed flat ground.

Our analyses included evaluating the liquefaction hazards of settlement, lateral spreading, and surface ground rupture, as well as dry sand settlement of the soil above the water table. The following is a summary of the CLiq analyses results.

LIQUEFACTION ANALYSES – GROUNDWATER AT A DEPTH OF 20-FEET

CPT	Liquefaction Settlement (in)	Dry Sand Settlement (in)	Lateral Displacement Index	Surface Ground Rupture
CPT1	0.3	0.0	2.6	N/A
CPT2	1.1	1.2	5.5	N/A
Average	**0.7**	**0.6**	**4.1**	**None**

Note: N/A – Not applicable

LIQUEFACTION ANALYSES – GROUNDWATER AT A DEPTH OF 25-FEET

CPT	Liquefaction Settlement (in)	Dry Sand Settlement (in)	Lateral Displacement Index	Surface Ground Rupture
CPT1	0.1	0.1	0.5	N/A
CPT2	0.9	1.2	4.9	N/A
Average	**0.5**	**0.6**	**2.7**	**None**

The following are our conclusions regarding the potential seismic impacts to the site (liquefaction settlement, dry sand settlement, lateral spreading, and surface ground rupture combined). The worst-case condition occurs when the groundwater level is at a depth of 20-feet bgs during the winter months. A conservative average condition is represented by groundwater occurring at a depth of 25-feet. If groundwater is more than 25-feet deep, seismic impacts would be very low.

- Total liquefaction induced ground settlement and dry sand settlement is estimated to be about 1-inch.
- Differential liquefaction induced ground settlement and dry sand settlement is estimated at about ½-inch across the project site.
- The lateral displacement index is 0.5 to 4.9, which is relatively low and below the accuracy level for minor displacements less than about 4 inches.
- The likelihood for surface ground rupture is nil.

Total seismically induced ground settlement should not impact the proposed surface improvements since the settlement would likely occur over the general area. Differential settlement could impact surface structures due to the increased amount of potential combined seismic and static differential settlement for the structures. Potential impacts to surface improvements from lateral spreading and surface disturbance are nil.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

We conclude, from a geotechnical engineering standpoint, that the proposed residential subdivision can generally be constructed as planned, provided that the conclusions and recommendations contained in this report are incorporated into the project design and during construction. The predominant geotechnical condition that may impact the proposed development is the presence of loose soil in the upper one to two feet. The site has been historically utilized for agriculture; hence, the surface soils are disturbed from farming operations and will likely be further disturbed during vineyard removal. The upper 2-feet of existing ground will need to be reworked as properly compacted engineered fill in building pad and other fill areas.

Other potential geotechnical impacts include import fill if needed to raise site grades, the stability of trench sidewalls for underground utility excavations, and the potential for encountering buried structures. Imported fill will need to be evaluated by the geotechnical engineer prior to importing since the recommendations contained in this report are based on the existing site soils. Utility

trenches may need to be laid back if caving sand conditions are encountered. Additionally, demolition of the existing structures will likely generate excavations from foundation removal that will need to be backfilled with engineered fill. It is not known if septic systems, leach fields, or irrigation lines are buried at the site, which would also require removal and backfilling with engineered fill.

SITE PREPARATION AND GRADING

Our general site preparation and grading recommendations are as follows:

1. The site will need to be cleared of the existing grape vineyards and structures. Remaining excavations from the removal of foundations, septic systems, leach fields, and buried irrigation lines will need to be backfilled with engineered fill.

2. In areas that will support new structures and receive fill, the upper 2-feet of the exposed soils will need to be reworked as engineered fill. This can be accomplished by a combination of overexcavation and scarification (maximum 12-inch-deep scarify-in-place).

3. If zones of soft or loose soil are encountered during grading operations, overexcavation of the loose soils may be required to expose deeper, firm soils. This should be determined in the field by the soils engineer.

4. Engineered fill soils should be moisture conditioned to above the optimum moisture content and compacted to at least 90 percent relative compaction. Relative compaction refers to the in-place dry density of soil expressed as a percentage of its maximum dry density, as determined by ASTM D1557 compaction test procedure. Optimum moisture is the water content (percentage by dry weight) corresponding to the maximum dry density.

5. Fill should be properly moisture conditioned and placed in thin lifts (normally 6 to 8 inches depending on the compaction equipment) and compacted as prescribed above.

6. The onsite soils are generally suitable for use as engineered fill, provided they are free of debris, significant vegetation, rocks greater than 4 inches in largest dimension and other deleterious matter. Debris, if encountered during grading, will need to be removed from the site.

7. Import fill, if required, should be subject to the evaluation of the soil engineer prior to its use. Import fill should be predominantly sandy, nonplastic, and contain no deleterious matter or rocks greater than 4 inches in largest dimension.

8. Observations and soil density tests should be performed during grading and backfilling to assist the contractor in obtaining the required degree of compaction and proper moisture content. Where the compaction is outside the range required, additional effort and adjustments to the moisture content should be made until the specified compaction and moisture conditioning are achieved.

9. The soils engineer should be notified at least 48 hours prior to any grading operations. The procedure and methods of grading may then be discussed between the contractor and the soils engineer.

UTILITY TRENCH EXCAVATION AND BACKFILL

Excavations should conform to applicable State and Federal industrial safety requirements. Temporary trench sidewalls more than 4-feet-deep may have to be laid back to 1H:1V or flatter to have stable sidewalls. Flatter trench slopes may be required if seepage is encountered during construction or if exposed soil conditions are conducive to instability.

The site soils are predominantly sandy with minor fines, and as such may not stand vertically or may slough into the excavations. The trench excavation sidewalls in these sandy soils may need to be laid back for stability.

Materials quality, placement procedures, and compaction operations for utility line bedding and shading materials should meet local agency and/or other applicable agency requirements. Utility trench backfill above the shading materials may consist of onsite soils, processed to remove rubble, rock fragments over 4 inches in largest dimension, rubbish, vegetation, and other undesirable substances. Backfill materials should be placed in level lifts about 8 to 10 inches in loose thickness, moisture conditioned, and mechanically compacted to at least 90 percent relative compaction.

CALIFORNIA BUILDING CODE (CBC) SEISMIC DESIGN PARAMETERS

The subject site is located at approximately 37.9988 degrees north latitude and -121.7335 degrees west longitude. The site is located within a large, deep alluvial valley; hence, the structural engineer should utilize Site Class D – Stiff Soil for determining seismic response spectra parameters. According to the ASCE 7 Hazard Tool and SEAOC websites (utilizing ASCE7-16), the site modified peak ground acceleration is 0.62g. Alternately, the site modified peak ground acceleration utilizing ASCE7-22 is 0.66g.

FOUNDATIONS

It is our opinion, from a geotechnical engineering standpoint, that shallow foundations can support the proposed structures. We are providing options for both shallow strip and isolated foundations and Post-Tensioned (PT) slab foundations.

SHALLOW STRIP AND ISOLATED FOUNDATIONS

Allowable Bearing Capacity (DL + LL) (may be increased by one-third for temporary seismic and wind loads at the discretion of the structural engineer)	2,500 psf
Allowable Passive Equivalent Fluid Pressure (neglect the upper 1 foot if the ground surface is not confined by slabs or pavement)	350 pcf
Allowable Base Friction Coefficient	0.35
Minimum Footing Depth	18-inches
Potential Differential Settlement Static – in an approximate 20-feet span Seismic – across one building pad	 ¾-inch ½-inch

We recommend that footing excavations be probed by the geotechnical engineer prior to reinforcing steel and concrete placement. Concrete for footings should be placed against undisturbed engineered fill or firm onsite soils.

The site is underlain by predominantly sandy soils with about 5% clay content, which are considered not expansive soils. However, we are providing two options for PT slab design parameters for the structural engineer to utilize: (1) expansive soil conditions and (2) compressible soil conditions. The expansive soil design parameters that are provided have been utilized for similar projects in the general site vicinity where the soils are predominantly poorly graded sands or silty sands. The compressible soil design parameters provided are based on estimated settlements for the subsurface soil conditions. We should discuss the design methods and results with the structural engineer during the foundation design process.

PT SLAB DESIGN PARAMETERS – EXPANSIVE SOILS

Allowable Bearing Capacity (may be increased by 1/3 for temporary seismic and wind loads, at the discretion of the structural engineer)	1,500 psf overall 2,200 psf isolated
Passive Equivalent Fluid Pressure (neglect the upper foot if the ground surface is not confined by slabs or pavement)	350 pcf
Base Friction Coefficient	0.35
<u>Edge Moisture Variation Distance</u> Center Lift Edge Lift	 9.0 feet 5.0 feet
<u>Differential Swell</u> Center Lift Edge Lift	 0.60 inches 1.00 inches
<u>Potential Differential Settlement</u> Static – in an approximate 20-feet span Seismic – across a building pad	 ¾-inch ½-inch
Minimum PT Slab Thickness	9 inches

PT SLAB DESIGN PARAMETERS – COMPRESSIBLE SOILS

Allowable Bearing Capacity (may be increased by 1/3 for temporary seismic and wind loads, at the discretion of the structural engineer)	1,500 psf overall 2,200 psf isolated
Passive Equivalent Fluid Pressure (neglect the upper foot if the ground surface is not confined by slabs or pavement)	350 pcf
Base Friction Coefficient	0.35
<u>Potential Differential Settlement</u> Static – in an approximate 20-feet span Seismic – across a building pad	 ¾-inch ½-inch
Minimum PT Slab Thickness	9 inches

Where moisture vapor through the floor slabs would be objectionable, the use of a vapor retarder may be necessary. From a geotechnical standpoint, we do not require a layer of sand above the vapor retarder. We suggest utilizing ASTM E1745 and ASTM E1643 as guidelines for the vapor retarder material and for installation of the vapor retarder.

Other minor site structures, such as site walls, can be supported on drilled, reinforced concrete pier foundations, utilizing the following recommendations.

DRILLED REINFORCED CONCRETE PIERS

Allowable Skin Friction, Vertically Down Ignore the upper foot	400 psf
Allowable Skin Friction, Vertically Up Ignore the upper foot	250 psf
Allowable Lateral Passive Resistance, equivalent fluid pressure, acting on 1.5 pier diameters, ignore the upper foot	350 pcf
Minimum Pier Diameter	12 inches

CONCRETE SLAB-ON-GRADE FLOORS

Reinforced concrete floor slabs can be utilized if the residences are supported on shallow strip and isolated foundations. The floor slabs should be at least 5-inches-thick and reinforced with reinforcing bars and can be supported directly on properly prepared subgrade soil. The subgrade soil should be moisture conditioned and compacted to at least 90% relative compaction at moisture contents above the optimum moisture. Where moisture vapor through the floor slab would be objectionable, the use of a vapor retarder may be necessary. From a geotechnical standpoint, we do not require a layer of sand above the vapor retarder. We suggest utilizing ASTM E1745 and ASTM E1643 as guidelines for the vapor retarder material and for installation of the vapor retarder.

During foundation and/or utility trench excavation, previously compacted subgrade soils may become disturbed. Before placement of concrete slabs, the disturbed subgrade soils should be moisture conditioned and compacted according to the requirements outlined under the section titled "Site Preparation and Grading" in this report. Subgrade soils should be maintained in a moist and compacted condition until covered with the complete slab section.

EXTERIOR FLATWORK SUGGESTIONS

We suggest that exterior concrete flatwork, such as sidewalks and patios, be at least 5-inches-thick and reinforced with reinforcing bars and driveways should be at least 6-inches-thick. Where possible, flatwork should be doweled into adjacent flatwork to reduce the potential for differential vertical movement. The flatwork can be constructed directly on properly prepared subgrade soils moisture conditioned to above optimum moisture and compacted to at least 90% relative compaction.

RETAINING WALLS

The following are recommended pressures to be utilized for the design of retaining walls. Retaining walls should be limited to a height of 6-feet, and the recommended lateral pressures are based on drained conditions. Backdrains are not required for retaining walls less than 2-feet high.

RETAINING WALL DESIGN PARAMETERS

Active Equivalent Fluid Pressure (Level backfill and drained conditions)	35 pcf
At-Rest Equivalent Fluid Pressure (Level backfill and drained conditions)	55 pcf
Surcharge Load, where applicable	Designated by structural engineer

Mechanically Stabilized Earth (MSE) retaining walls (stacked block walls possibly with geogrid reinforcing) can be designed utilizing a friction angle of 30 degrees, zero cohesion, and a moist soil unit weight of 115 pcf. MSE retaining wall backfill materials should consist of the onsite sandy soils. The base of these modular block walls should be at least 1-foot-deep on level ground and at least 2-feet-deep if the ground is sloping.

PAVEMENT RECOMMENDATIONS

We are providing structural pavement recommendations for the onsite soils. Our pavement analyses are based upon an R-Value of 30 using the Caltrans Design Method for Flexible Pavement for a 20-year design life. The following are our recommendations for Asphalt Concrete (AC) pavement sections along with their corresponding traffic indices (TI), which are indications of load frequency and intensity.

AC PAVEMENT SECTIONS

Traffic Index	AC (in)	Class 2 AB (in)	Total (in)
TI=4.5	3	4	7
TI=5	3	5	8
TI=6	3	8	11
TI=7	4 5	9 7	13 12
TI=8	4 5	12 10	16 15
TI=9	5 6	14 12	19 18

The upper foot of the subgrade soils in pavement areas should be compacted to at least 95 percent relative compaction and rolled to provide a smooth and unyielding surface. Class 2 aggregate base (AB) in pavement areas should also be compacted to at least 95 percent relative compaction.

ADDITIONAL SOIL ENGINEERING SERVICES

To a degree, the performance of the proposed project is dependent on the procedures and quality of the construction. Therefore, we should provide observation of the contractor's procedures and

the exposed soil conditions, and field and laboratory testing during site preparation and grading, placement and compaction of fill, underground utility backfilling, and foundation construction. These observations will allow us to check the contractor's work for conformance with the intent of our recommendations and to observe any unanticipated soil conditions that could require modification of our recommendations. In addition, we would welcome the opportunity to meet with the contractor prior to the start of earthwork operations to discuss the procedures and methods of construction. This can facilitate the performance of the construction operation and minimize possible misunderstanding and construction delays.

LIMITATIONS

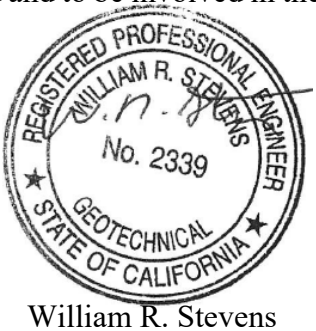
The conclusions and recommendations contained in this report are based upon the information provided to us regarding the proposed site improvements, subsurface conditions encountered in our field explorations, laboratory testing, and professional judgment. This study has been conducted in accordance with current professional geotechnical engineering standards; no other warranty is expressed or implied.

If changes are planned or implemented regarding the nature, design, and/or location of the proposed improvements, or if it is found during construction that subsurface conditions differ from those described in this report, then the conclusions and recommendations in this report shall be considered invalid, unless the changes are reviewed, and the conclusions and recommendations are modified or approved in writing.

Should you have questions or need additional information, please contact us. We appreciate the opportunity to provide professional services to you and to be involved in the design of this project.

Respectfully submitted,

BAEZ GEOTECHNICAL GROUP



Stefanie Parman-Ribeiro
Project Engineer

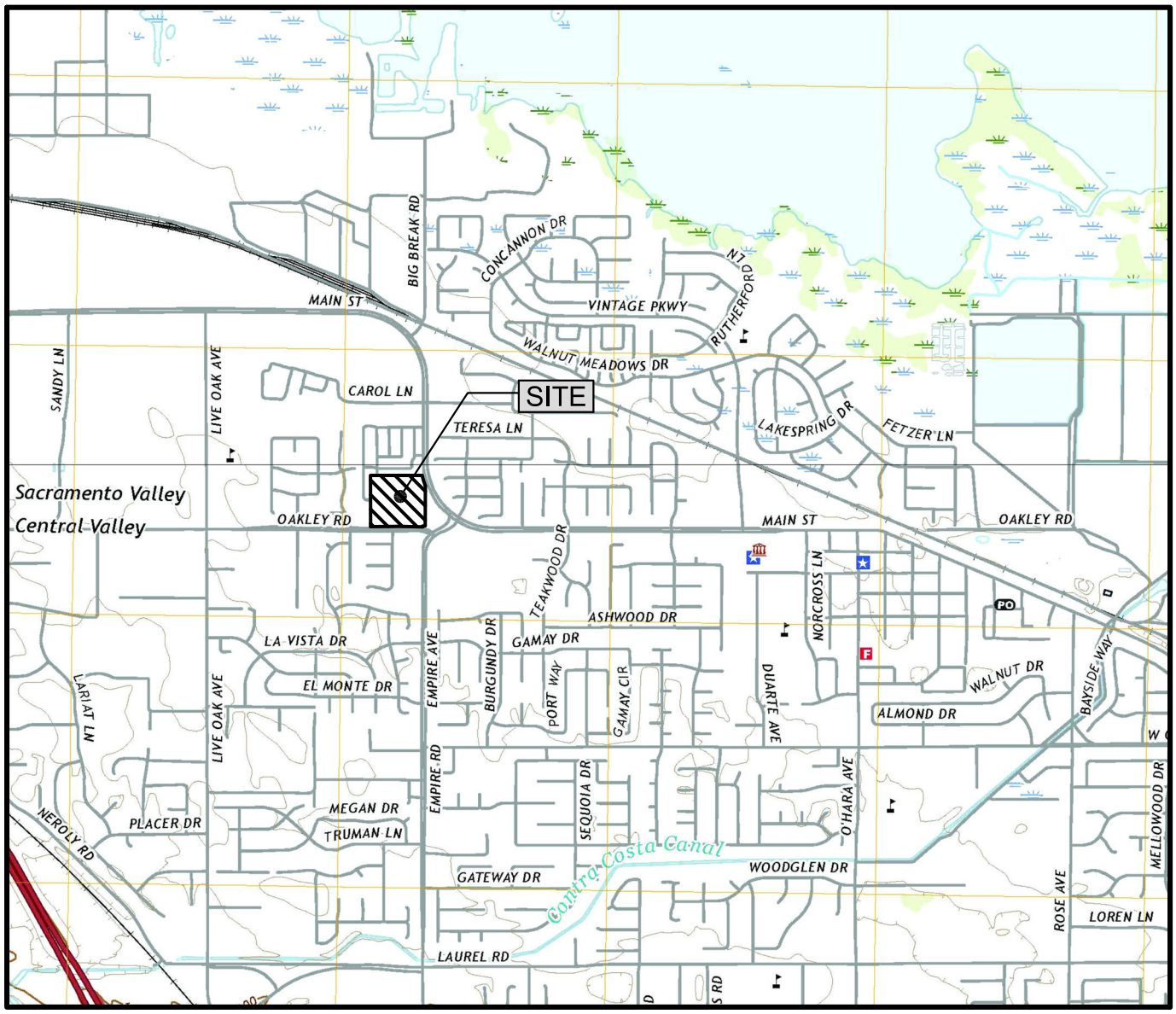
William R. Stevens
Principal Engineer
GE 2339

Attachments:

Plate 1 – Vicinity Map
Plate 2 – Site Plan

Appendix A – Boring Logs
Appendix B – CPT Graphs
Appendix C – Laboratory Test Results
Appendix D – Corrosion Test Results
Appendix E – Liquefaction Analyses – Groundwater 20-feet Deep
Appendix F – Liquefaction Analyses – Groundwater 25-feet Deep

E://BGG/G289-2092 Oakley Road/GI G289 Paseo Oakley.docx



BASE: PORTIONS OF U.S.G.S. 7.5 MINUTE TOPOGRAPHIC QUADRANGLES, JERSEY ISLAND & BRENTWOOD, CALIFORNIA, PHOTOREVISED 2021, AT A SCALE OF 1:24,000.

VICINITY MAP

PASEO SUBDIVISION

2092 OAKLEY ROAD

OAKLEY, CALIFORNIA

FOR

JOHN D'AMBROSIO FAMILY TRUST

BAEZ GEOTECHNICAL GROUP

DRAWN BY: SPR

DATE: 10/26/2022

BGG NUMBER: G289.01

N

0 100

1 INCH = 100 FEET

EXPLANATION

B4 — APPROXIMATE BORING LOCATION

CPT2 — APPROXIMATE CONE PENETROMETER TEST LOCATION

P2 — APPROXIMATE PERCOLATION TEST LOCATION

APPROXIMATE PROJECT BOUNDARY

BAEZ GEOTECHNICAL GROUP

BASE: GOOGLE EARTH IMAGE APRIL 2022.

SITE PLAN

PASEO SUBDIVISION

2092 OAKLEY ROAD

OAKLEY, CALIFORNIA

FOR

JOHN D'AMBROSIO FAMILY TRUST

APPENDIX A

Boring Logs

BORING NUMBER: B1

PROJECT NAME: Paseo Subdivision
PROJECT NUMBER: G289.01
DATE DRILLED: 09/30/2022
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
LOGGED BY: KJR
NOTES: Elevation obtained from Google Earth

PROJECT LOCATION: 2092 Oakley Road, Oakley
CLIENT: Mercantile Systems, Inc.
GROUND ELEVATION: 32 feet MSL
GROUNDWATER ELEVATION: Not encountered
SAMPLER TYPE:
Modified California Sampler
Standard Penetration Test

USCS	MATERIAL DESCRIPTION	ELEVATION (feet)	DEPTH (feet)	SAMPLER	BLOW COUNT (blows/foot)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	PLASTICITY INDEX	FINES CONTENT % PASSING #200
SM	SILTY SAND, tan to medium brown, dry, loose, fine- to medium-grained sand	32	0						
	below 1 foot, moist, medium dense				10		4.2		
	(Sample consolidated 0.1% upon loading to 1,000 psf and an additional 0.5% after saturation)						3.6		
	(Sample consolidated 0.1% upon loading to 2,500 psf and an additional 0.8% after saturation)				10				
SM	SILTY SAND, tan and medium brown with gray, moist, dense, fine- to medium-grained sand	27	5		35				
CL	SILTY CLAY, tan and light brown with light and dark gray, slightly moist, hard	22	10		53				91
	Bottom of Boring at 15 feet below the ground surface (bgs). Groundwater was not encountered.	17	15						
		12	20						

BORING NUMBER: B2

PROJECT NAME: Paseo Subdivision
PROJECT NUMBER: G289.01
DATE DRILLED: 09/30/2022
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
LOGGED BY: KJR
NOTES: Elevation obtained from Google Earth

PROJECT LOCATION: 2092 Oakley Road, Oakley
CLIENT: Mercantile Systems, Inc.
GROUND ELEVATION: 30 feet MSL
GROUNDWATER ELEVATION: Not encountered
SAMPLER TYPE:
Modified California Sampler
Standard Penetration Test

USCS	MATERIAL DESCRIPTION	ELEVATION (feet)	DEPTH (feet)	SAMPLER	BLOW COUNT (blows/foot)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	PLASTICITY INDEX	FINES CONTENT % PASSING #200
SM	SILTY SAND, tan to medium brown, dry, loose, fine- to medium-grained sand	30	0						
	below 1 foot, moist, medium dense				18				
		25	5						
	(84.6% sand, 10.4% silt, 5.0% clay)				17				15
	at 10 feet, fine- to coarse-grained sand	20	10		27				
SM/ ML	SILTY SAND to SANDY SILT, tan and light gray, dry to slightly moist, dense to very stiff								
SM	SILTY SAND, light tan and gray, moist, medium dense, fine- to medium-grained sand	15	15		24				15
	Bottom of Boring at 15 feet bgs. Groundwater was not encountered.	10	20						

BORING NUMBER: B3/P1

PROJECT NAME: Paseo Subdivision
PROJECT LOCATION: 2092 Oakley Road, Oakley
PROJECT NUMBER: G289.01
CLIENT: Mercantile Systems, Inc.
DATE DRILLED: 09/30/2022
GROUND ELEVATION: 32 feet MSL
DRILLING CONTRACTOR: West Coast Exploration
GROUNDWATER ELEVATION: Not encountered
DRILLING METHOD: Solid Flight Auger
SAMPLER TYPE:
LOGGED BY: KJR
Modified California Sampler
Standard Penetration Test
NOTES: Elevation obtained from Google Earth

USCS	MATERIAL DESCRIPTION	ELEVATION (feet)	DEPTH (feet)	SAMPLER	BLOW COUNT (blows/foot)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	PLASTICITY INDEX	FINES CONTENT % PASSING #200
SM	SILTY SAND, tan to medium brown, dry, loose, fine- to medium-grained sand	32	0						
	below 1 foot, moist, medium dense								
	(Sample consolidated 0.1% upon loading to 1,000 psf and nearly zero additional consolidation after saturation) (Sample consolidated 0.1% upon loading to 2,500 psf and an additional 0.8% after saturation)				15		3.7 3.7		
	below 3 feet, fine- to coarse-grained sand	27	5						
SP	SAND with SILT, tan to medium brown, medium dense, moist, fine- to coarse-grained sand				25				
	Bottom of Boring at 7 feet bgs. Groundwater was not encountered.	22	10						
		17	15						
		12	20						

BORING NUMBER: B4

PROJECT NAME: Paseo Subdivision
PROJECT LOCATION: 2092 Oakley Road, Oakley
PROJECT NUMBER: G289.01
CLIENT: Mercantile Systems, Inc.
DATE DRILLED: 09/30/2022
GROUND ELEVATION: 29 feet MSL
DRILLING CONTRACTOR: West Coast Exploration
GROUNDWATER ELEVATION: Not encountered
DRILLING METHOD: Solid Flight Auger
SAMPLER TYPE:
LOGGED BY: KJR
Modified California Sampler
Standard Penetration Test
NOTES: Elevation obtained from Google Earth

USCS	MATERIAL DESCRIPTION	ELEVATION (feet)	DEPTH (feet)	SAMPLER	BLOW COUNT (blows/foot)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	PLASTICITY INDEX	FINES CONTENT % PASSING #200
SM	SILTY SAND, tan to medium brown, dry, loose, fine- to medium-grained sand	29	0						
	below 1 foot, moist, medium dense								
	(84.2% sand, 9.3% silt, 6.5% clay)				13				16
		24	5						
		19	10						
ML	SANDY SILT, tan and light gray, dry to slightly moist, hard				50/6”				
		14	15						
SM	SILTY SAND, tan and light brown, moist to wet, medium dense, fine- to medium-grained sand								
	saturated below 19 feet				12				37
		9	20						

Bottom of Boring at 20 feet bgs. Groundwater not encountered.

BORING NUMBER: B5/P2

PROJECT NAME: Paseo Subdivision
PROJECT NUMBER: G289.01
DATE DRILLED: 09/30/2022
DRILLING CONTRACTOR: West Coast Exploration
DRILLING METHOD: Solid Flight Auger
LOGGED BY: KJR
NOTES: Elevation obtained from Google Earth

PROJECT LOCATION: 2092 Oakley Road, Oakley
CLIENT: Mercantile Systems, Inc.
GROUND ELEVATION: 30 feet MSL
GROUNDWATER ELEVATION: Not encountered
SAMPLER TYPE:
Modified California Sampler
Standard Penetration Test

USCS	MATERIAL DESCRIPTION	ELEVATION (feet)	DEPTH (feet)	SAMPLER	BLOW COUNT (blows/foot)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	PLASTICITY INDEX	FINES CONTENT % PASSING #200
SM	SILTY SAND, tan to medium brown, dry, loose, fine- to medium-grained sand below 1 foot, moist and medium dense	30	0						
	Bottom of Boring at 4 feet bgs. Groundwater was not encountered.	25	5						
		20	10						
		15	15						
		10	20						

APPENDIX B

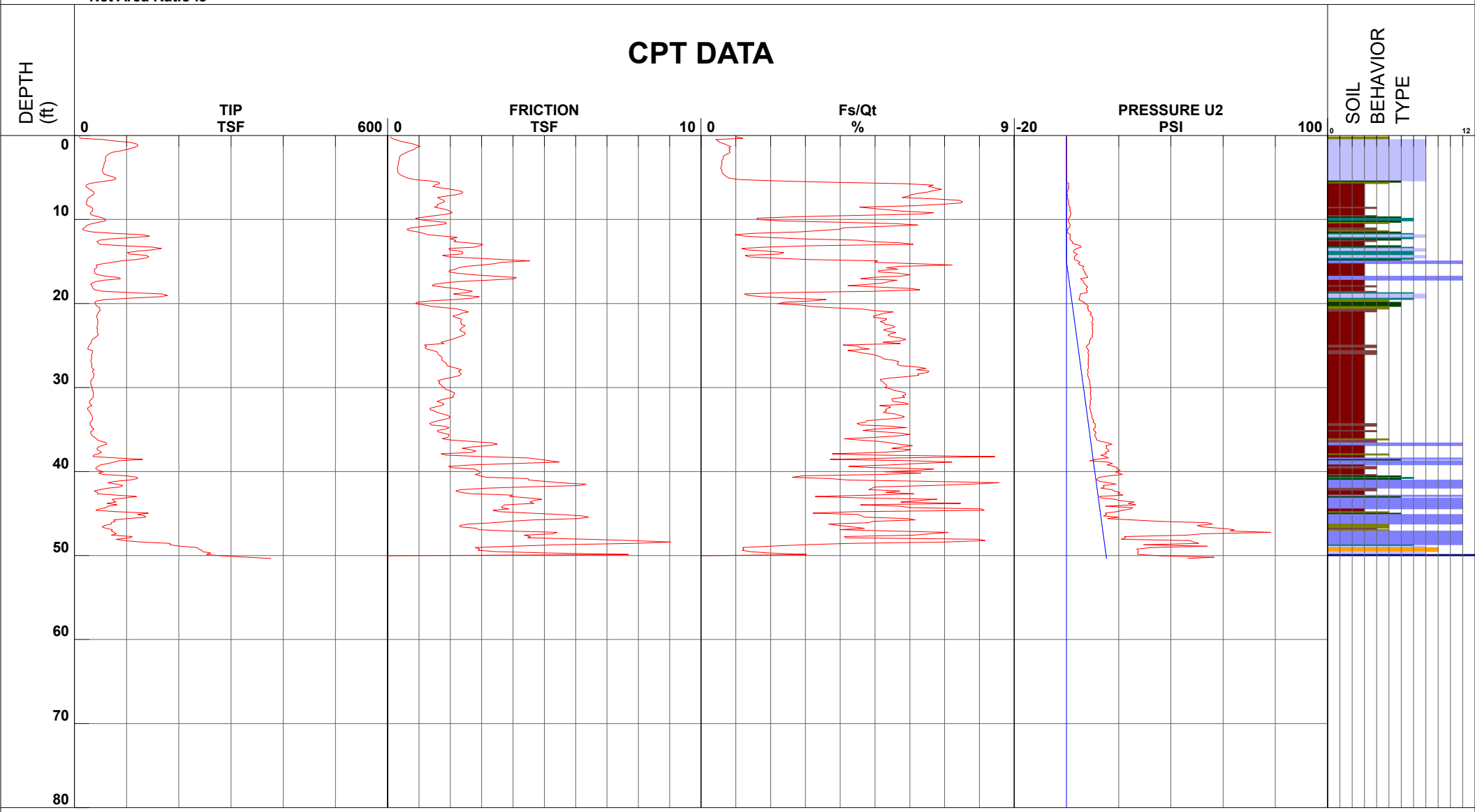
Middle Earth Earth Geo Testing, Inc.
Cone Penetrometer Test (CPT) Graphs

Baez Geotechnical

Project	Oakley Paseos	Operator	AJ-BH	Filename	SDF(231).cpt
Job Number	G289.01	Cone Number	DDG1589	GPS	
Hole Number	CPT-01	Date and Time	9/30/2022 11:16:19 AM	Maximum Depth	50.36 ft
EST GW Depth During Test		15.00 ft			

Net Area Ratio .8

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

818

Cone Size 15cm squared

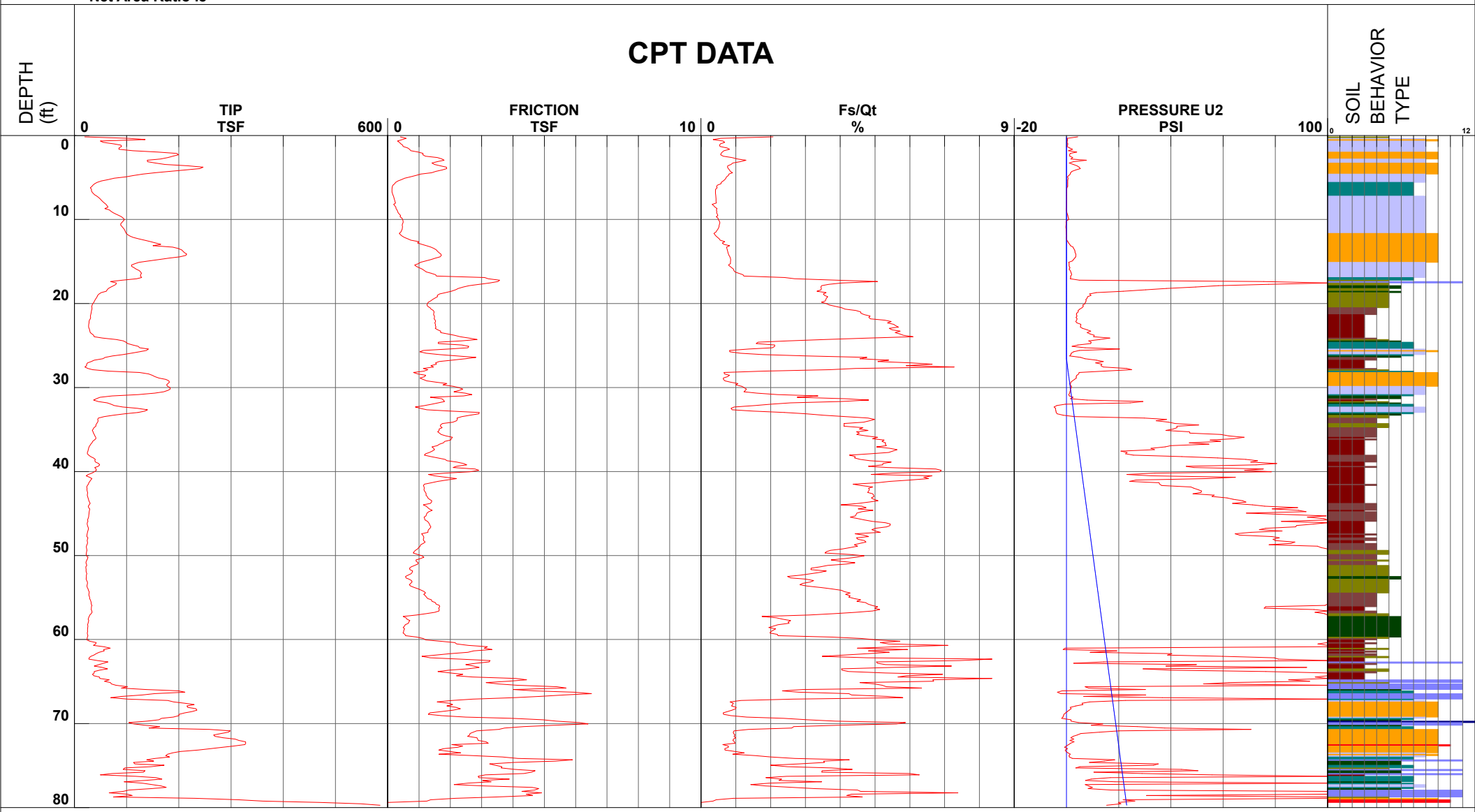
S*Soil behavior type and SPT based on data from UBC-1983

Baez Geotechnical

Project	Oakley Paseos	Operator	AJ-BH	Filename	SDF(230).cpt
Job Number	G289.01	Cone Number	DDG1589	GPS	
Hole Number	CPT-02	Date and Time	9/30/2022 8:45:23 AM	Maximum Depth	79.72 ft
EST GW Depth During Test		26.60 ft			

Net Area Ratio .8

CPT DATA

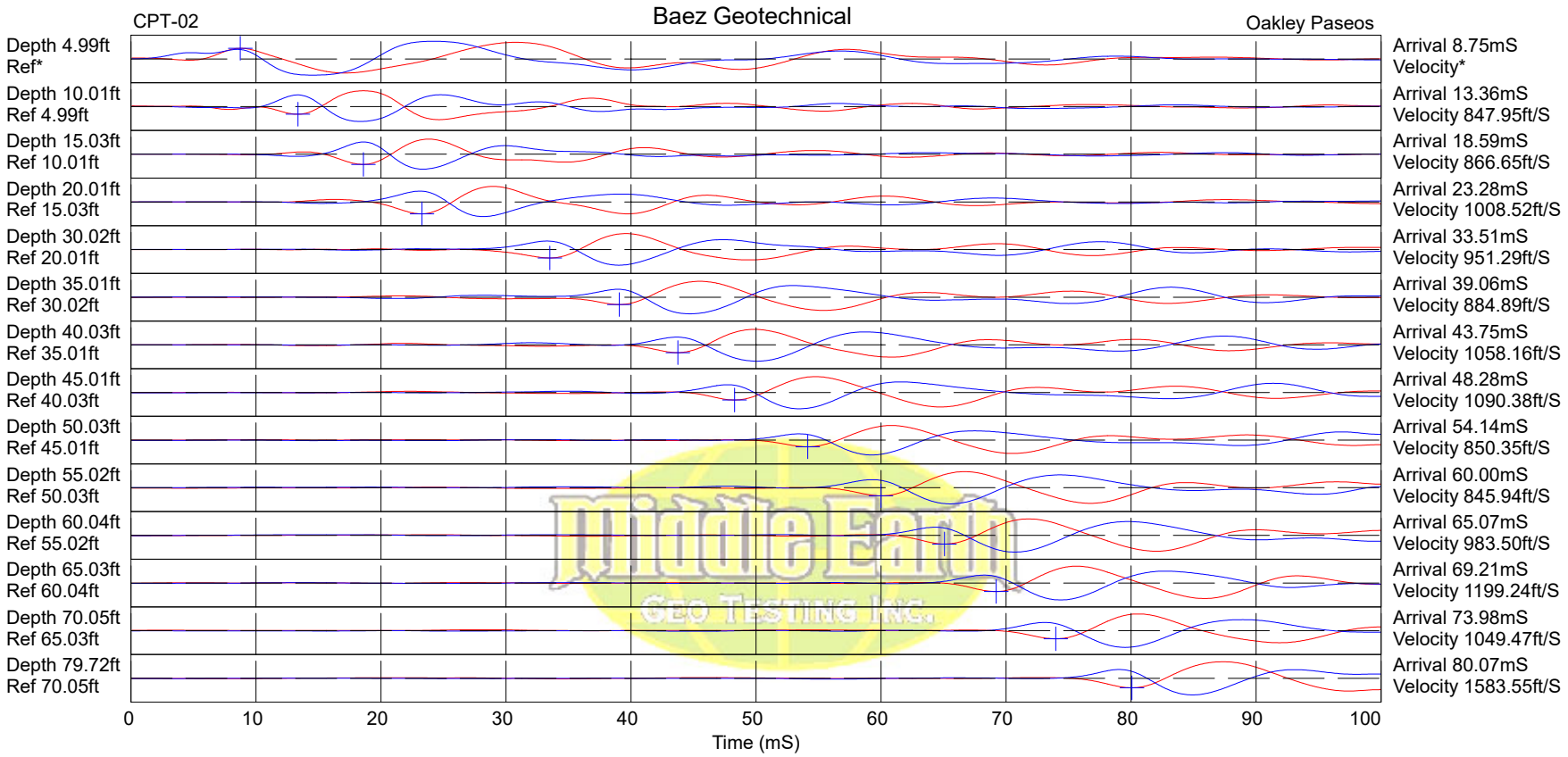


- 1 - sensitive fine grained
- 2 - organic material
- 3 - clay
- 4 - silty clay to clay
- 5 - clayey silt to silty clay
- 6 - sandy silt to clayey silt
- 7 - silty sand to sandy silt
- 8 - sand to silty sand
- 9 - sand
- 10 - gravelly sand to sand
- 11 - very stiff fine grained (*)
- 12 - sand to clayey sand (*)

819

Cone Size 15cm squared

S*Soil behavior type and SPT based on data from UBC-1983



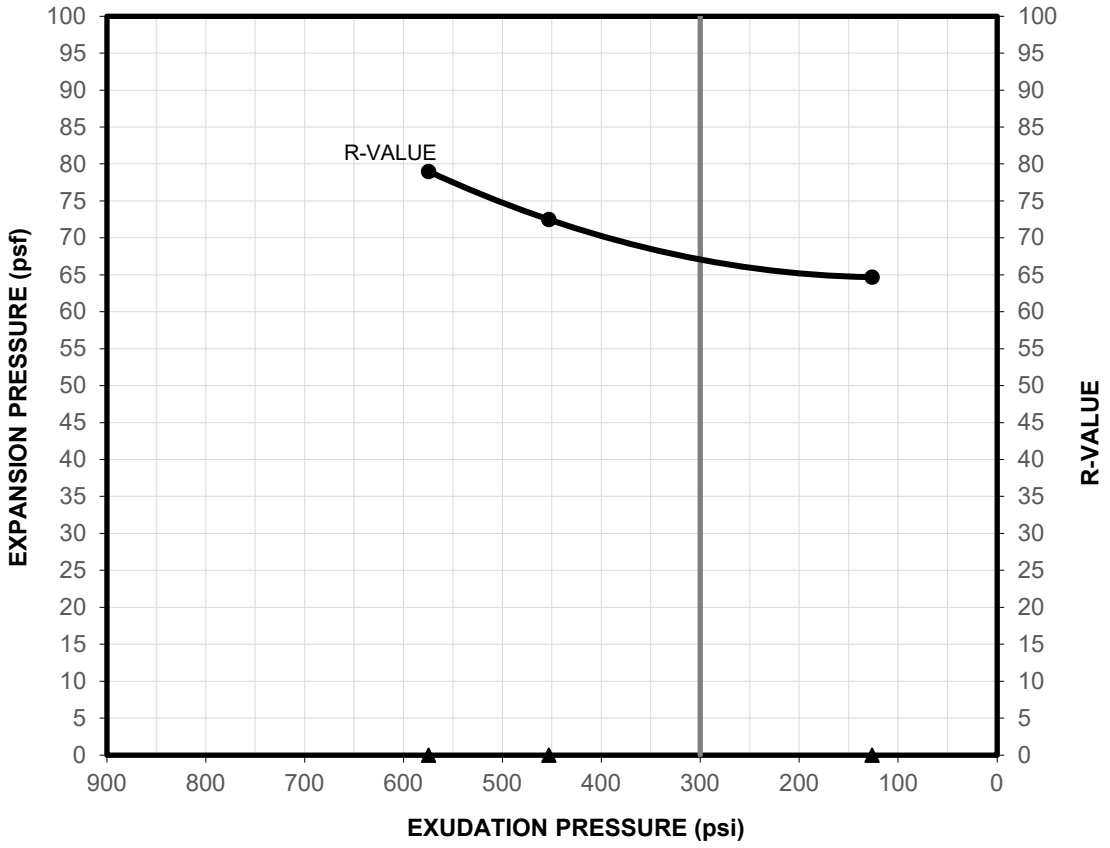
Hammer to Rod String Distance (ft): 5.83
* = Not Determined

COMMENT:

APPENDIX C

Laboratory Test Results

R-VALUE TEST REPORT
CTM 301



SAMPLE ID	MATERIAL DESCRIPTION [1]	SAMPLE LOCATION
B1&B3@0-4	Dark brown silty SAND	B1 and B3 at 0-4 feet

SPECIMENS	1	2	3
EXUDATION PRESSURE (psi)	575	453	126
EXPANSION PRESSURE (psf)	0	0	0
R-VALUE	79	72	65
MOISTURE CONTENT (%)	9.0	10.7	12.8
DRY DENSITY (pcf)	110.3	112.2	110.7
EXPANSION PRESSURE (psf) AT EXUDATION PRESSURE OF 300 psi		0	

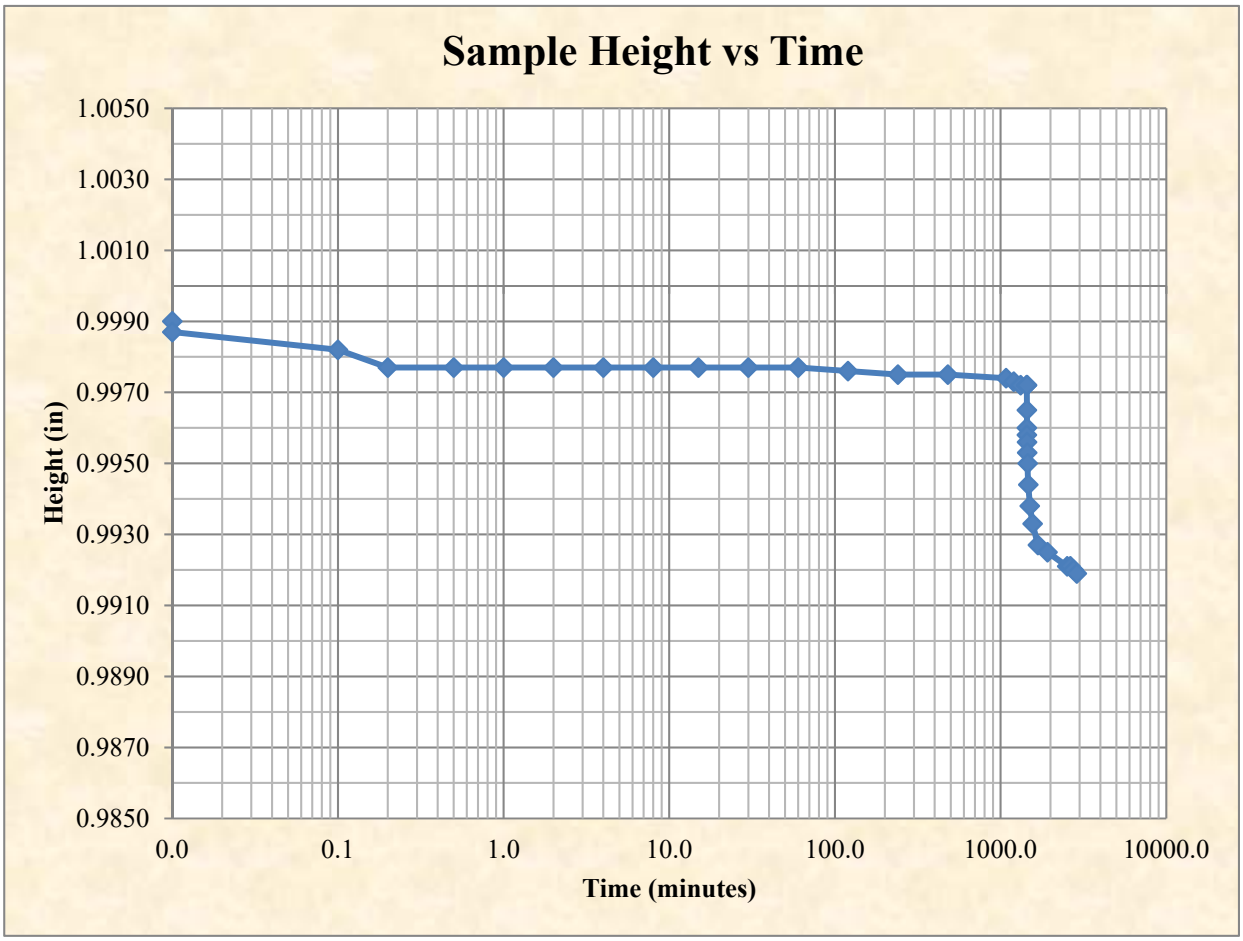
R-VALUE AT EXUDATION PRESSURE OF 300 psi	TEST RESULT
	67

[1] Material description per ASTM D2488

ENGEO
Expect Excellence

CLIENT: Baez Geotechnical Group, Inc.
PROJECT NAME: G289.01 - Paseo Homes, Oakley, Ca
PROJECT NO: 14368.000.174 PHLAB
PROJECT LOCATION: Oakley, CA
REPORT DATE: 10/12/2022
TESTED BY: M. Ryan
REVIEWED BY: M. Gilbert

ONE DIMENSIONAL SWELL/COLLAPSE POTENTIAL - METHOD 'C' Modified
ASTM D4546



SAMPLE ID:	**B1 @ 1.5-2'**		**IN-SITU LOAD (psf):** **150**
SAMPLE DESCRIPTION:	**See exploration logs**		**DESIGN LOAD (psf):** **1000**
TYPE OF WATER USED:	**Distilled**	**USCS: n/a**	**SOURCE OF WATER:** **Distilled**
TRANSPORTATION METHOD:	**Insulated bucket**		**SAMPLING DATE:** **n/a**
STORAGE ENVIRONMENT:	**Controlled**		**TEST START DATE:** **10/03/22**

Remolded? (Y/N):	**N**	**Initial % Saturation:**	**17.77**
Number of lifts, if remolded:	**n/a**	**Final % Saturation:**	**100.00**
Specific Gravity, <#4 (Measured):	**2.682**	**Initial water content:**	**4.24**
Initial sample height (in):	**0.9990**	**Final water content:**	**23.38**
Dry in-situ load height (in):	**0.9987**	**Post-test dry density (pcf):**	**102.83**
Dry design load height (in):	**0.9972**	*Dry In-situ load % SWELL/COLLAPSE:*	*-0.03*
Wet design load height (in):	**0.9919**	*Dry design load % SWELL/COLLAPSE:*	*-0.15*
Initial sample mass (g):	**126.10**	*Wet design load % SWELL/COLLAPSE:*	*-0.53*
Final saturated sample mass (g):	**149.25**	***Overall % SWELL/COLLAPSE:***	***-0.71***

Testing remarks:

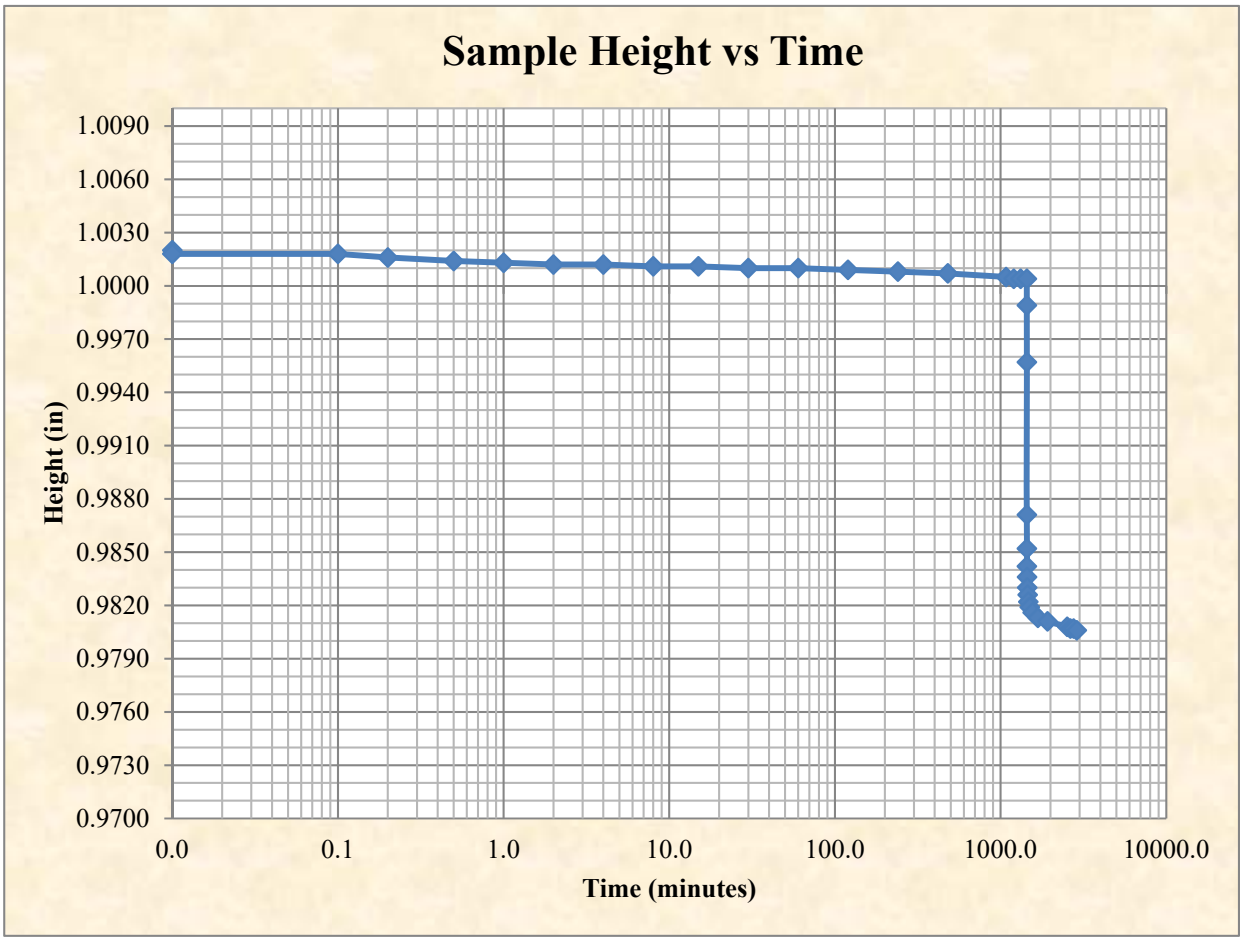
PROJECT NAME:	**G289.01 - Paseo Homes**	**REPORT DATE:**	**10/06/22**
PROJECT NUMBER:	**14368.000.174 PHLAB**		
CLIENT:	**Baez Geotechnical Group, Inc.**		
PHASE NUMBER:	**LAB**		

ENGEO
Expect Excellence

Tested by: K. Lecce

Reviewed by: M. Tong

ONE DIMENSIONAL SWELL/COLLAPSE POTENTIAL - METHOD 'C' Modified
ASTM D4546



SAMPLE ID:	**B1 @ 2-2.5'**		**IN-SITU LOAD (psf):** **200**
SAMPLE DESCRIPTION:	**See exploration logs**		**DESIGN LOAD (psf):** **2500**
TYPE OF WATER USED:	**Distilled**	**USCS:** **n/a**	**SOURCE OF WATER:** **Distilled**
TRANSPORTATION METHOD:	**Insulated bucket**		**SAMPLING DATE:** **n/a**
STORAGE ENVIRONMENT:	**Controlled**		**TEST START DATE:** **10/03/22**

Remolded? (Y/N):	**N**	**Initial % Saturation:**	**15.05**
Number of lifts, if remolded:	**n/a**	**Final % Saturation:**	**100.00**
Specific Gravity, <#4 (Measured):	**2.663**	**Initial water content:**	**3.62**
Initial sample height (in):	**1.0020**	**Final water content:**	**22.68**
Dry in-situ load height (in):	**1.0018**	**Post-test dry density (pcf):**	**103.57**
Dry design load height (in):	**1.0004**	*Dry In-situ load % SWELL/COLLAPSE:*	*-0.02*
Wet design load height (in):	**0.9806**	*Dry design load % SWELL/COLLAPSE:*	*-0.14*
Initial sample mass (g):	**124.60**	*Wet design load % SWELL/COLLAPSE:*	*-1.98*
Final saturated sample mass (g):	**147.52**	***Overall % SWELL/COLLAPSE:***	***-2.14***

Testing remarks:

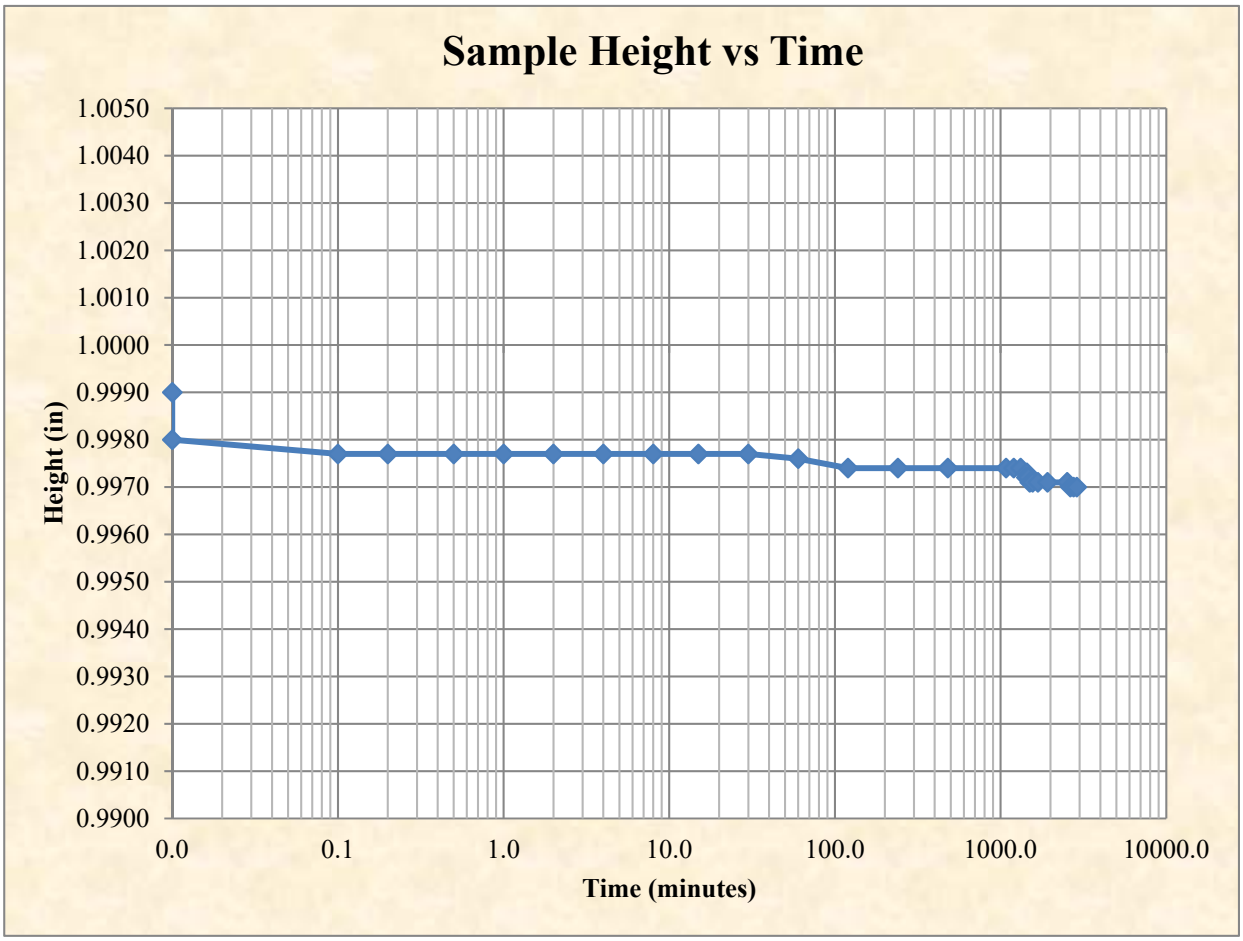
PROJECT NAME:	**G289.01 - Paseo Homes**
PROJECT NUMBER:	**14368.000.174 PHLAB**
CLIENT:	**Baez Geotechnical Group, Inc.**
PHASE NUMBER:	**LAB**
REPORT DATE:	**10/06/22**

ENGEO
Expect Excellence

Tested by: K. Lecce

Reviewed by: M. Tong

ONE DIMENSIONAL SWELL/COLLAPSE POTENTIAL - METHOD 'C' Modified
ASTM D4546



SAMPLE ID:	**B3 @ 2-2.5'**		**IN-SITU LOAD (psf):** **200**
SAMPLE DESCRIPTION:	**See exploration logs**		**DESIGN LOAD (psf):** **1000**
TYPE OF WATER USED:	**Distilled**	**USCS: n/a**	**SOURCE OF WATER:** **Distilled**
TRANSPORTATION METHOD:	**Insulated bucket**		**SAMPLING DATE:** **n/a**
STORAGE ENVIRONMENT:	**Controlled**		**TEST START DATE:** **10/03/22**

Remolded? (Y/N):	**N**	**Initial % Saturation:**	**16.29**
Number of lifts, if remolded:	**n/a**	**Final % Saturation:**	**99.99**
Specific Gravity, <#4 (Measured):	**2.658**	**Initial water content:**	**3.73**
Initial sample height (in):	**0.9990**	**Final water content:**	**22.74**
Dry in-situ load height (in):	**0.9980**	**Post-test dry density (pcf):**	**103.35**
Dry design load height (in):	**0.9973**	*Dry In-situ load % SWELL/COLLAPSE:*	*-0.10*
Wet design load height (in):	**0.9970**	*Dry design load % SWELL/COLLAPSE:*	*-0.07*
Initial sample mass (g):	**128.42**	*Wet design load % SWELL/COLLAPSE:*	*-0.03*
Final saturated sample mass (g):	**151.95**	***Overall % SWELL/COLLAPSE:***	***-0.20***

Testing remarks:

PROJECT NAME:	**G289.01 - Paseo Homes**	**REPORT DATE:**	**10/13/22**
PROJECT NUMBER:	**14368.000.174 PHLAB**		
CLIENT:	**Baez Geotechnical Group, Inc.**		
PHASE NUMBER:	**LAB**		

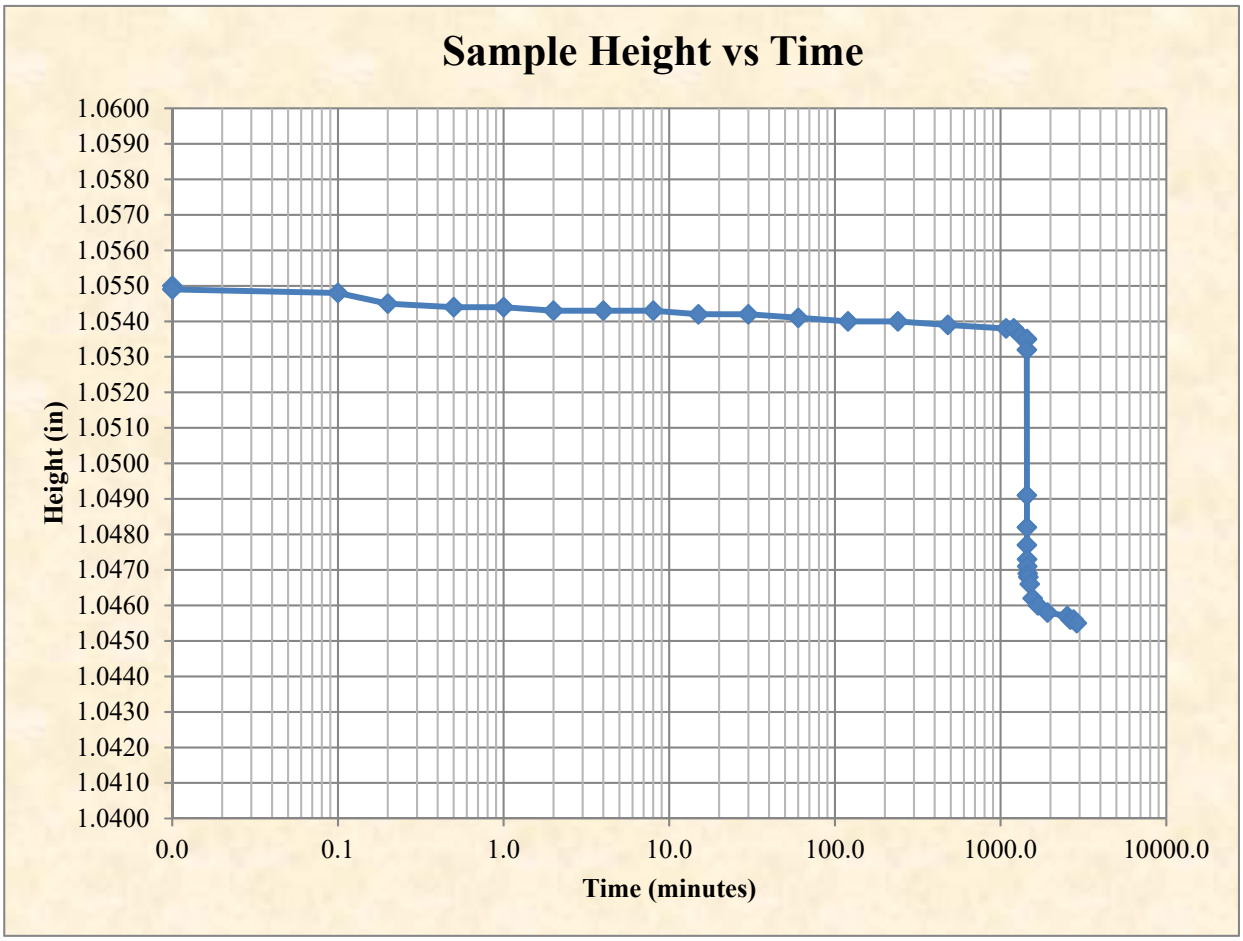
ENGEO
Expect Excellence

Tested by: K. Lecce

Reviewed by: M. Tong

ONE DIMENSIONAL SWELL/COLLAPSE POTENTIAL - METHOD 'C' Modified

ASTM D4546



SAMPLE ID:	**B3 @ 2.5-3'**		**IN-SITU LOAD (psf):** **250**
SAMPLE DESCRIPTION:	**See exploration logs**		**DESIGN LOAD (psf):** **2500**
TYPE OF WATER USED:	**Distilled**	**USCS:** **n/a**	**SOURCE OF WATER:** **Distilled**
TRANSPORTATION METHOD:	**Insulated bucket**		**SAMPLING DATE:** **n/a**
STORAGE ENVIRONMENT:	**Controlled**		**TEST START DATE:** **10/03/22**

Remolded? (Y/N):	**N**	**Initial % Saturation:**	**15.21**
Number of lifts, if remolded:	**n/a**	**Final % Saturation:**	**100.00**
Specific Gravity, <#4 (Measured):	**2.688**	**Initial water content:**	**3.71**
Initial sample height (in):	**1.0550**	**Final water content:**	**23.78**
Dry in-situ load height (in):	**1.0549**	**Post-test dry density (pcf):**	**102.30**
Dry design load height (in):	**1.0535**	*Dry In-situ load % SWELL/COLLAPSE:*	*-0.01*
Wet design load height (in):	**1.0455**	*Dry design load % SWELL/COLLAPSE:*	*-0.13*
Initial sample mass (g):	**133.16**	*Wet design load % SWELL/COLLAPSE:*	*-0.76*
Final saturated sample mass (g):	**158.93**	***Overall % SWELL/COLLAPSE:***	***-0.90***

Testing remarks:

PROJECT NAME:	**G289.01 - Paseo Homes**	**REPORT DATE:**	**10/13/22**
PROJECT NUMBER:	**14368.000.174 PHLAB**		
CLIENT:	**Baez Geotechnical Group, Inc.**		
PHASE NUMBER:	**LAB**		

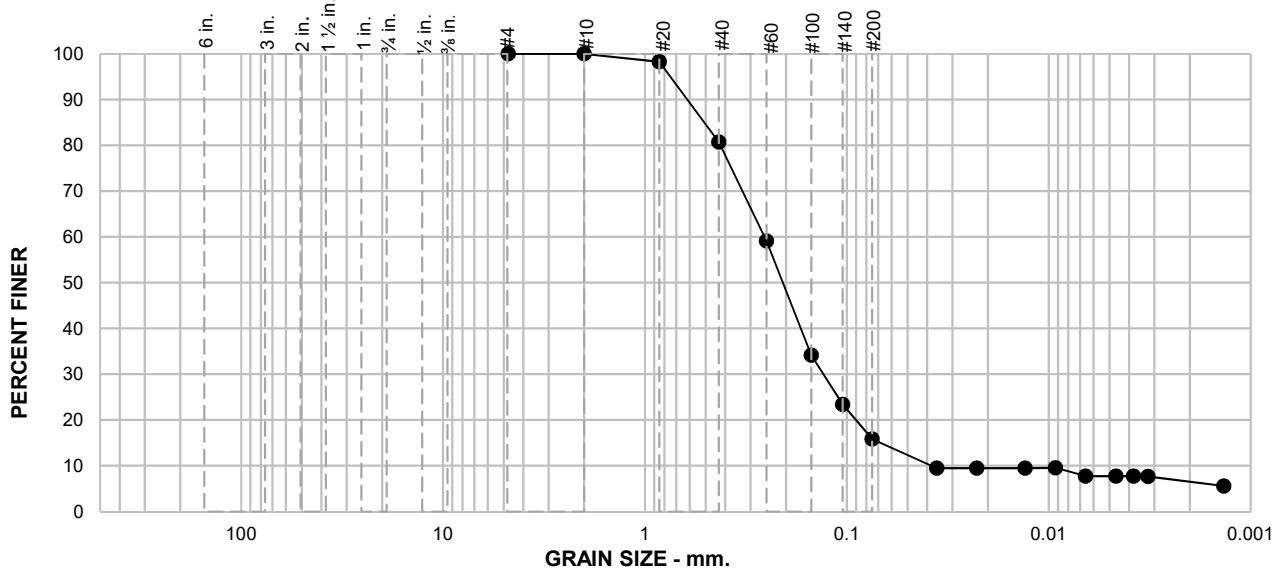
ENGEO
Expect Excellence

Tested by: K. Lecce

Reviewed by: M. Tong

PARTICLE SIZE DISTRIBUTION REPORT

ASTM D422



SAMPLE ID: B4@3-3.5'

DEPTH (ft): 3-3.5

LOCATION: B4

% +75mm	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
				19.3	64.9	9.3	6.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	98.3		
#40	80.7		
#60	59.1		
#100	34.2		
#140	23.4		
#200	15.8		
0.0359 mm.	9.5		
0.0227 mm.	9.5		
0.0131 mm.	9.5		
0.0093 mm.	9.5		
0.0066 mm.	7.7		
0.0047 mm.	7.7		
0.0038 mm.	7.7		
0.0032 mm.	7.7		
0.0014mm.	5.6		

SOIL DESCRIPTION

See exploration logs

ATTERBERG LIMITS

PL = LL = PI =

COEFFICIENTS

D_{90} = 0.6164 mm D_{85} = 0.5079 mm D_{60} = 0.2557 mm

D_{50} = 0.2074 mm D_{30} = 0.1306 mm D_{15} = #DIV/0!

D_{10} = #DIV/0! C_u = #DIV/0! C_c = #DIV/0!

CLASSIFICATION

USCS =

REMARKS

Silt/clay division of 0.002mm used

USCS: ASTM D2487

* (no specification provided)

ENGEO
Expect Excellence

CLIENT: Baez Geotechnical Group, Inc.

PROJECT NAME: G289.01 - Paseo Homes

PROJECT NO: 14368.000.173 PHLAB

PROJECT LOCATION: Oakley, CA

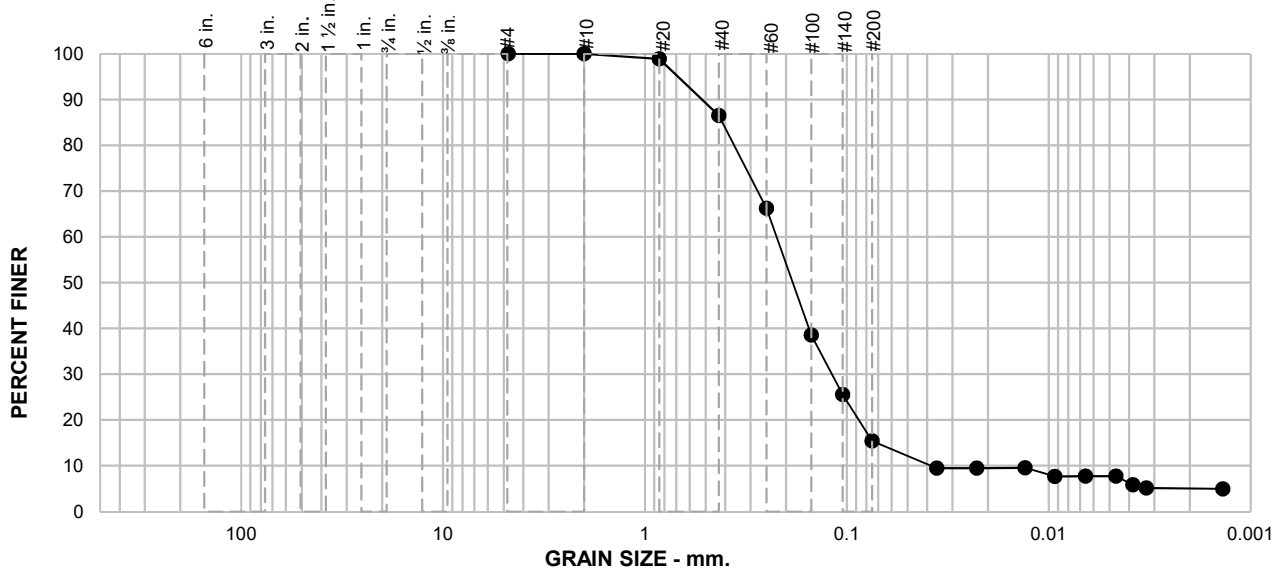
REPORT DATE: 10/10/2022

TESTED BY: K. Lecce

REVIEWED BY: M. Tong

PARTICLE SIZE DISTRIBUTION REPORT

ASTM D422



SAMPLE ID: B2@5.5-6'

DEPTH (ft): 5.5-6

LOCATION: B2

% +75mm	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
				13.5	71.1	10.4	5.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	100.0		
#20	98.9		
#40	86.5		
#60	66.3		
#100	38.6		
#140	25.6		
#200	15.4		
0.0359 mm.	9.5		
0.0227 mm.	9.5		
0.0131 mm.	9.5		
0.0093 mm.	7.7		
0.0066 mm.	7.7		
0.0047 mm.	7.7		
0.0038 mm.	5.8		
0.0033 mm.	5.1		
0.0014mm.	4.9		

SOIL DESCRIPTION

See exploration logs

ATTERBERG LIMITS

PL = LL = PI =

COEFFICIENTS

D_{90} = 0.5212 mm D_{85} = 0.4130 mm D_{60} = 0.2226 mm

D_{50} = 0.1851 mm D_{30} = 0.1185 mm D_{15} = #N/A

D_{10} = #N/A C_u = #N/A C_c = #N/A

CLASSIFICATION

USCS =

REMARKS

Silt/clay division of 0.002mm used
USCS: ASTM D2487

* (no specification provided)

ENGEO
Expect Excellence

CLIENT: Baez Geotechnical Group, Inc.

PROJECT NAME: G289.01 - Paseo Homes

PROJECT NO: 14368.000.173 PHLAB

PROJECT LOCATION: Oakley, CA

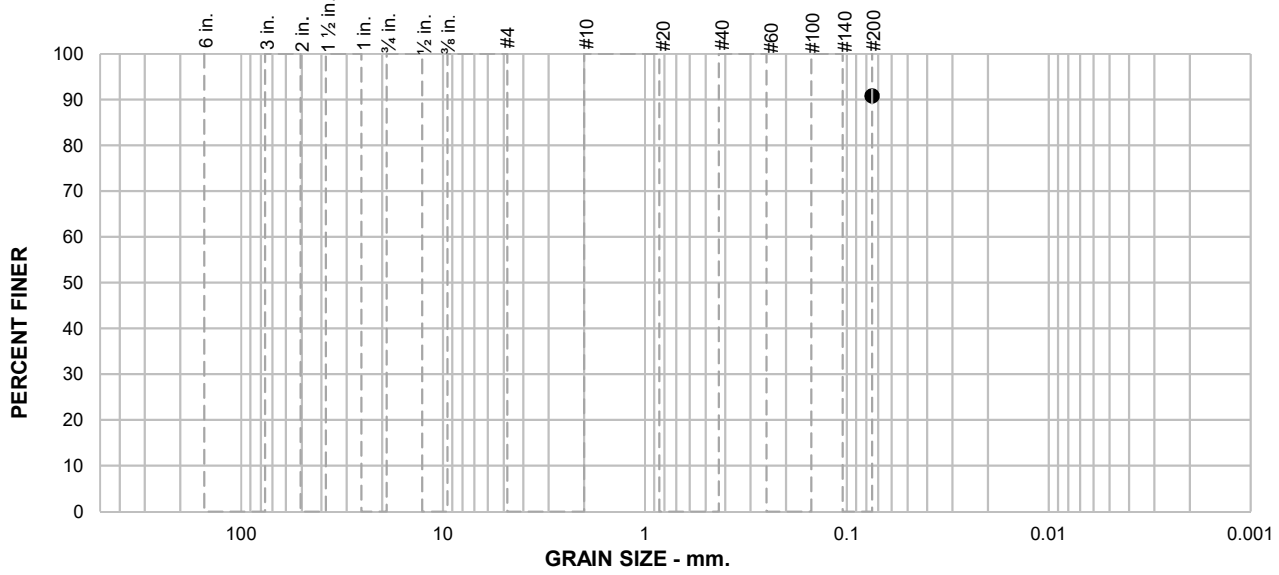
REPORT DATE: 10/10/2022

TESTED BY: K. Lecce

REVIEWED BY: M. Tong

PARTICLE SIZE DISTRIBUTION REPORT

ASTM D1140, Method B



SAMPLE ID: B1 @ 13.5-15'

DEPTH (ft): 13.5-15

LOCATION: B1

% +75mm	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
						90.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	90.8		

SOIL DESCRIPTION

See exploration logs

ATTERBERG LIMITS

PL = LL = PI =

COEFFICIENTS

D_{90} = D_{85} = D_{60} =
D_{50} = D_{30} = D_{15} =
D_{10} = C_u = C_c =

CLASSIFICATION

USCS =

REMARKS

Soak time = 180 min
Dry sample weight = 296.4 g
Largest particle size < No. 4 Sieve

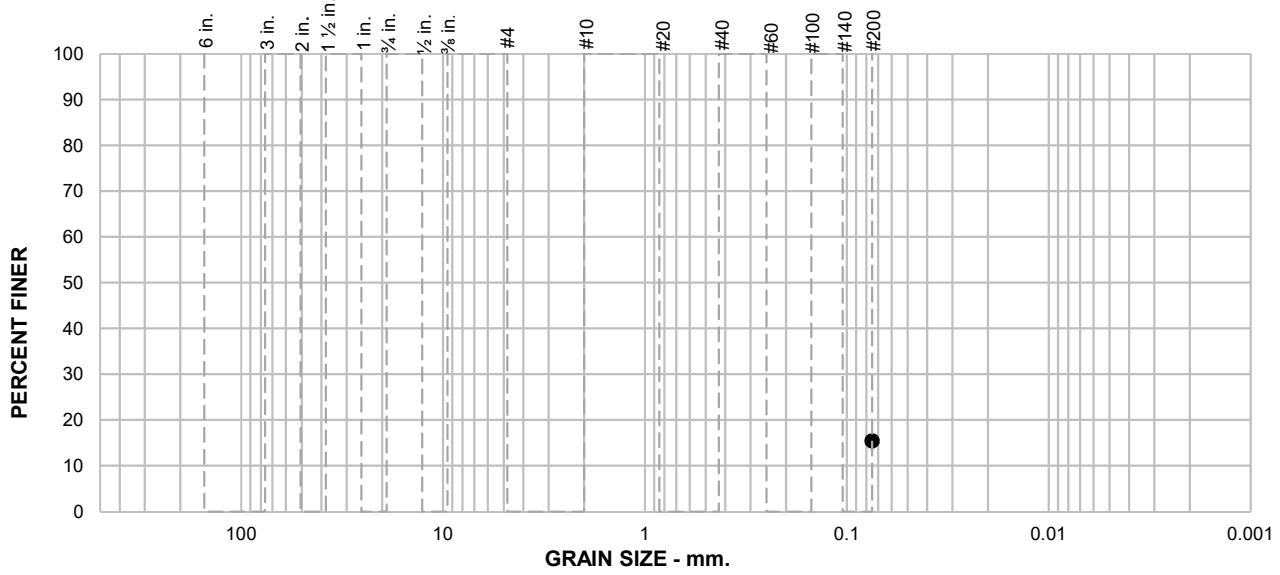
* (no specification provided)

ENGEO
Expect Excellence

CLIENT: Baez Geotechnical Group, Inc.
PROJECT NAME: G289.01 - Paseo Homes
PROJECT NO: 14368.000.174 PHLAB
PROJECT LOCATION: Oakley, CA
REPORT DATE: 10/6/2022
TESTED BY: K. Lecce
REVIEWED BY: M. Tong

PARTICLE SIZE DISTRIBUTION REPORT

ASTM D1140, Method B



SAMPLE ID: B2 @ 13.5-15'

DEPTH (ft): 13.5-15

LOCATION: B2

% +75mm	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
						15.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	15.4		

SOIL DESCRIPTION

See exploration logs

ATTERBERG LIMITS

PL = LL = PI =

COEFFICIENTS

D_{90} = D_{85} = D_{60} =
D_{50} = D_{30} = D_{15} =
D_{10} = C_u = C_c =

CLASSIFICATION

USCS =

REMARKS

Soak time = 180 min
Dry sample weight = 331.55 g
Largest particle size < No. 4 Sieve

* (no specification provided)

ENGEO
Expect Excellence

CLIENT: Baez Geotechnical Group, Inc.

PROJECT NAME: G289.01 - Paseo Homes

PROJECT NO: 14368.000.174 PHLAB

PROJECT LOCATION: Oakley, CA

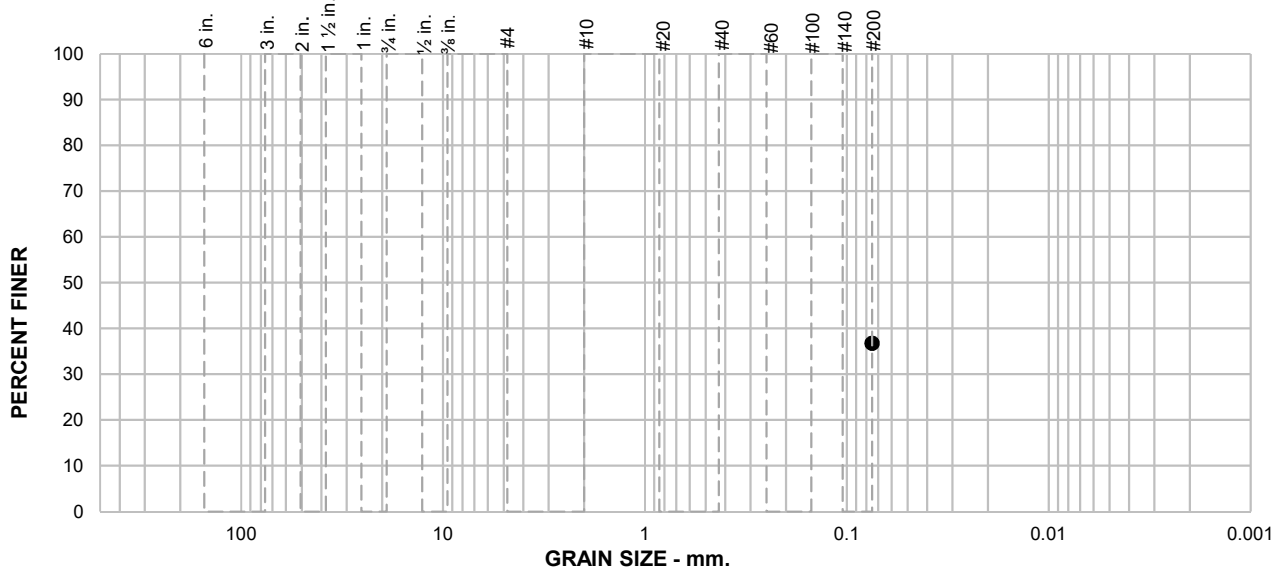
REPORT DATE: 10/6/2022

TESTED BY: K. Lecce

REVIEWED BY: M. Tong

PARTICLE SIZE DISTRIBUTION REPORT

ASTM D1140, Method B



SAMPLE ID: B4 @ 18.5-20'

DEPTH (ft): 18.5-20

LOCATION: B4

% +75mm	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
						36.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	36.7		

SOIL DESCRIPTION

See exploration logs

ATTERBERG LIMITS

PL = LL = PI =

COEFFICIENTS

D_{90} = D_{85} = D_{60} =
D_{50} = D_{30} = D_{15} =
D_{10} = C_u = C_c =

CLASSIFICATION

USCS =

REMARKS

Soak time = 180 min
Dry sample weight = 419.4 g
Largest particle size < No. 4 Sieve

* (no specification provided)

ENGEO
Expect Excellence

CLIENT: Baez Geotechnical Group, Inc.

PROJECT NAME: G289.01 - Paseo Homes

PROJECT NO: 14368.000.174 PHLAB

PROJECT LOCATION: Oakley, CA

REPORT DATE: 10/6/2022

TESTED BY: K. Lecce

REVIEWED BY: M. Tong

APPENDIX D

CERCO Analytical Corrosion Test Results

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

31 October, 2022

Job No. 2210010
Cust. No. 13042

Ms. Stefanie Parman
Baez Geotechnical Group, Inc.
P.O. Box 3808
Turlock, CA 95381

Subject: Project No.: G289.01
Project Name: Oakley Paseos, Oakley
Corrosivity Analysis – ASTM Methods

Dear Ms. Parman:

Pursuant to your request, CERCO Analytical has analyzed the soil sample submitted on October 06, 2022. Based on the analytical results, this brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurement, the sample is classified as "mildly corrosive". All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentration is none detected with a reporting limit of 15 mg/kg.

The sulfate ion concentration is 29 mg/kg and is determined to be insufficient to damage reinforced concrete structures and cement mortar-coated steel at this location.

The sulfide ion concentrations reflect none detected with a reporting limit of 50 mg/kg.

The pH of the soil is 7.53, which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

The redox potential is 300-mV and is indicative of potentially "slightly corrosive" soils resulting from anaerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific long-term corrosion control design recommendations or consultation, please call *JDH Corrosion Consultants, Inc. at (925) 927-6630.*

We appreciate the opportunity of working with you on this project. If you have any questions, or if you require further information, please do not hesitate to contact us.

Very truly yours,
CERCO ANALYTICAL, INC.

Allen Moore
J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

Client: Baez Geotechnical Group
Client's Project No.: G289.01
Client's Project Name: Oakley Paseos, Oakley
Date Sampled: 30-Sep-22
Date Received: 6-Oct-22
Matrix: Soil
Authorization: Signed Chain of Custody

Date of Report: 31-Oct-2022

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
2210010-001	B1 @ 4.5-5.0'	300	7.53	-	12,000	N.D.	N.D.	29

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	10	-	50	15	15
Date Analyzed:	24-Oct-2022	24-Oct-2022	-	24-Oct-2022	28-Oct-2022	22-Oct-2022	22-Oct-2022

Sherri Moore
Chemist

* Results Reported on "As Received" Basis
N.D. - None Detected

Quality Control Summary - All laboratory quality control parameters were found to be within established limits

834

Chain of Custody

22-10010

Page 1 of 1

Concord, CA 94520-1006
925 462 2771
Fax: 925 462 2775
CERCO analytical

Job No.	CU#		Client Project I.D.	Schedule		Date Sampled	Date Due
G289.01			Oakley Paseos	Analyte		9/30/2022	Standard

Full Name Stefanie Parman, smp@baezgeotechnicalgroup.com **Phone** Office (209) 602-6569

Company and/or Mailing Address Baez Geotechncial Group, PO Box 296, Oakdale, CA 95361 **Cell** (209) 602-6569

Sample Source G298.01 - Oakley Paseos - Oakley, CA

ANALYSIS — **ASTM**

Lab No.	Sample I.D.	Date	Time	Matrix	Contain.	Size	Preserv.	Qtv.	Redox Potential	pH	Sulfate	Chloride	Resistivity-100% Saturated	Sulfides		Brief Evaluation						
1	B1 @ 4.5-5.0'	9/30/2022		S	Baggy			1	X	X	X	X	X	X		X						

MATRIX: DW - Drinking Water; GW - Ground Water; SW - Surface Water; WW - Waste Water; Water; SL - Sludge; S - Soil; Product

ABBREVIATIONS: HB - Hosebib; PV - Petcock Valve; PT - Pressure Tank; PH - Pump House; RR - Restroom; GL - Glass; PL - Plastic; ST - Sterile

SAMPLE RECEIPT: Total No. of Containers; Rec'd Good Cond/Cold; Conforms to Record; Temp. a t Lab -°C; Sampler

Relinquished By: Date 6 AM Time 10/6/22

Received By: Allen Moore Date 1445 Time 10/6/22

Relinquished By: Date Time

Received By: Date Time

Relinquished By: Date Time

Received By: Date Time

Comments:

THERE IS AN ADDITIONAL CHARGE FOR EXTRUDING SOIL FROM METAL TUBES

Email Address smp@baezgeotechnicalgroup.com

835

APPENDIX E

CLiq Liquefaction Analyses Reports
for Groundwater at 20-feet Deep

Baez Geotechnical Group
Geotechnical Engineers
BGG
http://www.baezgeotechnicalgroup.com

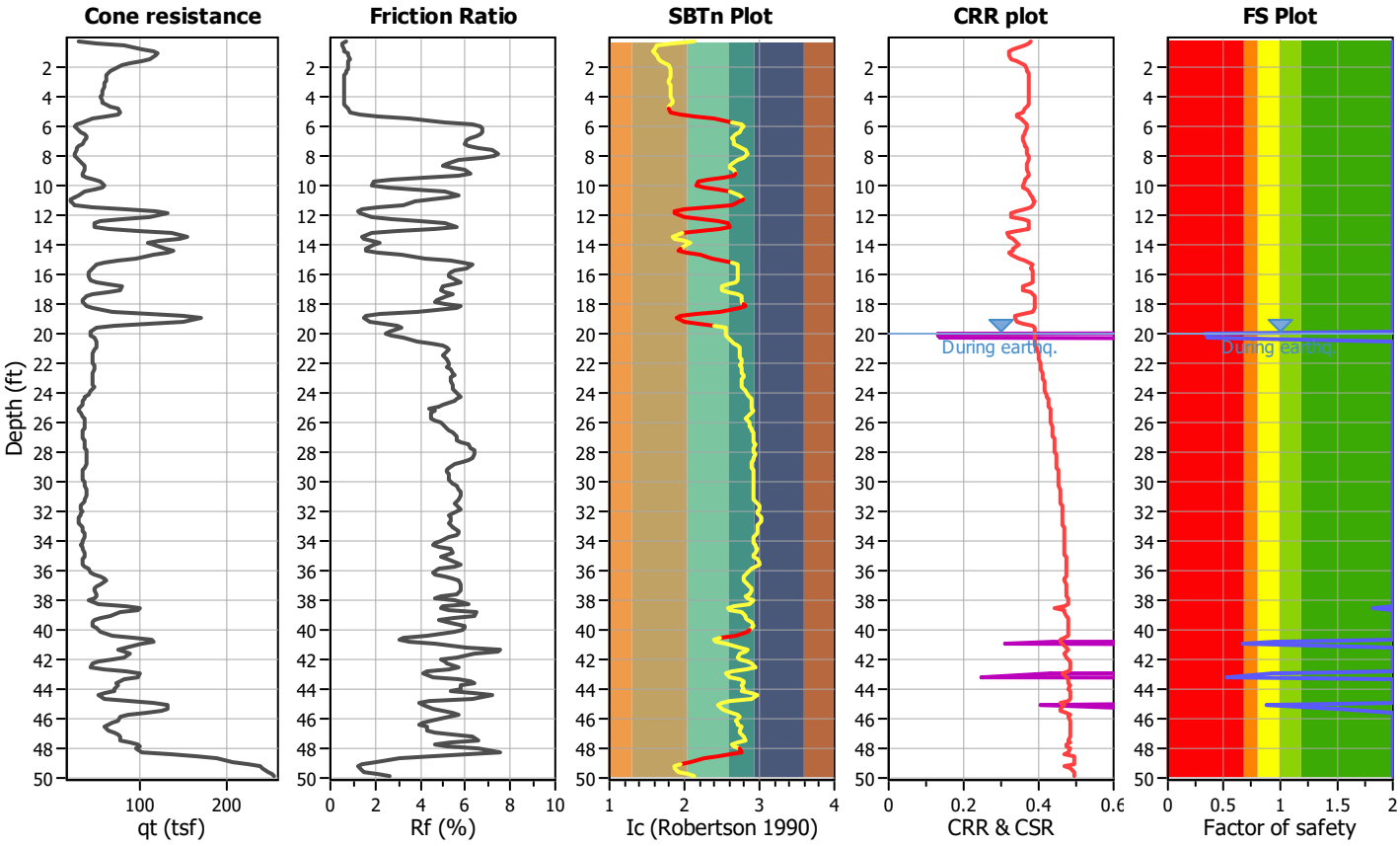
LIQUEFACTION ANALYSIS REPORT

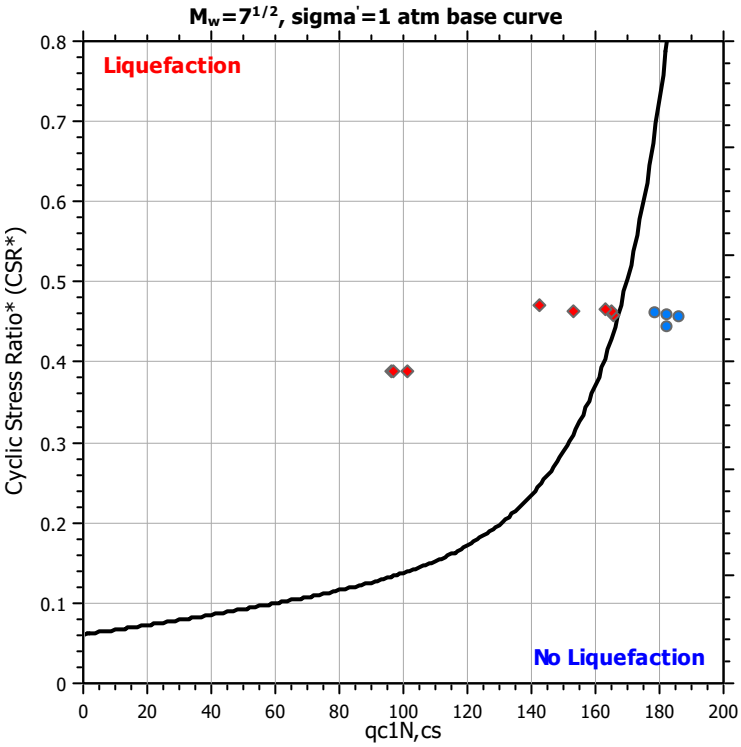
Project title : G289.01 Paseo **Location : Oakley Road, Oakley**

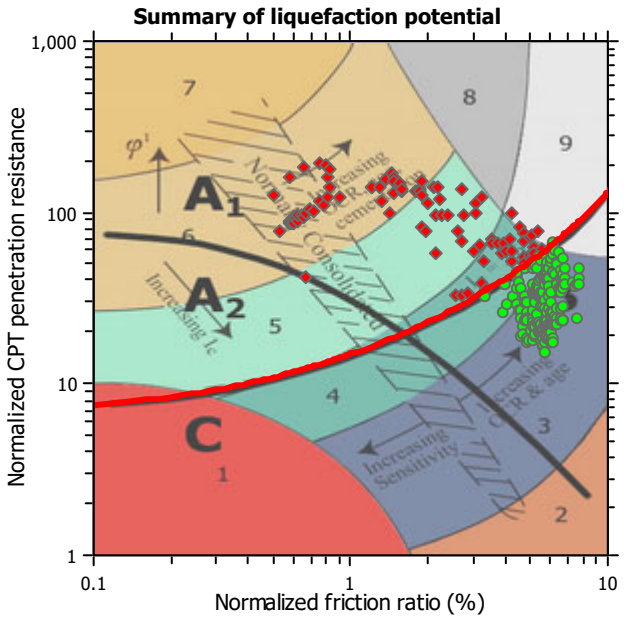
CPT file : CPT-01

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	20.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	20.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

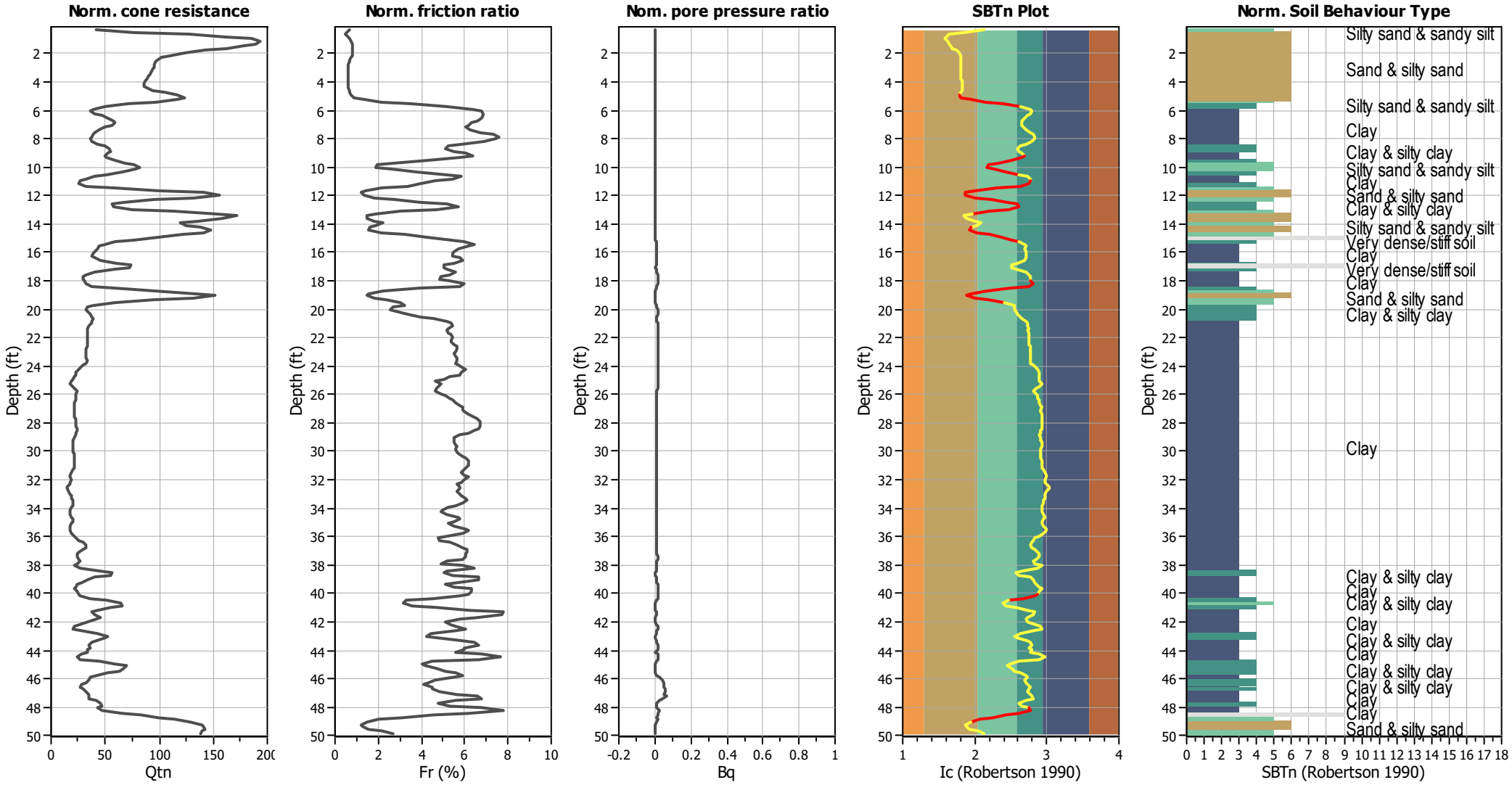






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normalized)



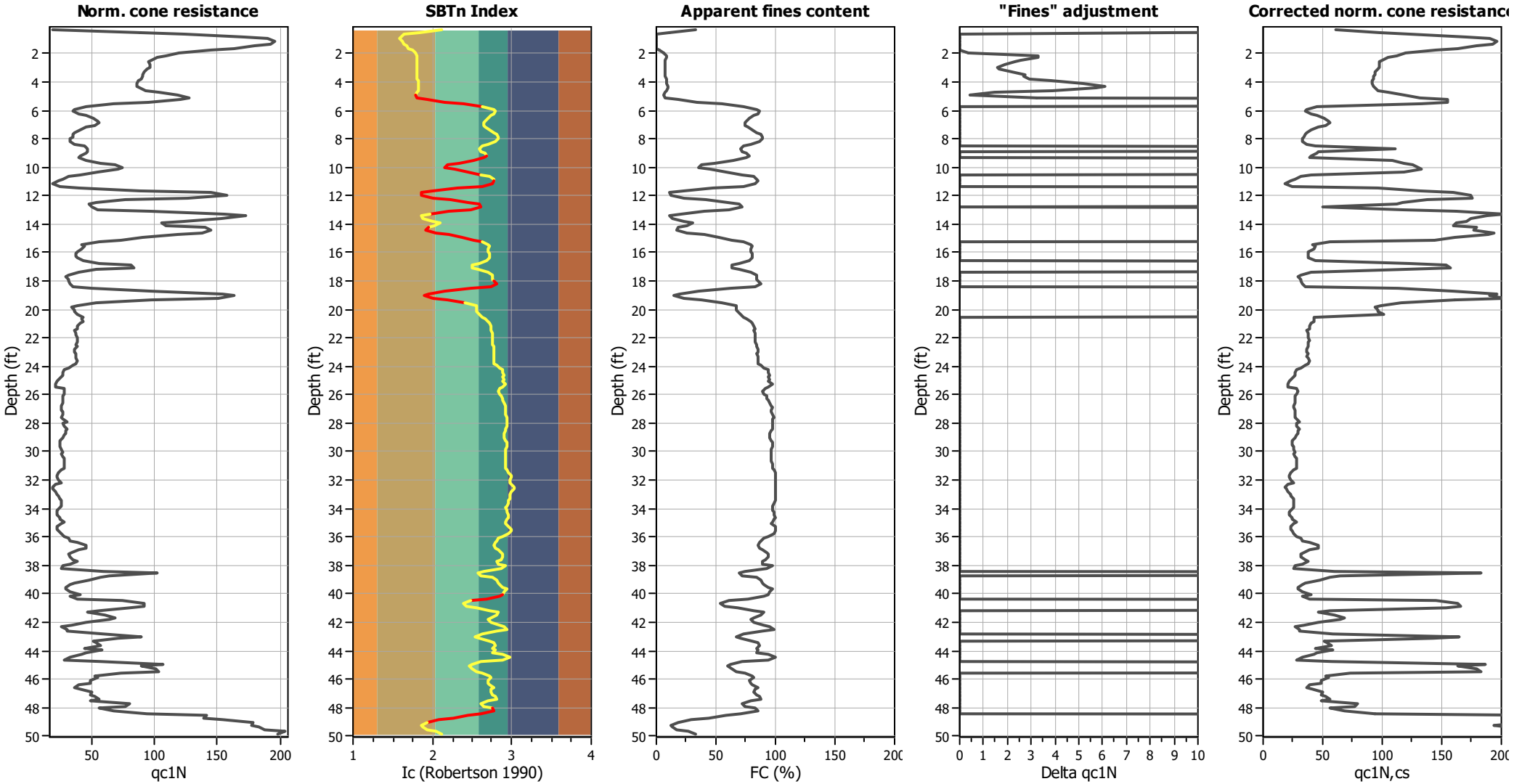
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

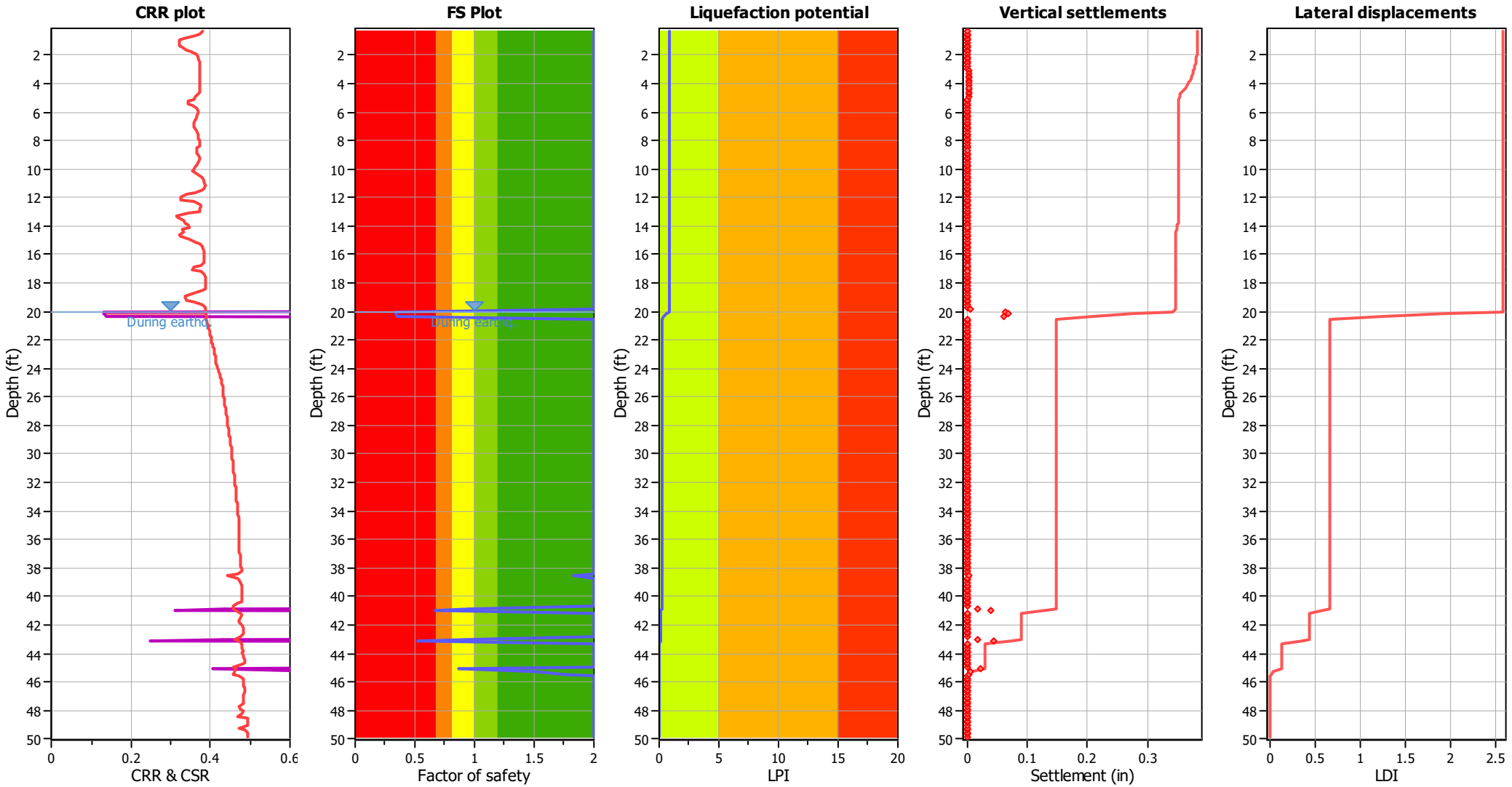
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	N/A

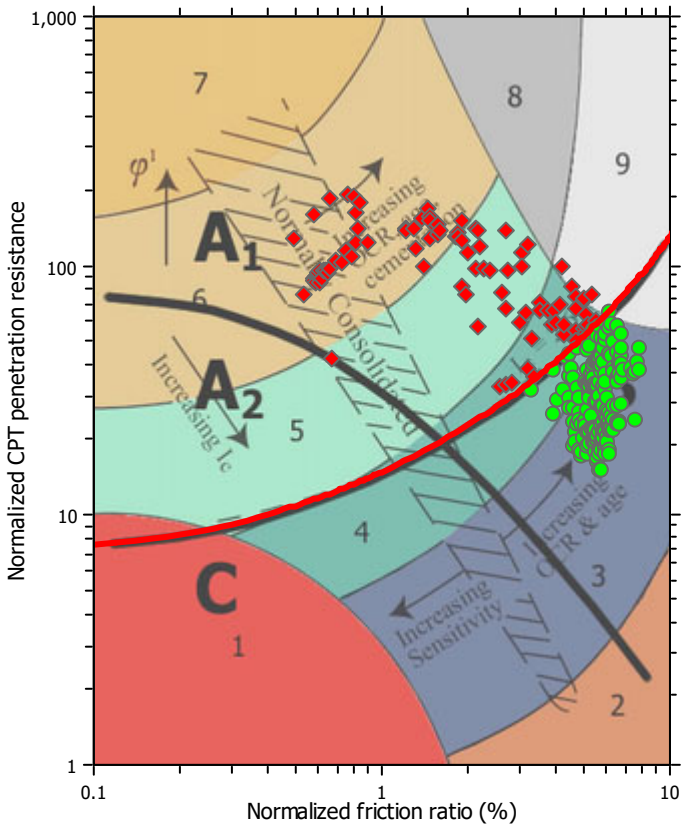
F.S. color scheme

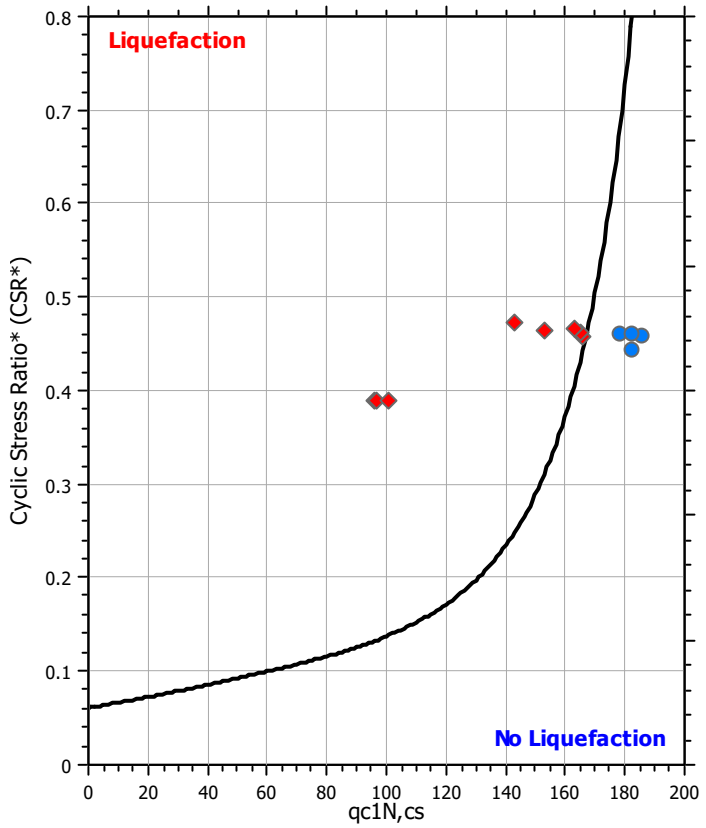
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

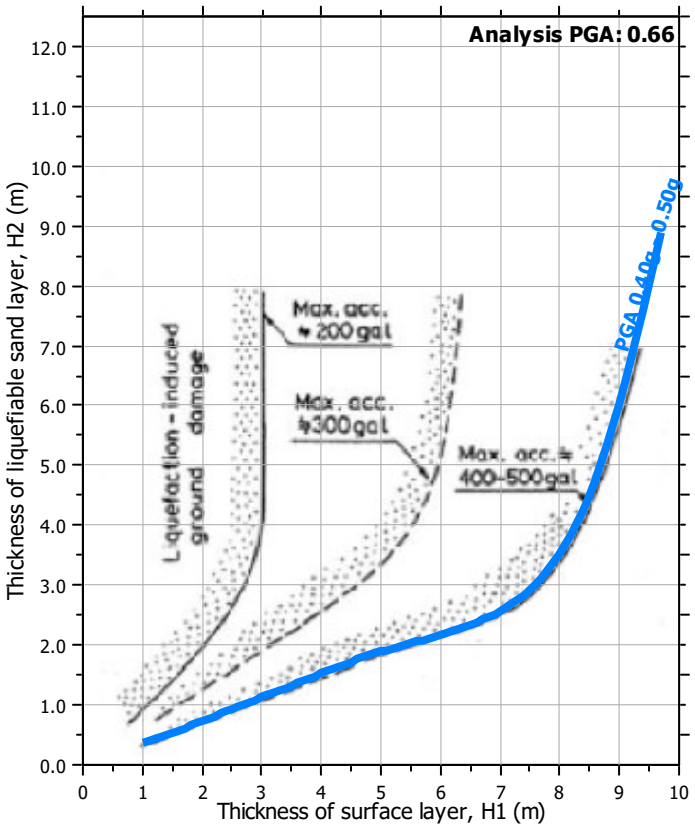
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



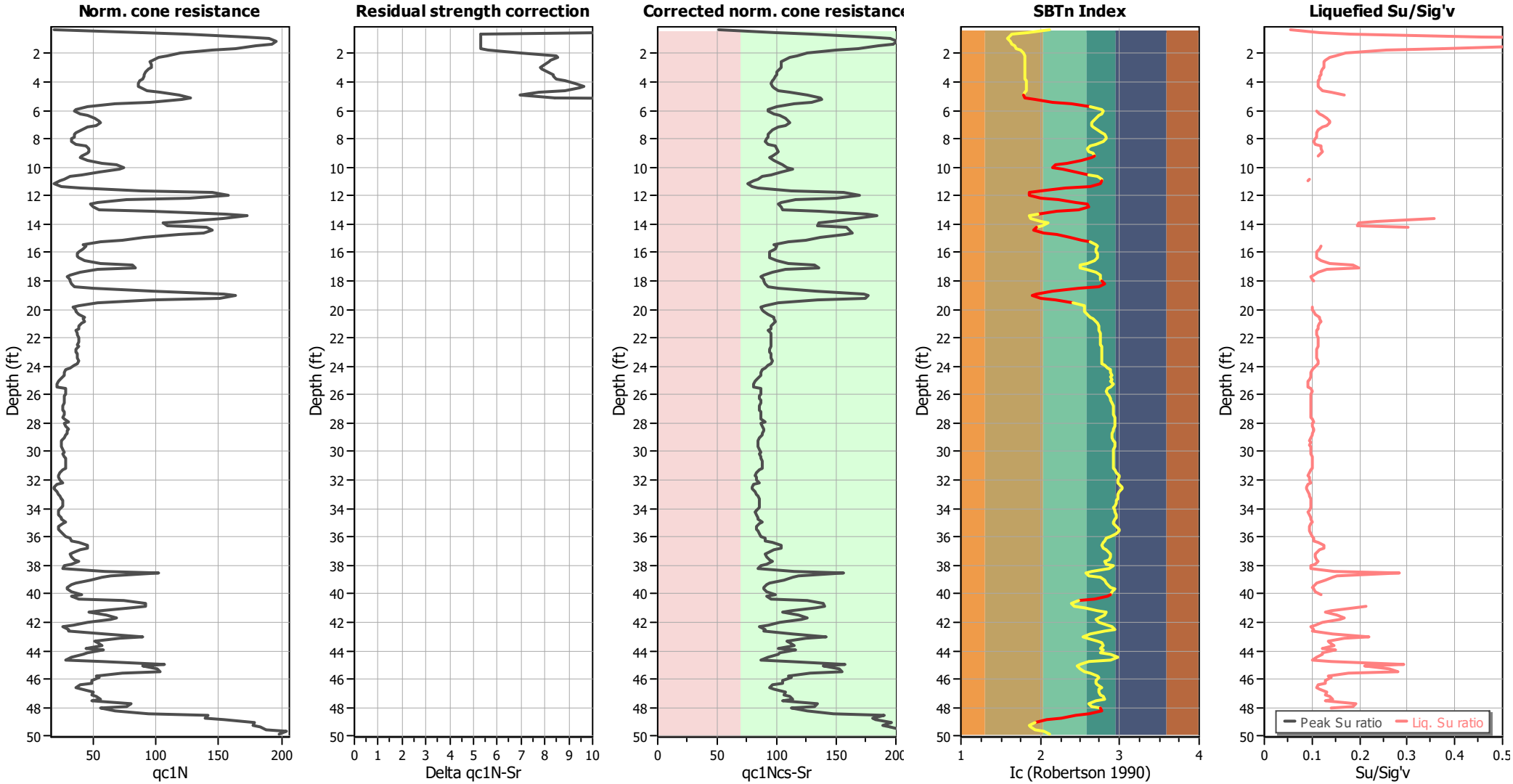




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	N/A

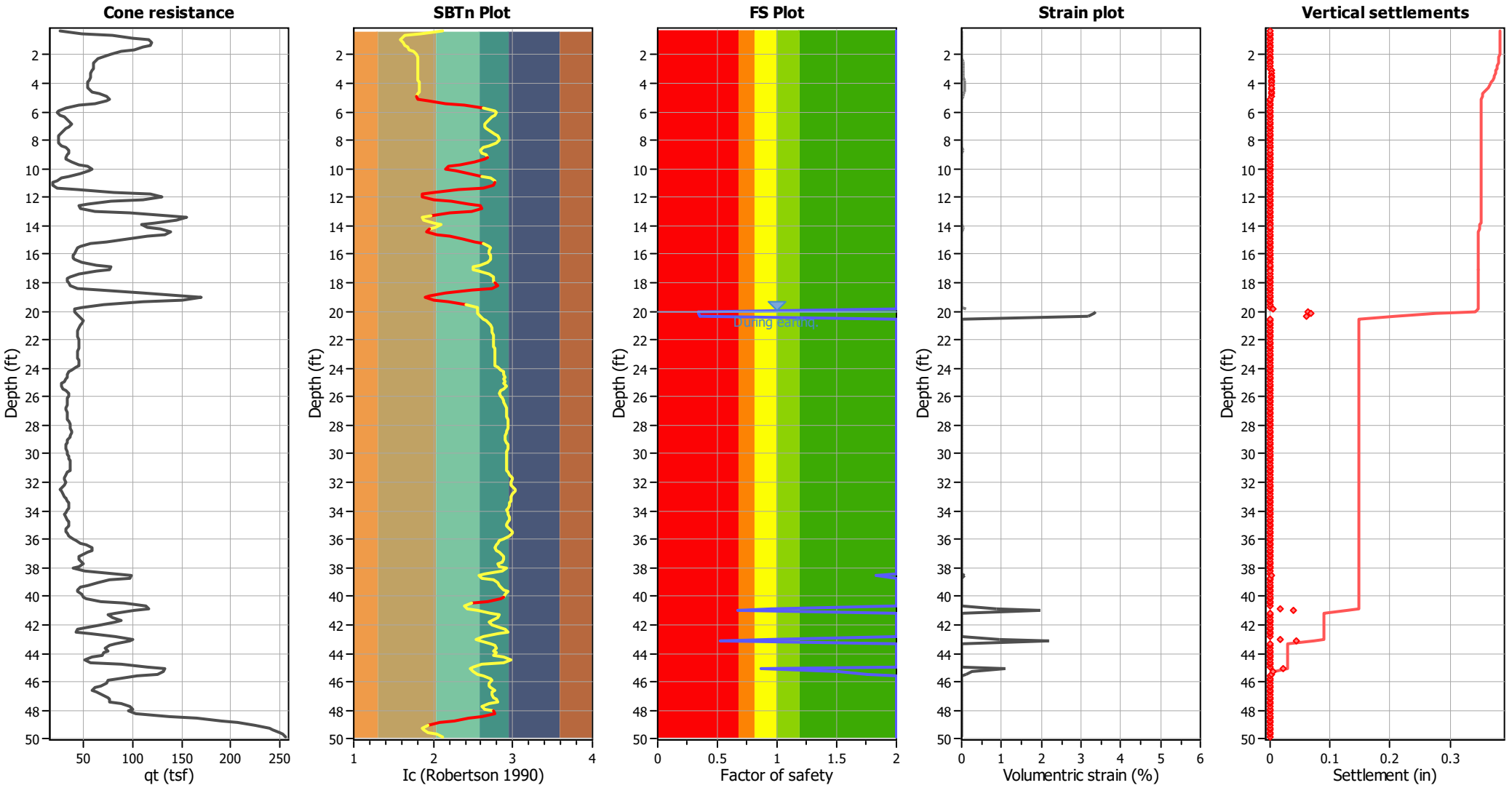
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement of dry sands ::

Depth (ft)	Ic	Q_{tn}	K_c	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
0.33	2.12	42.17	1.45	61.16	13	346	0.38	0.003	0.01	10.85	0.00	0.000
0.49	1.85	76.97	1.20	92.10	18	446	0.37	0.003	0.00	10.85	0.00	0.000
0.66	1.64	127.62	1.00	127.62	23	573	0.36	0.003	0.00	10.85	0.00	0.000
0.82	1.60	161.72	1.00	161.72	29	686	0.33	0.004	0.00	10.85	0.00	0.000
0.98	1.59	185.75	1.00	185.75	33	776	0.32	0.004	0.00	10.85	0.00	0.000
1.15	1.62	192.85	1.00	192.85	35	837	0.32	0.004	0.00	10.85	0.00	0.000
1.31	1.64	189.20	1.00	189.20	35	845	0.32	0.005	0.00	10.85	0.00	0.000
1.48	1.67	178.36	1.00	178.36	33	828	0.33	0.006	0.00	10.85	0.00	0.000
1.64	1.69	162.39	1.00	162.39	30	777	0.34	0.007	0.00	10.85	0.00	0.000
1.80	1.74	142.29	1.07	152.18	29	723	0.35	0.009	0.01	10.85	0.00	0.000
1.97	1.78	124.01	1.13	140.22	27	663	0.37	0.012	0.01	10.85	0.01	0.000
2.13	1.81	109.75	1.17	128.08	25	611	0.37	0.015	0.01	10.85	0.01	0.000
2.30	1.81	102.56	1.17	119.78	23	571	0.37	0.019	0.02	10.85	0.01	0.001
2.46	1.81	98.10	1.16	114.04	22	543	0.37	0.024	0.02	10.85	0.02	0.001
2.62	1.81	95.99	1.16	111.42	22	530	0.37	0.028	0.03	10.85	0.02	0.001
2.79	1.80	95.50	1.16	110.48	21	525	0.37	0.032	0.03	10.85	0.03	0.001
2.95	1.80	95.11	1.15	109.70	21	521	0.37	0.036	0.03	10.85	0.03	0.001
3.12	1.80	93.86	1.15	108.32	21	514	0.37	0.041	0.04	10.85	0.03	0.001
3.28	1.81	92.13	1.16	106.88	21	508	0.37	0.046	0.04	10.85	0.04	0.001
3.45	1.81	90.78	1.16	105.71	21	504	0.37	0.052	0.05	10.85	0.04	0.002
3.61	1.81	89.85	1.16	104.61	20	498	0.37	0.058	0.06	10.85	0.05	0.002
3.77	1.81	88.61	1.17	103.31	20	492	0.37	0.066	0.07	10.85	0.06	0.002
3.94	1.82	87.31	1.17	102.36	20	489	0.37	0.073	0.07	10.85	0.06	0.003
4.10	1.83	86.33	1.18	101.88	20	489	0.37	0.079	0.08	10.85	0.07	0.003
4.27	1.83	86.48	1.18	102.45	20	493	0.37	0.083	0.08	10.85	0.07	0.003
4.43	1.83	88.50	1.18	104.68	20	503	0.37	0.083	0.08	10.85	0.07	0.003
4.59	1.82	94.16	1.17	110.41	21	528	0.37	0.076	0.07	10.85	0.06	0.002
4.76	1.80	104.32	1.15	120.17	23	570	0.37	0.063	0.05	10.85	0.05	0.002
4.92	1.78	116.14	1.13	131.49	25	622	0.36	0.052	0.04	10.85	0.03	0.001
5.09	1.81	122.98	1.17	143.32	0	0	0.36	0.000	0.00	0.00	0.00	0.000
5.25	1.94	116.80	1.26	147.50	0	0	0.34	0.000	0.00	0.00	0.00	0.000
5.41	2.14	97.03	1.49	144.78	0	0	0.34	0.000	0.00	0.00	0.00	0.000
5.58	2.40	70.77	2.35	166.57	0	0	0.35	0.000	0.00	0.00	0.00	0.000
5.74	2.63	49.45	3.98	196.89	0	0	0.37	0.000	0.00	0.00	0.00	0.000
5.91	2.77	38.40	5.47	209.91	0	0	0.37	0.000	0.00	0.00	0.00	0.000
6.07	2.80	36.73	5.82	213.95	0	0	0.37	0.000	0.00	0.00	0.00	0.000
6.23	2.77	40.35	5.54	223.41	0	0	0.37	0.000	0.00	0.00	0.00	0.000
6.40	2.73	46.55	5.08	236.24	0	0	0.36	0.000	0.00	0.00	0.00	0.000
6.56	2.69	52.79	4.64	245.22	0	0	0.36	0.000	0.00	0.00	0.00	0.000
6.73	2.66	57.48	4.29	246.86	0	0	0.36	0.000	0.00	0.00	0.00	0.000
6.89	2.64	58.70	4.13	242.58	0	0	0.36	0.000	0.00	0.00	0.00	0.000
7.05	2.65	55.79	4.18	233.18	0	0	0.36	0.000	0.00	0.00	0.00	0.000
7.22	2.67	50.21	4.39	220.65	0	0	0.36	0.000	0.00	0.00	0.00	0.000
7.38	2.72	44.25	4.89	216.16	0	0	0.37	0.000	0.00	0.00	0.00	0.000
7.55	2.77	40.38	5.47	220.68	0	0	0.37	0.000	0.00	0.00	0.00	0.000
7.71	2.81	38.55	5.98	230.66	0	0	0.37	0.000	0.00	0.00	0.00	0.000
7.87	2.83	37.51	6.24	233.93	0	0	0.37	0.000	0.00	0.00	0.00	0.000
8.04	2.83	36.86	6.21	228.94	0	0	0.37	0.000	0.00	0.00	0.00	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	K_c	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
8.20	2.80	37.91	5.81	220.38	0	0	0.37	0.000	0.00	0.00	0.00	0.000
8.37	2.70	43.10	4.74	204.17	0	0	0.37	0.000	0.00	0.00	0.00	0.000
8.53	2.63	49.30	4.02	197.97	0	0	0.37	0.000	0.00	0.00	0.00	0.000
8.69	2.59	54.10	3.69	199.60	54	808	0.37	0.069	0.02	10.85	0.02	0.001
8.86	2.61	54.94	3.87	212.58	0	0	0.37	0.000	0.00	0.00	0.00	0.000
9.02	2.66	52.89	4.26	225.31	0	0	0.37	0.000	0.00	0.00	0.00	0.000
9.19	2.69	50.26	4.58	230.01	0	0	0.37	0.000	0.00	0.00	0.00	0.000
9.35	2.65	50.88	4.24	215.84	0	0	0.37	0.000	0.00	0.00	0.00	0.000
9.51	2.51	58.70	3.07	180.40	0	0	0.37	0.000	0.00	0.00	0.00	0.000
9.68	2.33	68.01	2.03	138.23	0	0	0.36	0.000	0.00	0.00	0.00	0.000
9.84	2.19	77.13	1.59	122.32	0	0	0.36	0.000	0.00	0.00	0.00	0.000
10.01	2.16	81.95	1.52	124.55	0	0	0.36	0.000	0.00	0.00	0.00	0.000
10.17	2.27	78.09	1.82	142.30	0	0	0.36	0.000	0.00	0.00	0.00	0.000
10.34	2.44	66.43	2.58	171.15	0	0	0.37	0.000	0.00	0.00	0.00	0.000
10.50	2.62	51.14	3.90	199.54	0	0	0.38	0.000	0.00	0.00	0.00	0.000
10.66	2.73	39.77	4.99	198.55	0	0	0.38	0.000	0.00	0.00	0.00	0.000
10.83	2.77	32.16	5.48	176.12	0	0	0.38	0.000	0.00	0.00	0.00	0.000
10.99	2.78	26.81	5.60	150.11	0	0	0.39	0.000	0.00	0.00	0.00	0.000
11.16	2.75	25.55	5.22	133.49	0	0	0.39	0.000	0.00	0.00	0.00	0.000
11.32	2.63	31.90	4.00	127.53	0	0	0.39	0.000	0.00	0.00	0.00	0.000
11.48	2.31	57.34	1.97	112.69	0	0	0.38	0.000	0.00	0.00	0.00	0.000
11.65	2.01	99.91	1.31	131.35	0	0	0.36	0.000	0.00	0.00	0.00	0.000
11.81	1.86	140.78	1.21	169.75	0	0	0.34	0.000	0.00	0.00	0.00	0.000
11.98	1.86	155.06	1.21	187.89	0	0	0.33	0.000	0.00	0.00	0.00	0.000
12.14	2.01	132.13	1.31	173.48	0	0	0.33	0.000	0.00	0.00	0.00	0.000
12.30	2.23	95.69	1.69	162.17	0	0	0.36	0.000	0.00	0.00	0.00	0.000
12.47	2.45	66.75	2.67	178.44	0	0	0.37	0.000	0.00	0.00	0.00	0.000
12.63	2.58	56.93	3.61	205.35	0	0	0.38	0.000	0.00	0.00	0.00	0.000
12.80	2.62	57.07	3.90	222.74	0	0	0.37	0.000	0.00	0.00	0.00	0.000
12.96	2.47	75.02	2.80	210.39	0	0	0.37	0.000	0.00	0.00	0.00	0.000
13.12	2.22	113.06	1.65	186.88	0	0	0.34	0.000	0.00	0.00	0.00	0.000
13.29	1.97	153.26	1.29	197.16	0	0	0.32	0.000	0.00	0.00	0.00	0.000
13.45	1.85	171.19	1.20	206.15	0	0	0.32	0.000	0.00	0.00	0.00	0.000
13.62	1.88	158.82	1.22	194.00	39	1393	0.33	0.040	0.02	10.85	0.02	0.001
13.78	2.00	135.37	1.31	176.85	37	1380	0.34	0.042	0.02	10.85	0.02	0.001
13.94	2.09	119.90	1.41	168.75	36	1374	0.34	0.043	0.02	10.85	0.02	0.001
14.11	2.03	125.27	1.34	167.51	35	1350	0.35	0.045	0.02	10.85	0.02	0.001
14.27	1.94	138.13	1.27	174.95	36	1352	0.33	0.046	0.02	10.85	0.02	0.001
14.44	1.92	147.83	1.25	184.91	0	0	0.33	0.000	0.00	0.00	0.00	0.000
14.60	2.03	140.89	1.34	188.55	0	0	0.32	0.000	0.00	0.00	0.00	0.000
14.76	2.21	122.46	1.64	201.23	0	0	0.32	0.000	0.00	0.00	0.00	0.000
14.93	2.36	99.54	2.19	217.98	0	0	0.35	0.000	0.00	0.00	0.00	0.000
15.09	2.51	77.04	3.07	236.20	0	0	0.36	0.000	0.00	0.00	0.00	0.000
15.26	2.62	59.66	3.93	234.28	0	0	0.37	0.000	0.00	0.00	0.00	0.000
15.42	2.70	49.10	4.69	230.25	0	0	0.38	0.000	0.00	0.00	0.00	0.000
15.58	2.72	44.03	4.89	215.29	0	0	0.38	0.000	0.00	0.00	0.00	0.000
15.75	2.70	42.39	4.72	199.89	0	0	0.38	0.000	0.00	0.00	0.00	0.000
15.91	2.71	40.13	4.77	191.32	0	0	0.38	0.000	0.00	0.00	0.00	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	K_c	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
16.08	2.71	38.40	4.86	186.80	0	0	0.38	0.000	0.00	0.00	0.00	0.000
16.24	2.72	38.24	4.89	186.95	0	0	0.39	0.000	0.00	0.00	0.00	0.000
16.40	2.72	40.08	4.93	197.70	0	0	0.38	0.000	0.00	0.00	0.00	0.000
16.57	2.69	46.29	4.59	212.49	0	0	0.38	0.000	0.00	0.00	0.00	0.000
16.73	2.59	60.69	3.63	220.35	59	1471	0.38	0.048	0.01	10.85	0.01	0.000
16.90	2.50	74.00	2.99	221.32	57	1630	0.36	0.041	0.01	10.85	0.01	0.000
17.06	2.50	72.68	3.01	218.69	56	1621	0.36	0.042	0.01	10.85	0.01	0.000
17.23	2.58	58.49	3.55	207.74	56	1441	0.38	0.053	0.02	10.85	0.01	0.001
17.39	2.71	40.87	4.77	194.90	0	0	0.38	0.000	0.00	0.00	0.00	0.000
17.55	2.76	32.54	5.37	174.69	0	0	0.39	0.000	0.00	0.00	0.00	0.000
17.72	2.76	29.63	5.42	160.62	0	0	0.39	0.000	0.00	0.00	0.00	0.000
17.88	2.76	29.47	5.40	159.05	0	0	0.39	0.000	0.00	0.00	0.00	0.000
18.05	2.78	30.61	5.57	170.40	0	0	0.39	0.000	0.00	0.00	0.00	0.000
18.21	2.80	31.80	5.89	187.44	0	0	0.39	0.000	0.00	0.00	0.00	0.000
18.37	2.74	37.63	5.16	194.23	0	0	0.39	0.000	0.00	0.00	0.00	0.000
18.54	2.48	58.57	2.87	168.37	0	0	0.38	0.000	0.00	0.00	0.00	0.000
18.70	2.16	97.31	1.52	148.28	0	0	0.36	0.000	0.00	0.00	0.00	0.000
18.87	1.95	134.15	1.27	170.44	0	0	0.34	0.000	0.00	0.00	0.00	0.000
19.03	1.89	151.10	1.23	186.33	0	0	0.34	0.000	0.00	0.00	0.00	0.000
19.19	2.00	131.82	1.31	172.28	0	0	0.34	0.000	0.00	0.00	0.00	0.000
19.36	2.18	95.56	1.57	150.03	0	0	0.36	0.000	0.00	0.00	0.00	0.000
19.52	2.40	59.12	2.39	141.11	0	0	0.38	0.000	0.00	0.00	0.00	0.000
19.69	2.55	38.96	3.38	131.57	0	0	0.39	0.000	0.00	0.00	0.00	0.000
19.85	2.55	33.35	3.37	112.35	30	907	0.39	0.224	0.14	10.85	0.12	0.005

Total estimated settlement: 0.04

Abbreviations

Q_{tn}: Normalized cone resistance
K_c: Fines correction factor
$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
G_{max}: Small strain shear modulus
CSR: Soil cyclic stress ratio
γ: Cyclic shear strain
$e_{vol(15)}$: Volumetric strain after 15 cycles
N_c: Equivalent number of cycles
e_v: Volumetric strain
Settle.: Calculated settlement

:: Post-earthquake settlement due to soil liquefaction ::

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
20.01	96.03	0.34	3.35	1.00	0.06	20.18	96.76	0.34	3.32	1.00	0.07
20.34	100.97	0.36	3.18	1.00	0.06	20.51	42.61	2.00	0.00	1.00	0.00
20.67	42.26	2.00	0.00	1.00	0.00	20.83	42.99	2.00	0.00	1.00	0.00
21.00	40.77	2.00	0.00	1.00	0.00	21.16	38.91	2.00	0.00	1.00	0.00
21.33	38.57	2.00	0.00	1.00	0.00	21.49	36.20	2.00	0.00	1.00	0.00
21.65	37.62	2.00	0.00	1.00	0.00	21.82	37.80	2.00	0.00	1.00	0.00
21.98	38.17	2.00	0.00	1.00	0.00	22.15	38.61	2.00	0.00	1.00	0.00
22.31	38.36	2.00	0.00	1.00	0.00	22.47	37.94	2.00	0.00	1.00	0.00
22.64	38.21	2.00	0.00	1.00	0.00	22.80	36.57	2.00	0.00	1.00	0.00
22.97	36.75	2.00	0.00	1.00	0.00	23.13	37.20	2.00	0.00	1.00	0.00
23.30	37.12	2.00	0.00	1.00	0.00	23.46	37.23	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
23.62	38.45	2.00	0.00	1.00	0.00	23.79	37.85	2.00	0.00	1.00	0.00
23.95	34.95	2.00	0.00	1.00	0.00	24.12	31.63	2.00	0.00	1.00	0.00
24.28	28.60	2.00	0.00	1.00	0.00	24.44	27.19	2.00	0.00	1.00	0.00
24.61	26.96	2.00	0.00	1.00	0.00	24.77	25.81	2.00	0.00	1.00	0.00
24.94	23.67	2.00	0.00	1.00	0.00	25.10	22.53	2.00	0.00	1.00	0.00
25.26	21.25	2.00	0.00	1.00	0.00	25.43	20.87	2.00	0.00	1.00	0.00
25.59	27.75	2.00	0.00	1.00	0.00	25.76	28.69	2.00	0.00	1.00	0.00
25.92	27.81	2.00	0.00	1.00	0.00	26.08	26.59	2.00	0.00	1.00	0.00
26.25	26.96	2.00	0.00	1.00	0.00	26.41	26.99	2.00	0.00	1.00	0.00
26.58	26.78	2.00	0.00	1.00	0.00	26.74	25.33	2.00	0.00	1.00	0.00
26.90	25.45	2.00	0.00	1.00	0.00	27.07	26.38	2.00	0.00	1.00	0.00
27.23	26.83	2.00	0.00	1.00	0.00	27.40	26.62	2.00	0.00	1.00	0.00
27.56	26.24	2.00	0.00	1.00	0.00	27.72	27.50	2.00	0.00	1.00	0.00
27.89	30.33	2.00	0.00	1.00	0.00	28.05	27.48	2.00	0.00	1.00	0.00
28.22	28.17	2.00	0.00	1.00	0.00	28.38	29.92	2.00	0.00	1.00	0.00
28.54	29.37	2.00	0.00	1.00	0.00	28.71	29.07	2.00	0.00	1.00	0.00
28.87	28.20	2.00	0.00	1.00	0.00	29.04	26.52	2.00	0.00	1.00	0.00
29.20	24.38	2.00	0.00	1.00	0.00	29.36	24.90	2.00	0.00	1.00	0.00
29.53	24.21	2.00	0.00	1.00	0.00	29.69	25.06	2.00	0.00	1.00	0.00
29.86	25.41	2.00	0.00	1.00	0.00	30.02	26.81	2.00	0.00	1.00	0.00
30.19	25.96	2.00	0.00	1.00	0.00	30.35	27.44	2.00	0.00	1.00	0.00
30.51	27.63	2.00	0.00	1.00	0.00	30.68	28.22	2.00	0.00	1.00	0.00
30.84	27.85	2.00	0.00	1.00	0.00	31.01	27.72	2.00	0.00	1.00	0.00
31.17	27.60	2.00	0.00	1.00	0.00	31.33	26.04	2.00	0.00	1.00	0.00
31.50	23.47	2.00	0.00	1.00	0.00	31.66	21.78	2.00	0.00	1.00	0.00
31.83	22.37	2.00	0.00	1.00	0.00	31.99	22.96	2.00	0.00	1.00	0.00
32.15	25.59	2.00	0.00	1.00	0.00	32.32	21.01	2.00	0.00	1.00	0.00
32.48	18.88	2.00	0.00	1.00	0.00	32.65	19.31	2.00	0.00	1.00	0.00
32.81	21.21	2.00	0.00	1.00	0.00	32.97	22.88	2.00	0.00	1.00	0.00
33.14	23.62	2.00	0.00	1.00	0.00	33.30	25.14	2.00	0.00	1.00	0.00
33.47	25.56	2.00	0.00	1.00	0.00	33.63	25.75	2.00	0.00	1.00	0.00
33.79	26.02	2.00	0.00	1.00	0.00	33.96	25.19	2.00	0.00	1.00	0.00
34.12	22.69	2.00	0.00	1.00	0.00	34.29	22.19	2.00	0.00	1.00	0.00
34.45	22.54	2.00	0.00	1.00	0.00	34.61	24.66	2.00	0.00	1.00	0.00
34.78	24.53	2.00	0.00	1.00	0.00	34.94	27.81	2.00	0.00	1.00	0.00
35.11	25.29	2.00	0.00	1.00	0.00	35.27	22.81	2.00	0.00	1.00	0.00
35.43	22.78	2.00	0.00	1.00	0.00	35.60	23.88	2.00	0.00	1.00	0.00
35.76	25.44	2.00	0.00	1.00	0.00	35.93	28.14	2.00	0.00	1.00	0.00
36.09	31.32	2.00	0.00	1.00	0.00	36.26	32.74	2.00	0.00	1.00	0.00
36.42	38.52	2.00	0.00	1.00	0.00	36.58	45.89	2.00	0.00	1.00	0.00
36.75	45.98	2.00	0.00	1.00	0.00	36.91	39.14	2.00	0.00	1.00	0.00
37.08	34.11	2.00	0.00	1.00	0.00	37.24	31.68	2.00	0.00	1.00	0.00
37.40	32.24	2.00	0.00	1.00	0.00	37.57	35.41	2.00	0.00	1.00	0.00
37.73	38.04	2.00	0.00	1.00	0.00	37.90	32.98	2.00	0.00	1.00	0.00
38.06	26.58	2.00	0.00	1.00	0.00	38.22	25.69	2.00	0.00	1.00	0.00
38.39	59.88	2.00	0.00	1.00	0.00	38.55	182.70	1.83	0.07	1.00	0.00
38.72	64.54	2.00	0.00	1.00	0.00	38.88	56.64	2.00	0.00	1.00	0.00
39.04	47.68	2.00	0.00	1.00	0.00	39.21	35.97	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

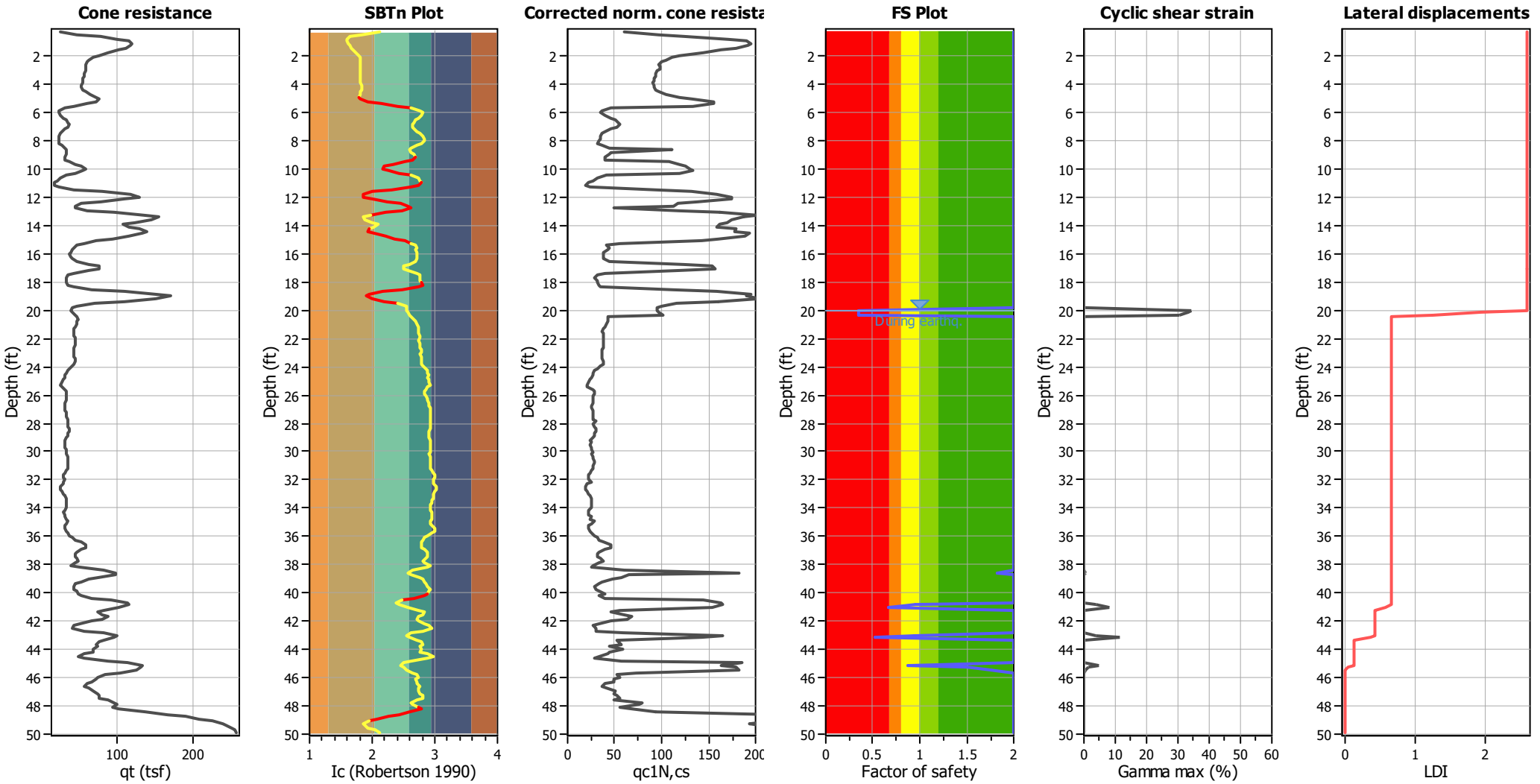
Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
39.37	32.96	2.00	0.00	1.00	0.00	39.54	29.30	2.00	0.00	1.00	0.00
39.70	29.49	2.00	0.00	1.00	0.00	39.86	32.60	2.00	0.00	1.00	0.00
40.03	40.31	2.00	0.00	1.00	0.00	40.19	33.23	2.00	0.00	1.00	0.00
40.36	39.00	2.00	0.00	1.00	0.00	40.52	144.68	2.00	0.00	1.00	0.00
40.68	163.55	2.00	0.00	1.00	0.00	40.85	165.52	0.95	0.89	1.00	0.02
41.01	153.33	0.67	1.99	1.00	0.04	41.18	55.89	2.00	0.00	1.00	0.00
41.34	46.17	2.00	0.00	1.00	0.00	41.50	60.08	2.00	0.00	1.00	0.00
41.67	68.53	2.00	0.00	1.00	0.00	41.83	64.22	2.00	0.00	1.00	0.00
42.00	45.82	2.00	0.00	1.00	0.00	42.16	33.86	2.00	0.00	1.00	0.00
42.32	26.33	2.00	0.00	1.00	0.00	42.49	30.76	2.00	0.00	1.00	0.00
42.65	30.45	2.00	0.00	1.00	0.00	42.82	59.01	2.00	0.00	1.00	0.00
42.98	165.11	0.93	0.93	1.00	0.02	43.15	142.74	0.52	2.19	1.00	0.04
43.31	51.75	2.00	0.00	1.00	0.00	43.47	53.42	2.00	0.00	1.00	0.00
43.64	56.88	2.00	0.00	1.00	0.00	43.80	43.90	2.00	0.00	1.00	0.00
43.97	58.59	2.00	0.00	1.00	0.00	44.13	45.06	2.00	0.00	1.00	0.00
44.29	42.12	2.00	0.00	1.00	0.00	44.46	32.97	2.00	0.00	1.00	0.00
44.62	28.10	2.00	0.00	1.00	0.00	44.79	57.16	2.00	0.00	1.00	0.00
44.95	186.17	2.00	0.00	1.00	0.00	45.11	163.11	0.87	1.08	1.00	0.02
45.28	178.82	1.51	0.25	1.00	0.01	45.44	182.57	1.76	0.11	1.00	0.00
45.61	73.54	2.00	0.00	1.00	0.00	45.77	52.86	2.00	0.00	1.00	0.00
45.93	54.88	2.00	0.00	1.00	0.00	46.10	49.03	2.00	0.00	1.00	0.00
46.26	48.90	2.00	0.00	1.00	0.00	46.43	39.51	2.00	0.00	1.00	0.00
46.59	36.00	2.00	0.00	1.00	0.00	46.75	41.21	2.00	0.00	1.00	0.00
46.92	50.41	2.00	0.00	1.00	0.00	47.08	48.86	2.00	0.00	1.00	0.00
47.25	52.83	2.00	0.00	1.00	0.00	47.41	55.98	2.00	0.00	1.00	0.00
47.57	48.83	2.00	0.00	1.00	0.00	47.74	79.63	2.00	0.00	1.00	0.00
47.90	76.77	2.00	0.00	1.00	0.00	48.07	55.54	2.00	0.00	1.00	0.00
48.23	67.91	2.00	0.00	1.00	0.00	48.39	94.08	2.00	0.00	1.00	0.00
48.56	228.75	2.00	0.00	1.00	0.00	48.72	217.41	2.00	0.00	1.00	0.00
48.89	219.30	2.00	0.00	1.00	0.00	49.05	220.56	2.00	0.00	1.00	0.00
49.22	193.78	2.00	0.00	1.00	0.00	49.38	204.82	2.00	0.00	1.00	0.00
49.54	227.31	2.00	0.00	1.00	0.00	49.71	273.10	2.00	0.00	1.00	0.00
49.87	277.86	2.00	0.00	1.00	0.00						

Total estimated settlement: 0.34

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

:: Lateral displacement index calculation ::

Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
20.01	96.03	0.34	0.34	0.82	0.34	0.65
20.18	96.76	0.33	0.34	0.82	0.33	0.68
20.34	100.97	0.30	0.36	0.78	0.30	0.58
20.51	42.61	0.00	2.00	0.00	0.00	0.00
20.67	42.26	0.00	2.00	0.00	0.00	0.00
20.83	42.99	0.00	2.00	0.00	0.00	0.00
21.00	40.77	0.00	2.00	0.00	0.00	0.00
21.16	38.91	0.00	2.00	0.00	0.00	0.00
21.33	38.57	0.00	2.00	0.00	0.00	0.00
21.49	36.20	0.00	2.00	0.00	0.00	0.00
21.65	37.62	0.00	2.00	0.00	0.00	0.00
21.82	37.80	0.00	2.00	0.00	0.00	0.00
21.98	38.17	0.00	2.00	0.00	0.00	0.00
22.15	38.61	0.00	2.00	0.00	0.00	0.00
22.31	38.36	0.00	2.00	0.00	0.00	0.00
22.47	37.94	0.00	2.00	0.00	0.00	0.00
22.64	38.21	0.00	2.00	0.00	0.00	0.00
22.80	36.57	0.00	2.00	0.00	0.00	0.00
22.97	36.75	0.00	2.00	0.00	0.00	0.00
23.13	37.20	0.00	2.00	0.00	0.00	0.00
23.30	37.12	0.00	2.00	0.00	0.00	0.00
23.46	37.23	0.00	2.00	0.00	0.00	0.00
23.62	38.45	0.00	2.00	0.00	0.00	0.00
23.79	37.85	0.00	2.00	0.00	0.00	0.00
23.95	34.95	0.00	2.00	0.00	0.00	0.00
24.12	31.63	0.00	2.00	0.00	0.00	0.00
24.28	28.60	0.00	2.00	0.00	0.00	0.00
24.44	27.19	0.00	2.00	0.00	0.00	0.00
24.61	26.96	0.00	2.00	0.00	0.00	0.00
24.77	25.81	0.00	2.00	0.00	0.00	0.00
24.94	23.67	0.00	2.00	0.00	0.00	0.00
25.10	22.53	0.00	2.00	0.00	0.00	0.00
25.26	21.25	0.00	2.00	0.00	0.00	0.00
25.43	20.87	0.00	2.00	0.00	0.00	0.00
25.59	27.75	0.00	2.00	0.00	0.00	0.00
25.76	28.69	0.00	2.00	0.00	0.00	0.00
25.92	27.81	0.00	2.00	0.00	0.00	0.00
26.08	26.59	0.00	2.00	0.00	0.00	0.00
26.25	26.96	0.00	2.00	0.00	0.00	0.00
26.41	26.99	0.00	2.00	0.00	0.00	0.00
26.58	26.78	0.00	2.00	0.00	0.00	0.00
26.74	25.33	0.00	2.00	0.00	0.00	0.00
26.90	25.45	0.00	2.00	0.00	0.00	0.00
27.07	26.38	0.00	2.00	0.00	0.00	0.00
27.23	26.83	0.00	2.00	0.00	0.00	0.00
27.40	26.62	0.00	2.00	0.00	0.00	0.00
27.56	26.24	0.00	2.00	0.00	0.00	0.00
27.72	27.50	0.00	2.00	0.00	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
27.89	30.33	0.00	2.00	0.00	0.00	0.00
28.05	27.48	0.00	2.00	0.00	0.00	0.00
28.22	28.17	0.00	2.00	0.00	0.00	0.00
28.38	29.92	0.00	2.00	0.00	0.00	0.00
28.54	29.37	0.00	2.00	0.00	0.00	0.00
28.71	29.07	0.00	2.00	0.00	0.00	0.00
28.87	28.20	0.00	2.00	0.00	0.00	0.00
29.04	26.52	0.00	2.00	0.00	0.00	0.00
29.20	24.38	0.00	2.00	0.00	0.00	0.00
29.36	24.90	0.00	2.00	0.00	0.00	0.00
29.53	24.21	0.00	2.00	0.00	0.00	0.00
29.69	25.06	0.00	2.00	0.00	0.00	0.00
29.86	25.41	0.00	2.00	0.00	0.00	0.00
30.02	26.81	0.00	2.00	0.00	0.00	0.00
30.19	25.96	0.00	2.00	0.00	0.00	0.00
30.35	27.44	0.00	2.00	0.00	0.00	0.00
30.51	27.63	0.00	2.00	0.00	0.00	0.00
30.68	28.22	0.00	2.00	0.00	0.00	0.00
30.84	27.85	0.00	2.00	0.00	0.00	0.00
31.01	27.72	0.00	2.00	0.00	0.00	0.00
31.17	27.60	0.00	2.00	0.00	0.00	0.00
31.33	26.04	0.00	2.00	0.00	0.00	0.00
31.50	23.47	0.00	2.00	0.00	0.00	0.00
31.66	21.78	0.00	2.00	0.00	0.00	0.00
31.83	22.37	0.00	2.00	0.00	0.00	0.00
31.99	22.96	0.00	2.00	0.00	0.00	0.00
32.15	25.59	0.00	2.00	0.00	0.00	0.00
32.32	21.01	0.00	2.00	0.00	0.00	0.00
32.48	18.88	0.00	2.00	0.00	0.00	0.00
32.65	19.31	0.00	2.00	0.00	0.00	0.00
32.81	21.21	0.00	2.00	0.00	0.00	0.00
32.97	22.88	0.00	2.00	0.00	0.00	0.00
33.14	23.62	0.00	2.00	0.00	0.00	0.00
33.30	25.14	0.00	2.00	0.00	0.00	0.00
33.47	25.56	0.00	2.00	0.00	0.00	0.00
33.63	25.75	0.00	2.00	0.00	0.00	0.00
33.79	26.02	0.00	2.00	0.00	0.00	0.00
33.96	25.19	0.00	2.00	0.00	0.00	0.00
34.12	22.69	0.00	2.00	0.00	0.00	0.00
34.29	22.19	0.00	2.00	0.00	0.00	0.00
34.45	22.54	0.00	2.00	0.00	0.00	0.00
34.61	24.66	0.00	2.00	0.00	0.00	0.00
34.78	24.53	0.00	2.00	0.00	0.00	0.00
34.94	27.81	0.00	2.00	0.00	0.00	0.00
35.11	25.29	0.00	2.00	0.00	0.00	0.00
35.27	22.81	0.00	2.00	0.00	0.00	0.00
35.43	22.78	0.00	2.00	0.00	0.00	0.00
35.60	23.88	0.00	2.00	0.00	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
35.76	25.44	0.00	2.00	0.00	0.00	0.00
35.93	28.14	0.00	2.00	0.00	0.00	0.00
36.09	31.32	0.00	2.00	0.00	0.00	0.00
36.26	32.74	0.00	2.00	0.00	0.00	0.00
36.42	38.52	0.00	2.00	0.00	0.00	0.00
36.58	45.89	0.00	2.00	0.00	0.00	0.00
36.75	45.98	0.00	2.00	0.00	0.00	0.00
36.91	39.14	0.00	2.00	0.00	0.00	0.00
37.08	34.11	0.00	2.00	0.00	0.00	0.00
37.24	31.68	0.00	2.00	0.00	0.00	0.00
37.40	32.24	0.00	2.00	0.00	0.00	0.00
37.57	35.41	0.00	2.00	0.00	0.00	0.00
37.73	38.04	0.00	2.00	0.00	0.00	0.00
37.90	32.98	0.00	2.00	0.00	0.00	0.00
38.06	26.58	0.00	2.00	0.00	0.00	0.00
38.22	25.69	0.00	2.00	0.00	0.00	0.00
38.39	59.88	0.00	2.00	0.00	0.00	0.00
38.55	182.70	0.04	1.83	-0.20	0.00	0.01
38.72	64.54	0.00	2.00	0.00	0.00	0.00
38.88	56.64	0.00	2.00	0.00	0.00	0.00
39.04	47.68	0.00	2.00	0.00	0.00	0.00
39.21	35.97	0.00	2.00	0.00	0.00	0.00
39.37	32.96	0.00	2.00	0.00	0.00	0.00
39.54	29.30	0.00	2.00	0.00	0.00	0.00
39.70	29.49	0.00	2.00	0.00	0.00	0.00
39.86	32.60	0.00	2.00	0.00	0.00	0.00
40.03	40.31	0.00	2.00	0.00	0.00	0.00
40.19	33.23	0.00	2.00	0.00	0.00	0.00
40.36	39.00	0.00	2.00	0.00	0.00	0.00
40.52	144.68	0.11	2.00	0.32	0.00	0.00
40.68	163.55	0.07	2.00	0.07	0.00	0.00
40.85	165.52	0.06	0.95	0.04	0.04	0.08
41.01	153.33	0.09	0.67	0.20	0.08	0.15
41.18	55.89	0.00	2.00	0.00	0.00	0.00
41.34	46.17	0.00	2.00	0.00	0.00	0.00
41.50	60.08	0.00	2.00	0.00	0.00	0.00
41.67	68.53	0.00	2.00	0.00	0.00	0.00
41.83	64.22	0.00	2.00	0.00	0.00	0.00
42.00	45.82	0.00	2.00	0.00	0.00	0.00
42.16	33.86	0.00	2.00	0.00	0.00	0.00
42.32	26.33	0.00	2.00	0.00	0.00	0.00
42.49	30.76	0.00	2.00	0.00	0.00	0.00
42.65	30.45	0.00	2.00	0.00	0.00	0.00
42.82	59.01	0.00	2.00	0.00	0.00	0.00
42.98	165.11	0.06	0.93	0.05	0.04	0.08
43.15	142.74	0.11	0.52	0.34	0.11	0.23
43.31	51.75	0.00	2.00	0.00	0.00	0.00
43.47	53.42	0.00	2.00	0.00	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

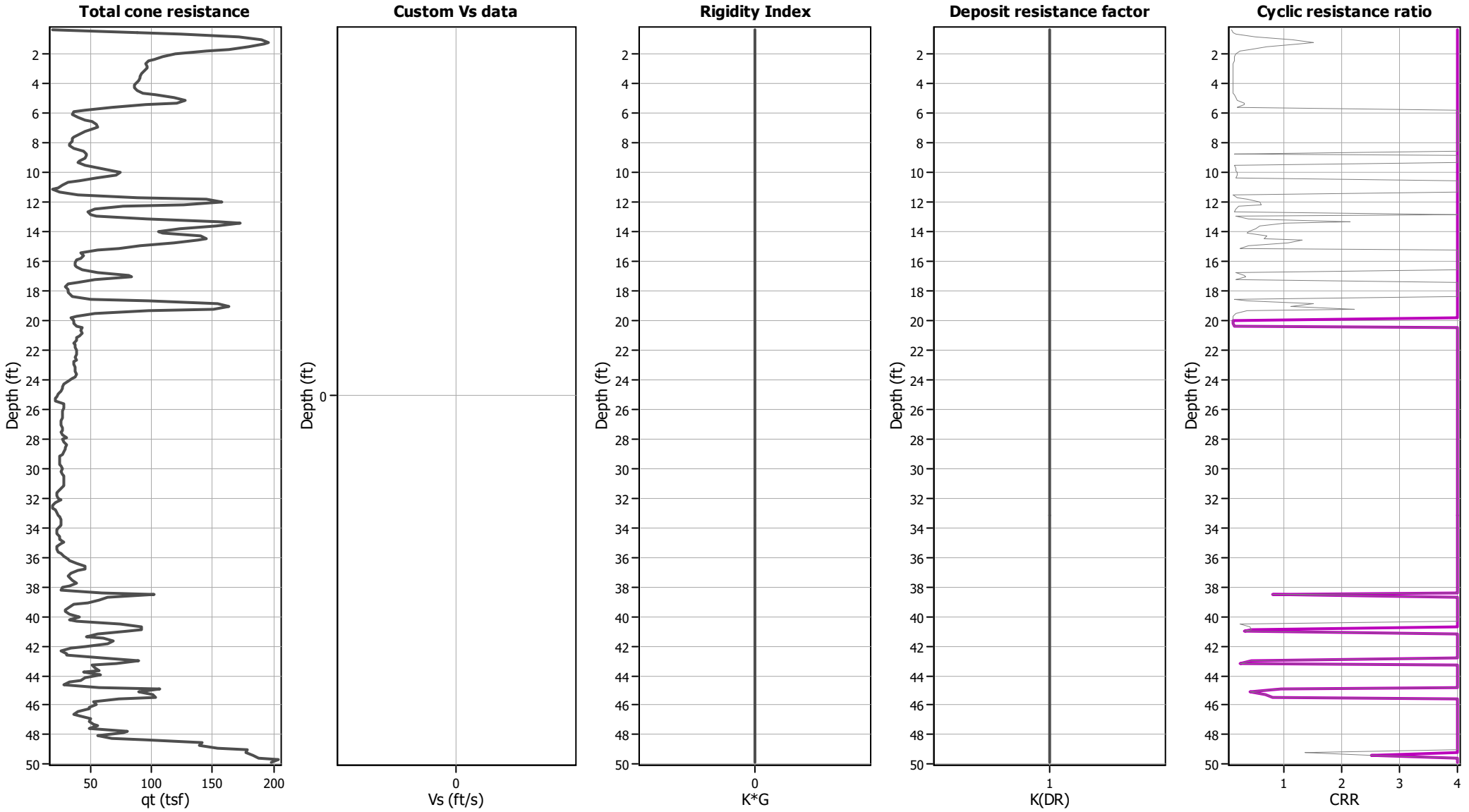
Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
43.64	56.88	0.00	2.00	0.00	0.00	0.00
43.80	43.90	0.00	2.00	0.00	0.00	0.00
43.97	58.59	0.00	2.00	0.00	0.00	0.00
44.13	45.06	0.00	2.00	0.00	0.00	0.00
44.29	42.12	0.00	2.00	0.00	0.00	0.00
44.46	32.97	0.00	2.00	0.00	0.00	0.00
44.62	28.10	0.00	2.00	0.00	0.00	0.00
44.79	57.16	0.00	2.00	0.00	0.00	0.00
44.95	186.17	0.03	2.00	-0.25	0.00	0.00
45.11	163.11	0.07	0.87	0.07	0.05	0.09
45.28	178.82	0.04	1.51	-0.14	0.01	0.02
45.44	182.57	0.04	1.76	-0.20	0.01	0.01
45.61	73.54	0.00	2.00	0.00	0.00	0.00
45.77	52.86	0.00	2.00	0.00	0.00	0.00
45.93	54.88	0.00	2.00	0.00	0.00	0.00
46.10	49.03	0.00	2.00	0.00	0.00	0.00
46.26	48.90	0.00	2.00	0.00	0.00	0.00
46.43	39.51	0.00	2.00	0.00	0.00	0.00
46.59	36.00	0.00	2.00	0.00	0.00	0.00
46.75	41.21	0.00	2.00	0.00	0.00	0.00
46.92	50.41	0.00	2.00	0.00	0.00	0.00
47.08	48.86	0.00	2.00	0.00	0.00	0.00
47.25	52.83	0.00	2.00	0.00	0.00	0.00
47.41	55.98	0.00	2.00	0.00	0.00	0.00
47.57	48.83	0.00	2.00	0.00	0.00	0.00
47.74	79.63	0.00	2.00	0.00	0.00	0.00
47.90	76.77	0.00	2.00	0.00	0.00	0.00
48.07	55.54	0.00	2.00	0.00	0.00	0.00
48.23	67.91	0.00	2.00	0.00	0.00	0.00
48.39	94.08	0.00	2.00	0.00	0.00	0.00
48.56	228.75	0.01	2.00	-0.88	0.00	0.00
48.72	217.41	0.01	2.00	-0.71	0.00	0.00
48.89	219.30	0.01	2.00	-0.74	0.00	0.00
49.05	220.56	0.01	2.00	-0.76	0.00	0.00
49.22	193.78	0.03	2.00	-0.36	0.00	0.00
49.38	204.82	0.02	2.00	-0.52	0.00	0.00
49.54	227.31	0.01	2.00	-0.86	0.00	0.00
49.71	273.10	0.00	2.00	-1.58	0.00	0.00
49.87	277.86	0.00	2.00	-1.65	0.00	0.00

Total estimated displacement: 2.58

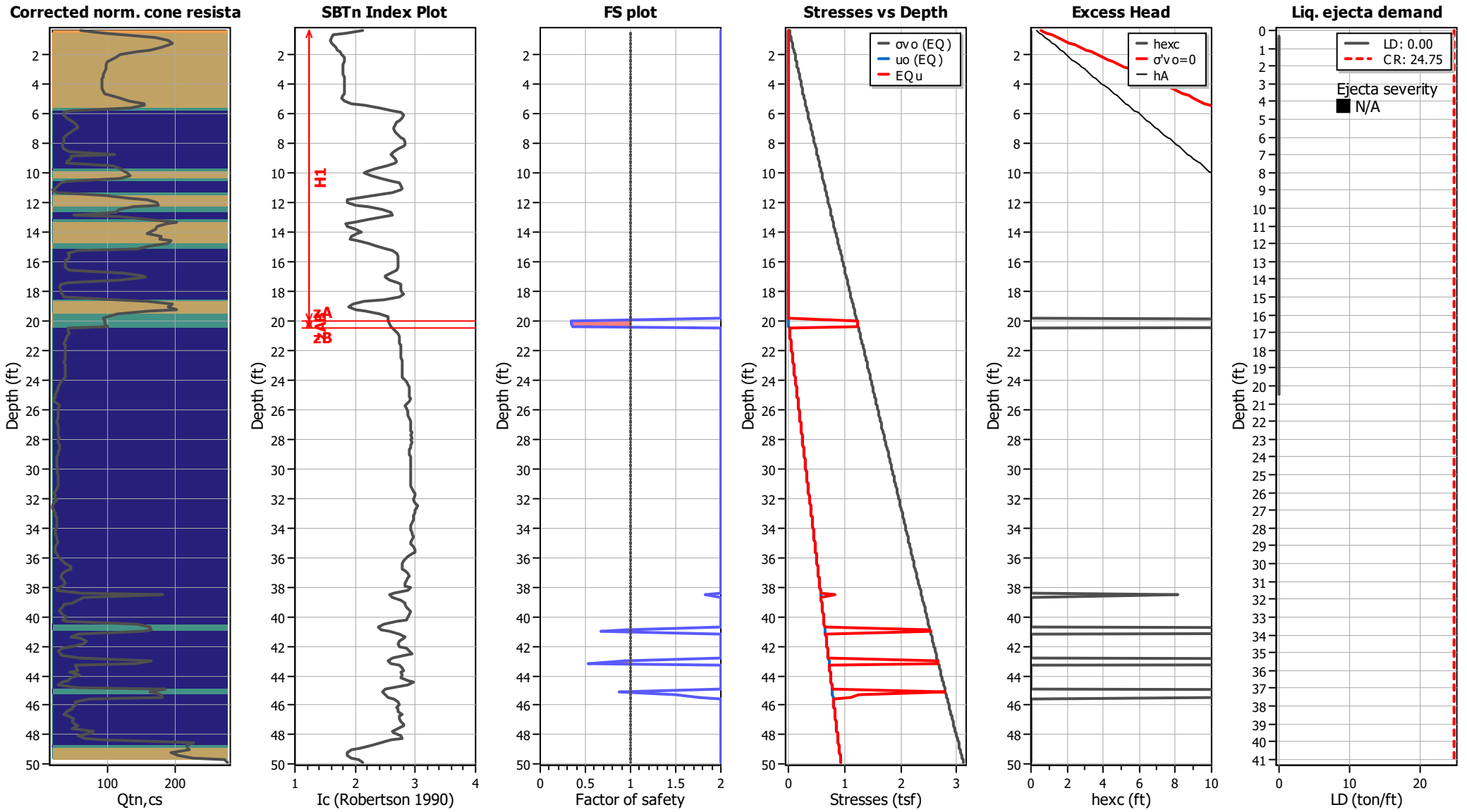
Abbreviations

Depth: Depth of test point
$q_{c1N,cs}$: Adjusted and corrected cone resistance due to fines
$Gamma_{lim}$: Limiting shear strain
FS: Calculated factor of safety against liquefaction
Fa:
$Gamma_{max}$: Maximum cyclic shear strain
Lat. disp.: Lateral displacement

Aging Calculation Estimation



Ejecta Severity Estimation



Baez Geotechnical Group
Geotechnical Engineers
BGG
http://www.baezgeotechnicalgroup.com

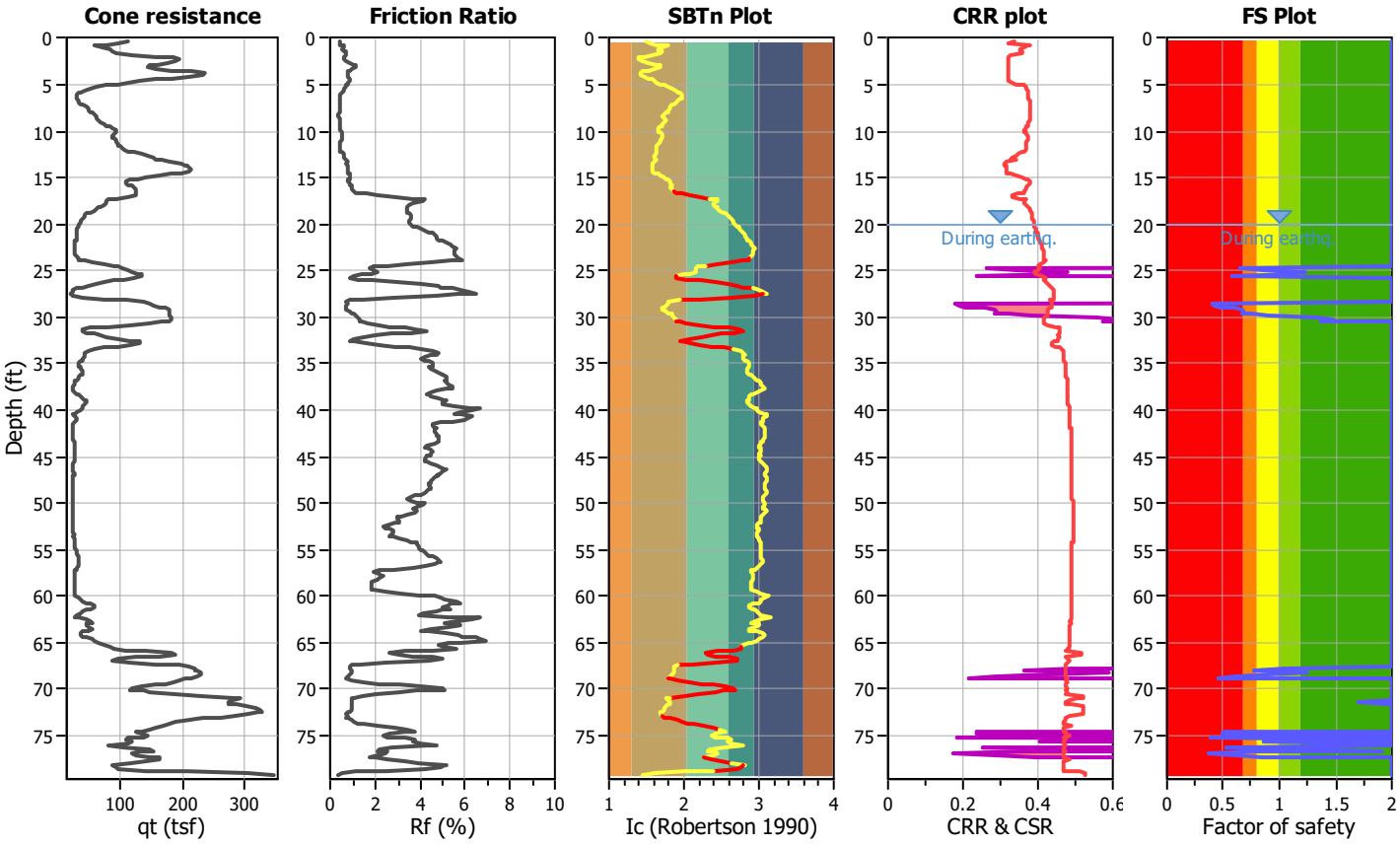
LIQUEFACTION ANALYSIS REPORT

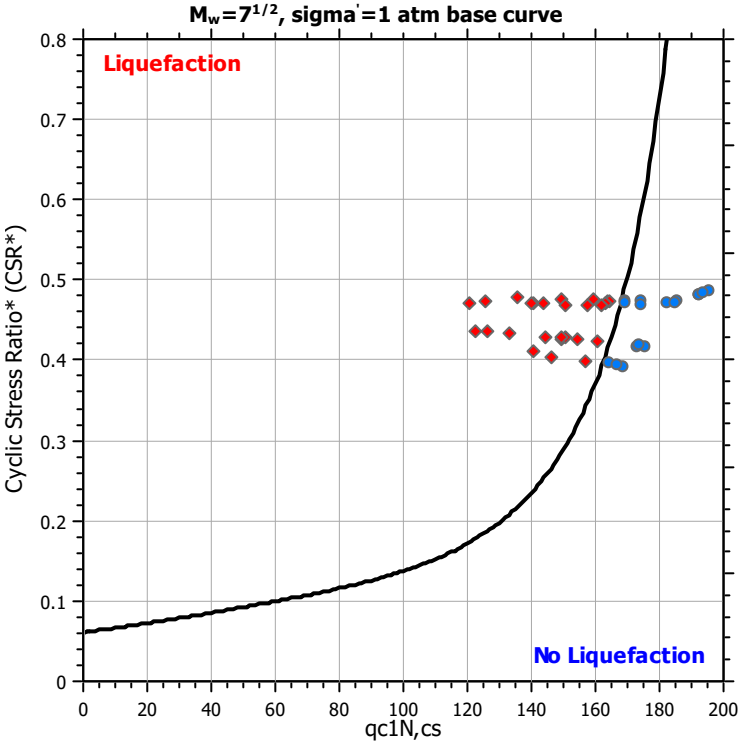
Project title : G289.01 Paseo **Location : Oakley Road, Oakley**

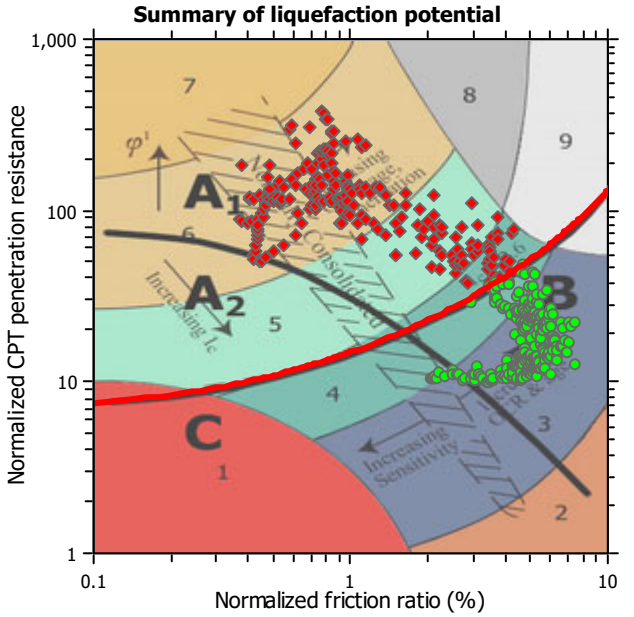
CPT file : CPT-02

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	20.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	20.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

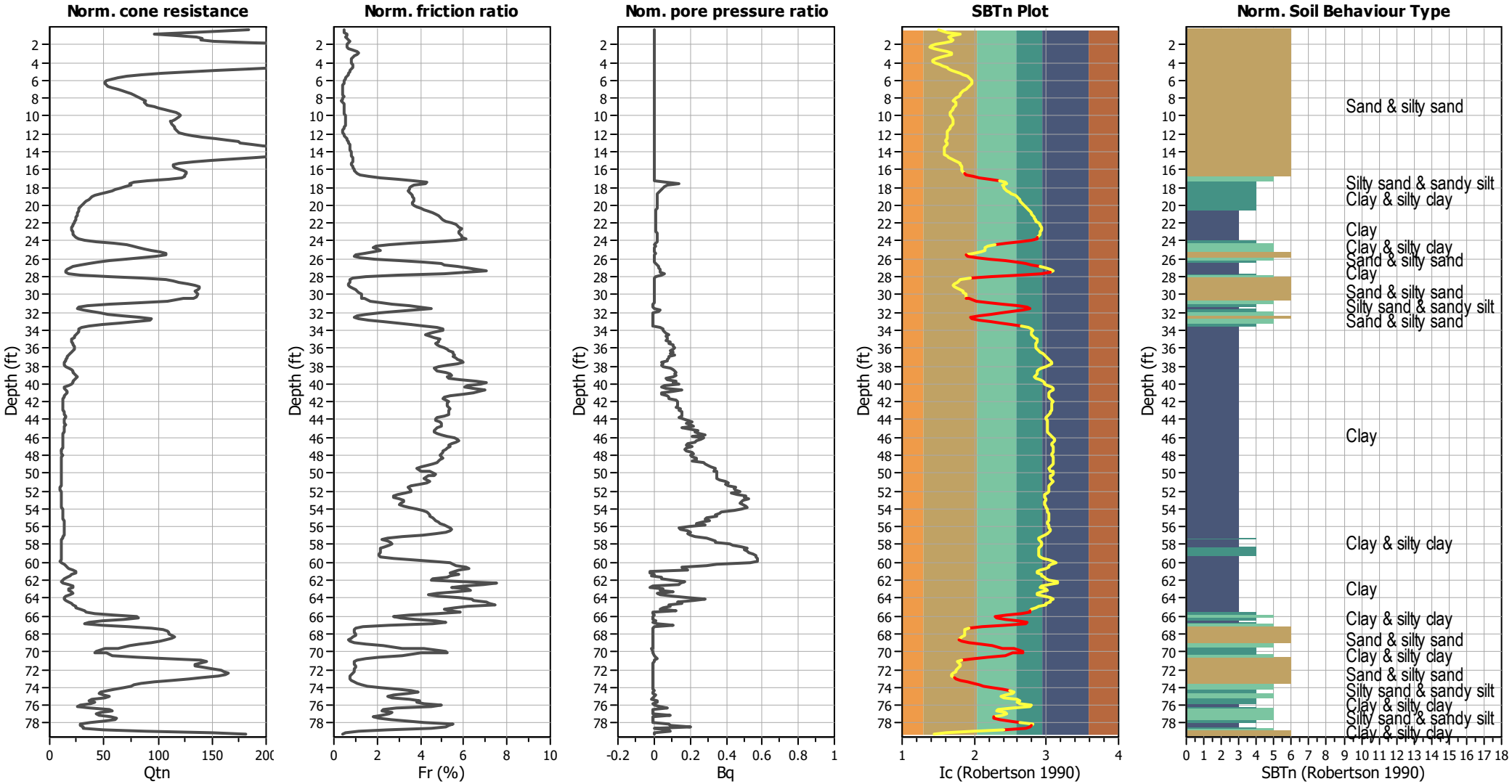






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normalized)



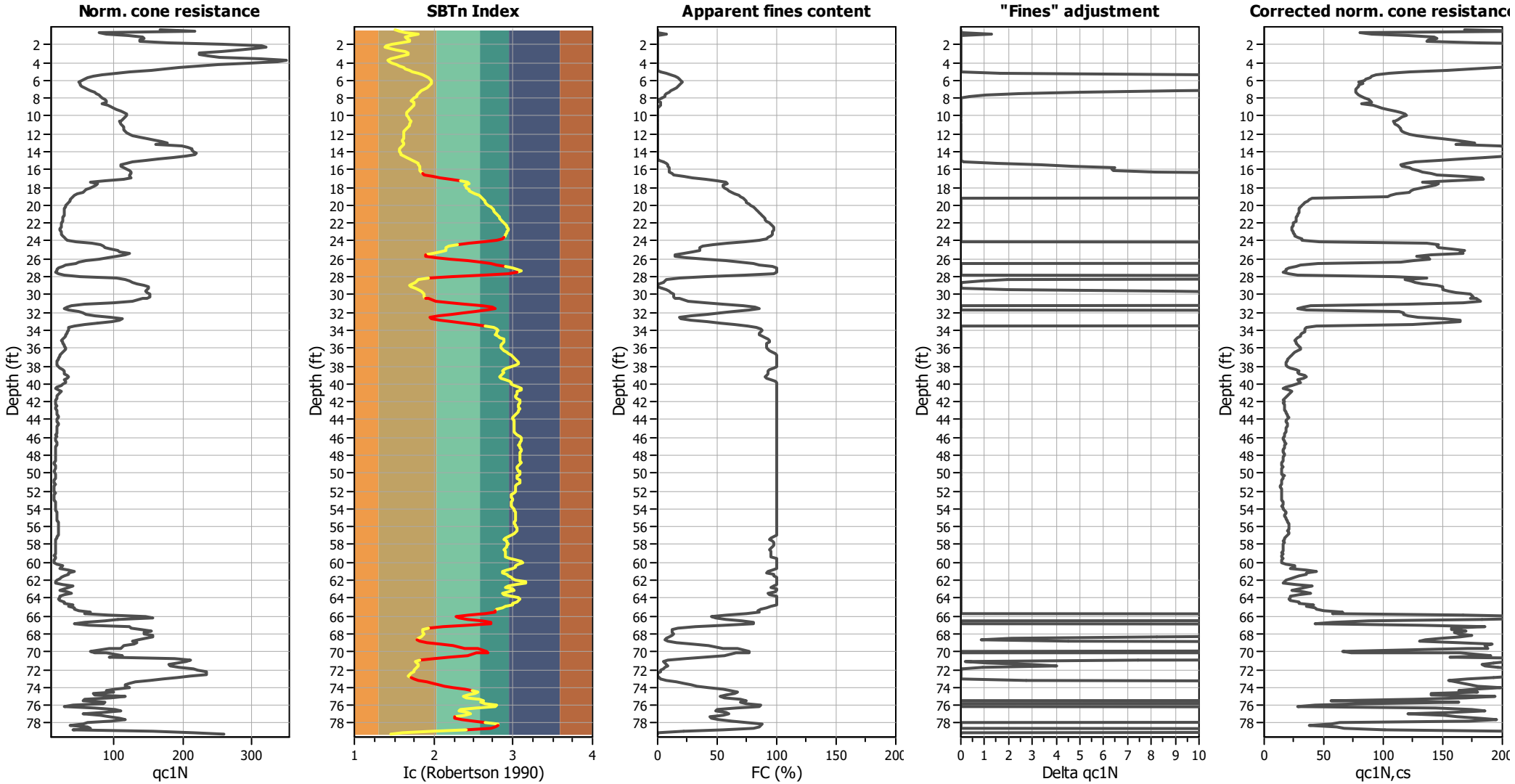
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

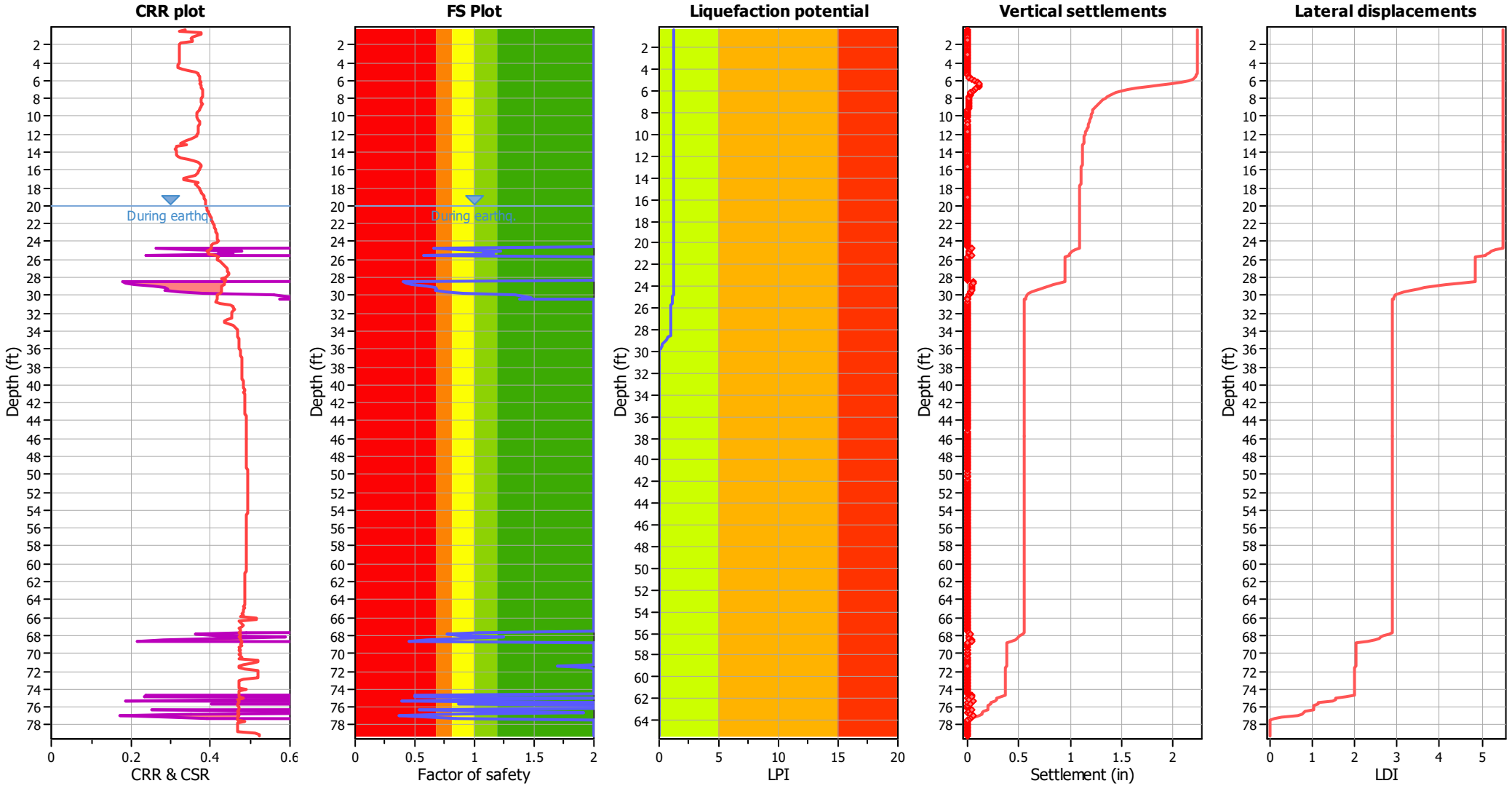
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	N/A

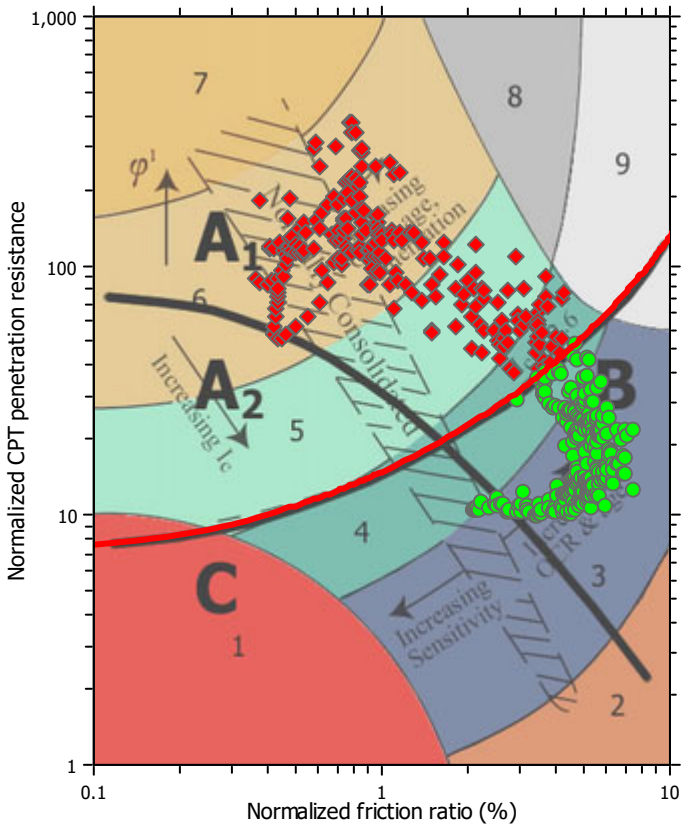
F.S. color scheme

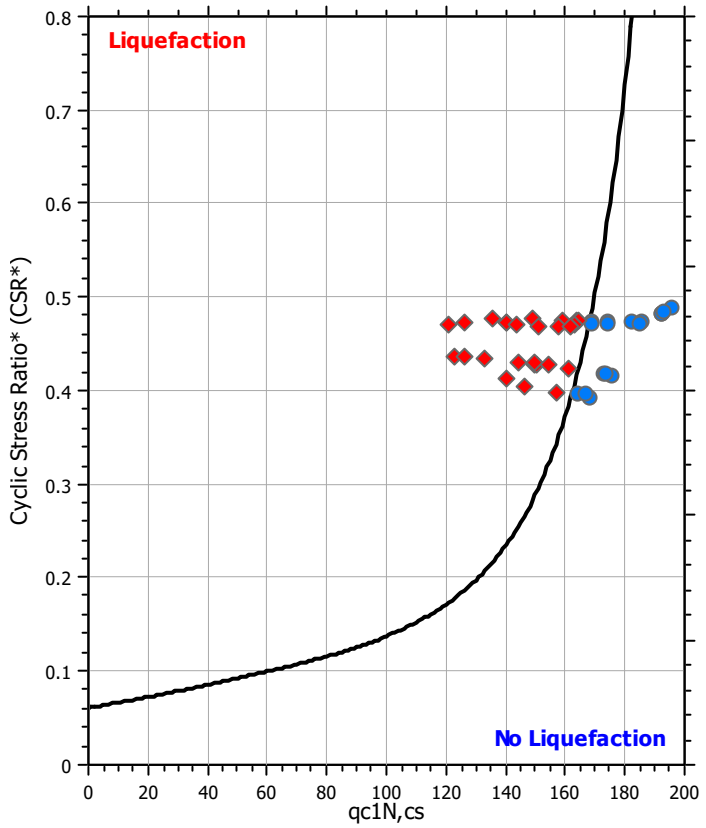
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

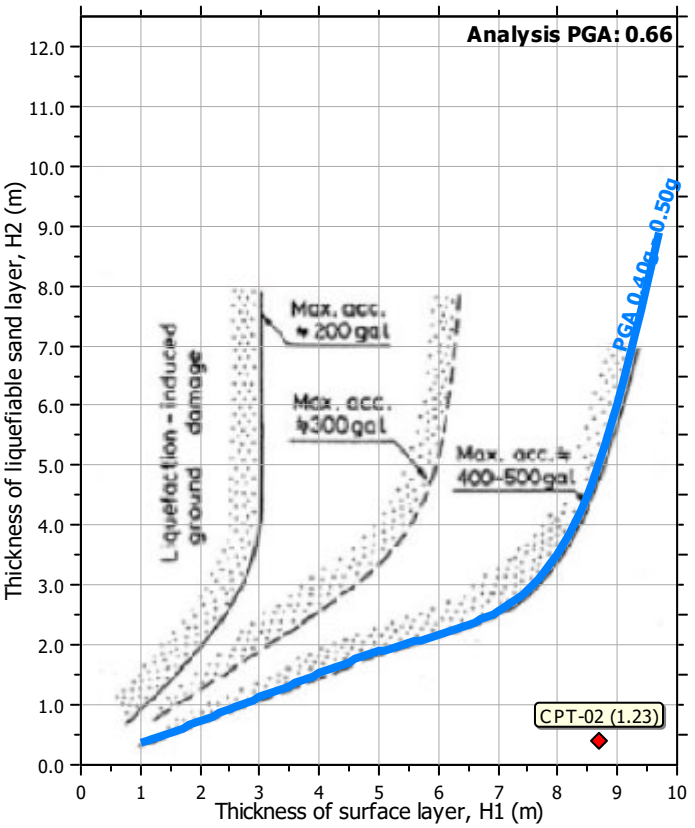
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



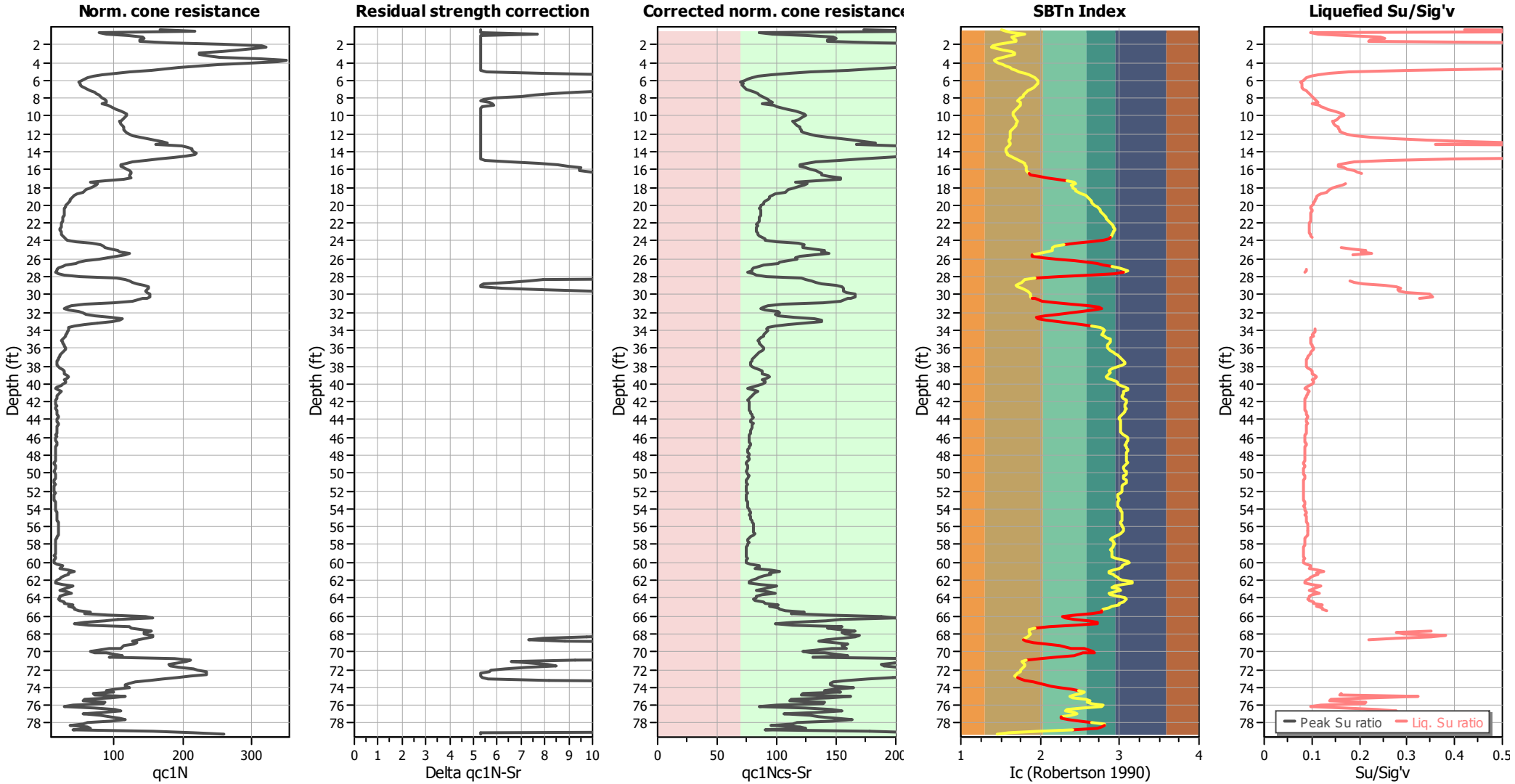




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	N/A

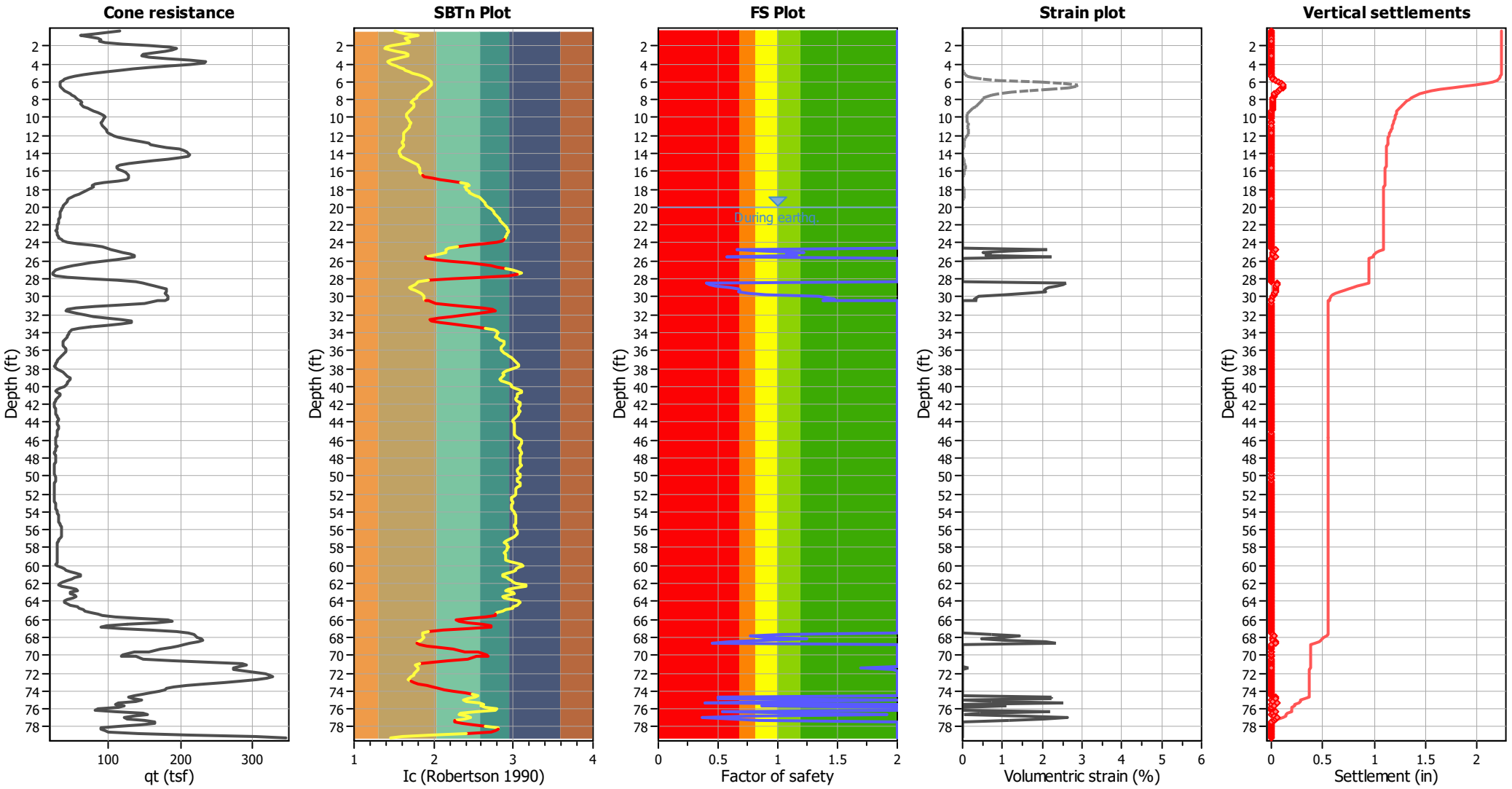
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	20.00 ft	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement of dry sands ::

Depth (ft)	Ic	Q_{tn}	K_c	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
0.33	1.50	184.53	1.00	184.53	32	694	0.34	0.001	0.00	10.85	0.00	0.000
0.49	1.56	155.22	1.00	155.22	28	629	0.32	0.002	0.00	10.85	0.00	0.000
0.66	1.63	128.85	1.00	128.85	23	570	0.38	0.004	0.00	10.85	0.00	0.000
0.82	1.80	96.28	1.15	110.72	21	525	0.38	0.006	0.01	10.85	0.00	0.000
0.98	1.71	117.20	1.01	118.61	22	574	0.37	0.006	0.01	10.85	0.00	0.000
1.15	1.64	135.88	1.00	135.88	25	611	0.35	0.007	0.01	10.85	0.00	0.000
1.31	1.66	141.60	1.00	141.60	26	647	0.35	0.007	0.01	10.85	0.00	0.000
1.48	1.70	139.61	1.00	139.61	26	674	0.36	0.008	0.01	10.85	0.00	0.000
1.64	1.69	151.28	1.00	151.28	28	717	0.36	0.008	0.01	10.85	0.00	0.000
1.80	1.59	191.08	1.00	191.08	34	798	0.33	0.008	0.00	10.85	0.00	0.000
1.97	1.47	250.34	1.00	250.34	43	901	0.32	0.007	0.00	10.85	0.00	0.000
2.13	1.40	297.19	1.00	297.19	50	982	0.32	0.007	0.00	10.85	0.00	0.000
2.30	1.39	312.57	1.00	312.57	53	1020	0.32	0.007	0.00	10.85	0.00	0.000
2.46	1.45	303.57	1.00	303.57	52	1064	0.32	0.008	0.00	10.85	0.00	0.000
2.62	1.53	285.08	1.00	285.08	50	1113	0.32	0.008	0.00	10.85	0.00	0.000
2.79	1.63	258.81	1.00	258.81	47	1147	0.32	0.008	0.00	10.85	0.00	0.000
2.95	1.68	237.86	1.00	237.86	44	1125	0.32	0.009	0.00	10.85	0.00	0.000
3.12	1.68	232.38	1.00	232.38	43	1089	0.32	0.010	0.00	10.85	0.00	0.000
3.28	1.61	250.58	1.00	250.58	45	1078	0.32	0.011	0.00	10.85	0.00	0.000
3.45	1.52	292.19	1.00	292.19	51	1126	0.32	0.010	0.00	10.85	0.00	0.000
3.61	1.46	341.42	1.00	341.42	59	1214	0.32	0.010	0.00	10.85	0.00	0.000
3.77	1.42	377.09	1.00	377.09	64	1281	0.32	0.010	0.00	10.85	0.00	0.000
3.94	1.43	374.44	1.00	374.44	64	1285	0.32	0.010	0.00	10.85	0.00	0.000
4.10	1.47	339.97	1.00	339.97	59	1224	0.32	0.012	0.00	10.85	0.00	0.000
4.27	1.53	294.08	1.00	294.08	52	1137	0.32	0.014	0.00	10.85	0.00	0.000
4.43	1.57	250.40	1.00	250.40	45	1028	0.32	0.017	0.01	10.85	0.01	0.000
4.59	1.62	213.91	1.00	213.91	39	927	0.32	0.021	0.01	10.85	0.01	0.000
4.76	1.64	183.84	1.00	183.84	34	822	0.33	0.028	0.01	10.85	0.01	0.001
4.92	1.69	154.31	1.00	154.31	29	732	0.34	0.038	0.02	10.85	0.02	0.001
5.09	1.74	127.46	1.06	135.36	26	644	0.36	0.056	0.04	10.85	0.04	0.001
5.25	1.80	102.70	1.15	118.52	23	563	0.37	0.090	0.08	10.85	0.07	0.003
5.41	1.85	85.23	1.20	102.47	20	498	0.37	0.149	0.15	10.85	0.13	0.005
5.58	1.90	71.66	1.24	88.70	18	446	0.37	0.257	0.30	10.85	0.26	0.010
5.74	1.93	62.65	1.26	78.73	16	404	0.37	0.444	0.58	10.85	0.50	0.019
5.91	1.95	57.17	1.27	72.46	15	377	0.37	0.701	1.01	10.85	0.87	0.036
6.07	1.96	52.71	1.00	52.71	11	354	0.37	1.087	2.27	10.85	1.97	0.075
6.23	1.96	51.25	1.00	51.25	11	345	0.38	1.350	2.92	10.85	2.52	0.097
6.40	1.96	50.86	1.00	50.86	10	342	0.37	1.535	3.35	10.85	2.90	0.118
6.56	1.94	52.56	1.00	52.56	11	345	0.38	1.561	3.30	10.85	2.86	0.110
6.73	1.93	54.26	1.00	54.26	11	350	0.38	1.516	3.11	10.85	2.69	0.110
6.89	1.91	57.62	1.00	57.62	12	361	0.38	1.325	2.55	10.85	2.21	0.085
7.05	1.88	62.42	1.00	62.42	12	377	0.38	1.083	1.92	10.85	1.66	0.064
7.22	1.85	67.65	1.00	67.65	13	396	0.38	0.869	1.42	10.85	1.22	0.050
7.38	1.83	71.80	1.00	71.80	14	416	0.38	0.692	1.06	10.85	0.92	0.035
7.55	1.81	75.24	1.00	75.24	15	434	0.38	0.584	0.85	10.85	0.74	0.030
7.71	1.80	78.22	1.00	78.22	15	450	0.38	0.509	0.71	10.85	0.62	0.024
7.87	1.78	81.10	1.00	81.10	16	466	0.38	0.445	0.60	10.85	0.52	0.020
8.04	1.75	83.74	1.00	83.74	16	472	0.38	0.440	0.58	10.85	0.50	0.020

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	K_c	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
8.20	1.73	86.29	1.00	86.29	16	481	0.38	0.422	0.54	10.85	0.47	0.018
8.37	1.71	88.33	1.00	88.33	17	490	0.38	0.403	0.51	10.85	0.44	0.018
8.53	1.74	87.16	1.00	87.16	17	502	0.38	0.376	0.47	10.85	0.41	0.016
8.69	1.75	88.57	1.00	88.57	17	518	0.38	0.338	0.42	10.85	0.36	0.014
8.86	1.75	90.37	1.00	90.37	17	534	0.38	0.307	0.37	10.85	0.32	0.013
9.02	1.73	96.23	1.00	96.23	18	560	0.38	0.259	0.29	10.85	0.25	0.010
9.19	1.71	100.55	1.00	100.55	19	583	0.37	0.227	0.24	10.85	0.21	0.009
9.35	1.70	106.13	1.00	106.13	20	612	0.37	0.194	0.20	10.85	0.17	0.007
9.51	1.68	111.59	1.00	111.59	21	635	0.37	0.174	0.17	10.85	0.14	0.006
9.68	1.66	116.56	1.00	116.56	21	660	0.37	0.156	0.14	10.85	0.12	0.005
9.84	1.66	119.92	1.00	119.92	22	679	0.36	0.145	0.13	10.85	0.11	0.004
10.01	1.67	120.71	1.00	120.71	22	697	0.36	0.137	0.12	10.85	0.10	0.004
10.17	1.68	118.99	1.00	118.99	22	703	0.37	0.138	0.12	10.85	0.11	0.004
10.34	1.70	115.42	1.00	115.42	22	700	0.37	0.144	0.13	10.85	0.11	0.005
10.50	1.71	112.68	1.00	112.83	21	695	0.37	0.152	0.14	10.85	0.12	0.005
10.66	1.71	111.71	1.00	111.77	21	694	0.37	0.158	0.15	10.85	0.13	0.005
10.83	1.70	112.42	1.00	112.42	21	699	0.37	0.159	0.15	10.85	0.13	0.005
10.99	1.69	114.08	1.00	114.08	21	706	0.37	0.158	0.15	10.85	0.13	0.005
11.16	1.67	115.28	1.00	115.28	21	708	0.37	0.161	0.15	10.85	0.13	0.005
11.32	1.66	116.08	1.00	116.08	21	707	0.37	0.166	0.15	10.85	0.13	0.005
11.48	1.64	116.44	1.00	116.44	21	698	0.37	0.179	0.17	10.85	0.14	0.006
11.65	1.63	117.48	1.00	117.48	21	700	0.37	0.183	0.17	10.85	0.15	0.006
11.81	1.62	120.09	1.00	120.09	22	715	0.37	0.174	0.16	10.85	0.14	0.005
11.98	1.62	124.49	1.00	124.49	23	750	0.37	0.150	0.13	10.85	0.11	0.005
12.14	1.63	131.80	1.00	131.80	24	800	0.36	0.124	0.10	10.85	0.09	0.003
12.30	1.62	141.37	1.00	141.37	26	858	0.36	0.103	0.08	10.85	0.07	0.003
12.47	1.62	153.26	1.00	153.26	28	942	0.35	0.081	0.05	10.85	0.05	0.002
12.63	1.61	164.38	1.00	164.38	30	1003	0.34	0.070	0.04	10.85	0.04	0.001
12.80	1.61	174.83	1.00	174.83	32	1067	0.33	0.062	0.04	10.85	0.03	0.001
12.96	1.62	175.75	1.00	175.75	32	1100	0.33	0.059	0.03	10.85	0.03	0.001
13.12	1.62	186.61	1.00	186.61	34	1171	0.34	0.052	0.03	10.85	0.02	0.001
13.29	1.61	197.45	1.00	197.45	36	1237	0.31	0.047	0.02	10.85	0.02	0.001
13.45	1.58	215.46	1.00	215.46	39	1306	0.31	0.043	0.02	10.85	0.02	0.001
13.62	1.57	221.03	1.00	221.03	40	1343	0.31	0.042	0.02	10.85	0.02	0.001
13.78	1.57	223.91	1.00	223.91	40	1369	0.31	0.041	0.02	10.85	0.02	0.001
13.94	1.58	226.06	1.00	226.06	40	1392	0.31	0.040	0.02	10.85	0.01	0.001
14.11	1.58	226.64	1.00	226.64	41	1411	0.32	0.040	0.02	10.85	0.01	0.001
14.27	1.59	222.40	1.00	222.40	40	1414	0.32	0.040	0.02	10.85	0.02	0.001
14.44	1.62	209.68	1.00	209.68	38	1381	0.32	0.043	0.02	10.85	0.02	0.001
14.60	1.65	191.12	1.00	191.12	35	1320	0.32	0.048	0.02	10.85	0.02	0.001
14.76	1.69	170.14	1.00	170.14	32	1239	0.34	0.055	0.03	10.85	0.03	0.001
14.93	1.73	149.28	1.06	157.72	30	1151	0.36	0.066	0.04	10.85	0.04	0.001
15.09	1.77	132.58	1.12	148.24	28	1077	0.37	0.079	0.05	10.85	0.04	0.002
15.26	1.80	120.11	1.15	138.31	27	1014	0.37	0.094	0.07	10.85	0.06	0.002
15.42	1.81	114.60	1.17	133.76	26	991	0.38	0.102	0.07	10.85	0.06	0.002
15.58	1.82	113.43	1.18	133.29	26	996	0.38	0.102	0.07	10.85	0.06	0.002
15.75	1.83	115.79	1.18	137.01	27	1034	0.37	0.094	0.07	10.85	0.06	0.002
15.91	1.83	119.98	1.18	141.89	28	1077	0.37	0.086	0.06	10.85	0.05	0.002

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	K_c	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
16.08	1.83	123.29	1.18	145.77	28	1114	0.37	0.080	0.05	10.85	0.05	0.002
16.24	1.84	125.95	1.19	149.78	29	1156	0.37	0.074	0.05	10.85	0.04	0.002
16.40	1.86	126.18	1.21	152.52	30	1200	0.36	0.069	0.04	10.85	0.04	0.001
16.57	1.88	125.33	1.23	153.74	0	0	0.36	0.000	0.00	0.00	0.00	0.000
16.73	1.98	124.96	1.29	161.77	0	0	0.35	0.000	0.00	0.00	0.00	0.000
16.90	2.07	121.84	1.38	168.63	0	0	0.33	0.000	0.00	0.00	0.00	0.000
17.06	2.21	109.82	1.64	180.48	0	0	0.33	0.000	0.00	0.00	0.00	0.000
17.23	2.34	90.21	2.10	189.73	0	0	0.35	0.000	0.00	0.00	0.00	0.000
17.39	2.43	77.66	2.56	199.16	0	0	0.37	0.000	0.00	0.00	0.00	0.000
17.55	2.44	73.65	2.61	192.56	48	1526	0.36	0.046	0.02	10.85	0.01	0.001
17.72	2.40	74.68	2.37	176.95	44	1477	0.36	0.050	0.02	10.85	0.02	0.001
17.88	2.40	70.46	2.37	167.22	41	1405	0.37	0.056	0.02	10.85	0.02	0.001
18.05	2.42	65.14	2.47	160.66	40	1339	0.37	0.063	0.03	10.85	0.02	0.001
18.21	2.44	60.72	2.59	157.12	39	1293	0.37	0.069	0.03	10.85	0.03	0.001
18.37	2.45	57.32	2.68	153.49	39	1254	0.38	0.075	0.03	10.85	0.03	0.001
18.54	2.48	52.54	2.87	150.98	39	1205	0.38	0.083	0.04	10.85	0.03	0.001
18.70	2.52	47.29	3.12	147.39	38	1144	0.38	0.096	0.04	10.85	0.04	0.001
18.87	2.57	41.90	3.46	145.18	39	1084	0.38	0.113	0.05	10.85	0.04	0.002
19.03	2.59	39.22	3.65	143.11	38	1052	0.38	0.124	0.06	10.85	0.05	0.002
19.19	2.61	37.27	3.81	142.10	0	0	0.39	0.000	0.00	0.00	0.00	0.000
19.36	2.62	35.59	3.96	140.82	0	0	0.39	0.000	0.00	0.00	0.00	0.000
19.52	2.64	33.81	4.09	138.40	0	0	0.39	0.000	0.00	0.00	0.00	0.000
19.69	2.65	32.28	4.20	135.60	0	0	0.39	0.000	0.00	0.00	0.00	0.000
19.85	2.67	30.64	4.37	133.98	0	0	0.39	0.000	0.00	0.00	0.00	0.000

Total estimated settlement: 1.15

Abbreviations

Q_{tn}: Normalized cone resistance
K_c: Fines correction factor
$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
G_{max}: Small strain shear modulus
CSR: Soil cyclic stress ratio
γ: Cyclic shear strain
$e_{vol(15)}$: Volumetric strain after 15 cycles
N_c: Equivalent number of cycles
e_v: Volumetric strain
Settle.: Calculated settlement

:: Post-earthquake settlement due to soil liquefaction ::

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
20.01	31.27	2.00	0.00	1.00	0.00	20.18	30.13	2.00	0.00	1.00	0.00
20.34	29.27	2.00	0.00	1.00	0.00	20.51	29.56	2.00	0.00	1.00	0.00
20.67	29.50	2.00	0.00	1.00	0.00	20.83	28.82	2.00	0.00	1.00	0.00
21.00	28.31	2.00	0.00	1.00	0.00	21.16	27.99	2.00	0.00	1.00	0.00
21.33	27.31	2.00	0.00	1.00	0.00	21.49	26.73	2.00	0.00	1.00	0.00
21.65	26.94	2.00	0.00	1.00	0.00	21.82	26.44	2.00	0.00	1.00	0.00
21.98	24.90	2.00	0.00	1.00	0.00	22.15	24.15	2.00	0.00	1.00	0.00
22.31	24.19	2.00	0.00	1.00	0.00	22.47	23.62	2.00	0.00	1.00	0.00
22.64	23.31	2.00	0.00	1.00	0.00	22.80	23.26	2.00	0.00	1.00	0.00
22.97	23.99	2.00	0.00	1.00	0.00	23.13	24.81	2.00	0.00	1.00	0.00
23.30	25.19	2.00	0.00	1.00	0.00	23.46	25.74	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
23.62	28.45	2.00	0.00	1.00	0.00	23.79	31.15	2.00	0.00	1.00	0.00
23.95	32.20	2.00	0.00	1.00	0.00	24.12	45.92	2.00	0.00	1.00	0.00
24.28	136.71	2.00	0.00	1.00	0.00	24.44	146.37	2.00	0.00	1.00	0.00
24.61	145.37	2.00	0.00	1.00	0.00	24.77	146.01	0.66	2.14	1.00	0.04
24.94	157.19	0.87	1.16	1.00	0.02	25.10	168.50	1.23	0.50	1.00	0.01
25.26	164.44	1.07	0.71	1.00	0.01	25.43	167.05	1.16	0.58	1.00	0.01
25.59	140.37	0.57	2.24	1.00	0.04	25.76	127.53	2.00	0.00	1.00	0.00
25.92	137.28	2.00	0.00	1.00	0.00	26.08	139.39	2.00	0.00	1.00	0.00
26.25	126.02	2.00	0.00	1.00	0.00	26.41	114.06	2.00	0.00	1.00	0.00
26.58	45.09	2.00	0.00	1.00	0.00	26.74	31.03	2.00	0.00	1.00	0.00
26.90	26.30	2.00	0.00	1.00	0.00	27.07	20.46	2.00	0.00	1.00	0.00
27.23	18.86	2.00	0.00	1.00	0.00	27.40	18.82	2.00	0.00	1.00	0.00
27.56	16.09	2.00	0.00	1.00	0.00	27.72	20.63	2.00	0.00	1.00	0.00
27.89	27.86	2.00	0.00	1.00	0.00	28.05	107.94	2.00	0.00	1.00	0.00
28.22	136.27	2.00	0.00	1.00	0.00	28.38	118.26	2.00	0.00	1.00	0.00
28.54	122.79	0.41	2.59	1.00	0.05	28.71	126.28	0.43	2.51	1.00	0.05
28.87	132.92	0.48	2.38	1.00	0.05	29.04	144.57	0.60	2.16	1.00	0.04
29.20	149.56	0.67	2.08	1.00	0.04	29.36	150.35	0.68	2.07	1.00	0.04
29.53	149.63	0.67	2.08	1.00	0.04	29.69	154.59	0.76	1.56	1.00	0.03
29.86	160.81	0.90	1.04	1.00	0.02	30.02	173.00	1.34	0.38	1.00	0.01
30.19	175.63	1.48	0.28	1.00	0.01	30.35	173.76	1.37	0.36	1.00	0.01
30.51	178.10	2.00	0.00	1.00	0.00	30.68	181.17	2.00	0.00	1.00	0.00
30.84	166.89	2.00	0.00	1.00	0.00	31.01	120.45	2.00	0.00	1.00	0.00
31.17	38.71	2.00	0.00	1.00	0.00	31.33	32.68	2.00	0.00	1.00	0.00
31.50	28.61	2.00	0.00	1.00	0.00	31.66	35.30	2.00	0.00	1.00	0.00
31.83	113.03	2.00	0.00	1.00	0.00	31.99	117.27	2.00	0.00	1.00	0.00
32.15	117.20	2.00	0.00	1.00	0.00	32.32	121.20	2.00	0.00	1.00	0.00
32.48	128.84	2.00	0.00	1.00	0.00	32.65	151.04	2.00	0.00	1.00	0.00
32.81	164.35	2.00	0.00	1.00	0.00	32.97	165.12	2.00	0.00	1.00	0.00
33.14	144.38	2.00	0.00	1.00	0.00	33.30	124.62	2.00	0.00	1.00	0.00
33.47	44.22	2.00	0.00	1.00	0.00	33.63	35.25	2.00	0.00	1.00	0.00
33.79	34.09	2.00	0.00	1.00	0.00	33.96	34.59	2.00	0.00	1.00	0.00
34.12	33.82	2.00	0.00	1.00	0.00	34.29	32.25	2.00	0.00	1.00	0.00
34.45	30.94	2.00	0.00	1.00	0.00	34.61	30.90	2.00	0.00	1.00	0.00
34.78	28.03	2.00	0.00	1.00	0.00	34.94	26.99	2.00	0.00	1.00	0.00
35.11	25.47	2.00	0.00	1.00	0.00	35.27	26.59	2.00	0.00	1.00	0.00
35.43	27.01	2.00	0.00	1.00	0.00	35.60	28.36	2.00	0.00	1.00	0.00
35.76	29.16	2.00	0.00	1.00	0.00	35.93	30.36	2.00	0.00	1.00	0.00
36.09	30.62	2.00	0.00	1.00	0.00	36.26	28.18	2.00	0.00	1.00	0.00
36.42	25.76	2.00	0.00	1.00	0.00	36.58	24.58	2.00	0.00	1.00	0.00
36.75	22.87	2.00	0.00	1.00	0.00	36.91	21.63	2.00	0.00	1.00	0.00
37.08	20.31	2.00	0.00	1.00	0.00	37.24	19.61	2.00	0.00	1.00	0.00
37.40	19.20	2.00	0.00	1.00	0.00	37.57	18.58	2.00	0.00	1.00	0.00
37.73	17.73	2.00	0.00	1.00	0.00	37.90	17.85	2.00	0.00	1.00	0.00
38.06	19.68	2.00	0.00	1.00	0.00	38.22	22.40	2.00	0.00	1.00	0.00
38.39	26.26	2.00	0.00	1.00	0.00	38.55	29.02	2.00	0.00	1.00	0.00
38.72	28.29	2.00	0.00	1.00	0.00	38.88	29.23	2.00	0.00	1.00	0.00
39.04	33.76	2.00	0.00	1.00	0.00	39.21	35.15	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
39.37	33.05	2.00	0.00	1.00	0.00	39.54	28.00	2.00	0.00	1.00	0.00
39.70	29.78	2.00	0.00	1.00	0.00	39.86	30.27	2.00	0.00	1.00	0.00
40.03	27.29	2.00	0.00	1.00	0.00	40.19	23.75	2.00	0.00	1.00	0.00
40.36	18.66	2.00	0.00	1.00	0.00	40.52	15.59	2.00	0.00	1.00	0.00
40.68	20.27	2.00	0.00	1.00	0.00	40.85	23.68	2.00	0.00	1.00	0.00
41.01	21.96	2.00	0.00	1.00	0.00	41.18	20.61	2.00	0.00	1.00	0.00
41.34	19.21	2.00	0.00	1.00	0.00	41.50	18.60	2.00	0.00	1.00	0.00
41.67	17.14	2.00	0.00	1.00	0.00	41.83	16.19	2.00	0.00	1.00	0.00
42.00	16.66	2.00	0.00	1.00	0.00	42.16	16.43	2.00	0.00	1.00	0.00
42.32	16.76	2.00	0.00	1.00	0.00	42.49	17.37	2.00	0.00	1.00	0.00
42.65	17.06	2.00	0.00	1.00	0.00	42.82	16.83	2.00	0.00	1.00	0.00
42.98	17.30	2.00	0.00	1.00	0.00	43.15	17.91	2.00	0.00	1.00	0.00
43.31	18.38	2.00	0.00	1.00	0.00	43.47	18.93	2.00	0.00	1.00	0.00
43.64	19.82	2.00	0.00	1.00	0.00	43.80	20.58	2.00	0.00	1.00	0.00
43.97	19.20	2.00	0.00	1.00	0.00	44.13	18.04	2.00	0.00	1.00	0.00
44.29	18.37	2.00	0.00	1.00	0.00	44.46	19.97	2.00	0.00	1.00	0.00
44.62	19.51	2.00	0.00	1.00	0.00	44.79	19.20	2.00	0.00	1.00	0.00
44.95	18.90	2.00	0.00	1.00	0.00	45.28	18.49	2.00	0.00	1.00	0.00
45.44	18.19	2.00	0.00	1.00	0.00	45.61	17.54	2.00	0.00	1.00	0.00
45.77	16.89	2.00	0.00	1.00	0.00	45.93	17.21	2.00	0.00	1.00	0.00
46.10	16.43	2.00	0.00	1.00	0.00	46.26	16.27	2.00	0.00	1.00	0.00
46.43	16.52	2.00	0.00	1.00	0.00	46.59	17.12	2.00	0.00	1.00	0.00
46.75	17.92	2.00	0.00	1.00	0.00	46.92	17.55	2.00	0.00	1.00	0.00
47.08	16.98	2.00	0.00	1.00	0.00	47.25	16.47	2.00	0.00	1.00	0.00
47.41	16.11	2.00	0.00	1.00	0.00	47.57	15.68	2.00	0.00	1.00	0.00
47.74	15.59	2.00	0.00	1.00	0.00	47.90	16.93	2.00	0.00	1.00	0.00
48.07	16.50	2.00	0.00	1.00	0.00	48.23	15.94	2.00	0.00	1.00	0.00
48.39	16.46	2.00	0.00	1.00	0.00	48.56	16.23	2.00	0.00	1.00	0.00
48.72	15.54	2.00	0.00	1.00	0.00	48.89	14.91	2.00	0.00	1.00	0.00
49.05	14.89	2.00	0.00	1.00	0.00	49.22	15.21	2.00	0.00	1.00	0.00
49.38	15.46	2.00	0.00	1.00	0.00	49.54	15.10	2.00	0.00	1.00	0.00
49.71	14.75	2.00	0.00	1.00	0.00	49.87	14.40	2.00	0.00	1.00	0.00
50.04	15.04	2.00	0.00	1.00	0.00	50.20	16.70	2.00	0.00	1.00	0.00
50.36	16.34	2.00	0.00	1.00	0.00	50.53	15.52	2.00	0.00	1.00	0.00
50.69	14.50	2.00	0.00	1.00	0.00	50.86	14.09	2.00	0.00	1.00	0.00
51.02	14.73	2.00	0.00	1.00	0.00	51.18	15.11	2.00	0.00	1.00	0.00
51.35	13.97	2.00	0.00	1.00	0.00	51.51	14.02	2.00	0.00	1.00	0.00
51.68	14.26	2.00	0.00	1.00	0.00	51.84	14.05	2.00	0.00	1.00	0.00
52.00	14.43	2.00	0.00	1.00	0.00	52.17	15.07	2.00	0.00	1.00	0.00
52.33	14.39	2.00	0.00	1.00	0.00	52.50	14.51	2.00	0.00	1.00	0.00
52.66	14.29	2.00	0.00	1.00	0.00	52.82	14.21	2.00	0.00	1.00	0.00
52.99	14.78	2.00	0.00	1.00	0.00	53.15	15.62	2.00	0.00	1.00	0.00
53.32	15.80	2.00	0.00	1.00	0.00	53.48	15.32	2.00	0.00	1.00	0.00
53.64	15.04	2.00	0.00	1.00	0.00	53.81	15.48	2.00	0.00	1.00	0.00
53.97	16.31	2.00	0.00	1.00	0.00	54.14	16.81	2.00	0.00	1.00	0.00
54.30	17.85	2.00	0.00	1.00	0.00	54.46	17.69	2.00	0.00	1.00	0.00
54.63	17.34	2.00	0.00	1.00	0.00	54.79	17.58	2.00	0.00	1.00	0.00
54.96	18.22	2.00	0.00	1.00	0.00	55.12	18.19	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
55.28	19.09	2.00	0.00	1.00	0.00	55.45	19.79	2.00	0.00	1.00	0.00
55.61	20.16	2.00	0.00	1.00	0.00	55.78	20.14	2.00	0.00	1.00	0.00
55.94	21.04	2.00	0.00	1.00	0.00	56.11	20.42	2.00	0.00	1.00	0.00
56.27	20.33	2.00	0.00	1.00	0.00	56.43	19.97	2.00	0.00	1.00	0.00
56.60	20.74	2.00	0.00	1.00	0.00	56.76	21.11	2.00	0.00	1.00	0.00
56.93	19.90	2.00	0.00	1.00	0.00	57.09	18.24	2.00	0.00	1.00	0.00
57.25	17.37	2.00	0.00	1.00	0.00	57.42	16.58	2.00	0.00	1.00	0.00
57.58	16.18	2.00	0.00	1.00	0.00	57.75	16.74	2.00	0.00	1.00	0.00
57.91	16.34	2.00	0.00	1.00	0.00	58.07	15.88	2.00	0.00	1.00	0.00
58.24	15.41	2.00	0.00	1.00	0.00	58.40	15.65	2.00	0.00	1.00	0.00
58.57	15.44	2.00	0.00	1.00	0.00	58.73	15.30	2.00	0.00	1.00	0.00
58.89	15.03	2.00	0.00	1.00	0.00	59.06	15.26	2.00	0.00	1.00	0.00
59.22	14.87	2.00	0.00	1.00	0.00	59.39	15.11	2.00	0.00	1.00	0.00
59.55	15.55	2.00	0.00	1.00	0.00	59.71	14.90	2.00	0.00	1.00	0.00
59.88	14.69	2.00	0.00	1.00	0.00	60.04	14.43	2.00	0.00	1.00	0.00
60.21	17.88	2.00	0.00	1.00	0.00	60.37	25.69	2.00	0.00	1.00	0.00
60.53	25.01	2.00	0.00	1.00	0.00	60.70	22.10	2.00	0.00	1.00	0.00
60.86	35.39	2.00	0.00	1.00	0.00	61.03	43.88	2.00	0.00	1.00	0.00
61.19	35.07	2.00	0.00	1.00	0.00	61.35	35.81	2.00	0.00	1.00	0.00
61.52	29.16	2.00	0.00	1.00	0.00	61.68	25.44	2.00	0.00	1.00	0.00
61.85	22.55	2.00	0.00	1.00	0.00	62.01	18.76	2.00	0.00	1.00	0.00
62.17	16.80	2.00	0.00	1.00	0.00	62.34	16.34	2.00	0.00	1.00	0.00
62.50	26.79	2.00	0.00	1.00	0.00	62.67	40.44	2.00	0.00	1.00	0.00
62.83	34.49	2.00	0.00	1.00	0.00	63.00	28.66	2.00	0.00	1.00	0.00
63.16	22.85	2.00	0.00	1.00	0.00	63.32	32.51	2.00	0.00	1.00	0.00
63.49	39.47	2.00	0.00	1.00	0.00	63.65	29.21	2.00	0.00	1.00	0.00
63.82	22.55	2.00	0.00	1.00	0.00	63.98	22.52	2.00	0.00	1.00	0.00
64.14	20.47	2.00	0.00	1.00	0.00	64.31	22.09	2.00	0.00	1.00	0.00
64.47	28.89	2.00	0.00	1.00	0.00	64.64	29.64	2.00	0.00	1.00	0.00
64.80	41.44	2.00	0.00	1.00	0.00	64.96	35.30	2.00	0.00	1.00	0.00
65.13	42.79	2.00	0.00	1.00	0.00	65.29	44.08	2.00	0.00	1.00	0.00
65.46	50.02	2.00	0.00	1.00	0.00	65.62	66.05	2.00	0.00	1.00	0.00
65.78	57.27	2.00	0.00	1.00	0.00	65.95	166.56	2.00	0.00	1.00	0.00
66.11	226.47	2.00	0.00	1.00	0.00	66.28	242.25	2.00	0.00	1.00	0.00
66.44	182.85	2.00	0.00	1.00	0.00	66.60	87.39	2.00	0.00	1.00	0.00
66.77	57.26	2.00	0.00	1.00	0.00	66.93	42.64	2.00	0.00	1.00	0.00
67.10	131.19	2.00	0.00	1.00	0.00	67.26	185.77	2.00	0.00	1.00	0.00
67.42	157.81	2.00	0.00	1.00	0.00	67.59	157.44	2.00	0.00	1.00	0.00
67.75	169.25	1.04	0.73	1.00	0.01	67.92	159.20	0.77	1.43	1.00	0.03
68.08	163.84	0.88	1.06	1.00	0.02	68.24	174.52	1.25	0.47	1.00	0.01
68.41	164.40	0.89	1.03	1.00	0.02	68.57	149.13	0.59	2.09	1.00	0.04
68.74	135.61	0.45	2.32	1.00	0.05	68.90	131.08	2.00	0.00	1.00	0.00
69.07	162.82	2.00	0.00	1.00	0.00	69.23	191.50	2.00	0.00	1.00	0.00
69.39	185.55	2.00	0.00	1.00	0.00	69.56	188.34	2.00	0.00	1.00	0.00
69.72	170.27	2.00	0.00	1.00	0.00	69.89	66.07	2.00	0.00	1.00	0.00
70.05	73.35	2.00	0.00	1.00	0.00	70.21	164.14	2.00	0.00	1.00	0.00
70.38	190.15	2.00	0.00	1.00	0.00	70.54	156.64	2.00	0.00	1.00	0.00
70.71	245.60	2.00	0.00	1.00	0.00	70.87	217.77	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

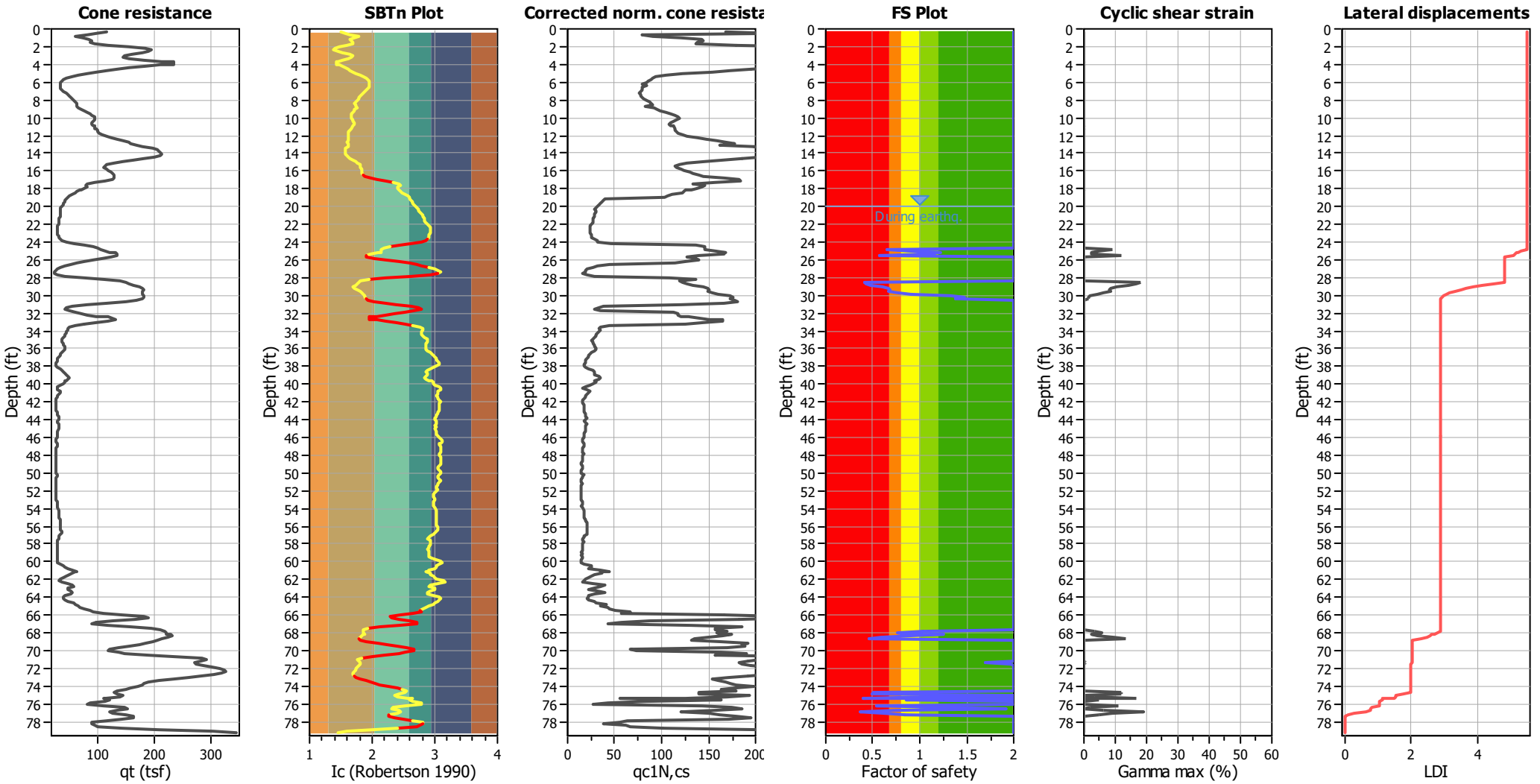
Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
71.03	204.77	2.00	0.00	1.00	0.00	71.20	192.70	2.00	0.00	1.00	0.00
71.36	182.43	1.70	0.14	1.00	0.00	71.53	185.75	1.96	0.02	1.00	0.00
71.69	195.86	2.00	0.00	1.00	0.00	71.85	215.90	2.00	0.00	1.00	0.00
72.02	222.06	2.00	0.00	1.00	0.00	72.18	234.73	2.00	0.00	1.00	0.00
72.35	235.12	2.00	0.00	1.00	0.00	72.51	233.27	2.00	0.00	1.00	0.00
72.67	212.07	2.00	0.00	1.00	0.00	72.84	192.62	2.00	0.00	1.00	0.00
73.00	170.86	2.00	0.00	1.00	0.00	73.17	154.53	2.00	0.00	1.00	0.00
73.33	161.08	2.00	0.00	1.00	0.00	73.49	167.66	2.00	0.00	1.00	0.00
73.66	173.21	2.00	0.00	1.00	0.00	73.82	178.75	2.00	0.00	1.00	0.00
73.99	198.19	2.00	0.00	1.00	0.00	74.15	177.16	2.00	0.00	1.00	0.00
74.31	163.96	2.00	0.00	1.00	0.00	74.48	179.64	2.00	0.00	1.00	0.00
74.64	140.46	0.50	2.23	1.00	0.04	74.81	139.98	0.50	2.24	1.00	0.05
74.97	193.61	2.00	0.00	1.00	0.00	75.13	169.24	1.05	0.72	1.00	0.01
75.30	125.91	0.39	2.52	1.00	0.05	75.46	56.08	2.00	0.00	1.00	0.00
75.63	162.94	0.86	1.11	1.00	0.02	75.79	84.59	2.00	0.00	1.00	0.00
75.96	42.21	2.00	0.00	1.00	0.00	76.12	27.61	2.00	0.00	1.00	0.00
76.28	143.53	0.53	2.18	1.00	0.04	76.45	174.59	1.26	0.46	1.00	0.01
76.61	185.18	1.92	0.03	1.00	0.00	76.78	157.79	0.75	1.53	1.00	0.03
76.94	120.82	0.37	2.64	1.00	0.05	77.10	150.68	0.63	2.06	1.00	0.04
77.27	161.94	0.84	1.18	1.00	0.02	77.43	180.11	2.00	0.00	1.00	0.00
77.60	195.50	2.00	0.00	1.00	0.00	77.76	171.56	2.00	0.00	1.00	0.00
77.92	62.84	2.00	0.00	1.00	0.00	78.09	55.52	2.00	0.00	1.00	0.00
78.25	37.61	2.00	0.00	1.00	0.00	78.42	61.55	2.00	0.00	1.00	0.00
78.58	67.35	2.00	0.00	1.00	0.00	78.74	101.27	2.00	0.00	1.00	0.00
78.91	206.55	2.00	0.00	1.00	0.00	79.07	214.37	2.00	0.00	1.00	0.00
79.24	258.63	2.00	0.00	1.00	0.00						

Total estimated settlement: 1.08

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

:: Lateral displacement index calculation ::

Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
20.01	31.27	0.00	2.00	0.00	0.00	0.00
20.18	30.13	0.00	2.00	0.00	0.00	0.00
20.34	29.27	0.00	2.00	0.00	0.00	0.00
20.51	29.56	0.00	2.00	0.00	0.00	0.00
20.67	29.50	0.00	2.00	0.00	0.00	0.00
20.83	28.82	0.00	2.00	0.00	0.00	0.00
21.00	28.31	0.00	2.00	0.00	0.00	0.00
21.16	27.99	0.00	2.00	0.00	0.00	0.00
21.33	27.31	0.00	2.00	0.00	0.00	0.00
21.49	26.73	0.00	2.00	0.00	0.00	0.00
21.65	26.94	0.00	2.00	0.00	0.00	0.00
21.82	26.44	0.00	2.00	0.00	0.00	0.00
21.98	24.90	0.00	2.00	0.00	0.00	0.00
22.15	24.15	0.00	2.00	0.00	0.00	0.00
22.31	24.19	0.00	2.00	0.00	0.00	0.00
22.47	23.62	0.00	2.00	0.00	0.00	0.00
22.64	23.31	0.00	2.00	0.00	0.00	0.00
22.80	23.26	0.00	2.00	0.00	0.00	0.00
22.97	23.99	0.00	2.00	0.00	0.00	0.00
23.13	24.81	0.00	2.00	0.00	0.00	0.00
23.30	25.19	0.00	2.00	0.00	0.00	0.00
23.46	25.74	0.00	2.00	0.00	0.00	0.00
23.62	28.45	0.00	2.00	0.00	0.00	0.00
23.79	31.15	0.00	2.00	0.00	0.00	0.00
23.95	32.20	0.00	2.00	0.00	0.00	0.00
24.12	45.92	0.00	2.00	0.00	0.00	0.00
24.28	136.71	0.13	2.00	0.41	0.00	0.00
24.44	146.37	0.10	2.00	0.29	0.00	0.00
24.61	145.37	0.10	2.00	0.31	0.00	0.00
24.77	146.01	0.10	0.66	0.30	0.09	0.18
24.94	157.19	0.08	0.87	0.15	0.05	0.10
25.10	168.50	0.06	1.23	0.00	0.02	0.04
25.26	164.44	0.06	1.07	0.06	0.03	0.06
25.43	167.05	0.06	1.16	0.02	0.03	0.05
25.59	140.37	0.12	0.57	0.37	0.12	0.23
25.76	127.53	0.16	2.00	0.52	0.00	0.00
25.92	137.28	0.13	2.00	0.41	0.00	0.00
26.08	139.39	0.12	2.00	0.38	0.00	0.00
26.25	126.02	0.17	2.00	0.54	0.00	0.00
26.41	114.06	0.22	2.00	0.67	0.00	0.00
26.58	45.09	0.00	2.00	0.00	0.00	0.00
26.74	31.03	0.00	2.00	0.00	0.00	0.00
26.90	26.30	0.00	2.00	0.00	0.00	0.00
27.07	20.46	0.00	2.00	0.00	0.00	0.00
27.23	18.86	0.00	2.00	0.00	0.00	0.00
27.40	18.82	0.00	2.00	0.00	0.00	0.00
27.56	16.09	0.00	2.00	0.00	0.00	0.00
27.72	20.63	0.00	2.00	0.00	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
27.89	27.86	0.00	2.00	0.00	0.00	0.00
28.05	107.94	0.26	2.00	0.72	0.00	0.00
28.22	136.27	0.13	2.00	0.42	0.00	0.00
28.38	118.26	0.20	2.00	0.62	0.00	0.00
28.54	122.79	0.18	0.41	0.57	0.18	0.35
28.71	126.28	0.17	0.43	0.54	0.17	0.34
28.87	132.92	0.14	0.48	0.46	0.14	0.27
29.04	144.57	0.11	0.60	0.32	0.11	0.22
29.20	149.56	0.09	0.67	0.25	0.08	0.16
29.36	150.35	0.09	0.68	0.24	0.08	0.15
29.53	149.63	0.09	0.67	0.25	0.08	0.17
29.69	154.59	0.08	0.76	0.19	0.06	0.12
29.86	160.81	0.07	0.90	0.10	0.04	0.09
30.02	173.00	0.05	1.34	-0.06	0.02	0.03
30.19	175.63	0.05	1.48	-0.10	0.01	0.03
30.35	173.76	0.05	1.37	-0.07	0.02	0.03
30.51	178.10	0.04	2.00	-0.13	0.00	0.00
30.68	181.17	0.04	2.00	-0.18	0.00	0.00
30.84	166.89	0.06	2.00	0.02	0.00	0.00
31.01	120.45	0.19	2.00	0.60	0.00	0.00
31.17	38.71	0.00	2.00	0.00	0.00	0.00
31.33	32.68	0.00	2.00	0.00	0.00	0.00
31.50	28.61	0.00	2.00	0.00	0.00	0.00
31.66	35.30	0.00	2.00	0.00	0.00	0.00
31.83	113.03	0.23	2.00	0.68	0.00	0.00
31.99	117.27	0.21	2.00	0.63	0.00	0.00
32.15	117.20	0.21	2.00	0.63	0.00	0.00
32.32	121.20	0.19	2.00	0.59	0.00	0.00
32.48	128.84	0.16	2.00	0.51	0.00	0.00
32.65	151.04	0.09	2.00	0.23	0.00	0.00
32.81	164.35	0.06	2.00	0.06	0.00	0.00
32.97	165.12	0.06	2.00	0.05	0.00	0.00
33.14	144.38	0.11	2.00	0.32	0.00	0.00
33.30	124.62	0.17	2.00	0.55	0.00	0.00
33.47	44.22	0.00	2.00	0.00	0.00	0.00
33.63	35.25	0.00	2.00	0.00	0.00	0.00
33.79	34.09	0.00	2.00	0.00	0.00	0.00
33.96	34.59	0.00	2.00	0.00	0.00	0.00
34.12	33.82	0.00	2.00	0.00	0.00	0.00
34.29	32.25	0.00	2.00	0.00	0.00	0.00
34.45	30.94	0.00	2.00	0.00	0.00	0.00
34.61	30.90	0.00	2.00	0.00	0.00	0.00
34.78	28.03	0.00	2.00	0.00	0.00	0.00
34.94	26.99	0.00	2.00	0.00	0.00	0.00
35.11	25.47	0.00	2.00	0.00	0.00	0.00
35.27	26.59	0.00	2.00	0.00	0.00	0.00
35.43	27.01	0.00	2.00	0.00	0.00	0.00
35.60	28.36	0.00	2.00	0.00	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
35.76	29.16	0.00	2.00	0.00	0.00	0.00
35.93	30.36	0.00	2.00	0.00	0.00	0.00
36.09	30.62	0.00	2.00	0.00	0.00	0.00
36.26	28.18	0.00	2.00	0.00	0.00	0.00
36.42	25.76	0.00	2.00	0.00	0.00	0.00
36.58	24.58	0.00	2.00	0.00	0.00	0.00
36.75	22.87	0.00	2.00	0.00	0.00	0.00
36.91	21.63	0.00	2.00	0.00	0.00	0.00
37.08	20.31	0.00	2.00	0.00	0.00	0.00
37.24	19.61	0.00	2.00	0.00	0.00	0.00
37.40	19.20	0.00	2.00	0.00	0.00	0.00
37.57	18.58	0.00	2.00	0.00	0.00	0.00
37.73	17.73	0.00	2.00	0.00	0.00	0.00
37.90	17.85	0.00	2.00	0.00	0.00	0.00
38.06	19.68	0.00	2.00	0.00	0.00	0.00
38.22	22.40	0.00	2.00	0.00	0.00	0.00
38.39	26.26	0.00	2.00	0.00	0.00	0.00
38.55	29.02	0.00	2.00	0.00	0.00	0.00
38.72	28.29	0.00	2.00	0.00	0.00	0.00
38.88	29.23	0.00	2.00	0.00	0.00	0.00
39.04	33.76	0.00	2.00	0.00	0.00	0.00
39.21	35.15	0.00	2.00	0.00	0.00	0.00
39.37	33.05	0.00	2.00	0.00	0.00	0.00
39.54	28.00	0.00	2.00	0.00	0.00	0.00
39.70	29.78	0.00	2.00	0.00	0.00	0.00
39.86	30.27	0.00	2.00	0.00	0.00	0.00
40.03	27.29	0.00	2.00	0.00	0.00	0.00
40.19	23.75	0.00	2.00	0.00	0.00	0.00
40.36	18.66	0.00	2.00	0.00	0.00	0.00
40.52	15.59	0.00	2.00	0.00	0.00	0.00
40.68	20.27	0.00	2.00	0.00	0.00	0.00
40.85	23.68	0.00	2.00	0.00	0.00	0.00
41.01	21.96	0.00	2.00	0.00	0.00	0.00
41.18	20.61	0.00	2.00	0.00	0.00	0.00
41.34	19.21	0.00	2.00	0.00	0.00	0.00
41.50	18.60	0.00	2.00	0.00	0.00	0.00
41.67	17.14	0.00	2.00	0.00	0.00	0.00
41.83	16.19	0.00	2.00	0.00	0.00	0.00
42.00	16.66	0.00	2.00	0.00	0.00	0.00
42.16	16.43	0.00	2.00	0.00	0.00	0.00
42.32	16.76	0.00	2.00	0.00	0.00	0.00
42.49	17.37	0.00	2.00	0.00	0.00	0.00
42.65	17.06	0.00	2.00	0.00	0.00	0.00
42.82	16.83	0.00	2.00	0.00	0.00	0.00
42.98	17.30	0.00	2.00	0.00	0.00	0.00
43.15	17.91	0.00	2.00	0.00	0.00	0.00
43.31	18.38	0.00	2.00	0.00	0.00	0.00
43.47	18.93	0.00	2.00	0.00	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
43.64	19.82	0.00	2.00	0.00	0.00	0.00
43.80	20.58	0.00	2.00	0.00	0.00	0.00
43.97	19.20	0.00	2.00	0.00	0.00	0.00
44.13	18.04	0.00	2.00	0.00	0.00	0.00
44.29	18.37	0.00	2.00	0.00	0.00	0.00
44.46	19.97	0.00	2.00	0.00	0.00	0.00
44.62	19.51	0.00	2.00	0.00	0.00	0.00
44.79	19.20	0.00	2.00	0.00	0.00	0.00
44.95	18.90	0.00	2.00	0.00	0.00	0.00
45.28	18.49	0.00	2.00	0.00	0.00	0.00
45.44	18.19	0.00	2.00	0.00	0.00	0.00
45.61	17.54	0.00	2.00	0.00	0.00	0.00
45.77	16.89	0.00	2.00	0.00	0.00	0.00
45.93	17.21	0.00	2.00	0.00	0.00	0.00
46.10	16.43	0.00	2.00	0.00	0.00	0.00
46.26	16.27	0.00	2.00	0.00	0.00	0.00
46.43	16.52	0.00	2.00	0.00	0.00	0.00
46.59	17.12	0.00	2.00	0.00	0.00	0.00
46.75	17.92	0.00	2.00	0.00	0.00	0.00
46.92	17.55	0.00	2.00	0.00	0.00	0.00
47.08	16.98	0.00	2.00	0.00	0.00	0.00
47.25	16.47	0.00	2.00	0.00	0.00	0.00
47.41	16.11	0.00	2.00	0.00	0.00	0.00
47.57	15.68	0.00	2.00	0.00	0.00	0.00
47.74	15.59	0.00	2.00	0.00	0.00	0.00
47.90	16.93	0.00	2.00	0.00	0.00	0.00
48.07	16.50	0.00	2.00	0.00	0.00	0.00
48.23	15.94	0.00	2.00	0.00	0.00	0.00
48.39	16.46	0.00	2.00	0.00	0.00	0.00
48.56	16.23	0.00	2.00	0.00	0.00	0.00
48.72	15.54	0.00	2.00	0.00	0.00	0.00
48.89	14.91	0.00	2.00	0.00	0.00	0.00
49.05	14.89	0.00	2.00	0.00	0.00	0.00
49.22	15.21	0.00	2.00	0.00	0.00	0.00
49.38	15.46	0.00	2.00	0.00	0.00	0.00
49.54	15.10	0.00	2.00	0.00	0.00	0.00
49.71	14.75	0.00	2.00	0.00	0.00	0.00
49.87	14.40	0.00	2.00	0.00	0.00	0.00
50.04	15.04	0.00	2.00	0.00	0.00	0.00
50.20	16.70	0.00	2.00	0.00	0.00	0.00
50.36	16.34	0.00	2.00	0.00	0.00	0.00
50.53	15.52	0.00	2.00	0.00	0.00	0.00
50.69	14.50	0.00	2.00	0.00	0.00	0.00
50.86	14.09	0.00	2.00	0.00	0.00	0.00
51.02	14.73	0.00	2.00	0.00	0.00	0.00
51.18	15.11	0.00	2.00	0.00	0.00	0.00
51.35	13.97	0.00	2.00	0.00	0.00	0.00
51.51	14.02	0.00	2.00	0.00	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
51.68	14.26	0.00	2.00	0.00	0.00	0.00
51.84	14.05	0.00	2.00	0.00	0.00	0.00
52.00	14.43	0.00	2.00	0.00	0.00	0.00
52.17	15.07	0.00	2.00	0.00	0.00	0.00
52.33	14.39	0.00	2.00	0.00	0.00	0.00
52.50	14.51	0.00	2.00	0.00	0.00	0.00
52.66	14.29	0.00	2.00	0.00	0.00	0.00
52.82	14.21	0.00	2.00	0.00	0.00	0.00
52.99	14.78	0.00	2.00	0.00	0.00	0.00
53.15	15.62	0.00	2.00	0.00	0.00	0.00
53.32	15.80	0.00	2.00	0.00	0.00	0.00
53.48	15.32	0.00	2.00	0.00	0.00	0.00
53.64	15.04	0.00	2.00	0.00	0.00	0.00
53.81	15.48	0.00	2.00	0.00	0.00	0.00
53.97	16.31	0.00	2.00	0.00	0.00	0.00
54.14	16.81	0.00	2.00	0.00	0.00	0.00
54.30	17.85	0.00	2.00	0.00	0.00	0.00
54.46	17.69	0.00	2.00	0.00	0.00	0.00
54.63	17.34	0.00	2.00	0.00	0.00	0.00
54.79	17.58	0.00	2.00	0.00	0.00	0.00
54.96	18.22	0.00	2.00	0.00	0.00	0.00
55.12	18.19	0.00	2.00	0.00	0.00	0.00
55.28	19.09	0.00	2.00	0.00	0.00	0.00
55.45	19.79	0.00	2.00	0.00	0.00	0.00
55.61	20.16	0.00	2.00	0.00	0.00	0.00
55.78	20.14	0.00	2.00	0.00	0.00	0.00
55.94	21.04	0.00	2.00	0.00	0.00	0.00
56.11	20.42	0.00	2.00	0.00	0.00	0.00
56.27	20.33	0.00	2.00	0.00	0.00	0.00
56.43	19.97	0.00	2.00	0.00	0.00	0.00
56.60	20.74	0.00	2.00	0.00	0.00	0.00
56.76	21.11	0.00	2.00	0.00	0.00	0.00
56.93	19.90	0.00	2.00	0.00	0.00	0.00
57.09	18.24	0.00	2.00	0.00	0.00	0.00
57.25	17.37	0.00	2.00	0.00	0.00	0.00
57.42	16.58	0.00	2.00	0.00	0.00	0.00
57.58	16.18	0.00	2.00	0.00	0.00	0.00
57.75	16.74	0.00	2.00	0.00	0.00	0.00
57.91	16.34	0.00	2.00	0.00	0.00	0.00
58.07	15.88	0.00	2.00	0.00	0.00	0.00
58.24	15.41	0.00	2.00	0.00	0.00	0.00
58.40	15.65	0.00	2.00	0.00	0.00	0.00
58.57	15.44	0.00	2.00	0.00	0.00	0.00
58.73	15.30	0.00	2.00	0.00	0.00	0.00
58.89	15.03	0.00	2.00	0.00	0.00	0.00
59.06	15.26	0.00	2.00	0.00	0.00	0.00
59.22	14.87	0.00	2.00	0.00	0.00	0.00
59.39	15.11	0.00	2.00	0.00	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
59.55	15.55	0.00	2.00	0.00	0.00	0.00
59.71	14.90	0.00	2.00	0.00	0.00	0.00
59.88	14.69	0.00	2.00	0.00	0.00	0.00
60.04	14.43	0.00	2.00	0.00	0.00	0.00
60.21	17.88	0.00	2.00	0.00	0.00	0.00
60.37	25.69	0.00	2.00	0.00	0.00	0.00
60.53	25.01	0.00	2.00	0.00	0.00	0.00
60.70	22.10	0.00	2.00	0.00	0.00	0.00
60.86	35.39	0.00	2.00	0.00	0.00	0.00
61.03	43.88	0.00	2.00	0.00	0.00	0.00
61.19	35.07	0.00	2.00	0.00	0.00	0.00
61.35	35.81	0.00	2.00	0.00	0.00	0.00
61.52	29.16	0.00	2.00	0.00	0.00	0.00
61.68	25.44	0.00	2.00	0.00	0.00	0.00
61.85	22.55	0.00	2.00	0.00	0.00	0.00
62.01	18.76	0.00	2.00	0.00	0.00	0.00
62.17	16.80	0.00	2.00	0.00	0.00	0.00
62.34	16.34	0.00	2.00	0.00	0.00	0.00
62.50	26.79	0.00	2.00	0.00	0.00	0.00
62.67	40.44	0.00	2.00	0.00	0.00	0.00
62.83	34.49	0.00	2.00	0.00	0.00	0.00
63.00	28.66	0.00	2.00	0.00	0.00	0.00
63.16	22.85	0.00	2.00	0.00	0.00	0.00
63.32	32.51	0.00	2.00	0.00	0.00	0.00
63.49	39.47	0.00	2.00	0.00	0.00	0.00
63.65	29.21	0.00	2.00	0.00	0.00	0.00
63.82	22.55	0.00	2.00	0.00	0.00	0.00
63.98	22.52	0.00	2.00	0.00	0.00	0.00
64.14	20.47	0.00	2.00	0.00	0.00	0.00
64.31	22.09	0.00	2.00	0.00	0.00	0.00
64.47	28.89	0.00	2.00	0.00	0.00	0.00
64.64	29.64	0.00	2.00	0.00	0.00	0.00
64.80	41.44	0.00	2.00	0.00	0.00	0.00
64.96	35.30	0.00	2.00	0.00	0.00	0.00
65.13	42.79	0.00	2.00	0.00	0.00	0.00
65.29	44.08	0.00	2.00	0.00	0.00	0.00
65.46	50.02	0.00	2.00	0.00	0.00	0.00
65.62	66.05	0.00	2.00	0.00	0.00	0.00
65.78	57.27	0.00	2.00	0.00	0.00	0.00
65.95	166.56	0.06	2.00	0.03	0.00	0.00
66.11	226.47	0.01	2.00	-0.85	0.00	0.00
66.28	242.25	0.00	2.00	-1.09	0.00	0.00
66.44	182.85	0.04	2.00	-0.20	0.00	0.00
66.60	87.39	0.00	2.00	0.00	0.00	0.00
66.77	57.26	0.00	2.00	0.00	0.00	0.00
66.93	42.64	0.00	2.00	0.00	0.00	0.00
67.10	131.19	0.15	2.00	0.48	0.00	0.00
67.26	185.77	0.03	2.00	-0.24	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
67.42	157.81	0.08	2.00	0.15	0.00	0.00
67.59	157.44	0.08	2.00	0.15	0.00	0.00
67.75	169.25	0.06	1.04	-0.01	0.03	0.06
67.92	159.20	0.07	0.77	0.13	0.06	0.12
68.08	163.84	0.06	0.88	0.06	0.05	0.09
68.24	174.52	0.05	1.25	-0.08	0.02	0.04
68.41	164.40	0.06	0.89	0.06	0.04	0.09
68.57	149.13	0.10	0.59	0.26	0.10	0.18
68.74	135.61	0.13	0.45	0.43	0.13	0.27
68.90	131.08	0.15	2.00	0.48	0.00	0.00
69.07	162.82	0.07	2.00	0.08	0.00	0.00
69.23	191.50	0.03	2.00	-0.33	0.00	0.00
69.39	185.55	0.03	2.00	-0.24	0.00	0.00
69.56	188.34	0.03	2.00	-0.28	0.00	0.00
69.72	170.27	0.05	2.00	-0.02	0.00	0.00
69.89	66.07	0.00	2.00	0.00	0.00	0.00
70.05	73.35	0.00	2.00	0.00	0.00	0.00
70.21	164.14	0.06	2.00	0.06	0.00	0.00
70.38	190.15	0.03	2.00	-0.31	0.00	0.00
70.54	156.64	0.08	2.00	0.16	0.00	0.00
70.71	245.60	0.00	2.00	-1.15	0.00	0.00
70.87	217.77	0.01	2.00	-0.72	0.00	0.00
71.03	204.77	0.02	2.00	-0.52	0.00	0.00
71.20	192.70	0.03	2.00	-0.34	0.00	0.00
71.36	182.43	0.04	1.70	-0.20	0.01	0.01
71.53	185.75	0.03	1.96	-0.24	0.00	0.00
71.69	195.86	0.02	2.00	-0.39	0.00	0.00
71.85	215.90	0.01	2.00	-0.69	0.00	0.00
72.02	222.06	0.01	2.00	-0.78	0.00	0.00
72.18	234.73	0.01	2.00	-0.98	0.00	0.00
72.35	235.12	0.01	2.00	-0.98	0.00	0.00
72.51	233.27	0.01	2.00	-0.95	0.00	0.00
72.67	212.07	0.01	2.00	-0.63	0.00	0.00
72.84	192.62	0.03	2.00	-0.34	0.00	0.00
73.00	170.86	0.05	2.00	-0.03	0.00	0.00
73.17	154.53	0.08	2.00	0.19	0.00	0.00
73.33	161.08	0.07	2.00	0.10	0.00	0.00
73.49	167.66	0.06	2.00	0.01	0.00	0.00
73.66	173.21	0.05	2.00	-0.07	0.00	0.00
73.82	178.75	0.04	2.00	-0.14	0.00	0.00
73.99	198.19	0.02	2.00	-0.42	0.00	0.00
74.15	177.16	0.04	2.00	-0.12	0.00	0.00
74.31	163.96	0.06	2.00	0.06	0.00	0.00
74.48	179.64	0.04	2.00	-0.16	0.00	0.00
74.64	140.46	0.12	0.50	0.37	0.12	0.23
74.81	139.98	0.12	0.50	0.37	0.12	0.24
74.97	193.61	0.03	2.00	-0.36	0.00	0.00
75.13	169.24	0.06	1.05	-0.01	0.03	0.06

:: Estimation of post-earthquake lateral Displacements :: (continued)

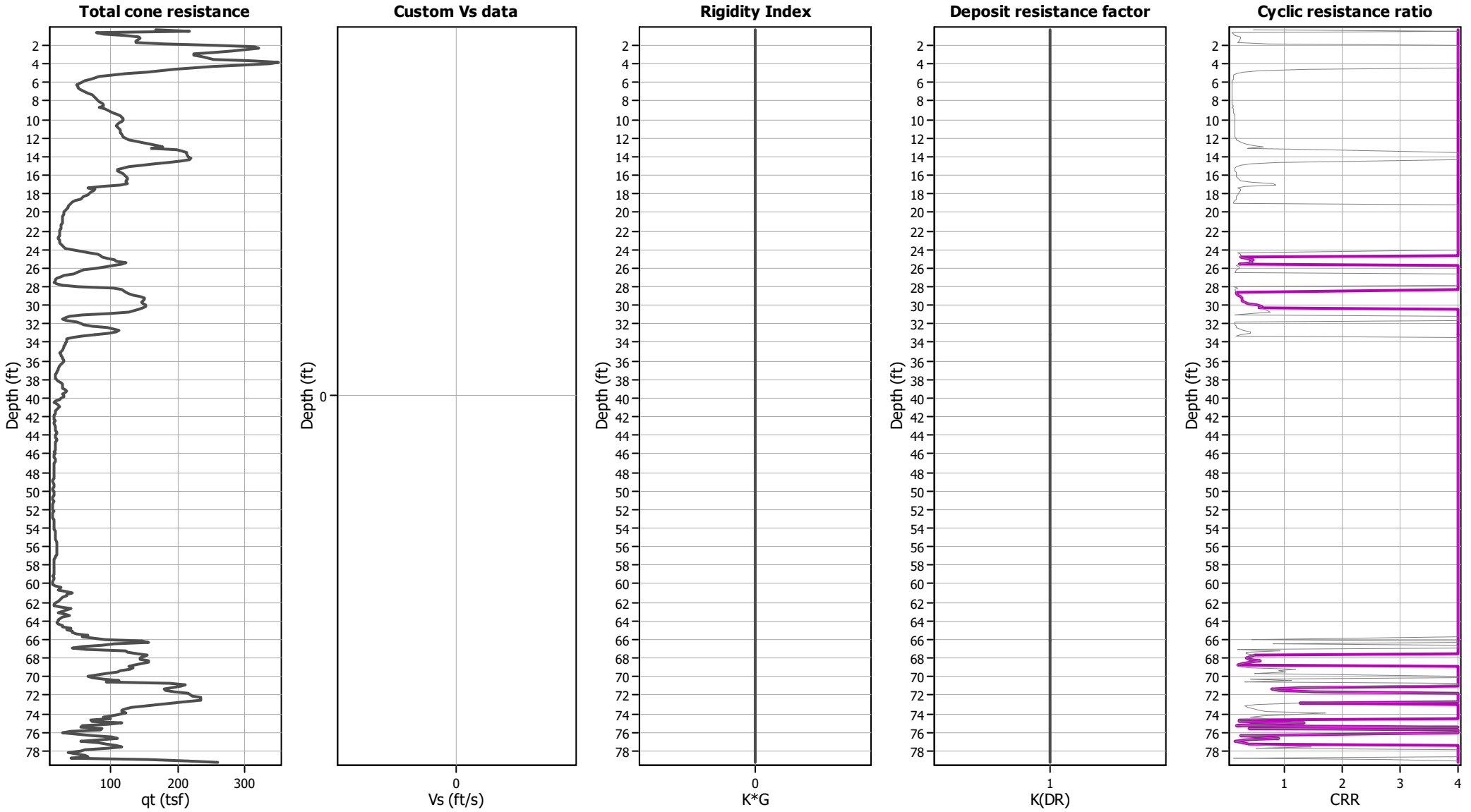
Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
75.30	125.91	0.17	0.39	0.54	0.17	0.34
75.46	56.08	0.00	2.00	0.00	0.00	0.00
75.63	162.94	0.07	0.86	0.08	0.05	0.10
75.79	84.59	0.00	2.00	0.00	0.00	0.00
75.96	42.21	0.00	2.00	0.00	0.00	0.00
76.12	27.61	0.00	2.00	0.00	0.00	0.00
76.28	143.53	0.11	0.53	0.33	0.11	0.21
76.45	174.59	0.05	1.26	-0.08	0.02	0.04
76.61	185.18	0.03	1.92	-0.24	0.00	0.00
76.78	157.79	0.08	0.75	0.15	0.06	0.13
76.94	120.82	0.19	0.37	0.60	0.19	0.37
77.10	150.68	0.09	0.63	0.24	0.09	0.18
77.27	161.94	0.07	0.84	0.09	0.05	0.10
77.43	180.11	0.04	2.00	-0.16	0.00	0.00
77.60	195.50	0.03	2.00	-0.38	0.00	0.00
77.76	171.56	0.05	2.00	-0.04	0.00	0.00
77.92	62.84	0.00	2.00	0.00	0.00	0.00
78.09	55.52	0.00	2.00	0.00	0.00	0.00
78.25	37.61	0.00	2.00	0.00	0.00	0.00
78.42	61.55	0.00	2.00	0.00	0.00	0.00
78.58	67.35	0.00	2.00	0.00	0.00	0.00
78.74	101.27	0.30	2.00	0.78	0.00	0.00
78.91	206.55	0.02	2.00	-0.55	0.00	0.00
79.07	214.37	0.01	2.00	-0.67	0.00	0.00
79.24	258.63	0.00	2.00	-1.35	0.00	0.00

Total estimated displacement: 5.49

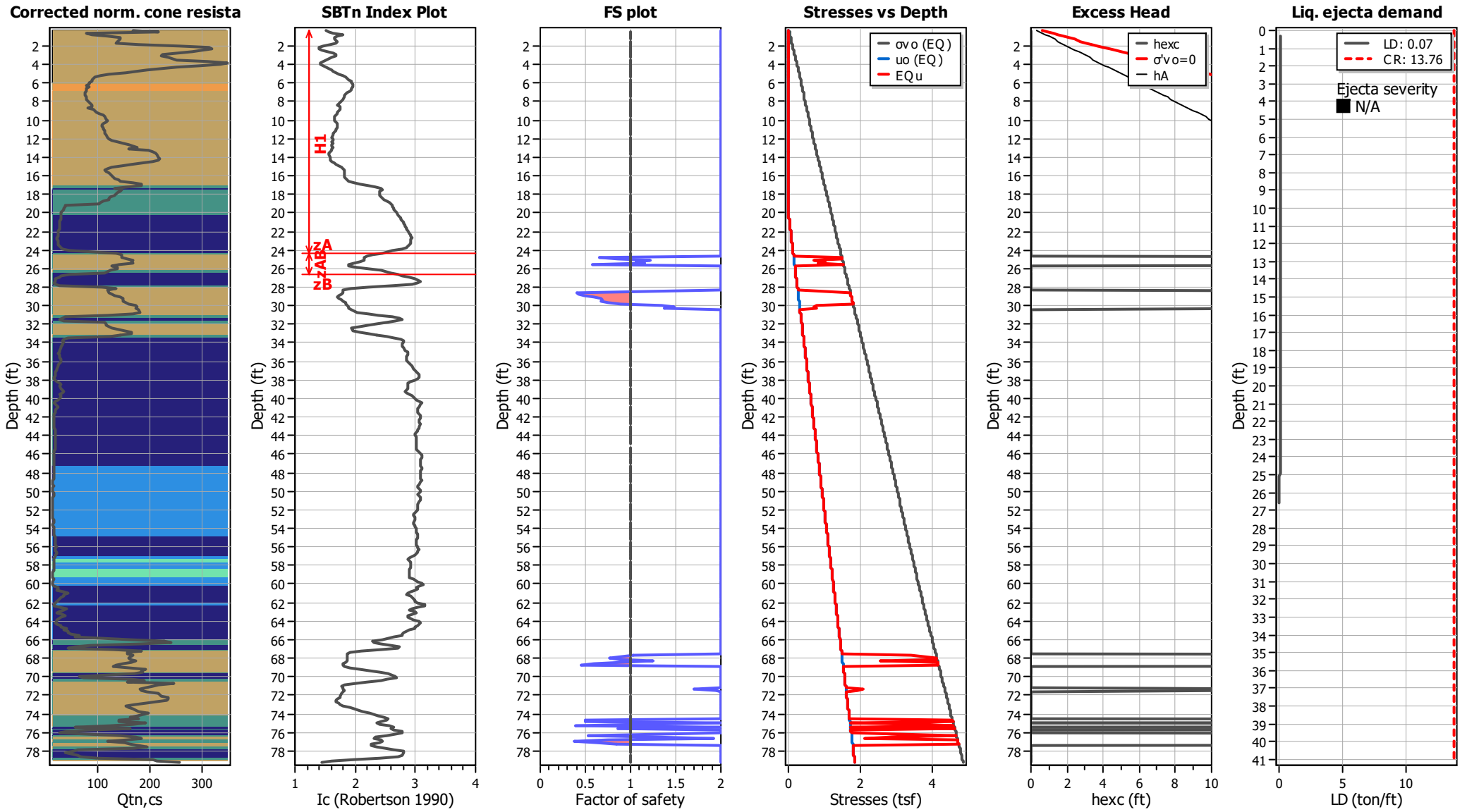
Abbreviations

Depth: Depth of test point
$q_{c1N,cs}$: Adjusted and corrected cone resistance due to fines
$Gamma_{lim}$: Limiting shear strain
FS: Calculated factor of safety against liquefaction
Fa:
$Gamma_{max}$: Maximum cyclic shear strain
Lat. disp.: Lateral displacement

Aging Calculation Estimation



Ejecta Severity Estimation



APPENDIX F

CLiq Liquefaction Analyses Reports
for Groundwater at 25-feet Deep

Baez Geotechnical Group
Geotechnical Engineers
BGG
http://www.baezgeotechnicalgroup.com

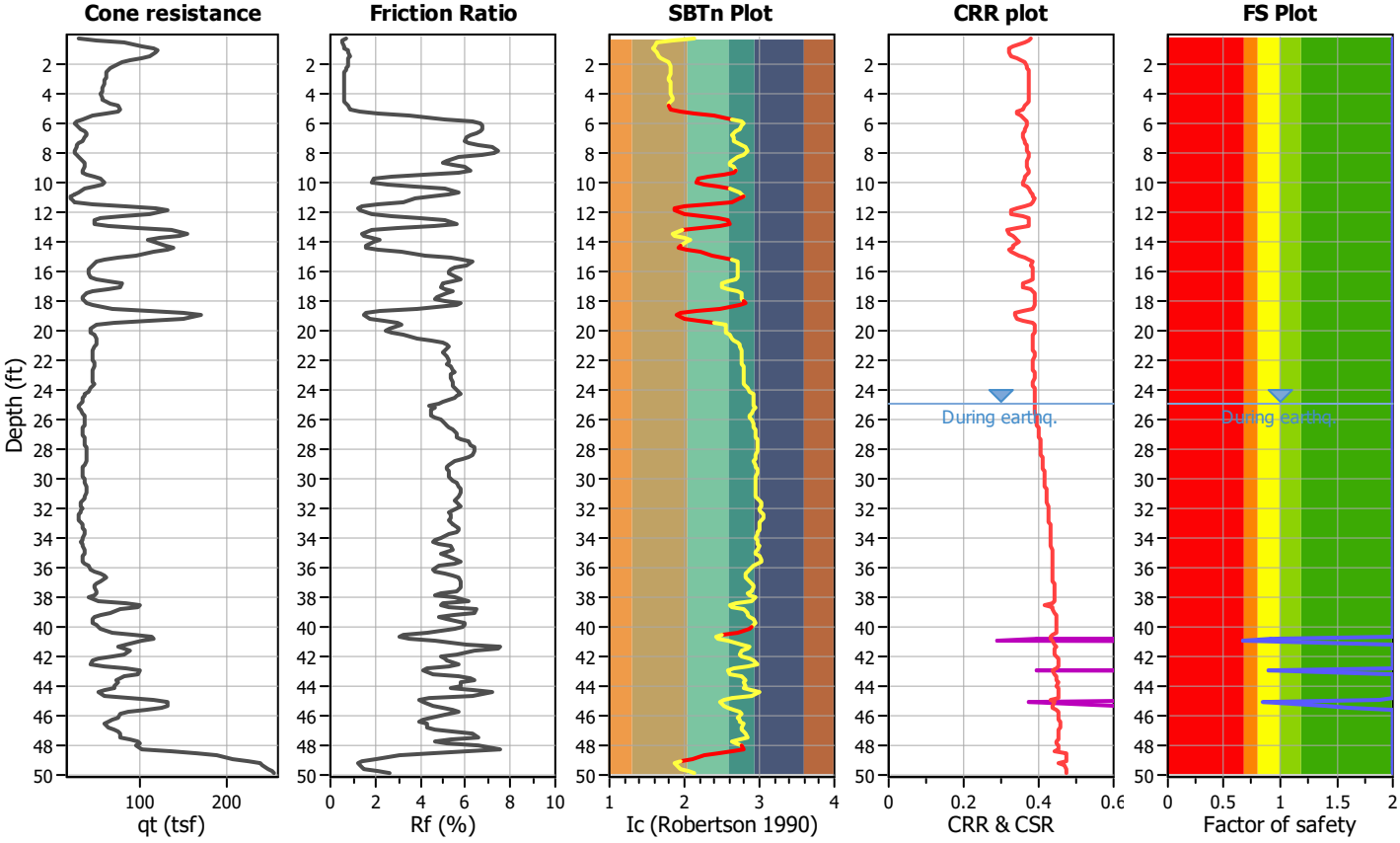
LIQUEFACTION ANALYSIS REPORT

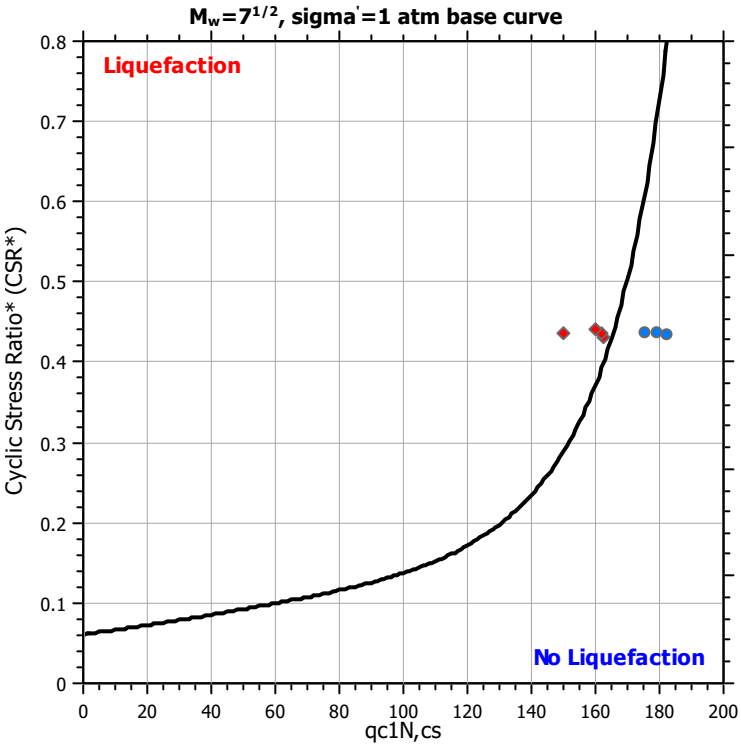
Project title : G289.01 Paseo **Location : Oakley Road, Oakley**

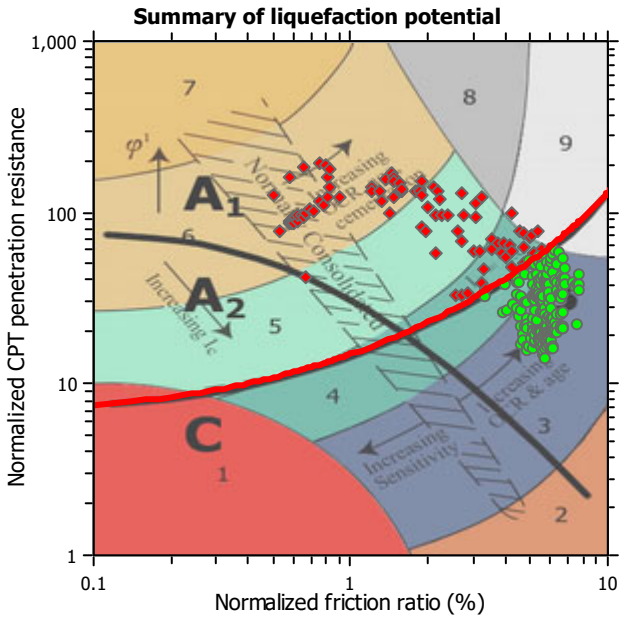
CPT file : CPT-01

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	25.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	25.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

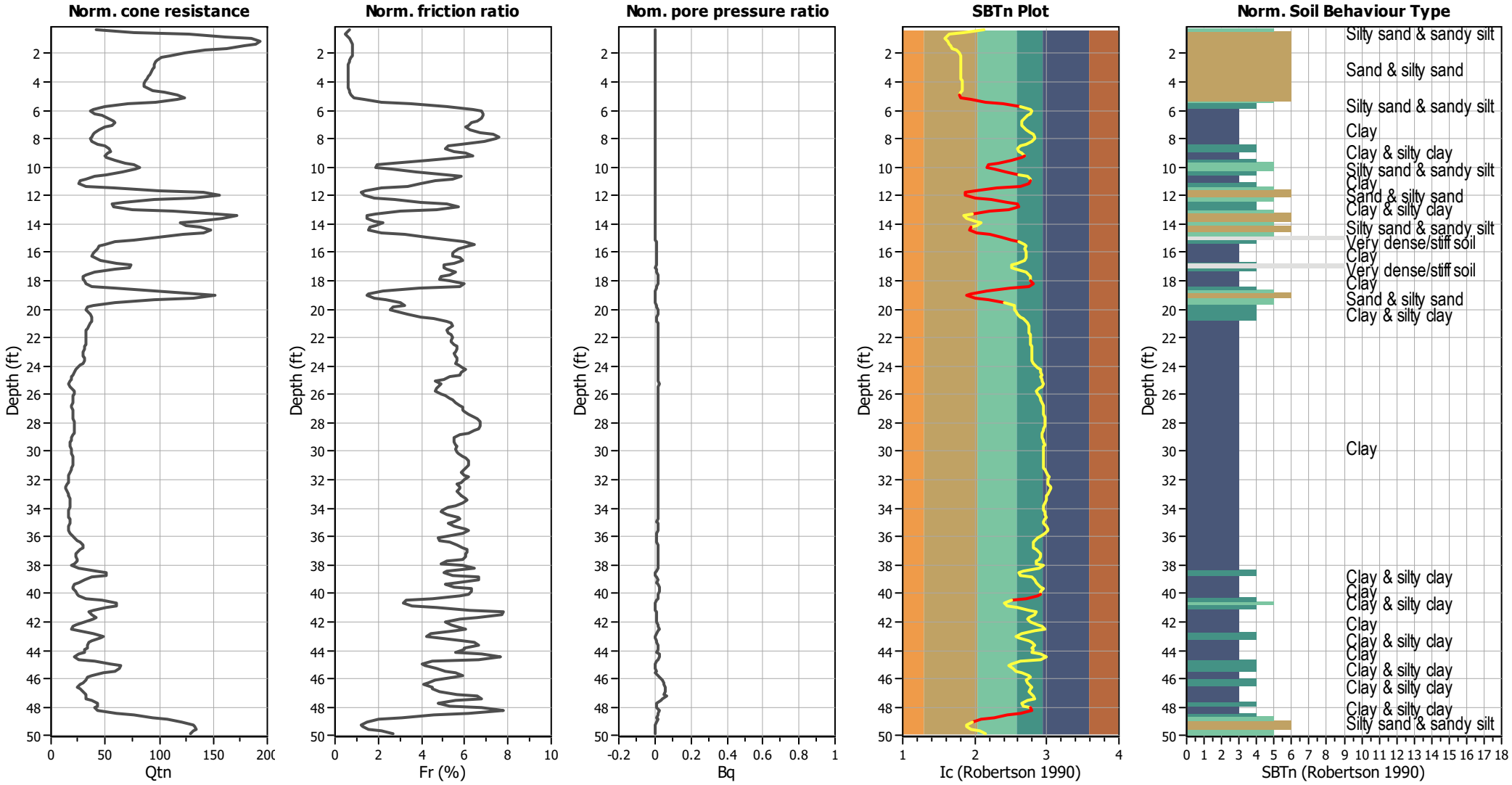






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normalized)



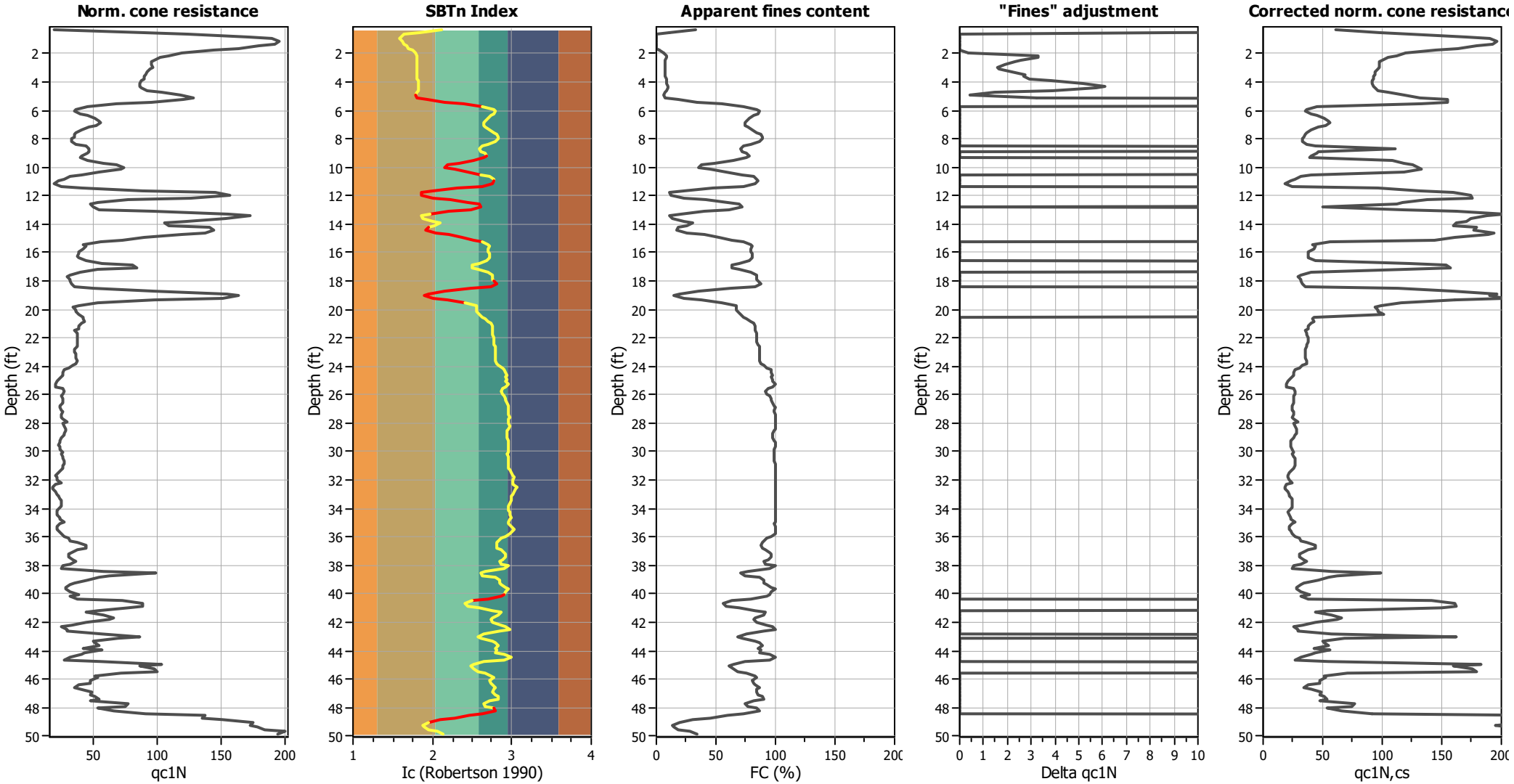
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	25.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

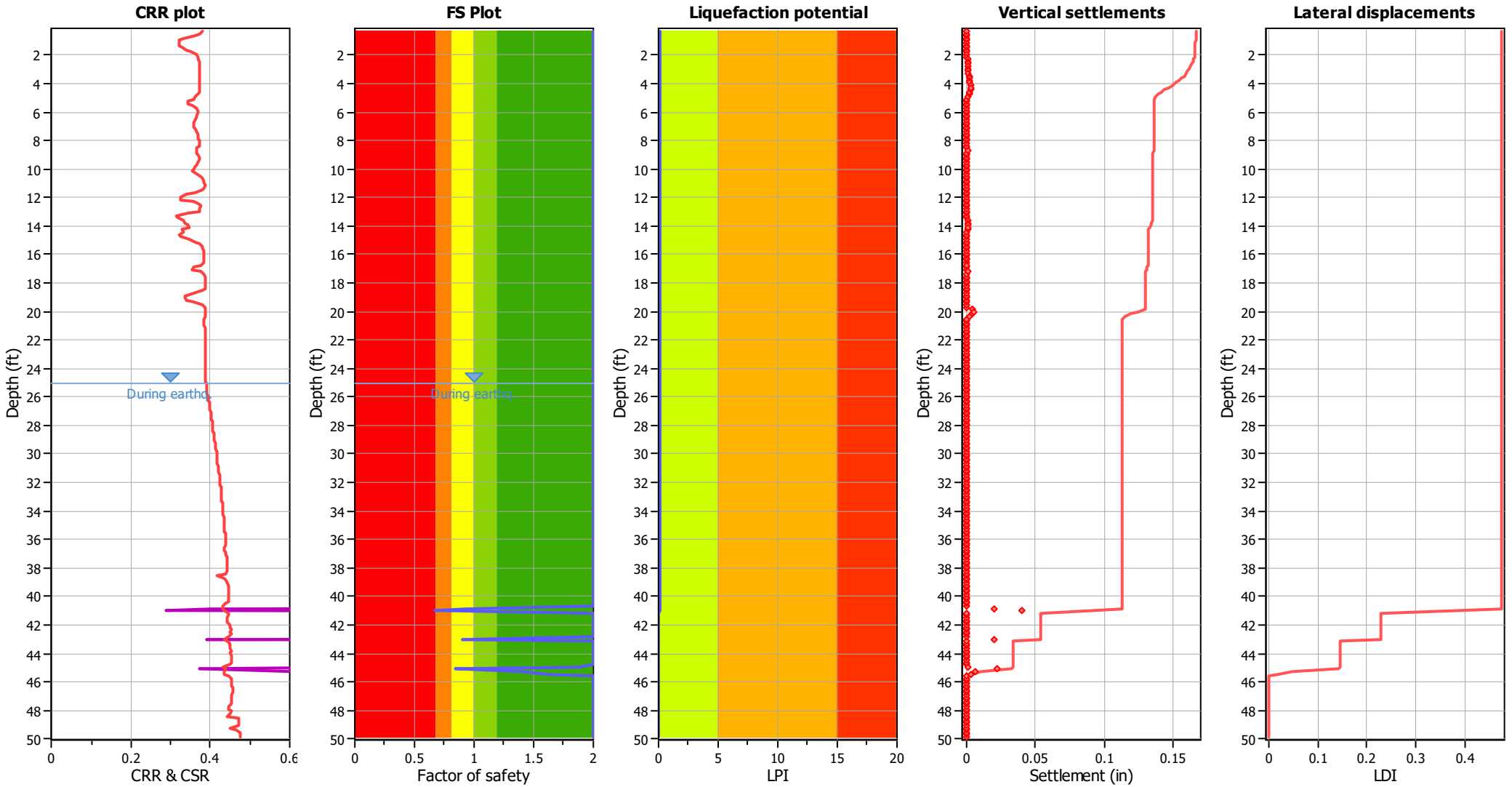
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	25.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	25.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

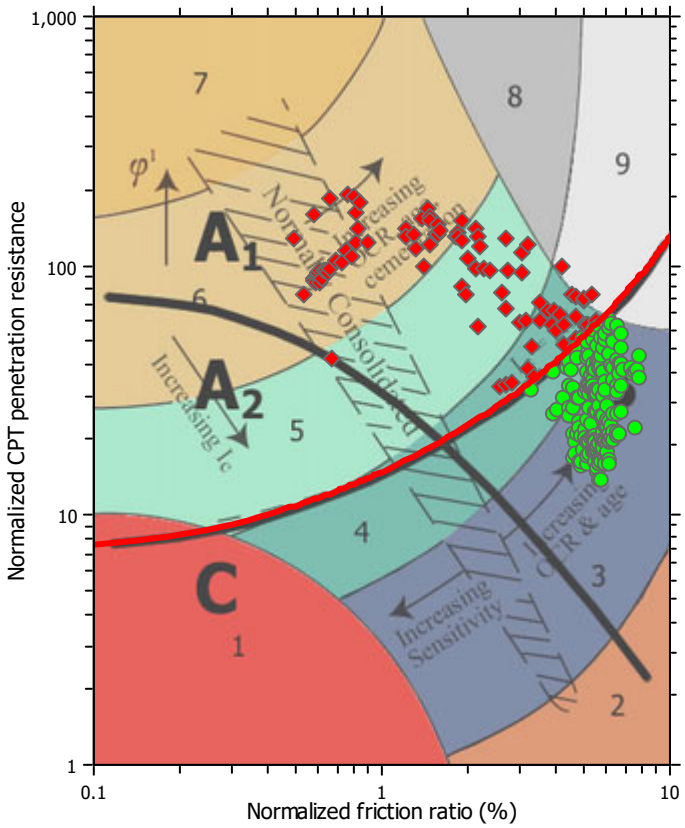
F.S. color scheme

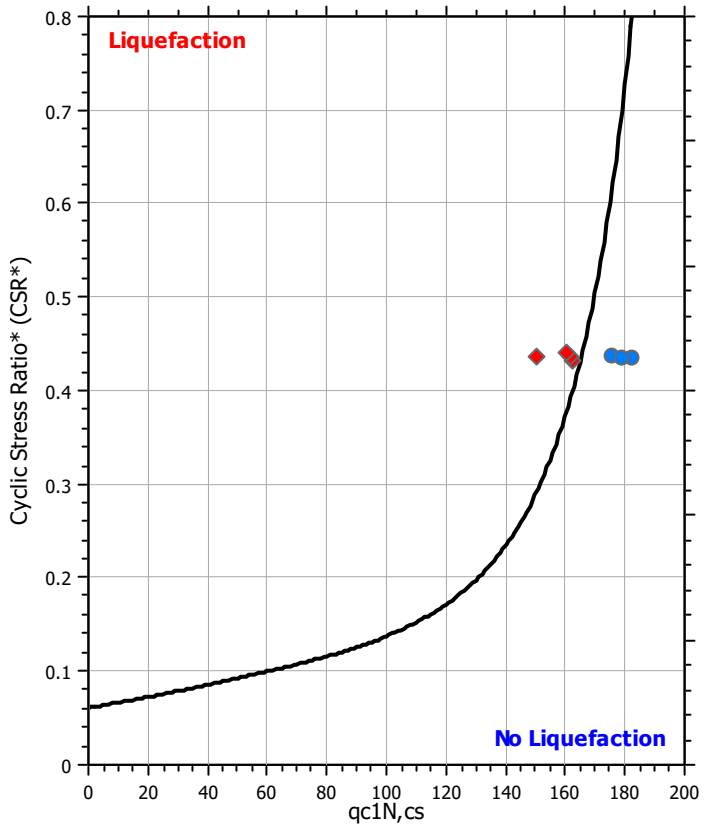
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

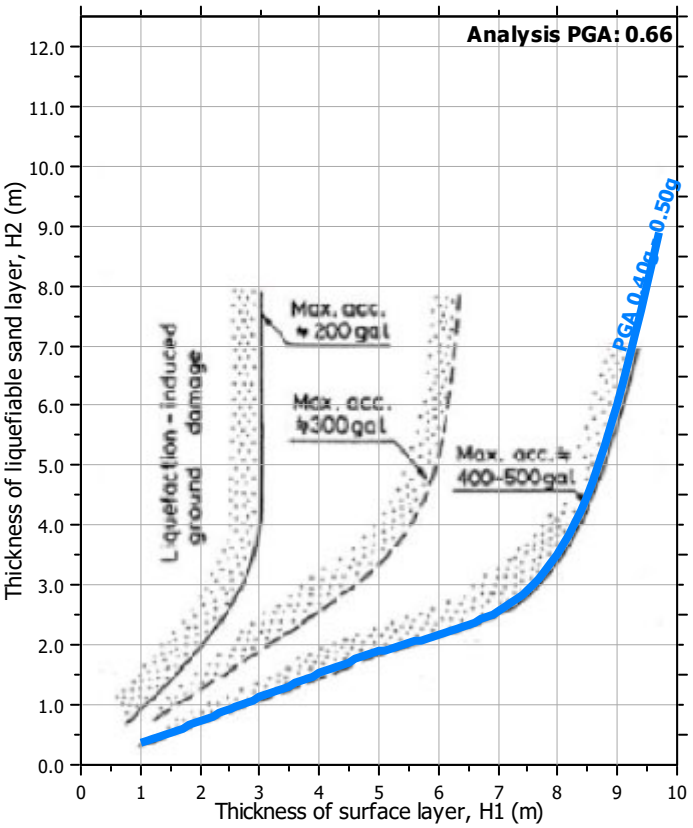
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



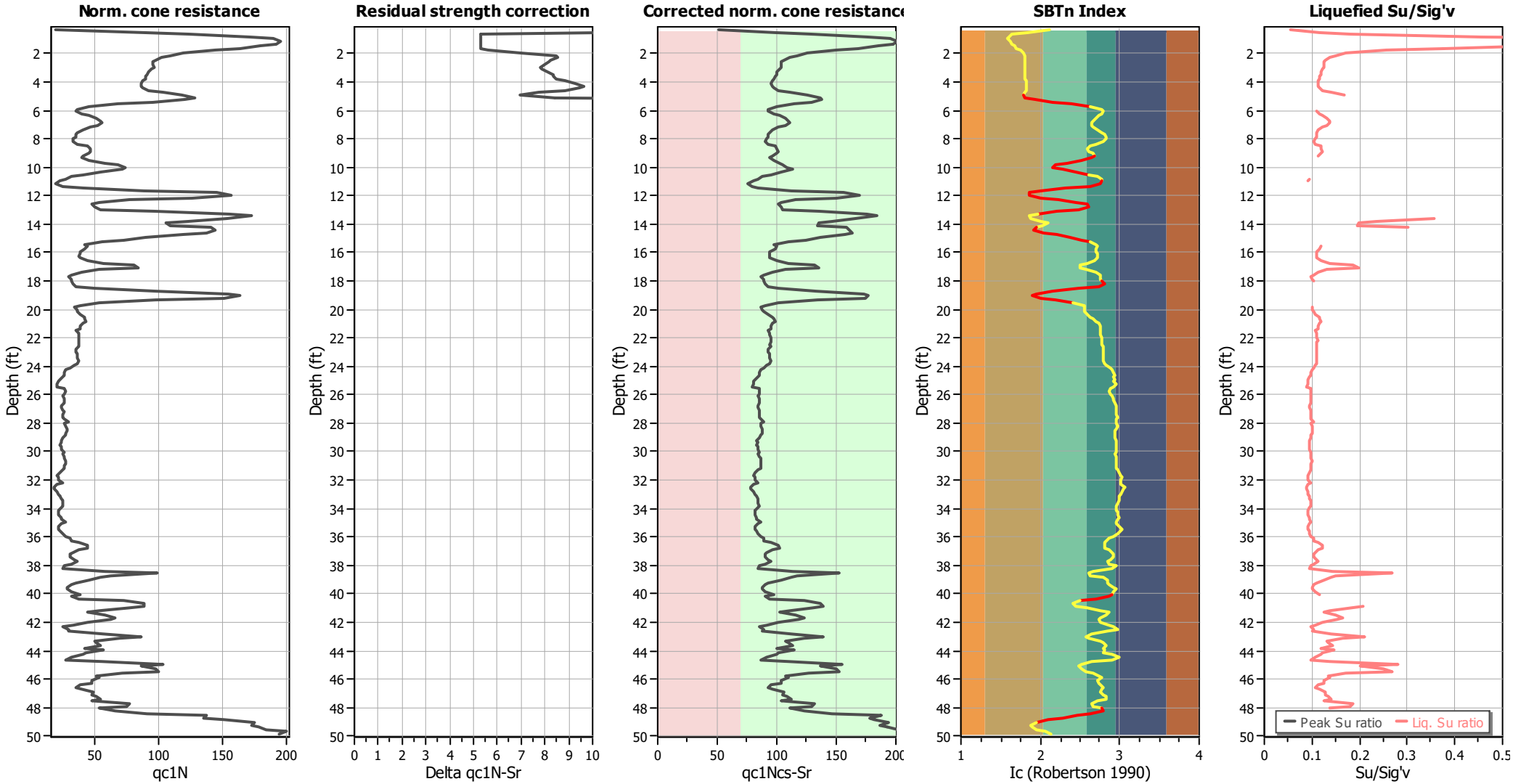




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	25.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

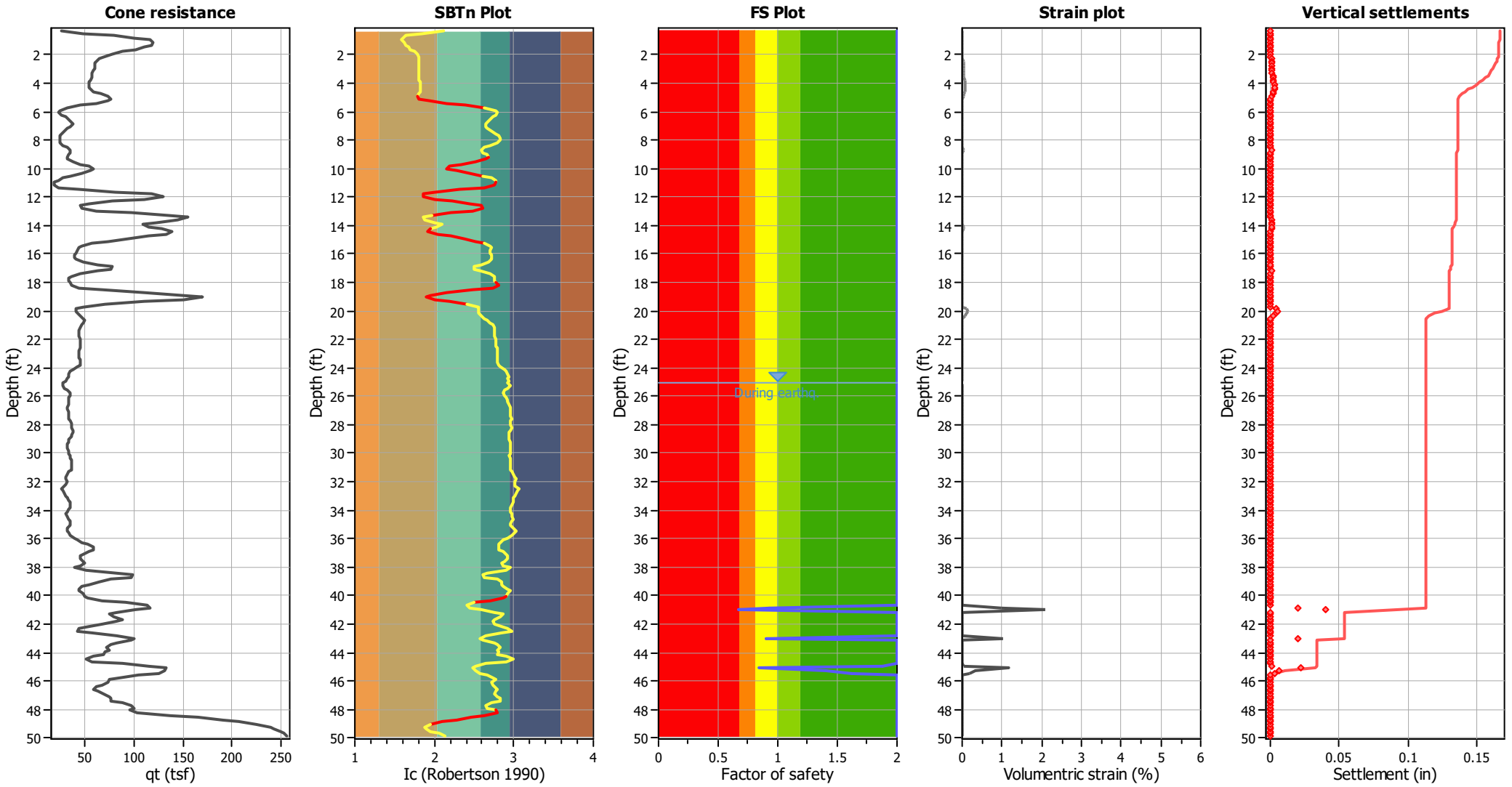
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	25.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement of dry sands ::

Depth (ft)	Ic	Q_{tn}	K_c	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
0.33	2.12	42.17	1.45	61.16	13	346	0.38	0.003	0.01	10.85	0.00	0.000
0.49	1.85	76.97	1.20	92.10	18	446	0.37	0.003	0.00	10.85	0.00	0.000
0.66	1.64	127.62	1.00	127.62	23	573	0.36	0.003	0.00	10.85	0.00	0.000
0.82	1.60	161.72	1.00	161.72	29	686	0.33	0.004	0.00	10.85	0.00	0.000
0.98	1.59	185.75	1.00	185.75	33	776	0.32	0.004	0.00	10.85	0.00	0.000
1.15	1.62	192.85	1.00	192.85	35	837	0.32	0.004	0.00	10.85	0.00	0.000
1.31	1.64	189.20	1.00	189.20	35	845	0.32	0.005	0.00	10.85	0.00	0.000
1.48	1.67	178.36	1.00	178.36	33	828	0.33	0.006	0.00	10.85	0.00	0.000
1.64	1.69	162.39	1.00	162.39	30	777	0.34	0.007	0.00	10.85	0.00	0.000
1.80	1.74	142.29	1.07	152.18	29	723	0.35	0.009	0.01	10.85	0.00	0.000
1.97	1.78	124.01	1.13	140.22	27	663	0.37	0.012	0.01	10.85	0.01	0.000
2.13	1.81	109.75	1.17	128.08	25	611	0.37	0.015	0.01	10.85	0.01	0.000
2.30	1.81	102.56	1.17	119.78	23	571	0.37	0.019	0.02	10.85	0.01	0.001
2.46	1.81	98.10	1.16	114.04	22	543	0.37	0.024	0.02	10.85	0.02	0.001
2.62	1.81	95.99	1.16	111.42	22	530	0.37	0.028	0.03	10.85	0.02	0.001
2.79	1.80	95.50	1.16	110.48	21	525	0.37	0.032	0.03	10.85	0.03	0.001
2.95	1.80	95.11	1.15	109.70	21	521	0.37	0.036	0.03	10.85	0.03	0.001
3.12	1.80	93.86	1.15	108.32	21	514	0.37	0.041	0.04	10.85	0.03	0.001
3.28	1.81	92.13	1.16	106.88	21	508	0.37	0.046	0.04	10.85	0.04	0.001
3.45	1.81	90.78	1.16	105.71	21	504	0.37	0.052	0.05	10.85	0.04	0.002
3.61	1.81	89.85	1.16	104.61	20	498	0.37	0.058	0.06	10.85	0.05	0.002
3.77	1.81	88.61	1.17	103.31	20	492	0.37	0.066	0.07	10.85	0.06	0.002
3.94	1.82	87.31	1.17	102.36	20	489	0.37	0.073	0.07	10.85	0.06	0.003
4.10	1.83	86.33	1.18	101.88	20	489	0.37	0.079	0.08	10.85	0.07	0.003
4.27	1.83	86.48	1.18	102.45	20	493	0.37	0.083	0.08	10.85	0.07	0.003
4.43	1.83	88.50	1.18	104.68	20	503	0.37	0.083	0.08	10.85	0.07	0.003
4.59	1.82	94.16	1.17	110.41	21	528	0.37	0.076	0.07	10.85	0.06	0.002
4.76	1.80	104.32	1.15	120.17	23	570	0.37	0.063	0.05	10.85	0.05	0.002
4.92	1.78	116.14	1.13	131.49	25	622	0.36	0.052	0.04	10.85	0.03	0.001
5.09	1.81	122.98	1.17	143.32	0	0	0.36	0.000	0.00	0.00	0.00	0.000
5.25	1.94	116.80	1.26	147.50	0	0	0.34	0.000	0.00	0.00	0.00	0.000
5.41	2.14	97.03	1.49	144.78	0	0	0.34	0.000	0.00	0.00	0.00	0.000
5.58	2.40	70.77	2.35	166.57	0	0	0.35	0.000	0.00	0.00	0.00	0.000
5.74	2.63	49.45	3.98	196.89	0	0	0.37	0.000	0.00	0.00	0.00	0.000
5.91	2.77	38.40	5.47	209.91	0	0	0.37	0.000	0.00	0.00	0.00	0.000
6.07	2.80	36.73	5.82	213.95	0	0	0.37	0.000	0.00	0.00	0.00	0.000
6.23	2.77	40.35	5.54	223.41	0	0	0.37	0.000	0.00	0.00	0.00	0.000
6.40	2.73	46.55	5.08	236.24	0	0	0.36	0.000	0.00	0.00	0.00	0.000
6.56	2.69	52.79	4.64	245.22	0	0	0.36	0.000	0.00	0.00	0.00	0.000
6.73	2.66	57.48	4.29	246.86	0	0	0.36	0.000	0.00	0.00	0.00	0.000
6.89	2.64	58.70	4.13	242.58	0	0	0.36	0.000	0.00	0.00	0.00	0.000
7.05	2.65	55.79	4.18	233.18	0	0	0.36	0.000	0.00	0.00	0.00	0.000
7.22	2.67	50.21	4.39	220.65	0	0	0.36	0.000	0.00	0.00	0.00	0.000
7.38	2.72	44.25	4.89	216.16	0	0	0.37	0.000	0.00	0.00	0.00	0.000
7.55	2.77	40.38	5.47	220.68	0	0	0.37	0.000	0.00	0.00	0.00	0.000
7.71	2.81	38.55	5.98	230.66	0	0	0.37	0.000	0.00	0.00	0.00	0.000
7.87	2.83	37.51	6.24	233.93	0	0	0.37	0.000	0.00	0.00	0.00	0.000
8.04	2.83	36.86	6.21	228.94	0	0	0.37	0.000	0.00	0.00	0.00	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	K_c	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
8.20	2.80	37.91	5.81	220.38	0	0	0.37	0.000	0.00	0.00	0.00	0.000
8.37	2.70	43.10	4.74	204.17	0	0	0.37	0.000	0.00	0.00	0.00	0.000
8.53	2.63	49.30	4.02	197.97	0	0	0.37	0.000	0.00	0.00	0.00	0.000
8.69	2.59	54.10	3.69	199.60	54	808	0.37	0.069	0.02	10.85	0.02	0.001
8.86	2.61	54.94	3.87	212.58	0	0	0.37	0.000	0.00	0.00	0.00	0.000
9.02	2.66	52.89	4.26	225.31	0	0	0.37	0.000	0.00	0.00	0.00	0.000
9.19	2.69	50.26	4.58	230.01	0	0	0.37	0.000	0.00	0.00	0.00	0.000
9.35	2.65	50.88	4.24	215.84	0	0	0.37	0.000	0.00	0.00	0.00	0.000
9.51	2.51	58.70	3.07	180.40	0	0	0.37	0.000	0.00	0.00	0.00	0.000
9.68	2.33	68.01	2.03	138.23	0	0	0.36	0.000	0.00	0.00	0.00	0.000
9.84	2.19	77.13	1.59	122.32	0	0	0.36	0.000	0.00	0.00	0.00	0.000
10.01	2.16	81.95	1.52	124.55	0	0	0.36	0.000	0.00	0.00	0.00	0.000
10.17	2.27	78.09	1.82	142.30	0	0	0.36	0.000	0.00	0.00	0.00	0.000
10.34	2.44	66.43	2.58	171.15	0	0	0.37	0.000	0.00	0.00	0.00	0.000
10.50	2.62	51.14	3.90	199.54	0	0	0.38	0.000	0.00	0.00	0.00	0.000
10.66	2.73	39.77	4.99	198.55	0	0	0.38	0.000	0.00	0.00	0.00	0.000
10.83	2.77	32.16	5.48	176.12	0	0	0.38	0.000	0.00	0.00	0.00	0.000
10.99	2.78	26.81	5.60	150.11	0	0	0.39	0.000	0.00	0.00	0.00	0.000
11.16	2.75	25.55	5.22	133.49	0	0	0.39	0.000	0.00	0.00	0.00	0.000
11.32	2.63	31.90	4.00	127.53	0	0	0.39	0.000	0.00	0.00	0.00	0.000
11.48	2.31	57.34	1.97	112.69	0	0	0.38	0.000	0.00	0.00	0.00	0.000
11.65	2.01	99.91	1.31	131.35	0	0	0.36	0.000	0.00	0.00	0.00	0.000
11.81	1.86	140.78	1.21	169.75	0	0	0.34	0.000	0.00	0.00	0.00	0.000
11.98	1.86	155.06	1.21	187.89	0	0	0.33	0.000	0.00	0.00	0.00	0.000
12.14	2.01	132.13	1.31	173.48	0	0	0.33	0.000	0.00	0.00	0.00	0.000
12.30	2.23	95.69	1.69	162.17	0	0	0.36	0.000	0.00	0.00	0.00	0.000
12.47	2.45	66.75	2.67	178.44	0	0	0.37	0.000	0.00	0.00	0.00	0.000
12.63	2.58	56.93	3.61	205.35	0	0	0.38	0.000	0.00	0.00	0.00	0.000
12.80	2.62	57.07	3.90	222.74	0	0	0.37	0.000	0.00	0.00	0.00	0.000
12.96	2.47	75.02	2.80	210.39	0	0	0.37	0.000	0.00	0.00	0.00	0.000
13.12	2.22	113.06	1.65	186.88	0	0	0.34	0.000	0.00	0.00	0.00	0.000
13.29	1.97	153.26	1.29	197.16	0	0	0.32	0.000	0.00	0.00	0.00	0.000
13.45	1.85	171.19	1.20	206.15	0	0	0.32	0.000	0.00	0.00	0.00	0.000
13.62	1.88	158.82	1.22	194.00	39	1393	0.33	0.040	0.02	10.85	0.02	0.001
13.78	2.00	135.37	1.31	176.85	37	1380	0.34	0.042	0.02	10.85	0.02	0.001
13.94	2.09	119.90	1.41	168.75	36	1374	0.34	0.043	0.02	10.85	0.02	0.001
14.11	2.03	125.27	1.34	167.51	35	1350	0.35	0.045	0.02	10.85	0.02	0.001
14.27	1.94	138.13	1.27	174.95	36	1352	0.33	0.046	0.02	10.85	0.02	0.001
14.44	1.92	147.83	1.25	184.91	0	0	0.33	0.000	0.00	0.00	0.00	0.000
14.60	2.03	140.89	1.34	188.55	0	0	0.32	0.000	0.00	0.00	0.00	0.000
14.76	2.21	122.46	1.64	201.23	0	0	0.32	0.000	0.00	0.00	0.00	0.000
14.93	2.36	99.54	2.19	217.98	0	0	0.35	0.000	0.00	0.00	0.00	0.000
15.09	2.51	77.04	3.07	236.20	0	0	0.36	0.000	0.00	0.00	0.00	0.000
15.26	2.62	59.66	3.93	234.28	0	0	0.37	0.000	0.00	0.00	0.00	0.000
15.42	2.70	49.10	4.69	230.25	0	0	0.38	0.000	0.00	0.00	0.00	0.000
15.58	2.72	44.03	4.89	215.29	0	0	0.38	0.000	0.00	0.00	0.00	0.000
15.75	2.70	42.39	4.72	199.89	0	0	0.38	0.000	0.00	0.00	0.00	0.000
15.91	2.71	40.13	4.77	191.32	0	0	0.38	0.000	0.00	0.00	0.00	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	K_c	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
16.08	2.71	38.40	4.86	186.80	0	0	0.38	0.000	0.00	0.00	0.00	0.000
16.24	2.72	38.24	4.89	186.95	0	0	0.39	0.000	0.00	0.00	0.00	0.000
16.40	2.72	40.08	4.93	197.70	0	0	0.38	0.000	0.00	0.00	0.00	0.000
16.57	2.69	46.29	4.59	212.49	0	0	0.38	0.000	0.00	0.00	0.00	0.000
16.73	2.59	60.69	3.63	220.35	59	1471	0.38	0.048	0.01	10.85	0.01	0.000
16.90	2.50	74.00	2.99	221.32	57	1630	0.36	0.041	0.01	10.85	0.01	0.000
17.06	2.50	72.68	3.01	218.69	56	1621	0.36	0.042	0.01	10.85	0.01	0.000
17.23	2.58	58.49	3.55	207.74	56	1441	0.38	0.053	0.02	10.85	0.01	0.001
17.39	2.71	40.87	4.77	194.90	0	0	0.38	0.000	0.00	0.00	0.00	0.000
17.55	2.76	32.54	5.37	174.69	0	0	0.39	0.000	0.00	0.00	0.00	0.000
17.72	2.76	29.63	5.42	160.62	0	0	0.39	0.000	0.00	0.00	0.00	0.000
17.88	2.76	29.47	5.40	159.05	0	0	0.39	0.000	0.00	0.00	0.00	0.000
18.05	2.78	30.61	5.57	170.40	0	0	0.39	0.000	0.00	0.00	0.00	0.000
18.21	2.80	31.80	5.89	187.44	0	0	0.39	0.000	0.00	0.00	0.00	0.000
18.37	2.74	37.63	5.16	194.23	0	0	0.39	0.000	0.00	0.00	0.00	0.000
18.54	2.48	58.57	2.87	168.37	0	0	0.38	0.000	0.00	0.00	0.00	0.000
18.70	2.16	97.31	1.52	148.28	0	0	0.36	0.000	0.00	0.00	0.00	0.000
18.87	1.95	134.15	1.27	170.44	0	0	0.34	0.000	0.00	0.00	0.00	0.000
19.03	1.89	151.10	1.23	186.33	0	0	0.34	0.000	0.00	0.00	0.00	0.000
19.19	2.00	131.82	1.31	172.28	0	0	0.34	0.000	0.00	0.00	0.00	0.000
19.36	2.18	95.56	1.57	150.03	0	0	0.36	0.000	0.00	0.00	0.00	0.000
19.52	2.40	59.12	2.39	141.11	0	0	0.38	0.000	0.00	0.00	0.00	0.000
19.69	2.55	38.96	3.38	131.57	0	0	0.39	0.000	0.00	0.00	0.00	0.000
19.85	2.55	33.35	3.37	112.35	30	907	0.39	0.224	0.14	10.85	0.12	0.005
20.01	2.55	32.61	3.31	108.07	28	885	0.39	0.248	0.16	10.85	0.14	0.005
20.18	2.56	33.82	3.44	116.30	31	945	0.39	0.201	0.12	10.85	0.10	0.004
20.34	2.59	35.70	3.71	132.31	36	1048	0.39	0.146	0.07	10.85	0.06	0.002
20.51	2.63	37.29	4.02	149.77	0	0	0.39	0.000	0.00	0.00	0.00	0.000
20.67	2.66	38.21	4.34	165.65	0	0	0.39	0.000	0.00	0.00	0.00	0.000
20.83	2.71	37.32	4.80	178.98	0	0	0.38	0.000	0.00	0.00	0.00	0.000
21.00	2.73	36.04	5.04	181.81	0	0	0.39	0.000	0.00	0.00	0.00	0.000
21.16	2.75	34.49	5.25	180.93	0	0	0.39	0.000	0.00	0.00	0.00	0.000
21.33	2.75	32.94	5.29	174.09	0	0	0.39	0.000	0.00	0.00	0.00	0.000
21.49	2.75	32.38	5.28	170.88	0	0	0.39	0.000	0.00	0.00	0.00	0.000
21.65	2.76	31.96	5.38	171.87	0	0	0.39	0.000	0.00	0.00	0.00	0.000
21.82	2.76	32.33	5.41	175.02	0	0	0.39	0.000	0.00	0.00	0.00	0.000
21.98	2.77	32.42	5.45	176.63	0	0	0.39	0.000	0.00	0.00	0.00	0.000
22.15	2.77	32.39	5.43	175.94	0	0	0.39	0.000	0.00	0.00	0.00	0.000
22.31	2.77	32.14	5.46	175.36	0	0	0.39	0.000	0.00	0.00	0.00	0.000
22.47	2.78	31.82	5.58	177.44	0	0	0.39	0.000	0.00	0.00	0.00	0.000
22.64	2.79	31.09	5.74	178.37	0	0	0.39	0.000	0.00	0.00	0.00	0.000
22.80	2.80	30.57	5.83	178.37	0	0	0.39	0.000	0.00	0.00	0.00	0.000
22.97	2.80	30.12	5.83	175.56	0	0	0.39	0.000	0.00	0.00	0.00	0.000
23.13	2.79	30.12	5.78	174.05	0	0	0.39	0.000	0.00	0.00	0.00	0.000
23.30	2.80	30.07	5.83	175.22	0	0	0.39	0.000	0.00	0.00	0.00	0.000
23.46	2.80	30.24	5.85	176.80	0	0	0.39	0.000	0.00	0.00	0.00	0.000
23.62	2.80	30.27	5.85	177.02	0	0	0.39	0.000	0.00	0.00	0.00	0.000
23.79	2.81	29.47	5.93	174.69	0	0	0.39	0.000	0.00	0.00	0.00	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	K_c	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
23.95	2.83	27.40	6.30	172.57	0	0	0.39	0.000	0.00	0.00	0.00	0.000
24.12	2.88	24.80	6.86	170.10	0	0	0.39	0.000	0.00	0.00	0.00	0.000
24.28	2.91	22.63	7.36	166.56	0	0	0.39	0.000	0.00	0.00	0.00	0.000
24.44	2.92	21.29	7.53	160.36	0	0	0.39	0.000	0.00	0.00	0.00	0.000
24.61	2.93	20.45	7.69	157.21	0	0	0.39	0.000	0.00	0.00	0.00	0.000
24.77	2.92	19.43	7.52	146.09	0	0	0.39	0.000	0.00	0.00	0.00	0.000
24.94	2.93	18.18	7.66	139.18	0	0	0.39	0.000	0.00	0.00	0.00	0.000

Total estimated settlement: 0.05

Abbreviations

Q_{tn}: Normalized cone resistance
K_c: Fines correction factor
$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
G_{max}: Small strain shear modulus
CSR: Soil cyclic stress ratio
γ: Cyclic shear strain
$e_{vol(15)}$: Volumetric strain after 15 cycles
N_c: Equivalent number of cycles
e_v: Volumetric strain
Settle.: Calculated settlement

:: Post-earthquake settlement due to soil liquefaction ::

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
25.10	21.24	2.00	0.00	1.00	0.00	25.26	20.02	2.00	0.00	1.00	0.00
25.43	19.67	2.00	0.00	1.00	0.00	25.59	26.21	2.00	0.00	1.00	0.00
25.76	27.11	2.00	0.00	1.00	0.00	25.92	26.28	2.00	0.00	1.00	0.00
26.08	25.12	2.00	0.00	1.00	0.00	26.25	25.48	2.00	0.00	1.00	0.00
26.41	25.52	2.00	0.00	1.00	0.00	26.58	25.32	2.00	0.00	1.00	0.00
26.74	23.94	2.00	0.00	1.00	0.00	26.90	24.05	2.00	0.00	1.00	0.00
27.07	24.95	2.00	0.00	1.00	0.00	27.23	25.38	2.00	0.00	1.00	0.00
27.40	25.18	2.00	0.00	1.00	0.00	27.56	24.83	2.00	0.00	1.00	0.00
27.72	26.04	2.00	0.00	1.00	0.00	27.89	28.74	2.00	0.00	1.00	0.00
28.05	26.03	2.00	0.00	1.00	0.00	28.22	26.68	2.00	0.00	1.00	0.00
28.38	28.36	2.00	0.00	1.00	0.00	28.54	27.84	2.00	0.00	1.00	0.00
28.71	27.56	2.00	0.00	1.00	0.00	28.87	26.73	2.00	0.00	1.00	0.00
29.04	25.14	2.00	0.00	1.00	0.00	29.20	23.09	2.00	0.00	1.00	0.00
29.36	23.60	2.00	0.00	1.00	0.00	29.53	22.94	2.00	0.00	1.00	0.00
29.69	23.75	2.00	0.00	1.00	0.00	29.86	24.09	2.00	0.00	1.00	0.00
30.02	25.43	2.00	0.00	1.00	0.00	30.19	24.62	2.00	0.00	1.00	0.00
30.35	26.04	2.00	0.00	1.00	0.00	30.51	26.23	2.00	0.00	1.00	0.00
30.68	26.80	2.00	0.00	1.00	0.00	30.84	26.45	2.00	0.00	1.00	0.00
31.01	26.33	2.00	0.00	1.00	0.00	31.17	26.21	2.00	0.00	1.00	0.00
31.33	24.73	2.00	0.00	1.00	0.00	31.50	22.27	2.00	0.00	1.00	0.00
31.66	20.66	2.00	0.00	1.00	0.00	31.83	21.22	2.00	0.00	1.00	0.00
31.99	21.79	2.00	0.00	1.00	0.00	32.15	24.31	2.00	0.00	1.00	0.00
32.32	19.93	2.00	0.00	1.00	0.00	32.48	17.91	2.00	0.00	1.00	0.00
32.65	18.32	2.00	0.00	1.00	0.00	32.81	20.14	2.00	0.00	1.00	0.00
32.97	21.74	2.00	0.00	1.00	0.00	33.14	22.45	2.00	0.00	1.00	0.00
33.30	23.90	2.00	0.00	1.00	0.00	33.47	24.31	2.00	0.00	1.00	0.00
33.63	24.50	2.00	0.00	1.00	0.00	33.79	24.76	2.00	0.00	1.00	0.00
33.96	23.97	2.00	0.00	1.00	0.00	34.12	21.58	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
34.29	21.10	2.00	0.00	1.00	0.00	34.45	21.44	2.00	0.00	1.00	0.00
34.61	23.46	2.00	0.00	1.00	0.00	34.78	23.35	2.00	0.00	1.00	0.00
34.94	26.50	2.00	0.00	1.00	0.00	35.11	24.09	2.00	0.00	1.00	0.00
35.27	21.71	2.00	0.00	1.00	0.00	35.43	21.68	2.00	0.00	1.00	0.00
35.60	22.74	2.00	0.00	1.00	0.00	35.76	24.24	2.00	0.00	1.00	0.00
35.93	26.84	2.00	0.00	1.00	0.00	36.09	29.89	2.00	0.00	1.00	0.00
36.26	31.25	2.00	0.00	1.00	0.00	36.42	36.82	2.00	0.00	1.00	0.00
36.58	43.94	2.00	0.00	1.00	0.00	36.75	44.03	2.00	0.00	1.00	0.00
36.91	37.42	2.00	0.00	1.00	0.00	37.08	32.60	2.00	0.00	1.00	0.00
37.24	30.25	2.00	0.00	1.00	0.00	37.40	30.80	2.00	0.00	1.00	0.00
37.57	33.86	2.00	0.00	1.00	0.00	37.73	36.40	2.00	0.00	1.00	0.00
37.90	31.52	2.00	0.00	1.00	0.00	38.06	25.38	2.00	0.00	1.00	0.00
38.22	24.53	2.00	0.00	1.00	0.00	38.39	57.54	2.00	0.00	1.00	0.00
38.55	99.14	2.00	0.00	1.00	0.00	38.72	62.07	2.00	0.00	1.00	0.00
38.88	54.42	2.00	0.00	1.00	0.00	39.04	45.75	2.00	0.00	1.00	0.00
39.21	34.44	2.00	0.00	1.00	0.00	39.37	31.55	2.00	0.00	1.00	0.00
39.54	28.03	2.00	0.00	1.00	0.00	39.70	28.21	2.00	0.00	1.00	0.00
39.86	31.22	2.00	0.00	1.00	0.00	40.03	38.65	2.00	0.00	1.00	0.00
40.19	31.83	2.00	0.00	1.00	0.00	40.36	37.39	2.00	0.00	1.00	0.00
40.52	141.85	2.00	0.00	1.00	0.00	40.68	160.46	2.00	0.00	1.00	0.00
40.85	162.33	0.92	0.98	1.00	0.02	41.01	150.24	0.67	2.07	1.00	0.04
41.18	53.76	2.00	0.00	1.00	0.00	41.34	44.34	2.00	0.00	1.00	0.00
41.50	57.85	2.00	0.00	1.00	0.00	41.67	66.08	2.00	0.00	1.00	0.00
41.83	61.88	2.00	0.00	1.00	0.00	42.00	44.03	2.00	0.00	1.00	0.00
42.16	32.48	2.00	0.00	1.00	0.00	42.32	25.21	2.00	0.00	1.00	0.00
42.49	29.49	2.00	0.00	1.00	0.00	42.65	29.19	2.00	0.00	1.00	0.00
42.82	56.84	2.00	0.00	1.00	0.00	42.98	161.92	0.90	1.03	1.00	0.02
43.15	68.79	2.00	0.00	1.00	0.00	43.31	49.81	2.00	0.00	1.00	0.00
43.47	51.44	2.00	0.00	1.00	0.00	43.64	54.80	2.00	0.00	1.00	0.00
43.80	42.21	2.00	0.00	1.00	0.00	43.97	56.47	2.00	0.00	1.00	0.00
44.13	43.34	2.00	0.00	1.00	0.00	44.29	40.50	2.00	0.00	1.00	0.00
44.46	31.66	2.00	0.00	1.00	0.00	44.62	26.96	2.00	0.00	1.00	0.00
44.79	55.11	2.00	0.00	1.00	0.00	44.95	182.78	1.88	0.05	1.00	0.00
45.11	160.10	0.85	1.18	1.00	0.02	45.28	175.51	1.40	0.33	1.00	0.01
45.44	179.17	1.62	0.18	1.00	0.00	45.61	71.09	2.00	0.00	1.00	0.00
45.77	50.96	2.00	0.00	1.00	0.00	45.93	52.93	2.00	0.00	1.00	0.00
46.10	47.25	2.00	0.00	1.00	0.00	46.26	47.13	2.00	0.00	1.00	0.00
46.43	38.03	2.00	0.00	1.00	0.00	46.59	34.63	2.00	0.00	1.00	0.00
46.75	39.67	2.00	0.00	1.00	0.00	46.92	48.61	2.00	0.00	1.00	0.00
47.08	47.10	2.00	0.00	1.00	0.00	47.25	50.97	2.00	0.00	1.00	0.00
47.41	54.04	2.00	0.00	1.00	0.00	47.57	47.08	2.00	0.00	1.00	0.00
47.74	77.13	2.00	0.00	1.00	0.00	47.90	74.33	2.00	0.00	1.00	0.00
48.07	53.62	2.00	0.00	1.00	0.00	48.23	65.68	2.00	0.00	1.00	0.00
48.39	91.32	2.00	0.00	1.00	0.00	48.56	225.11	2.00	0.00	1.00	0.00
48.72	214.33	2.00	0.00	1.00	0.00	48.89	217.50	2.00	0.00	1.00	0.00
49.05	221.25	2.00	0.00	1.00	0.00	49.22	195.43	2.00	0.00	1.00	0.00
49.38	206.56	2.00	0.00	1.00	0.00	49.54	228.21	2.00	0.00	1.00	0.00
49.71	271.80	2.00	0.00	1.00	0.00	49.87	275.64	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

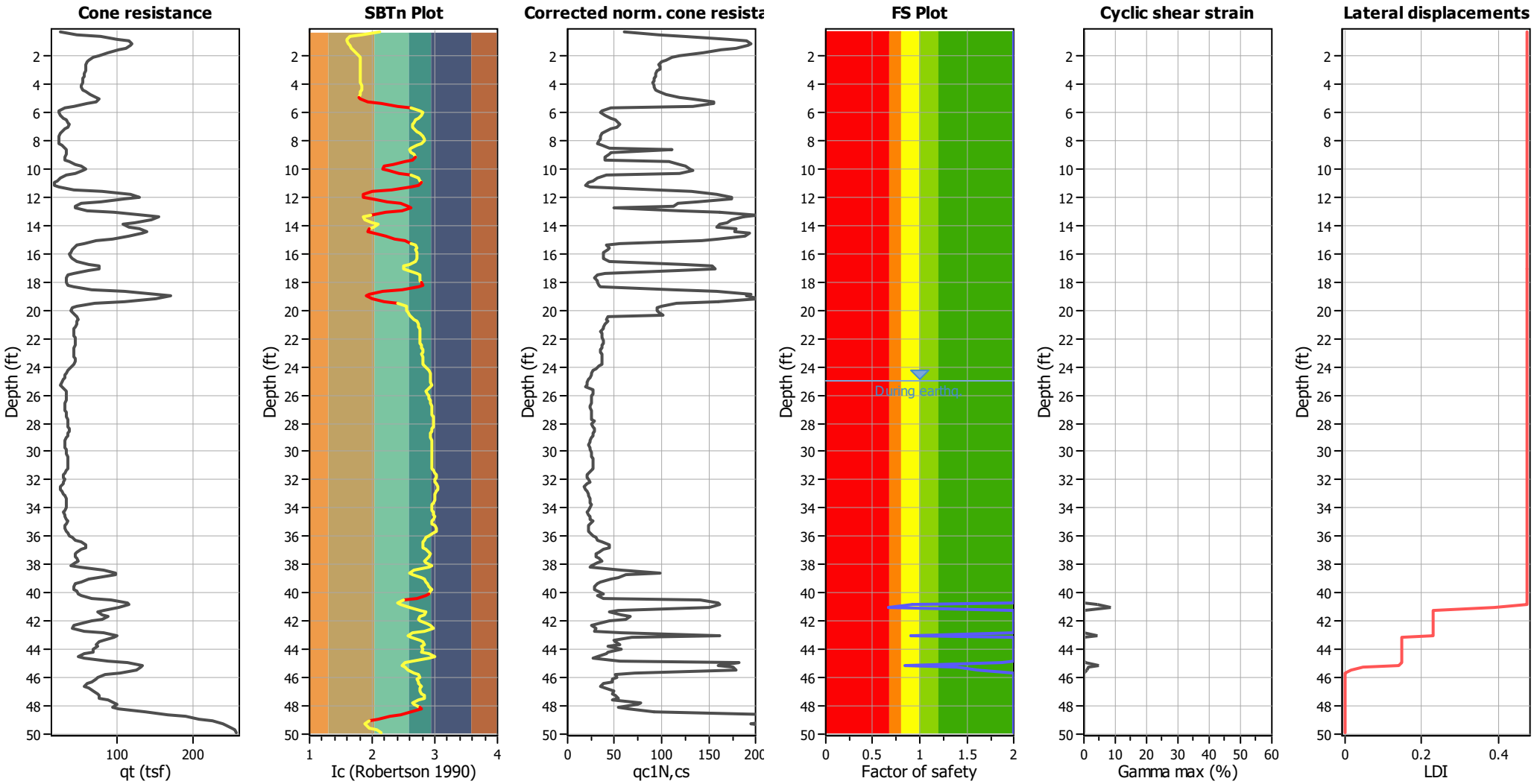
Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)

Total estimated settlement: 0.11

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

:: Lateral displacement index calculation ::

Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
25.10	21.24	0.00	2.00	0.00	0.00	0.00
25.26	20.02	0.00	2.00	0.00	0.00	0.00
25.43	19.67	0.00	2.00	0.00	0.00	0.00
25.59	26.21	0.00	2.00	0.00	0.00	0.00
25.76	27.11	0.00	2.00	0.00	0.00	0.00
25.92	26.28	0.00	2.00	0.00	0.00	0.00
26.08	25.12	0.00	2.00	0.00	0.00	0.00
26.25	25.48	0.00	2.00	0.00	0.00	0.00
26.41	25.52	0.00	2.00	0.00	0.00	0.00
26.58	25.32	0.00	2.00	0.00	0.00	0.00
26.74	23.94	0.00	2.00	0.00	0.00	0.00
26.90	24.05	0.00	2.00	0.00	0.00	0.00
27.07	24.95	0.00	2.00	0.00	0.00	0.00
27.23	25.38	0.00	2.00	0.00	0.00	0.00
27.40	25.18	0.00	2.00	0.00	0.00	0.00
27.56	24.83	0.00	2.00	0.00	0.00	0.00
27.72	26.04	0.00	2.00	0.00	0.00	0.00
27.89	28.74	0.00	2.00	0.00	0.00	0.00
28.05	26.03	0.00	2.00	0.00	0.00	0.00
28.22	26.68	0.00	2.00	0.00	0.00	0.00
28.38	28.36	0.00	2.00	0.00	0.00	0.00
28.54	27.84	0.00	2.00	0.00	0.00	0.00
28.71	27.56	0.00	2.00	0.00	0.00	0.00
28.87	26.73	0.00	2.00	0.00	0.00	0.00
29.04	25.14	0.00	2.00	0.00	0.00	0.00
29.20	23.09	0.00	2.00	0.00	0.00	0.00
29.36	23.60	0.00	2.00	0.00	0.00	0.00
29.53	22.94	0.00	2.00	0.00	0.00	0.00
29.69	23.75	0.00	2.00	0.00	0.00	0.00
29.86	24.09	0.00	2.00	0.00	0.00	0.00
30.02	25.43	0.00	2.00	0.00	0.00	0.00
30.19	24.62	0.00	2.00	0.00	0.00	0.00
30.35	26.04	0.00	2.00	0.00	0.00	0.00
30.51	26.23	0.00	2.00	0.00	0.00	0.00
30.68	26.80	0.00	2.00	0.00	0.00	0.00
30.84	26.45	0.00	2.00	0.00	0.00	0.00
31.01	26.33	0.00	2.00	0.00	0.00	0.00
31.17	26.21	0.00	2.00	0.00	0.00	0.00
31.33	24.73	0.00	2.00	0.00	0.00	0.00
31.50	22.27	0.00	2.00	0.00	0.00	0.00
31.66	20.66	0.00	2.00	0.00	0.00	0.00
31.83	21.22	0.00	2.00	0.00	0.00	0.00
31.99	21.79	0.00	2.00	0.00	0.00	0.00
32.15	24.31	0.00	2.00	0.00	0.00	0.00
32.32	19.93	0.00	2.00	0.00	0.00	0.00
32.48	17.91	0.00	2.00	0.00	0.00	0.00
32.65	18.32	0.00	2.00	0.00	0.00	0.00
32.81	20.14	0.00	2.00	0.00	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
32.97	21.74	0.00	2.00	0.00	0.00	0.00
33.14	22.45	0.00	2.00	0.00	0.00	0.00
33.30	23.90	0.00	2.00	0.00	0.00	0.00
33.47	24.31	0.00	2.00	0.00	0.00	0.00
33.63	24.50	0.00	2.00	0.00	0.00	0.00
33.79	24.76	0.00	2.00	0.00	0.00	0.00
33.96	23.97	0.00	2.00	0.00	0.00	0.00
34.12	21.58	0.00	2.00	0.00	0.00	0.00
34.29	21.10	0.00	2.00	0.00	0.00	0.00
34.45	21.44	0.00	2.00	0.00	0.00	0.00
34.61	23.46	0.00	2.00	0.00	0.00	0.00
34.78	23.35	0.00	2.00	0.00	0.00	0.00
34.94	26.50	0.00	2.00	0.00	0.00	0.00
35.11	24.09	0.00	2.00	0.00	0.00	0.00
35.27	21.71	0.00	2.00	0.00	0.00	0.00
35.43	21.68	0.00	2.00	0.00	0.00	0.00
35.60	22.74	0.00	2.00	0.00	0.00	0.00
35.76	24.24	0.00	2.00	0.00	0.00	0.00
35.93	26.84	0.00	2.00	0.00	0.00	0.00
36.09	29.89	0.00	2.00	0.00	0.00	0.00
36.26	31.25	0.00	2.00	0.00	0.00	0.00
36.42	36.82	0.00	2.00	0.00	0.00	0.00
36.58	43.94	0.00	2.00	0.00	0.00	0.00
36.75	44.03	0.00	2.00	0.00	0.00	0.00
36.91	37.42	0.00	2.00	0.00	0.00	0.00
37.08	32.60	0.00	2.00	0.00	0.00	0.00
37.24	30.25	0.00	2.00	0.00	0.00	0.00
37.40	30.80	0.00	2.00	0.00	0.00	0.00
37.57	33.86	0.00	2.00	0.00	0.00	0.00
37.73	36.40	0.00	2.00	0.00	0.00	0.00
37.90	31.52	0.00	2.00	0.00	0.00	0.00
38.06	25.38	0.00	2.00	0.00	0.00	0.00
38.22	24.53	0.00	2.00	0.00	0.00	0.00
38.39	57.54	0.00	2.00	0.00	0.00	0.00
38.55	99.14	0.00	2.00	0.00	0.00	0.00
38.72	62.07	0.00	2.00	0.00	0.00	0.00
38.88	54.42	0.00	2.00	0.00	0.00	0.00
39.04	45.75	0.00	2.00	0.00	0.00	0.00
39.21	34.44	0.00	2.00	0.00	0.00	0.00
39.37	31.55	0.00	2.00	0.00	0.00	0.00
39.54	28.03	0.00	2.00	0.00	0.00	0.00
39.70	28.21	0.00	2.00	0.00	0.00	0.00
39.86	31.22	0.00	2.00	0.00	0.00	0.00
40.03	38.65	0.00	2.00	0.00	0.00	0.00
40.19	31.83	0.00	2.00	0.00	0.00	0.00
40.36	37.39	0.00	2.00	0.00	0.00	0.00
40.52	141.85	0.11	2.00	0.35	0.00	0.00
40.68	160.46	0.07	2.00	0.11	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
40.85	162.33	0.07	0.92	0.08	0.04	0.08
41.01	150.24	0.09	0.67	0.24	0.08	0.16
41.18	53.76	0.00	2.00	0.00	0.00	0.00
41.34	44.34	0.00	2.00	0.00	0.00	0.00
41.50	57.85	0.00	2.00	0.00	0.00	0.00
41.67	66.08	0.00	2.00	0.00	0.00	0.00
41.83	61.88	0.00	2.00	0.00	0.00	0.00
42.00	44.03	0.00	2.00	0.00	0.00	0.00
42.16	32.48	0.00	2.00	0.00	0.00	0.00
42.32	25.21	0.00	2.00	0.00	0.00	0.00
42.49	29.49	0.00	2.00	0.00	0.00	0.00
42.65	29.19	0.00	2.00	0.00	0.00	0.00
42.82	56.84	0.00	2.00	0.00	0.00	0.00
42.98	161.92	0.07	0.90	0.09	0.04	0.08
43.15	68.79	0.00	2.00	0.00	0.00	0.00
43.31	49.81	0.00	2.00	0.00	0.00	0.00
43.47	51.44	0.00	2.00	0.00	0.00	0.00
43.64	54.80	0.00	2.00	0.00	0.00	0.00
43.80	42.21	0.00	2.00	0.00	0.00	0.00
43.97	56.47	0.00	2.00	0.00	0.00	0.00
44.13	43.34	0.00	2.00	0.00	0.00	0.00
44.29	40.50	0.00	2.00	0.00	0.00	0.00
44.46	31.66	0.00	2.00	0.00	0.00	0.00
44.62	26.96	0.00	2.00	0.00	0.00	0.00
44.79	55.11	0.00	2.00	0.00	0.00	0.00
44.95	182.78	0.04	1.88	-0.20	0.00	0.00
45.11	160.10	0.07	0.85	0.11	0.05	0.09
45.28	175.51	0.05	1.40	-0.10	0.02	0.03
45.44	179.17	0.04	1.62	-0.15	0.01	0.02
45.61	71.09	0.00	2.00	0.00	0.00	0.00
45.77	50.96	0.00	2.00	0.00	0.00	0.00
45.93	52.93	0.00	2.00	0.00	0.00	0.00
46.10	47.25	0.00	2.00	0.00	0.00	0.00
46.26	47.13	0.00	2.00	0.00	0.00	0.00
46.43	38.03	0.00	2.00	0.00	0.00	0.00
46.59	34.63	0.00	2.00	0.00	0.00	0.00
46.75	39.67	0.00	2.00	0.00	0.00	0.00
46.92	48.61	0.00	2.00	0.00	0.00	0.00
47.08	47.10	0.00	2.00	0.00	0.00	0.00
47.25	50.97	0.00	2.00	0.00	0.00	0.00
47.41	54.04	0.00	2.00	0.00	0.00	0.00
47.57	47.08	0.00	2.00	0.00	0.00	0.00
47.74	77.13	0.00	2.00	0.00	0.00	0.00
47.90	74.33	0.00	2.00	0.00	0.00	0.00
48.07	53.62	0.00	2.00	0.00	0.00	0.00
48.23	65.68	0.00	2.00	0.00	0.00	0.00
48.39	91.32	0.00	2.00	0.00	0.00	0.00
48.56	225.11	0.01	2.00	-0.83	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

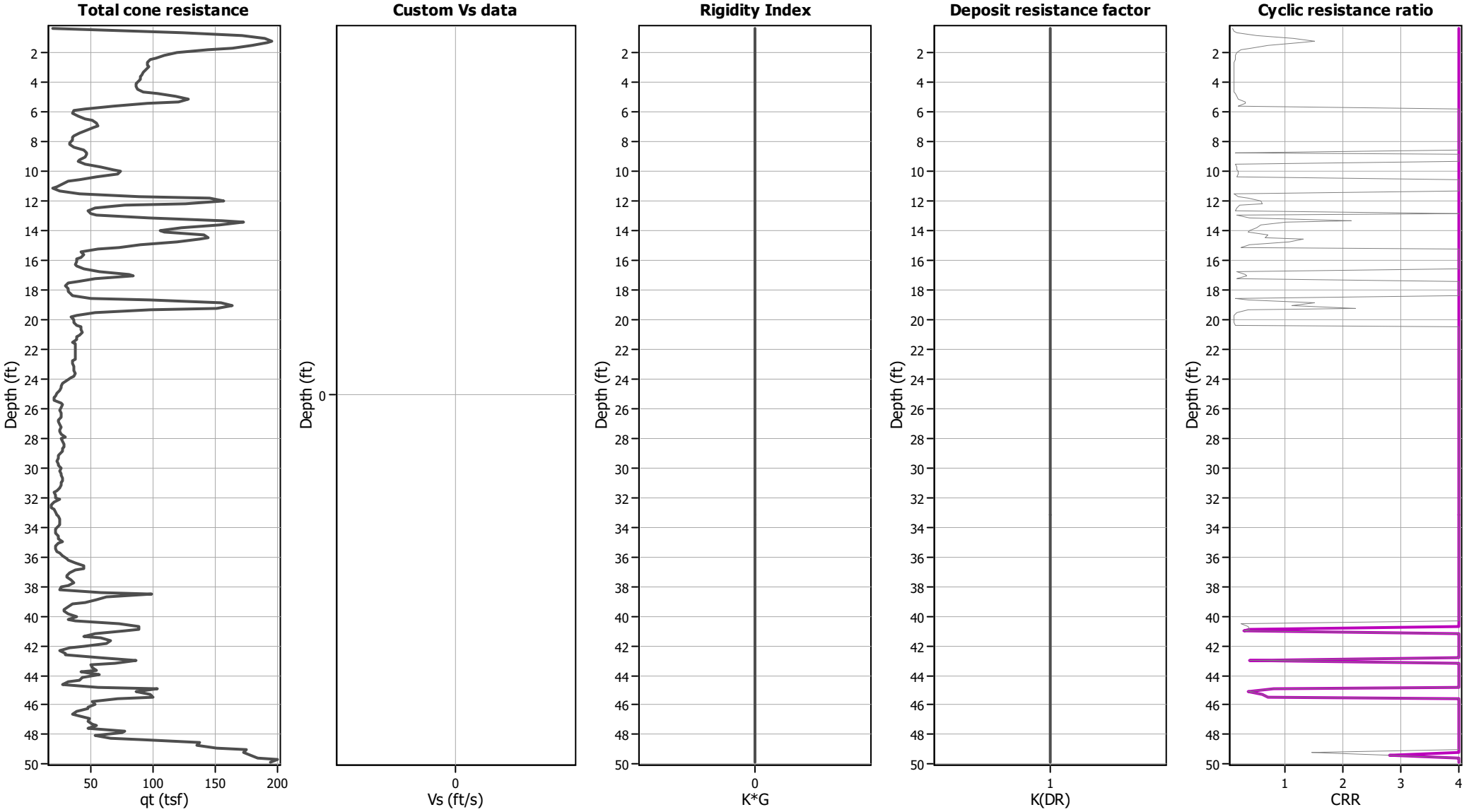
Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
48.72	214.33	0.01	2.00	-0.67	0.00	0.00
48.89	217.50	0.01	2.00	-0.71	0.00	0.00
49.05	221.25	0.01	2.00	-0.77	0.00	0.00
49.22	195.43	0.03	2.00	-0.38	0.00	0.00
49.38	206.56	0.02	2.00	-0.55	0.00	0.00
49.54	228.21	0.01	2.00	-0.88	0.00	0.00
49.71	271.80	0.00	2.00	-1.56	0.00	0.00
49.87	275.64	0.00	2.00	-1.62	0.00	0.00

Total estimated displacement: 0.47

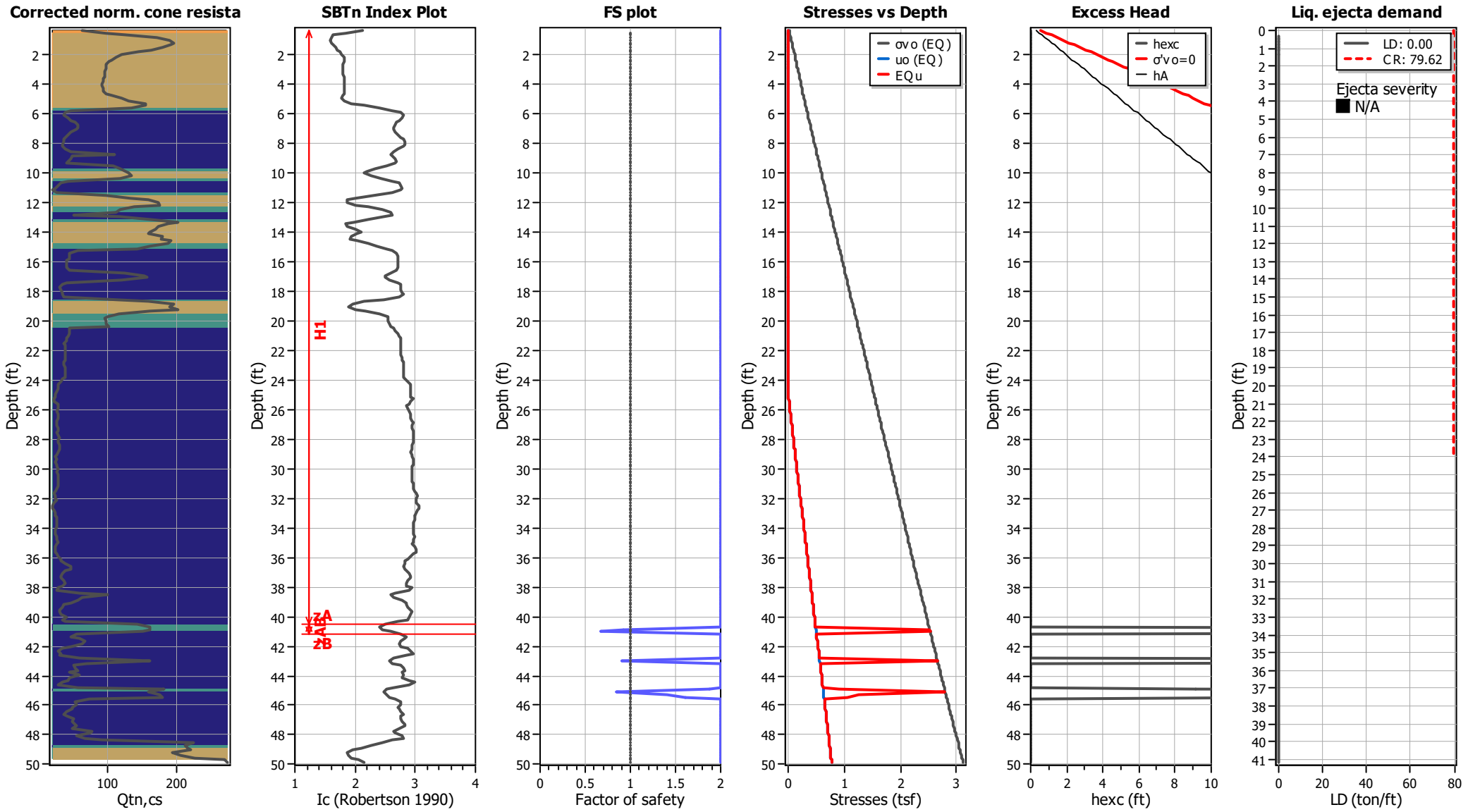
Abbreviations

Depth: Depth of test point
$q_{c1N,cs}$: Adjusted and corrected cone resistance due to fines
$Gamma_{lim}$: Limiting shear strain
FS: Calculated factor of safety against liquefaction
Fa:
$Gamma_{max}$: Maximum cyclic shear strain
Lat. disp.: Lateral displacement

Aging Calculation Estimation



Ejecta Severity Estimation



Baez Geotechnical Group
Geotechnical Engineers
BGG
http://www.baezgeotechnicalgroup.com

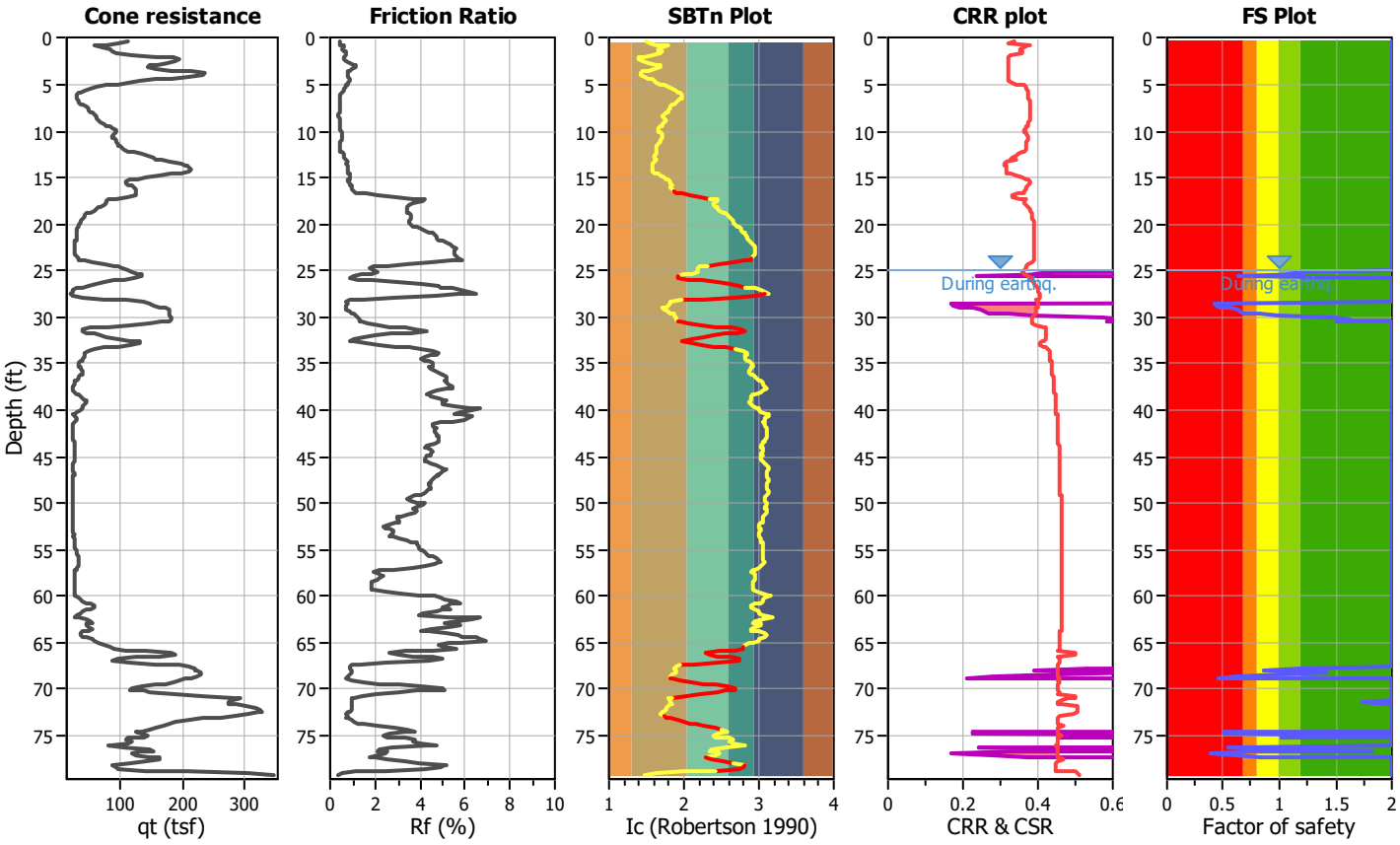
LIQUEFACTION ANALYSIS REPORT

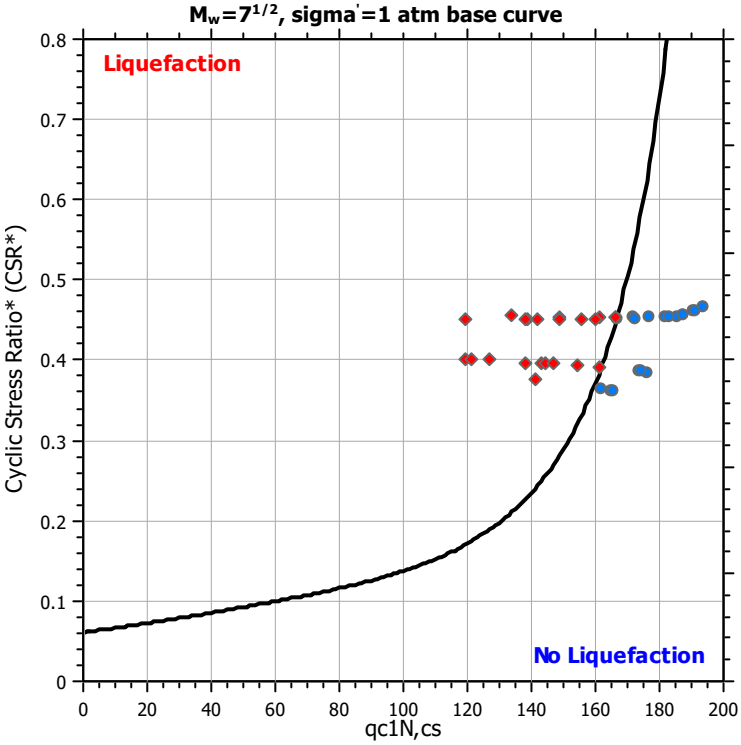
Project title : G289.01 Paseo **Location : Oakley Road, Oakley**

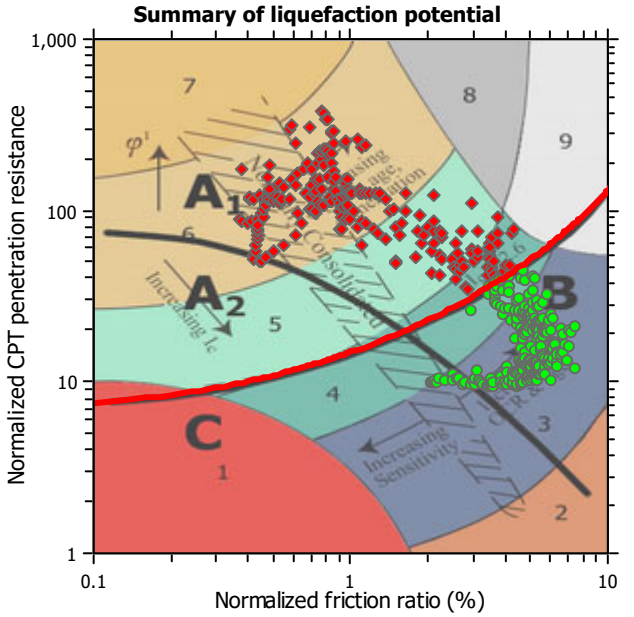
CPT file : CPT-02

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	25.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	25.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.66	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

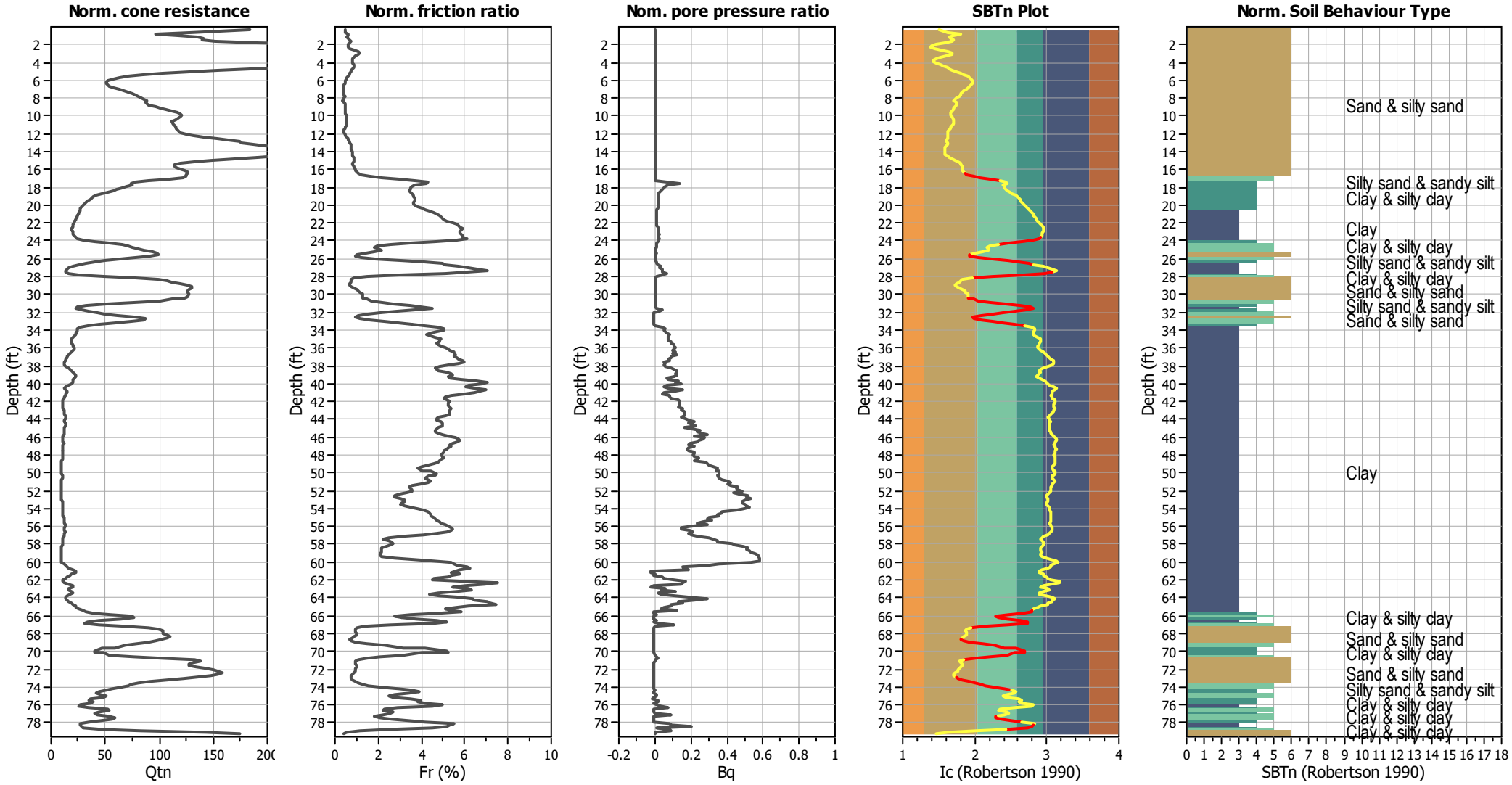






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normalized)



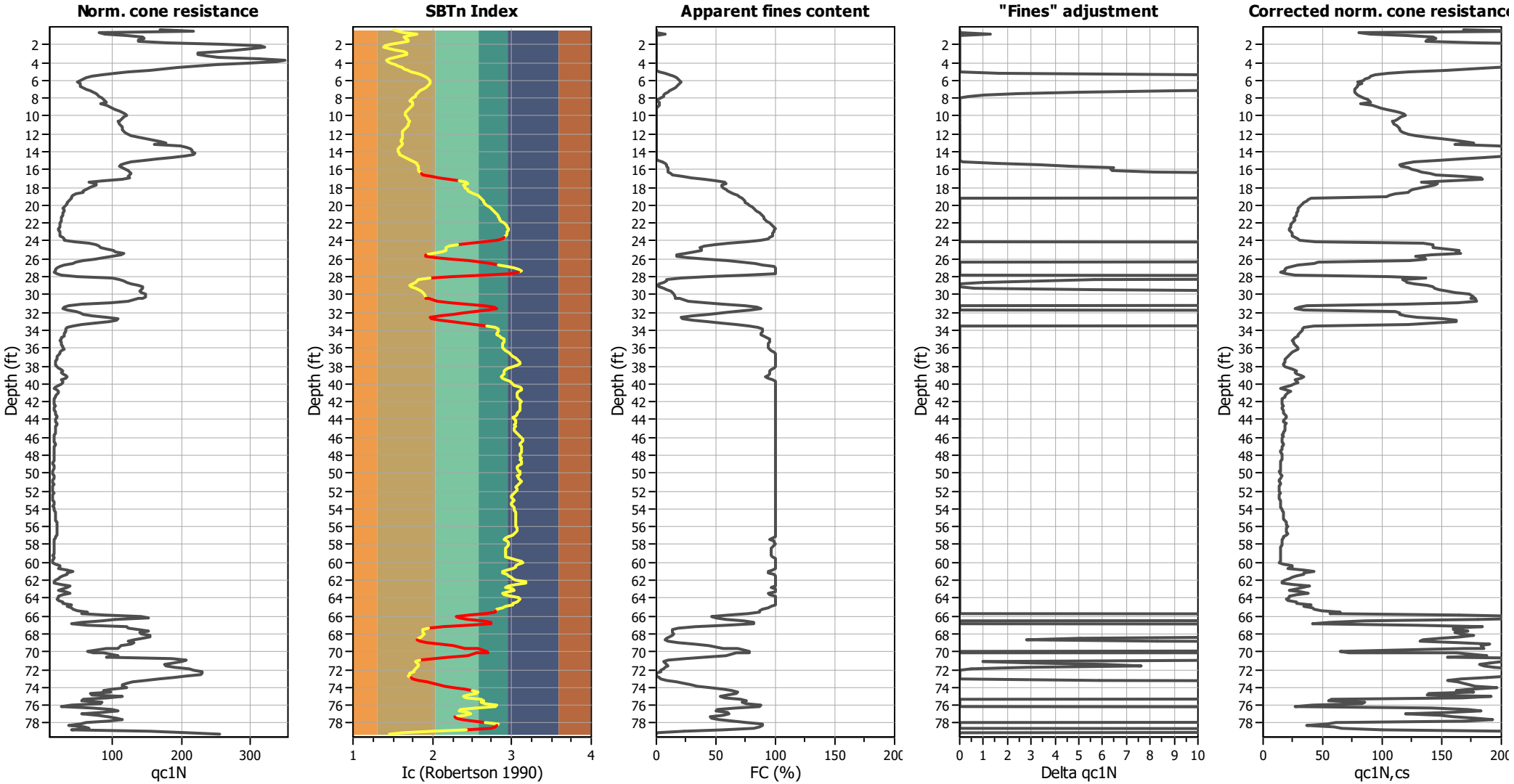
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	25.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

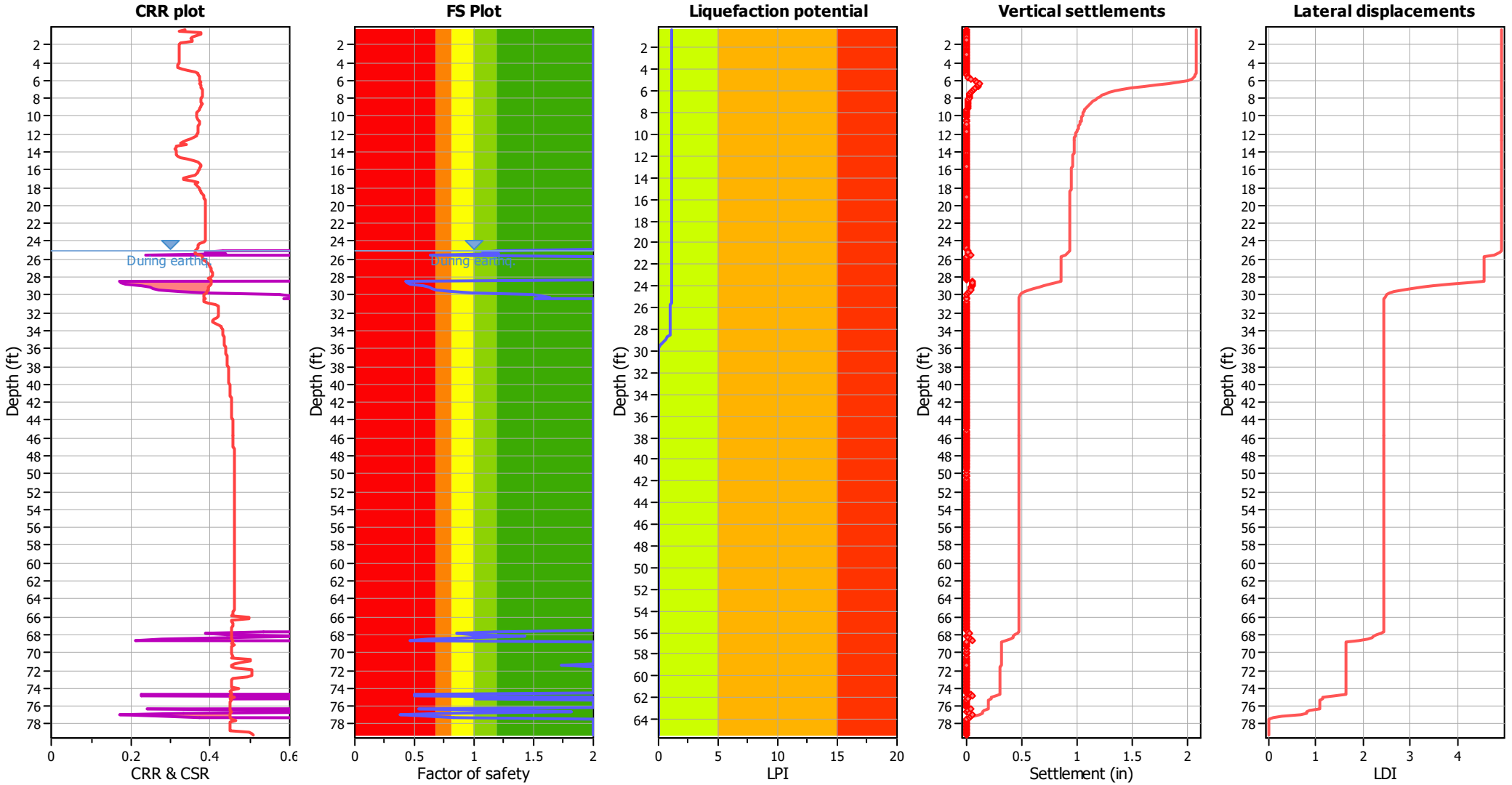
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	25.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	25.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

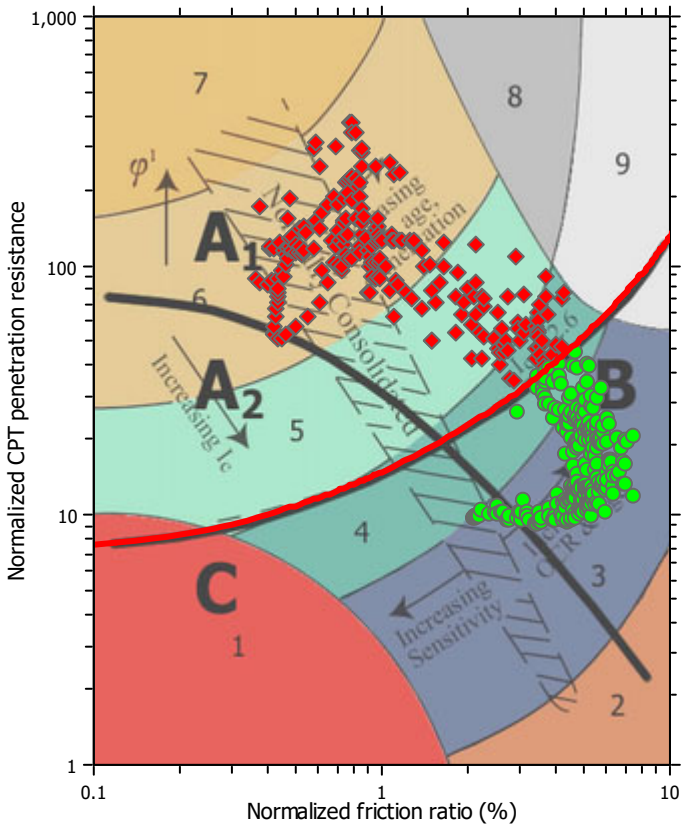
F.S. color scheme

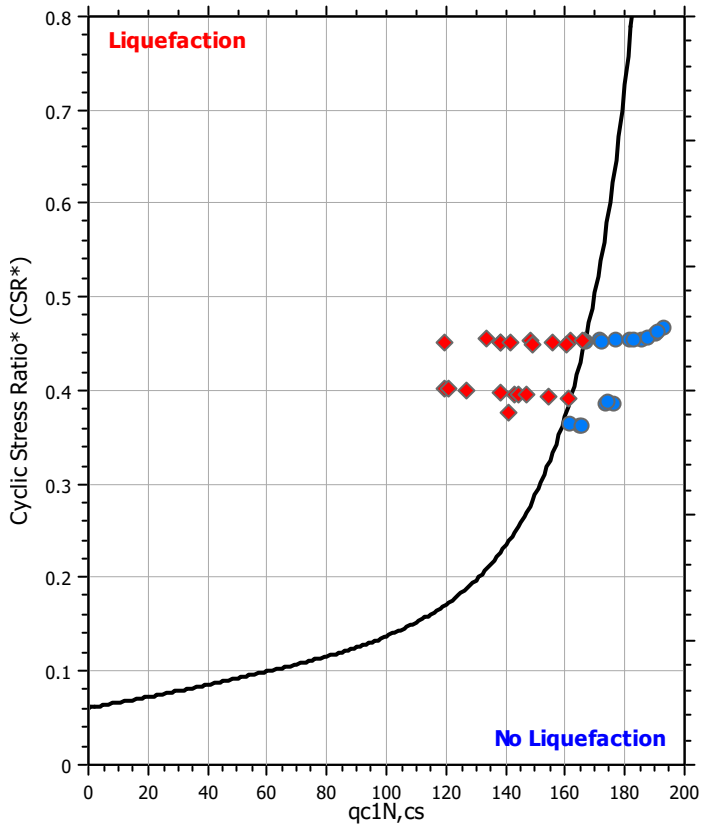
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

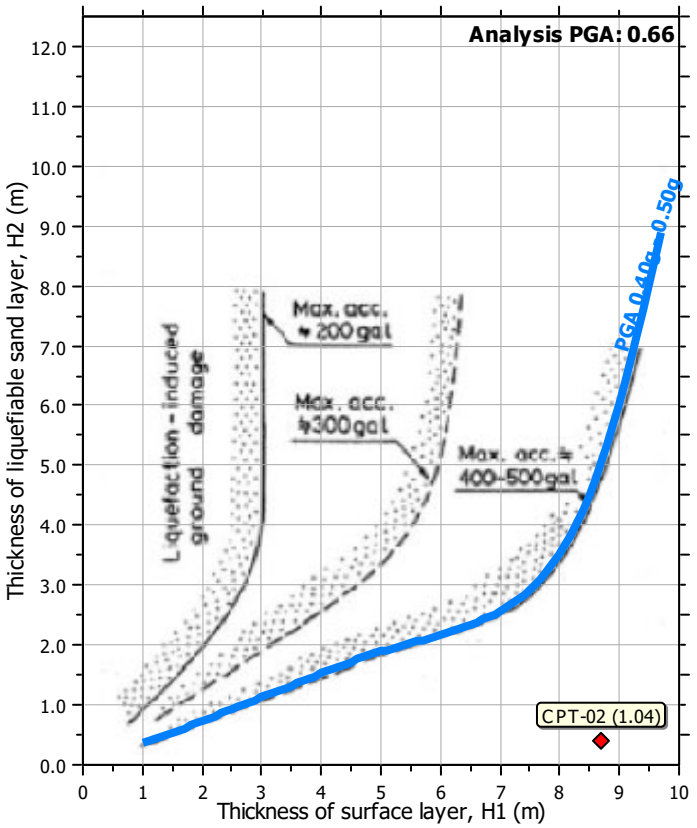
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



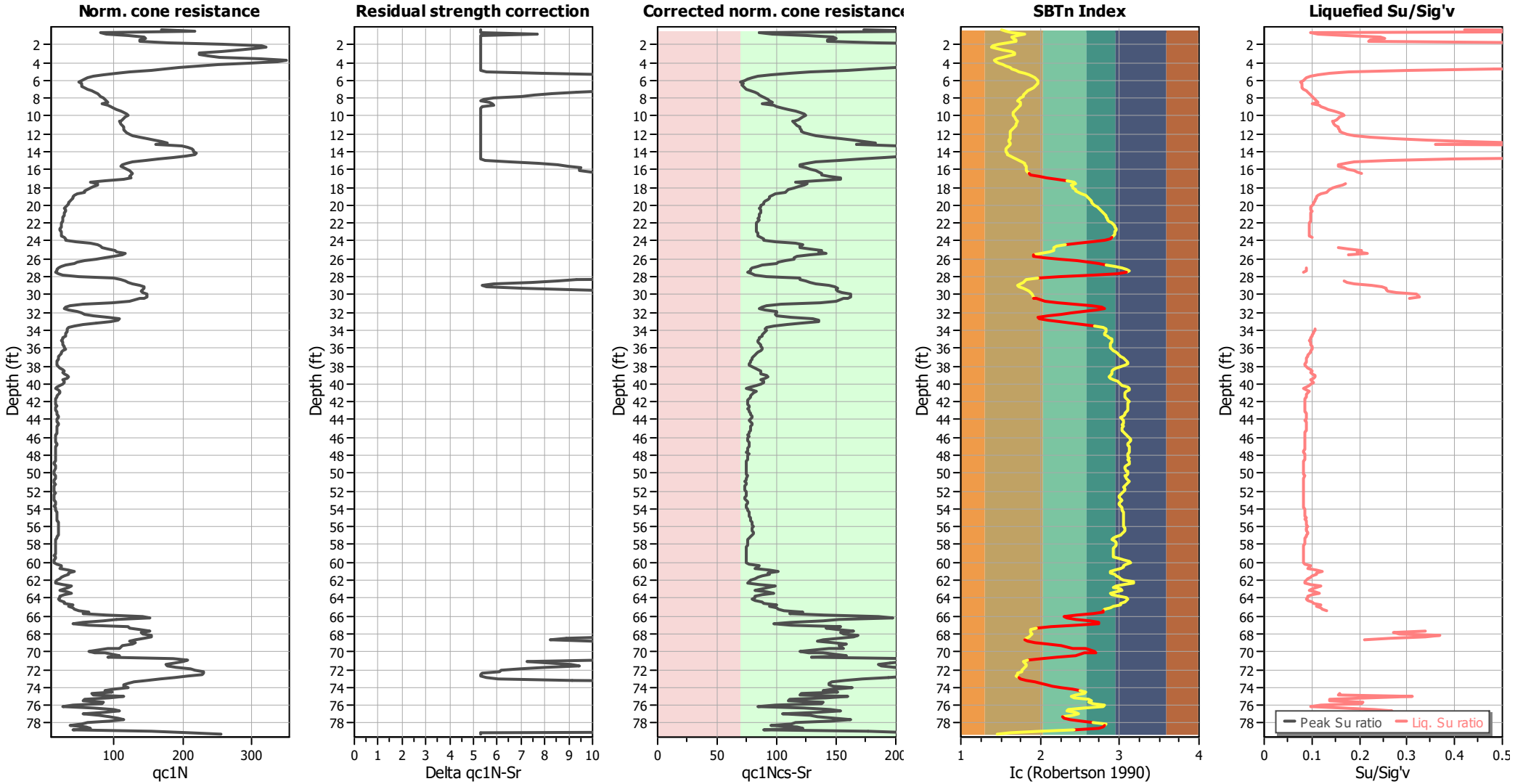




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	25.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

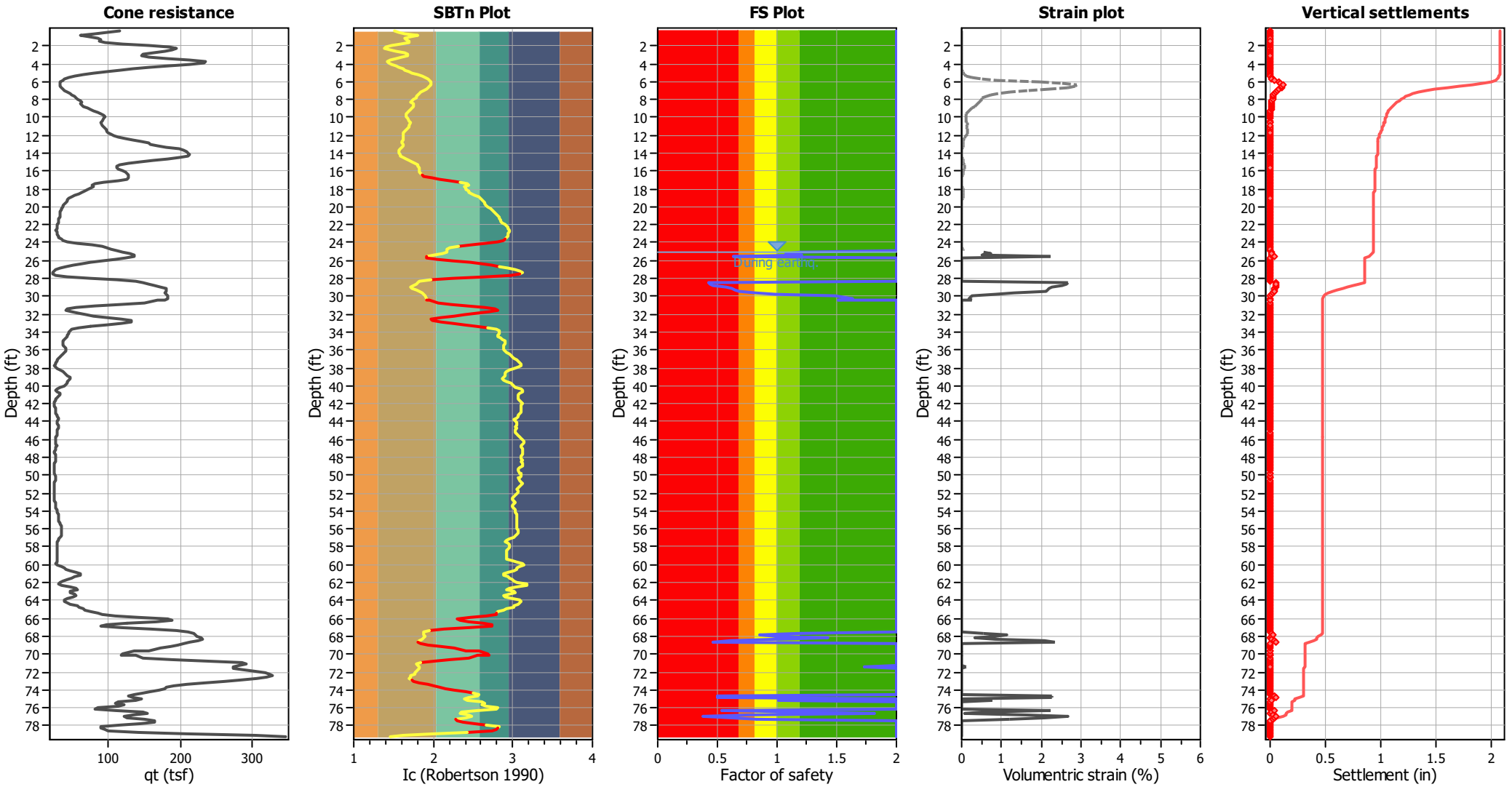
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	25.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.66	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement of dry sands ::

Depth (ft)	Ic	Q_{tn}	K_c	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
0.33	1.50	184.53	1.00	184.53	32	694	0.34	0.001	0.00	10.85	0.00	0.000
0.49	1.56	155.22	1.00	155.22	28	629	0.32	0.002	0.00	10.85	0.00	0.000
0.66	1.63	128.85	1.00	128.85	23	570	0.38	0.004	0.00	10.85	0.00	0.000
0.82	1.80	96.28	1.15	110.72	21	525	0.38	0.006	0.01	10.85	0.00	0.000
0.98	1.71	117.20	1.01	118.61	22	574	0.37	0.006	0.01	10.85	0.00	0.000
1.15	1.64	135.88	1.00	135.88	25	611	0.35	0.007	0.01	10.85	0.00	0.000
1.31	1.66	141.60	1.00	141.60	26	647	0.35	0.007	0.01	10.85	0.00	0.000
1.48	1.70	139.61	1.00	139.61	26	674	0.36	0.008	0.01	10.85	0.00	0.000
1.64	1.69	151.28	1.00	151.28	28	717	0.36	0.008	0.01	10.85	0.00	0.000
1.80	1.59	191.08	1.00	191.08	34	798	0.33	0.008	0.00	10.85	0.00	0.000
1.97	1.47	250.34	1.00	250.34	43	901	0.32	0.007	0.00	10.85	0.00	0.000
2.13	1.40	297.19	1.00	297.19	50	982	0.32	0.007	0.00	10.85	0.00	0.000
2.30	1.39	312.57	1.00	312.57	53	1020	0.32	0.007	0.00	10.85	0.00	0.000
2.46	1.45	303.57	1.00	303.57	52	1064	0.32	0.008	0.00	10.85	0.00	0.000
2.62	1.53	285.08	1.00	285.08	50	1113	0.32	0.008	0.00	10.85	0.00	0.000
2.79	1.63	258.81	1.00	258.81	47	1147	0.32	0.008	0.00	10.85	0.00	0.000
2.95	1.68	237.86	1.00	237.86	44	1125	0.32	0.009	0.00	10.85	0.00	0.000
3.12	1.68	232.38	1.00	232.38	43	1089	0.32	0.010	0.00	10.85	0.00	0.000
3.28	1.61	250.58	1.00	250.58	45	1078	0.32	0.011	0.00	10.85	0.00	0.000
3.45	1.52	292.19	1.00	292.19	51	1126	0.32	0.010	0.00	10.85	0.00	0.000
3.61	1.46	341.42	1.00	341.42	59	1214	0.32	0.010	0.00	10.85	0.00	0.000
3.77	1.42	377.09	1.00	377.09	64	1281	0.32	0.010	0.00	10.85	0.00	0.000
3.94	1.43	374.44	1.00	374.44	64	1285	0.32	0.010	0.00	10.85	0.00	0.000
4.10	1.47	339.97	1.00	339.97	59	1224	0.32	0.012	0.00	10.85	0.00	0.000
4.27	1.53	294.08	1.00	294.08	52	1137	0.32	0.014	0.00	10.85	0.00	0.000
4.43	1.57	250.40	1.00	250.40	45	1028	0.32	0.017	0.01	10.85	0.01	0.000
4.59	1.62	213.91	1.00	213.91	39	927	0.32	0.021	0.01	10.85	0.01	0.000
4.76	1.64	183.84	1.00	183.84	34	822	0.33	0.028	0.01	10.85	0.01	0.001
4.92	1.69	154.31	1.00	154.31	29	732	0.34	0.038	0.02	10.85	0.02	0.001
5.09	1.74	127.46	1.06	135.36	26	644	0.36	0.056	0.04	10.85	0.04	0.001
5.25	1.80	102.70	1.15	118.52	23	563	0.37	0.090	0.08	10.85	0.07	0.003
5.41	1.85	85.23	1.20	102.47	20	498	0.37	0.149	0.15	10.85	0.13	0.005
5.58	1.90	71.66	1.24	88.70	18	446	0.37	0.257	0.30	10.85	0.26	0.010
5.74	1.93	62.65	1.26	78.73	16	404	0.37	0.444	0.58	10.85	0.50	0.019
5.91	1.95	57.17	1.27	72.46	15	377	0.37	0.701	1.01	10.85	0.87	0.036
6.07	1.96	52.71	1.00	52.71	11	354	0.37	1.087	2.27	10.85	1.97	0.075
6.23	1.96	51.25	1.00	51.25	11	345	0.38	1.350	2.92	10.85	2.52	0.097
6.40	1.96	50.86	1.00	50.86	10	342	0.37	1.535	3.35	10.85	2.90	0.118
6.56	1.94	52.56	1.00	52.56	11	345	0.38	1.561	3.30	10.85	2.86	0.110
6.73	1.93	54.26	1.00	54.26	11	350	0.38	1.516	3.11	10.85	2.69	0.110
6.89	1.91	57.62	1.00	57.62	12	361	0.38	1.325	2.55	10.85	2.21	0.085
7.05	1.88	62.42	1.00	62.42	12	377	0.38	1.083	1.92	10.85	1.66	0.064
7.22	1.85	67.65	1.00	67.65	13	396	0.38	0.869	1.42	10.85	1.22	0.050
7.38	1.83	71.80	1.00	71.80	14	416	0.38	0.692	1.06	10.85	0.92	0.035
7.55	1.81	75.24	1.00	75.24	15	434	0.38	0.584	0.85	10.85	0.74	0.030
7.71	1.80	78.22	1.00	78.22	15	450	0.38	0.509	0.71	10.85	0.62	0.024
7.87	1.78	81.10	1.00	81.10	16	466	0.38	0.445	0.60	10.85	0.52	0.020
8.04	1.75	83.74	1.00	83.74	16	472	0.38	0.440	0.58	10.85	0.50	0.020

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	K_c	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
8.20	1.73	86.29	1.00	86.29	16	481	0.38	0.422	0.54	10.85	0.47	0.018
8.37	1.71	88.33	1.00	88.33	17	490	0.38	0.403	0.51	10.85	0.44	0.018
8.53	1.74	87.16	1.00	87.16	17	502	0.38	0.376	0.47	10.85	0.41	0.016
8.69	1.75	88.57	1.00	88.57	17	518	0.38	0.338	0.42	10.85	0.36	0.014
8.86	1.75	90.37	1.00	90.37	17	534	0.38	0.307	0.37	10.85	0.32	0.013
9.02	1.73	96.23	1.00	96.23	18	560	0.38	0.259	0.29	10.85	0.25	0.010
9.19	1.71	100.55	1.00	100.55	19	583	0.37	0.227	0.24	10.85	0.21	0.009
9.35	1.70	106.13	1.00	106.13	20	612	0.37	0.194	0.20	10.85	0.17	0.007
9.51	1.68	111.59	1.00	111.59	21	635	0.37	0.174	0.17	10.85	0.14	0.006
9.68	1.66	116.56	1.00	116.56	21	660	0.37	0.156	0.14	10.85	0.12	0.005
9.84	1.66	119.92	1.00	119.92	22	679	0.36	0.145	0.13	10.85	0.11	0.004
10.01	1.67	120.71	1.00	120.71	22	697	0.36	0.137	0.12	10.85	0.10	0.004
10.17	1.68	118.99	1.00	118.99	22	703	0.37	0.138	0.12	10.85	0.11	0.004
10.34	1.70	115.42	1.00	115.42	22	700	0.37	0.144	0.13	10.85	0.11	0.005
10.50	1.71	112.68	1.00	112.83	21	695	0.37	0.152	0.14	10.85	0.12	0.005
10.66	1.71	111.71	1.00	111.77	21	694	0.37	0.158	0.15	10.85	0.13	0.005
10.83	1.70	112.42	1.00	112.42	21	699	0.37	0.159	0.15	10.85	0.13	0.005
10.99	1.69	114.08	1.00	114.08	21	706	0.37	0.158	0.15	10.85	0.13	0.005
11.16	1.67	115.28	1.00	115.28	21	708	0.37	0.161	0.15	10.85	0.13	0.005
11.32	1.66	116.08	1.00	116.08	21	707	0.37	0.166	0.15	10.85	0.13	0.005
11.48	1.64	116.44	1.00	116.44	21	698	0.37	0.179	0.17	10.85	0.14	0.006
11.65	1.63	117.48	1.00	117.48	21	700	0.37	0.183	0.17	10.85	0.15	0.006
11.81	1.62	120.09	1.00	120.09	22	715	0.37	0.174	0.16	10.85	0.14	0.005
11.98	1.62	124.49	1.00	124.49	23	750	0.37	0.150	0.13	10.85	0.11	0.005
12.14	1.63	131.80	1.00	131.80	24	800	0.36	0.124	0.10	10.85	0.09	0.003
12.30	1.62	141.37	1.00	141.37	26	858	0.36	0.103	0.08	10.85	0.07	0.003
12.47	1.62	153.26	1.00	153.26	28	942	0.35	0.081	0.05	10.85	0.05	0.002
12.63	1.61	164.38	1.00	164.38	30	1003	0.34	0.070	0.04	10.85	0.04	0.001
12.80	1.61	174.83	1.00	174.83	32	1067	0.33	0.062	0.04	10.85	0.03	0.001
12.96	1.62	175.75	1.00	175.75	32	1100	0.33	0.059	0.03	10.85	0.03	0.001
13.12	1.62	186.61	1.00	186.61	34	1171	0.34	0.052	0.03	10.85	0.02	0.001
13.29	1.61	197.45	1.00	197.45	36	1237	0.31	0.047	0.02	10.85	0.02	0.001
13.45	1.58	215.46	1.00	215.46	39	1306	0.31	0.043	0.02	10.85	0.02	0.001
13.62	1.57	221.03	1.00	221.03	40	1343	0.31	0.042	0.02	10.85	0.02	0.001
13.78	1.57	223.91	1.00	223.91	40	1369	0.31	0.041	0.02	10.85	0.02	0.001
13.94	1.58	226.06	1.00	226.06	40	1392	0.31	0.040	0.02	10.85	0.01	0.001
14.11	1.58	226.64	1.00	226.64	41	1411	0.32	0.040	0.02	10.85	0.01	0.001
14.27	1.59	222.40	1.00	222.40	40	1414	0.32	0.040	0.02	10.85	0.02	0.001
14.44	1.62	209.68	1.00	209.68	38	1381	0.32	0.043	0.02	10.85	0.02	0.001
14.60	1.65	191.12	1.00	191.12	35	1320	0.32	0.048	0.02	10.85	0.02	0.001
14.76	1.69	170.14	1.00	170.14	32	1239	0.34	0.055	0.03	10.85	0.03	0.001
14.93	1.73	149.28	1.06	157.72	30	1151	0.36	0.066	0.04	10.85	0.04	0.001
15.09	1.77	132.58	1.12	148.24	28	1077	0.37	0.079	0.05	10.85	0.04	0.002
15.26	1.80	120.11	1.15	138.31	27	1014	0.37	0.094	0.07	10.85	0.06	0.002
15.42	1.81	114.60	1.17	133.76	26	991	0.38	0.102	0.07	10.85	0.06	0.002
15.58	1.82	113.43	1.18	133.29	26	996	0.38	0.102	0.07	10.85	0.06	0.002
15.75	1.83	115.79	1.18	137.01	27	1034	0.37	0.094	0.07	10.85	0.06	0.002
15.91	1.83	119.98	1.18	141.89	28	1077	0.37	0.086	0.06	10.85	0.05	0.002

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	K_c	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
16.08	1.83	123.29	1.18	145.77	28	1114	0.37	0.080	0.05	10.85	0.05	0.002
16.24	1.84	125.95	1.19	149.78	29	1156	0.37	0.074	0.05	10.85	0.04	0.002
16.40	1.86	126.18	1.21	152.52	30	1200	0.36	0.069	0.04	10.85	0.04	0.001
16.57	1.88	125.33	1.23	153.74	0	0	0.36	0.000	0.00	0.00	0.00	0.000
16.73	1.98	124.96	1.29	161.77	0	0	0.35	0.000	0.00	0.00	0.00	0.000
16.90	2.07	121.84	1.38	168.63	0	0	0.33	0.000	0.00	0.00	0.00	0.000
17.06	2.21	109.82	1.64	180.48	0	0	0.33	0.000	0.00	0.00	0.00	0.000
17.23	2.34	90.21	2.10	189.73	0	0	0.35	0.000	0.00	0.00	0.00	0.000
17.39	2.43	77.66	2.56	199.16	0	0	0.37	0.000	0.00	0.00	0.00	0.000
17.55	2.44	73.65	2.61	192.56	48	1526	0.36	0.046	0.02	10.85	0.01	0.001
17.72	2.40	74.68	2.37	176.95	44	1477	0.36	0.050	0.02	10.85	0.02	0.001
17.88	2.40	70.46	2.37	167.22	41	1405	0.37	0.056	0.02	10.85	0.02	0.001
18.05	2.42	65.14	2.47	160.66	40	1339	0.37	0.063	0.03	10.85	0.02	0.001
18.21	2.44	60.72	2.59	157.12	39	1293	0.37	0.069	0.03	10.85	0.03	0.001
18.37	2.45	57.32	2.68	153.49	39	1254	0.38	0.075	0.03	10.85	0.03	0.001
18.54	2.48	52.54	2.87	150.98	39	1205	0.38	0.083	0.04	10.85	0.03	0.001
18.70	2.52	47.29	3.12	147.39	38	1144	0.38	0.096	0.04	10.85	0.04	0.001
18.87	2.57	41.90	3.46	145.18	39	1084	0.38	0.113	0.05	10.85	0.04	0.002
19.03	2.59	39.22	3.65	143.11	38	1052	0.38	0.124	0.06	10.85	0.05	0.002
19.19	2.61	37.27	3.81	142.10	0	0	0.39	0.000	0.00	0.00	0.00	0.000
19.36	2.62	35.59	3.96	140.82	0	0	0.39	0.000	0.00	0.00	0.00	0.000
19.52	2.64	33.81	4.09	138.40	0	0	0.39	0.000	0.00	0.00	0.00	0.000
19.69	2.65	32.28	4.20	135.60	0	0	0.39	0.000	0.00	0.00	0.00	0.000
19.85	2.67	30.64	4.37	133.98	0	0	0.39	0.000	0.00	0.00	0.00	0.000
20.01	2.69	29.10	4.57	133.07	0	0	0.39	0.000	0.00	0.00	0.00	0.000
20.18	2.72	27.62	4.87	134.55	0	0	0.39	0.000	0.00	0.00	0.00	0.000
20.34	2.74	26.90	5.09	136.90	0	0	0.39	0.000	0.00	0.00	0.00	0.000
20.51	2.75	26.51	5.27	139.79	0	0	0.39	0.000	0.00	0.00	0.00	0.000
20.67	2.77	26.18	5.48	143.40	0	0	0.39	0.000	0.00	0.00	0.00	0.000
20.83	2.79	25.61	5.71	146.38	0	0	0.39	0.000	0.00	0.00	0.00	0.000
21.00	2.81	24.96	5.94	148.40	0	0	0.39	0.000	0.00	0.00	0.00	0.000
21.16	2.82	24.34	6.12	148.89	0	0	0.39	0.000	0.00	0.00	0.00	0.000
21.33	2.84	23.69	6.31	149.42	0	0	0.39	0.000	0.00	0.00	0.00	0.000
21.49	2.85	23.22	6.46	150.01	0	0	0.39	0.000	0.00	0.00	0.00	0.000
21.65	2.86	22.82	6.59	150.34	0	0	0.39	0.000	0.00	0.00	0.00	0.000
21.82	2.87	22.14	6.84	151.36	0	0	0.39	0.000	0.00	0.00	0.00	0.000
21.98	2.90	21.21	7.22	153.07	0	0	0.39	0.000	0.00	0.00	0.00	0.000
22.15	2.92	20.43	7.54	154.12	0	0	0.39	0.000	0.00	0.00	0.00	0.000
22.31	2.94	19.95	7.74	154.38	0	0	0.39	0.000	0.00	0.00	0.00	0.000
22.47	2.94	19.61	7.86	154.15	0	0	0.39	0.000	0.00	0.00	0.00	0.000
22.64	2.96	19.24	8.05	154.85	0	0	0.39	0.000	0.00	0.00	0.00	0.000
22.80	2.95	19.24	8.01	154.09	0	0	0.39	0.000	0.00	0.00	0.00	0.000
22.97	2.95	19.56	7.89	154.29	0	0	0.39	0.000	0.00	0.00	0.00	0.000
23.13	2.94	20.01	7.79	155.79	0	0	0.39	0.000	0.00	0.00	0.00	0.000
23.30	2.94	20.38	7.73	157.64	0	0	0.39	0.000	0.00	0.00	0.00	0.000
23.46	2.92	21.28	7.58	161.23	0	0	0.39	0.000	0.00	0.00	0.00	0.000
23.62	2.90	22.80	7.26	165.64	0	0	0.39	0.000	0.00	0.00	0.00	0.000
23.79	2.89	24.44	7.06	172.62	0	0	0.39	0.000	0.00	0.00	0.00	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	K_c	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vol(15)}$ (%)	N_c	e_v (%)	Settle. (in)
23.95	2.81	29.13	6.01	174.92	0	0	0.39	0.000	0.00	0.00	0.00	0.000
24.12	2.66	39.71	4.26	168.98	0	0	0.38	0.000	0.00	0.00	0.00	0.000
24.28	2.48	53.62	2.83	151.54	0	0	0.37	0.000	0.00	0.00	0.00	0.000
24.44	2.32	65.14	2.01	130.64	0	0	0.37	0.000	0.00	0.00	0.00	0.000
24.61	2.21	70.95	1.64	116.41	0	0	0.37	0.000	0.00	0.00	0.00	0.000
24.77	2.17	75.33	1.55	117.00	26	1451	0.37	0.082	0.06	10.85	0.05	0.002
24.94	2.18	80.55	1.56	125.96	28	1571	0.37	0.070	0.05	10.85	0.04	0.002

Total estimated settlement: 1.15

Abbreviations

Q_{tn}: Normalized cone resistance
K_c: Fines correction factor
$Q_{tn,cs}$: Equivalent clean sand normalized cone resistance
G_{max}: Small strain shear modulus
CSR: Soil cyclic stress ratio
γ: Cyclic shear strain
$e_{vol(15)}$: Volumetric strain after 15 cycles
N_c: Equivalent number of cycles
e_v: Volumetric strain
Settle.: Calculated settlement

:: Post-earthquake settlement due to soil liquefaction ::

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
25.10	165.11	1.20	0.54	1.00	0.01	25.26	161.67	1.07	0.72	1.00	0.01
25.43	165.67	1.21	0.52	1.00	0.01	25.59	141.08	0.64	2.22	1.00	0.04
25.76	128.44	2.00	0.00	1.00	0.00	25.92	135.94	2.00	0.00	1.00	0.00
26.08	136.47	2.00	0.00	1.00	0.00	26.25	123.00	2.00	0.00	1.00	0.00
26.41	46.68	2.00	0.00	1.00	0.00	26.58	42.78	2.00	0.00	1.00	0.00
26.74	29.34	2.00	0.00	1.00	0.00	26.90	24.85	2.00	0.00	1.00	0.00
27.07	19.29	2.00	0.00	1.00	0.00	27.23	17.78	2.00	0.00	1.00	0.00
27.40	17.74	2.00	0.00	1.00	0.00	27.56	15.16	2.00	0.00	1.00	0.00
27.72	19.47	2.00	0.00	1.00	0.00	27.89	26.34	2.00	0.00	1.00	0.00
28.05	106.07	2.00	0.00	1.00	0.00	28.22	136.58	2.00	0.00	1.00	0.00
28.38	116.48	2.00	0.00	1.00	0.00	28.54	119.62	0.43	2.66	1.00	0.05
28.71	121.10	0.43	2.63	1.00	0.05	28.87	126.58	0.47	2.51	1.00	0.05
29.04	137.98	0.57	2.28	1.00	0.05	29.20	142.88	0.63	2.19	1.00	0.04
29.36	144.30	0.64	2.17	1.00	0.04	29.53	147.08	0.68	2.12	1.00	0.04
29.69	154.65	0.82	1.33	1.00	0.03	29.86	161.41	0.99	0.85	1.00	0.02
30.02	173.69	1.49	0.27	1.00	0.01	30.19	176.26	1.63	0.17	1.00	0.00
30.35	174.34	1.52	0.25	1.00	0.00	30.51	177.95	2.00	0.00	1.00	0.00
30.68	179.25	2.00	0.00	1.00	0.00	30.84	163.64	2.00	0.00	1.00	0.00
31.01	117.90	2.00	0.00	1.00	0.00	31.17	36.82	2.00	0.00	1.00	0.00
31.33	31.05	2.00	0.00	1.00	0.00	31.50	27.16	2.00	0.00	1.00	0.00
31.66	33.57	2.00	0.00	1.00	0.00	31.83	110.69	2.00	0.00	1.00	0.00
31.99	114.95	2.00	0.00	1.00	0.00	32.15	115.22	2.00	0.00	1.00	0.00
32.32	120.03	2.00	0.00	1.00	0.00	32.48	129.28	2.00	0.00	1.00	0.00
32.65	150.84	2.00	0.00	1.00	0.00	32.81	162.33	2.00	0.00	1.00	0.00
32.97	161.97	2.00	0.00	1.00	0.00	33.14	141.29	2.00	0.00	1.00	0.00
33.30	121.93	2.00	0.00	1.00	0.00	33.47	42.20	2.00	0.00	1.00	0.00
33.63	33.58	2.00	0.00	1.00	0.00	33.79	32.48	2.00	0.00	1.00	0.00
33.96	32.96	2.00	0.00	1.00	0.00	34.12	32.22	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
34.29	30.72	2.00	0.00	1.00	0.00	34.45	29.46	2.00	0.00	1.00	0.00
34.61	29.43	2.00	0.00	1.00	0.00	34.78	26.69	2.00	0.00	1.00	0.00
34.94	25.69	2.00	0.00	1.00	0.00	35.11	24.24	2.00	0.00	1.00	0.00
35.27	25.32	2.00	0.00	1.00	0.00	35.43	25.72	2.00	0.00	1.00	0.00
35.60	27.02	2.00	0.00	1.00	0.00	35.76	27.79	2.00	0.00	1.00	0.00
35.93	28.94	2.00	0.00	1.00	0.00	36.09	29.20	2.00	0.00	1.00	0.00
36.26	26.86	2.00	0.00	1.00	0.00	36.42	24.55	2.00	0.00	1.00	0.00
36.58	23.42	2.00	0.00	1.00	0.00	36.75	21.78	2.00	0.00	1.00	0.00
36.91	20.59	2.00	0.00	1.00	0.00	37.08	19.34	2.00	0.00	1.00	0.00
37.24	18.67	2.00	0.00	1.00	0.00	37.40	18.28	2.00	0.00	1.00	0.00
37.57	17.69	2.00	0.00	1.00	0.00	37.73	16.88	2.00	0.00	1.00	0.00
37.90	17.00	2.00	0.00	1.00	0.00	38.06	18.75	2.00	0.00	1.00	0.00
38.22	21.36	2.00	0.00	1.00	0.00	38.39	25.06	2.00	0.00	1.00	0.00
38.55	27.71	2.00	0.00	1.00	0.00	38.72	27.02	2.00	0.00	1.00	0.00
38.88	27.93	2.00	0.00	1.00	0.00	39.04	32.29	2.00	0.00	1.00	0.00
39.21	33.63	2.00	0.00	1.00	0.00	39.37	31.61	2.00	0.00	1.00	0.00
39.54	26.76	2.00	0.00	1.00	0.00	39.70	28.47	2.00	0.00	1.00	0.00
39.86	28.93	2.00	0.00	1.00	0.00	40.03	26.07	2.00	0.00	1.00	0.00
40.19	22.68	2.00	0.00	1.00	0.00	40.36	17.80	2.00	0.00	1.00	0.00
40.52	14.87	2.00	0.00	1.00	0.00	40.68	19.35	2.00	0.00	1.00	0.00
40.85	22.62	2.00	0.00	1.00	0.00	41.01	20.97	2.00	0.00	1.00	0.00
41.18	19.68	2.00	0.00	1.00	0.00	41.34	18.34	2.00	0.00	1.00	0.00
41.50	17.76	2.00	0.00	1.00	0.00	41.67	16.36	2.00	0.00	1.00	0.00
41.83	15.45	2.00	0.00	1.00	0.00	42.00	15.91	2.00	0.00	1.00	0.00
42.16	15.68	2.00	0.00	1.00	0.00	42.32	16.00	2.00	0.00	1.00	0.00
42.49	16.59	2.00	0.00	1.00	0.00	42.65	16.30	2.00	0.00	1.00	0.00
42.82	16.07	2.00	0.00	1.00	0.00	42.98	16.53	2.00	0.00	1.00	0.00
43.15	17.12	2.00	0.00	1.00	0.00	43.31	17.57	2.00	0.00	1.00	0.00
43.47	18.09	2.00	0.00	1.00	0.00	43.64	18.95	2.00	0.00	1.00	0.00
43.80	19.68	2.00	0.00	1.00	0.00	43.97	18.36	2.00	0.00	1.00	0.00
44.13	17.25	2.00	0.00	1.00	0.00	44.29	17.57	2.00	0.00	1.00	0.00
44.46	19.10	2.00	0.00	1.00	0.00	44.62	18.67	2.00	0.00	1.00	0.00
44.79	18.37	2.00	0.00	1.00	0.00	44.95	18.08	2.00	0.00	1.00	0.00
45.28	17.70	2.00	0.00	1.00	0.00	45.44	17.41	2.00	0.00	1.00	0.00
45.61	16.78	2.00	0.00	1.00	0.00	45.77	16.16	2.00	0.00	1.00	0.00
45.93	16.47	2.00	0.00	1.00	0.00	46.10	15.72	2.00	0.00	1.00	0.00
46.26	15.57	2.00	0.00	1.00	0.00	46.43	15.81	2.00	0.00	1.00	0.00
46.59	16.39	2.00	0.00	1.00	0.00	46.75	17.16	2.00	0.00	1.00	0.00
46.92	16.81	2.00	0.00	1.00	0.00	47.08	16.26	2.00	0.00	1.00	0.00
47.25	15.78	2.00	0.00	1.00	0.00	47.41	15.43	2.00	0.00	1.00	0.00
47.57	15.02	2.00	0.00	1.00	0.00	47.74	14.93	2.00	0.00	1.00	0.00
47.90	16.22	2.00	0.00	1.00	0.00	48.07	15.81	2.00	0.00	1.00	0.00
48.23	15.27	2.00	0.00	1.00	0.00	48.39	15.77	2.00	0.00	1.00	0.00
48.56	15.55	2.00	0.00	1.00	0.00	48.72	14.89	2.00	0.00	1.00	0.00
48.89	14.29	2.00	0.00	1.00	0.00	49.05	14.27	2.00	0.00	1.00	0.00
49.22	14.57	2.00	0.00	1.00	0.00	49.38	14.81	2.00	0.00	1.00	0.00
49.54	14.48	2.00	0.00	1.00	0.00	49.71	14.14	2.00	0.00	1.00	0.00
49.87	13.80	2.00	0.00	1.00	0.00	50.04	14.42	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
50.20	16.02	2.00	0.00	1.00	0.00	50.36	15.67	2.00	0.00	1.00	0.00
50.53	14.88	2.00	0.00	1.00	0.00	50.69	13.91	2.00	0.00	1.00	0.00
50.86	13.51	2.00	0.00	1.00	0.00	51.02	14.13	2.00	0.00	1.00	0.00
51.18	14.50	2.00	0.00	1.00	0.00	51.35	13.40	2.00	0.00	1.00	0.00
51.51	13.45	2.00	0.00	1.00	0.00	51.68	13.68	2.00	0.00	1.00	0.00
51.84	13.48	2.00	0.00	1.00	0.00	52.00	13.84	2.00	0.00	1.00	0.00
52.17	14.46	2.00	0.00	1.00	0.00	52.33	13.81	2.00	0.00	1.00	0.00
52.50	13.92	2.00	0.00	1.00	0.00	52.66	13.72	2.00	0.00	1.00	0.00
52.82	13.64	2.00	0.00	1.00	0.00	52.99	14.19	2.00	0.00	1.00	0.00
53.15	15.00	2.00	0.00	1.00	0.00	53.32	15.17	2.00	0.00	1.00	0.00
53.48	14.71	2.00	0.00	1.00	0.00	53.64	14.44	2.00	0.00	1.00	0.00
53.81	14.87	2.00	0.00	1.00	0.00	53.97	15.67	2.00	0.00	1.00	0.00
54.14	16.16	2.00	0.00	1.00	0.00	54.30	17.15	2.00	0.00	1.00	0.00
54.46	17.01	2.00	0.00	1.00	0.00	54.63	16.67	2.00	0.00	1.00	0.00
54.79	16.90	2.00	0.00	1.00	0.00	54.96	17.51	2.00	0.00	1.00	0.00
55.12	17.49	2.00	0.00	1.00	0.00	55.28	18.36	2.00	0.00	1.00	0.00
55.45	19.04	2.00	0.00	1.00	0.00	55.61	19.40	2.00	0.00	1.00	0.00
55.78	19.38	2.00	0.00	1.00	0.00	55.94	20.25	2.00	0.00	1.00	0.00
56.11	19.65	2.00	0.00	1.00	0.00	56.27	19.56	2.00	0.00	1.00	0.00
56.43	19.22	2.00	0.00	1.00	0.00	56.60	19.96	2.00	0.00	1.00	0.00
56.76	20.32	2.00	0.00	1.00	0.00	56.93	19.15	2.00	0.00	1.00	0.00
57.09	17.56	2.00	0.00	1.00	0.00	57.25	16.72	2.00	0.00	1.00	0.00
57.42	15.96	2.00	0.00	1.00	0.00	57.58	15.58	2.00	0.00	1.00	0.00
57.75	16.12	2.00	0.00	1.00	0.00	57.91	15.74	2.00	0.00	1.00	0.00
58.07	15.29	2.00	0.00	1.00	0.00	58.24	14.84	2.00	0.00	1.00	0.00
58.40	15.06	2.00	0.00	1.00	0.00	58.57	14.86	2.00	0.00	1.00	0.00
58.73	14.73	2.00	0.00	1.00	0.00	58.89	14.47	2.00	0.00	1.00	0.00
59.06	14.70	2.00	0.00	1.00	0.00	59.22	14.32	2.00	0.00	1.00	0.00
59.39	14.55	2.00	0.00	1.00	0.00	59.55	14.97	2.00	0.00	1.00	0.00
59.71	14.35	2.00	0.00	1.00	0.00	59.88	14.15	2.00	0.00	1.00	0.00
60.04	13.89	2.00	0.00	1.00	0.00	60.21	17.22	2.00	0.00	1.00	0.00
60.37	24.79	2.00	0.00	1.00	0.00	60.53	24.12	2.00	0.00	1.00	0.00
60.70	21.31	2.00	0.00	1.00	0.00	60.86	34.20	2.00	0.00	1.00	0.00
61.03	42.46	2.00	0.00	1.00	0.00	61.19	33.90	2.00	0.00	1.00	0.00
61.35	34.62	2.00	0.00	1.00	0.00	61.52	28.16	2.00	0.00	1.00	0.00
61.68	24.55	2.00	0.00	1.00	0.00	61.85	21.76	2.00	0.00	1.00	0.00
62.01	18.10	2.00	0.00	1.00	0.00	62.17	16.20	2.00	0.00	1.00	0.00
62.34	15.75	2.00	0.00	1.00	0.00	62.50	25.88	2.00	0.00	1.00	0.00
62.67	39.13	2.00	0.00	1.00	0.00	62.83	33.36	2.00	0.00	1.00	0.00
63.00	27.69	2.00	0.00	1.00	0.00	63.16	22.06	2.00	0.00	1.00	0.00
63.32	31.45	2.00	0.00	1.00	0.00	63.49	38.18	2.00	0.00	1.00	0.00
63.65	28.24	2.00	0.00	1.00	0.00	63.82	21.77	2.00	0.00	1.00	0.00
63.98	21.75	2.00	0.00	1.00	0.00	64.14	19.76	2.00	0.00	1.00	0.00
64.31	21.33	2.00	0.00	1.00	0.00	64.47	27.93	2.00	0.00	1.00	0.00
64.64	28.66	2.00	0.00	1.00	0.00	64.80	40.13	2.00	0.00	1.00	0.00
64.96	34.17	2.00	0.00	1.00	0.00	65.13	41.46	2.00	0.00	1.00	0.00
65.29	42.71	2.00	0.00	1.00	0.00	65.46	48.51	2.00	0.00	1.00	0.00
65.62	64.17	2.00	0.00	1.00	0.00	65.78	55.59	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

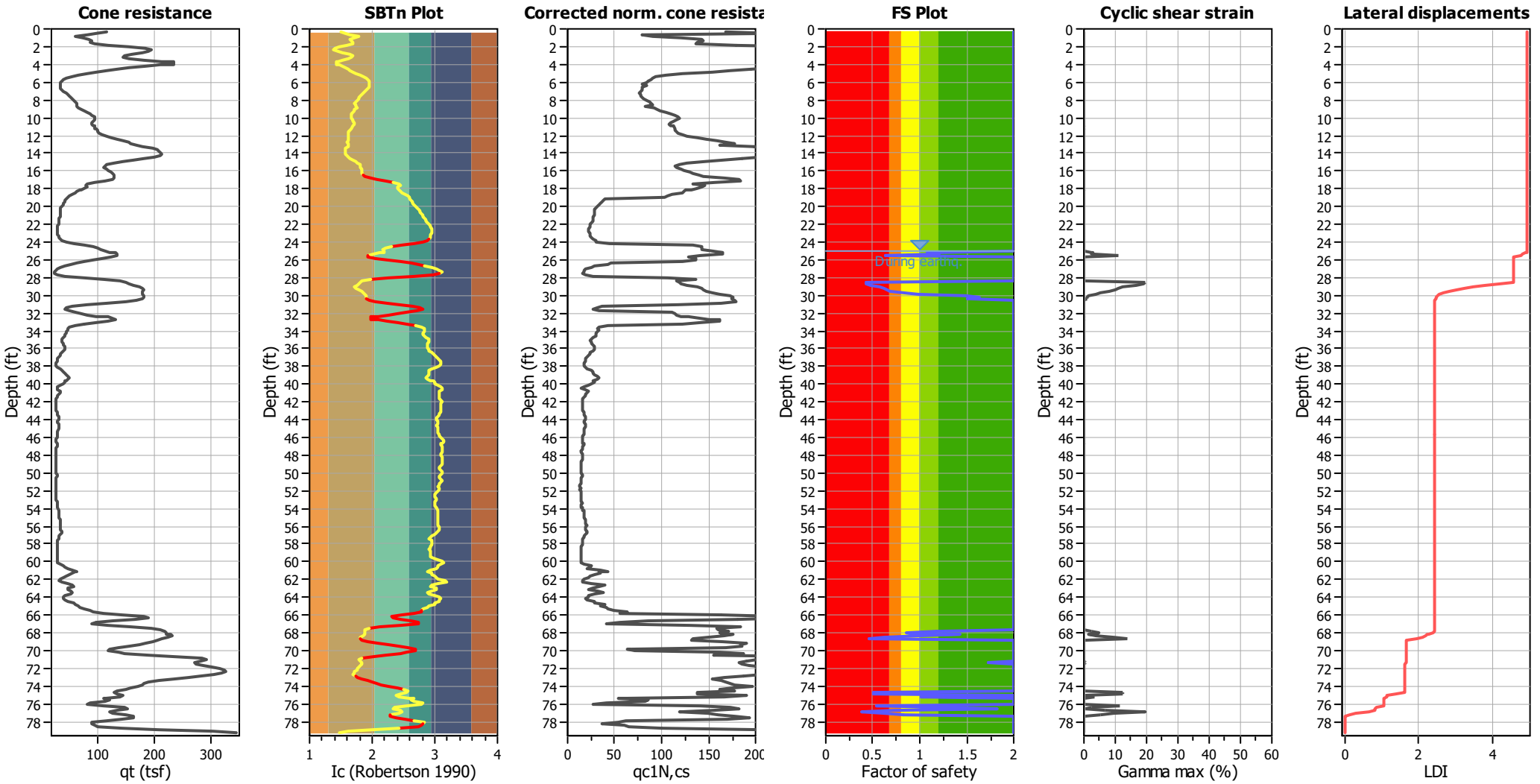
Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
65.95	164.10	2.00	0.00	1.00	0.00	66.11	223.79	2.00	0.00	1.00	0.00
66.28	239.37	2.00	0.00	1.00	0.00	66.44	180.20	2.00	0.00	1.00	0.00
66.60	85.14	2.00	0.00	1.00	0.00	66.77	55.60	2.00	0.00	1.00	0.00
66.93	41.34	2.00	0.00	1.00	0.00	67.10	129.44	2.00	0.00	1.00	0.00
67.26	184.54	2.00	0.00	1.00	0.00	67.42	159.47	2.00	0.00	1.00	0.00
67.59	159.84	2.00	0.00	1.00	0.00	67.75	171.65	1.18	0.55	1.00	0.01
67.92	161.53	0.86	1.14	1.00	0.02	68.08	166.19	0.98	0.83	1.00	0.02
68.24	176.95	1.42	0.31	1.00	0.01	68.41	166.00	0.98	0.84	1.00	0.02
68.57	148.49	0.61	2.10	1.00	0.04	68.74	133.89	0.46	2.36	1.00	0.05
68.90	131.97	2.00	0.00	1.00	0.00	69.07	164.78	2.00	0.00	1.00	0.00
69.23	190.45	2.00	0.00	1.00	0.00	69.39	183.42	2.00	0.00	1.00	0.00
69.56	185.80	2.00	0.00	1.00	0.00	69.72	167.77	2.00	0.00	1.00	0.00
69.89	64.27	2.00	0.00	1.00	0.00	70.05	71.41	2.00	0.00	1.00	0.00
70.21	161.75	2.00	0.00	1.00	0.00	70.38	187.58	2.00	0.00	1.00	0.00
70.54	155.04	2.00	0.00	1.00	0.00	70.71	246.48	2.00	0.00	1.00	0.00
70.87	219.09	2.00	0.00	1.00	0.00	71.03	200.82	2.00	0.00	1.00	0.00
71.20	190.57	2.00	0.00	1.00	0.00	71.36	181.97	1.74	0.12	1.00	0.00
71.53	185.88	2.00	0.00	1.00	0.00	71.69	193.50	2.00	0.00	1.00	0.00
71.85	211.42	2.00	0.00	1.00	0.00	72.02	217.60	2.00	0.00	1.00	0.00
72.18	229.64	2.00	0.00	1.00	0.00	72.35	230.01	2.00	0.00	1.00	0.00
72.51	228.18	2.00	0.00	1.00	0.00	72.67	207.03	2.00	0.00	1.00	0.00
72.84	187.76	2.00	0.00	1.00	0.00	73.00	166.25	2.00	0.00	1.00	0.00
73.17	154.41	2.00	0.00	1.00	0.00	73.33	163.13	2.00	0.00	1.00	0.00
73.49	168.33	2.00	0.00	1.00	0.00	73.66	172.72	2.00	0.00	1.00	0.00
73.82	177.53	2.00	0.00	1.00	0.00	73.99	196.10	2.00	0.00	1.00	0.00
74.15	174.89	2.00	0.00	1.00	0.00	74.31	161.74	2.00	0.00	1.00	0.00
74.48	177.15	2.00	0.00	1.00	0.00	74.64	138.59	0.51	2.27	1.00	0.04
74.81	138.21	0.50	2.28	1.00	0.05	74.97	191.27	2.00	0.00	1.00	0.00
75.13	167.09	1.02	0.78	1.00	0.01	75.30	56.85	2.00	0.00	1.00	0.00
75.46	54.58	2.00	0.00	1.00	0.00	75.63	84.94	2.00	0.00	1.00	0.00
75.79	82.57	2.00	0.00	1.00	0.00	75.96	41.04	2.00	0.00	1.00	0.00
76.12	26.81	2.00	0.00	1.00	0.00	76.28	141.65	0.54	2.21	1.00	0.04
76.45	172.54	1.22	0.50	1.00	0.01	76.61	183.08	1.82	0.08	1.00	0.00
76.78	155.79	0.74	1.61	1.00	0.03	76.94	119.42	0.38	2.67	1.00	0.05
77.10	148.88	0.63	2.09	1.00	0.04	77.27	160.29	0.83	1.21	1.00	0.02
77.43	178.20	2.00	0.00	1.00	0.00	77.60	193.20	2.00	0.00	1.00	0.00
77.76	169.30	2.00	0.00	1.00	0.00	77.92	61.24	2.00	0.00	1.00	0.00
78.09	54.07	2.00	0.00	1.00	0.00	78.25	36.58	2.00	0.00	1.00	0.00
78.42	59.99	2.00	0.00	1.00	0.00	78.58	65.68	2.00	0.00	1.00	0.00
78.74	100.36	2.00	0.00	1.00	0.00	78.91	207.33	2.00	0.00	1.00	0.00
79.07	209.59	2.00	0.00	1.00	0.00	79.24	255.22	2.00	0.00	1.00	0.00

Total estimated settlement: 0.93

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement

Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

:: Lateral displacement index calculation ::

Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
25.10	165.11	0.06	1.20	0.05	0.02	0.04
25.26	161.67	0.07	1.07	0.09	0.03	0.06
25.43	165.67	0.06	1.21	0.04	0.02	0.05
25.59	141.08	0.12	0.64	0.36	0.11	0.21
25.76	128.44	0.16	2.00	0.51	0.00	0.00
25.92	135.94	0.13	2.00	0.42	0.00	0.00
26.08	136.47	0.13	2.00	0.42	0.00	0.00
26.25	123.00	0.18	2.00	0.57	0.00	0.00
26.41	46.68	0.00	2.00	0.00	0.00	0.00
26.58	42.78	0.00	2.00	0.00	0.00	0.00
26.74	29.34	0.00	2.00	0.00	0.00	0.00
26.90	24.85	0.00	2.00	0.00	0.00	0.00
27.07	19.29	0.00	2.00	0.00	0.00	0.00
27.23	17.78	0.00	2.00	0.00	0.00	0.00
27.40	17.74	0.00	2.00	0.00	0.00	0.00
27.56	15.16	0.00	2.00	0.00	0.00	0.00
27.72	19.47	0.00	2.00	0.00	0.00	0.00
27.89	26.34	0.00	2.00	0.00	0.00	0.00
28.05	106.07	0.27	2.00	0.74	0.00	0.00
28.22	136.58	0.13	2.00	0.42	0.00	0.00
28.38	116.48	0.21	2.00	0.64	0.00	0.00
28.54	119.62	0.20	0.43	0.61	0.20	0.38
28.71	121.10	0.19	0.43	0.59	0.19	0.39
28.87	126.58	0.17	0.47	0.53	0.17	0.32
29.04	137.98	0.13	0.57	0.40	0.13	0.26
29.20	142.88	0.11	0.63	0.34	0.11	0.21
29.36	144.30	0.11	0.64	0.32	0.10	0.19
29.53	147.08	0.10	0.68	0.29	0.08	0.17
29.69	154.65	0.08	0.82	0.19	0.05	0.10
29.86	161.41	0.07	0.99	0.10	0.04	0.07
30.02	173.69	0.05	1.49	-0.07	0.01	0.02
30.19	176.26	0.05	1.63	-0.11	0.01	0.02
30.35	174.34	0.05	1.52	-0.08	0.01	0.02
30.51	177.95	0.04	2.00	-0.13	0.00	0.00
30.68	179.25	0.04	2.00	-0.15	0.00	0.00
30.84	163.64	0.06	2.00	0.07	0.00	0.00
31.01	117.90	0.20	2.00	0.63	0.00	0.00
31.17	36.82	0.00	2.00	0.00	0.00	0.00
31.33	31.05	0.00	2.00	0.00	0.00	0.00
31.50	27.16	0.00	2.00	0.00	0.00	0.00
31.66	33.57	0.00	2.00	0.00	0.00	0.00
31.83	110.69	0.24	2.00	0.70	0.00	0.00
31.99	114.95	0.22	2.00	0.66	0.00	0.00
32.15	115.22	0.22	2.00	0.65	0.00	0.00
32.32	120.03	0.19	2.00	0.60	0.00	0.00
32.48	129.28	0.16	2.00	0.50	0.00	0.00
32.65	150.84	0.09	2.00	0.24	0.00	0.00
32.81	162.33	0.07	2.00	0.08	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
32.97	161.97	0.07	2.00	0.09	0.00	0.00
33.14	141.29	0.12	2.00	0.36	0.00	0.00
33.30	121.93	0.19	2.00	0.58	0.00	0.00
33.47	42.20	0.00	2.00	0.00	0.00	0.00
33.63	33.58	0.00	2.00	0.00	0.00	0.00
33.79	32.48	0.00	2.00	0.00	0.00	0.00
33.96	32.96	0.00	2.00	0.00	0.00	0.00
34.12	32.22	0.00	2.00	0.00	0.00	0.00
34.29	30.72	0.00	2.00	0.00	0.00	0.00
34.45	29.46	0.00	2.00	0.00	0.00	0.00
34.61	29.43	0.00	2.00	0.00	0.00	0.00
34.78	26.69	0.00	2.00	0.00	0.00	0.00
34.94	25.69	0.00	2.00	0.00	0.00	0.00
35.11	24.24	0.00	2.00	0.00	0.00	0.00
35.27	25.32	0.00	2.00	0.00	0.00	0.00
35.43	25.72	0.00	2.00	0.00	0.00	0.00
35.60	27.02	0.00	2.00	0.00	0.00	0.00
35.76	27.79	0.00	2.00	0.00	0.00	0.00
35.93	28.94	0.00	2.00	0.00	0.00	0.00
36.09	29.20	0.00	2.00	0.00	0.00	0.00
36.26	26.86	0.00	2.00	0.00	0.00	0.00
36.42	24.55	0.00	2.00	0.00	0.00	0.00
36.58	23.42	0.00	2.00	0.00	0.00	0.00
36.75	21.78	0.00	2.00	0.00	0.00	0.00
36.91	20.59	0.00	2.00	0.00	0.00	0.00
37.08	19.34	0.00	2.00	0.00	0.00	0.00
37.24	18.67	0.00	2.00	0.00	0.00	0.00
37.40	18.28	0.00	2.00	0.00	0.00	0.00
37.57	17.69	0.00	2.00	0.00	0.00	0.00
37.73	16.88	0.00	2.00	0.00	0.00	0.00
37.90	17.00	0.00	2.00	0.00	0.00	0.00
38.06	18.75	0.00	2.00	0.00	0.00	0.00
38.22	21.36	0.00	2.00	0.00	0.00	0.00
38.39	25.06	0.00	2.00	0.00	0.00	0.00
38.55	27.71	0.00	2.00	0.00	0.00	0.00
38.72	27.02	0.00	2.00	0.00	0.00	0.00
38.88	27.93	0.00	2.00	0.00	0.00	0.00
39.04	32.29	0.00	2.00	0.00	0.00	0.00
39.21	33.63	0.00	2.00	0.00	0.00	0.00
39.37	31.61	0.00	2.00	0.00	0.00	0.00
39.54	26.76	0.00	2.00	0.00	0.00	0.00
39.70	28.47	0.00	2.00	0.00	0.00	0.00
39.86	28.93	0.00	2.00	0.00	0.00	0.00
40.03	26.07	0.00	2.00	0.00	0.00	0.00
40.19	22.68	0.00	2.00	0.00	0.00	0.00
40.36	17.80	0.00	2.00	0.00	0.00	0.00
40.52	14.87	0.00	2.00	0.00	0.00	0.00
40.68	19.35	0.00	2.00	0.00	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
40.85	22.62	0.00	2.00	0.00	0.00	0.00
41.01	20.97	0.00	2.00	0.00	0.00	0.00
41.18	19.68	0.00	2.00	0.00	0.00	0.00
41.34	18.34	0.00	2.00	0.00	0.00	0.00
41.50	17.76	0.00	2.00	0.00	0.00	0.00
41.67	16.36	0.00	2.00	0.00	0.00	0.00
41.83	15.45	0.00	2.00	0.00	0.00	0.00
42.00	15.91	0.00	2.00	0.00	0.00	0.00
42.16	15.68	0.00	2.00	0.00	0.00	0.00
42.32	16.00	0.00	2.00	0.00	0.00	0.00
42.49	16.59	0.00	2.00	0.00	0.00	0.00
42.65	16.30	0.00	2.00	0.00	0.00	0.00
42.82	16.07	0.00	2.00	0.00	0.00	0.00
42.98	16.53	0.00	2.00	0.00	0.00	0.00
43.15	17.12	0.00	2.00	0.00	0.00	0.00
43.31	17.57	0.00	2.00	0.00	0.00	0.00
43.47	18.09	0.00	2.00	0.00	0.00	0.00
43.64	18.95	0.00	2.00	0.00	0.00	0.00
43.80	19.68	0.00	2.00	0.00	0.00	0.00
43.97	18.36	0.00	2.00	0.00	0.00	0.00
44.13	17.25	0.00	2.00	0.00	0.00	0.00
44.29	17.57	0.00	2.00	0.00	0.00	0.00
44.46	19.10	0.00	2.00	0.00	0.00	0.00
44.62	18.67	0.00	2.00	0.00	0.00	0.00
44.79	18.37	0.00	2.00	0.00	0.00	0.00
44.95	18.08	0.00	2.00	0.00	0.00	0.00
45.28	17.70	0.00	2.00	0.00	0.00	0.00
45.44	17.41	0.00	2.00	0.00	0.00	0.00
45.61	16.78	0.00	2.00	0.00	0.00	0.00
45.77	16.16	0.00	2.00	0.00	0.00	0.00
45.93	16.47	0.00	2.00	0.00	0.00	0.00
46.10	15.72	0.00	2.00	0.00	0.00	0.00
46.26	15.57	0.00	2.00	0.00	0.00	0.00
46.43	15.81	0.00	2.00	0.00	0.00	0.00
46.59	16.39	0.00	2.00	0.00	0.00	0.00
46.75	17.16	0.00	2.00	0.00	0.00	0.00
46.92	16.81	0.00	2.00	0.00	0.00	0.00
47.08	16.26	0.00	2.00	0.00	0.00	0.00
47.25	15.78	0.00	2.00	0.00	0.00	0.00
47.41	15.43	0.00	2.00	0.00	0.00	0.00
47.57	15.02	0.00	2.00	0.00	0.00	0.00
47.74	14.93	0.00	2.00	0.00	0.00	0.00
47.90	16.22	0.00	2.00	0.00	0.00	0.00
48.07	15.81	0.00	2.00	0.00	0.00	0.00
48.23	15.27	0.00	2.00	0.00	0.00	0.00
48.39	15.77	0.00	2.00	0.00	0.00	0.00
48.56	15.55	0.00	2.00	0.00	0.00	0.00
48.72	14.89	0.00	2.00	0.00	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
48.89	14.29	0.00	2.00	0.00	0.00	0.00
49.05	14.27	0.00	2.00	0.00	0.00	0.00
49.22	14.57	0.00	2.00	0.00	0.00	0.00
49.38	14.81	0.00	2.00	0.00	0.00	0.00
49.54	14.48	0.00	2.00	0.00	0.00	0.00
49.71	14.14	0.00	2.00	0.00	0.00	0.00
49.87	13.80	0.00	2.00	0.00	0.00	0.00
50.04	14.42	0.00	2.00	0.00	0.00	0.00
50.20	16.02	0.00	2.00	0.00	0.00	0.00
50.36	15.67	0.00	2.00	0.00	0.00	0.00
50.53	14.88	0.00	2.00	0.00	0.00	0.00
50.69	13.91	0.00	2.00	0.00	0.00	0.00
50.86	13.51	0.00	2.00	0.00	0.00	0.00
51.02	14.13	0.00	2.00	0.00	0.00	0.00
51.18	14.50	0.00	2.00	0.00	0.00	0.00
51.35	13.40	0.00	2.00	0.00	0.00	0.00
51.51	13.45	0.00	2.00	0.00	0.00	0.00
51.68	13.68	0.00	2.00	0.00	0.00	0.00
51.84	13.48	0.00	2.00	0.00	0.00	0.00
52.00	13.84	0.00	2.00	0.00	0.00	0.00
52.17	14.46	0.00	2.00	0.00	0.00	0.00
52.33	13.81	0.00	2.00	0.00	0.00	0.00
52.50	13.92	0.00	2.00	0.00	0.00	0.00
52.66	13.72	0.00	2.00	0.00	0.00	0.00
52.82	13.64	0.00	2.00	0.00	0.00	0.00
52.99	14.19	0.00	2.00	0.00	0.00	0.00
53.15	15.00	0.00	2.00	0.00	0.00	0.00
53.32	15.17	0.00	2.00	0.00	0.00	0.00
53.48	14.71	0.00	2.00	0.00	0.00	0.00
53.64	14.44	0.00	2.00	0.00	0.00	0.00
53.81	14.87	0.00	2.00	0.00	0.00	0.00
53.97	15.67	0.00	2.00	0.00	0.00	0.00
54.14	16.16	0.00	2.00	0.00	0.00	0.00
54.30	17.15	0.00	2.00	0.00	0.00	0.00
54.46	17.01	0.00	2.00	0.00	0.00	0.00
54.63	16.67	0.00	2.00	0.00	0.00	0.00
54.79	16.90	0.00	2.00	0.00	0.00	0.00
54.96	17.51	0.00	2.00	0.00	0.00	0.00
55.12	17.49	0.00	2.00	0.00	0.00	0.00
55.28	18.36	0.00	2.00	0.00	0.00	0.00
55.45	19.04	0.00	2.00	0.00	0.00	0.00
55.61	19.40	0.00	2.00	0.00	0.00	0.00
55.78	19.38	0.00	2.00	0.00	0.00	0.00
55.94	20.25	0.00	2.00	0.00	0.00	0.00
56.11	19.65	0.00	2.00	0.00	0.00	0.00
56.27	19.56	0.00	2.00	0.00	0.00	0.00
56.43	19.22	0.00	2.00	0.00	0.00	0.00
56.60	19.96	0.00	2.00	0.00	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
56.76	20.32	0.00	2.00	0.00	0.00	0.00
56.93	19.15	0.00	2.00	0.00	0.00	0.00
57.09	17.56	0.00	2.00	0.00	0.00	0.00
57.25	16.72	0.00	2.00	0.00	0.00	0.00
57.42	15.96	0.00	2.00	0.00	0.00	0.00
57.58	15.58	0.00	2.00	0.00	0.00	0.00
57.75	16.12	0.00	2.00	0.00	0.00	0.00
57.91	15.74	0.00	2.00	0.00	0.00	0.00
58.07	15.29	0.00	2.00	0.00	0.00	0.00
58.24	14.84	0.00	2.00	0.00	0.00	0.00
58.40	15.06	0.00	2.00	0.00	0.00	0.00
58.57	14.86	0.00	2.00	0.00	0.00	0.00
58.73	14.73	0.00	2.00	0.00	0.00	0.00
58.89	14.47	0.00	2.00	0.00	0.00	0.00
59.06	14.70	0.00	2.00	0.00	0.00	0.00
59.22	14.32	0.00	2.00	0.00	0.00	0.00
59.39	14.55	0.00	2.00	0.00	0.00	0.00
59.55	14.97	0.00	2.00	0.00	0.00	0.00
59.71	14.35	0.00	2.00	0.00	0.00	0.00
59.88	14.15	0.00	2.00	0.00	0.00	0.00
60.04	13.89	0.00	2.00	0.00	0.00	0.00
60.21	17.22	0.00	2.00	0.00	0.00	0.00
60.37	24.79	0.00	2.00	0.00	0.00	0.00
60.53	24.12	0.00	2.00	0.00	0.00	0.00
60.70	21.31	0.00	2.00	0.00	0.00	0.00
60.86	34.20	0.00	2.00	0.00	0.00	0.00
61.03	42.46	0.00	2.00	0.00	0.00	0.00
61.19	33.90	0.00	2.00	0.00	0.00	0.00
61.35	34.62	0.00	2.00	0.00	0.00	0.00
61.52	28.16	0.00	2.00	0.00	0.00	0.00
61.68	24.55	0.00	2.00	0.00	0.00	0.00
61.85	21.76	0.00	2.00	0.00	0.00	0.00
62.01	18.10	0.00	2.00	0.00	0.00	0.00
62.17	16.20	0.00	2.00	0.00	0.00	0.00
62.34	15.75	0.00	2.00	0.00	0.00	0.00
62.50	25.88	0.00	2.00	0.00	0.00	0.00
62.67	39.13	0.00	2.00	0.00	0.00	0.00
62.83	33.36	0.00	2.00	0.00	0.00	0.00
63.00	27.69	0.00	2.00	0.00	0.00	0.00
63.16	22.06	0.00	2.00	0.00	0.00	0.00
63.32	31.45	0.00	2.00	0.00	0.00	0.00
63.49	38.18	0.00	2.00	0.00	0.00	0.00
63.65	28.24	0.00	2.00	0.00	0.00	0.00
63.82	21.77	0.00	2.00	0.00	0.00	0.00
63.98	21.75	0.00	2.00	0.00	0.00	0.00
64.14	19.76	0.00	2.00	0.00	0.00	0.00
64.31	21.33	0.00	2.00	0.00	0.00	0.00
64.47	27.93	0.00	2.00	0.00	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
64.64	28.66	0.00	2.00	0.00	0.00	0.00
64.80	40.13	0.00	2.00	0.00	0.00	0.00
64.96	34.17	0.00	2.00	0.00	0.00	0.00
65.13	41.46	0.00	2.00	0.00	0.00	0.00
65.29	42.71	0.00	2.00	0.00	0.00	0.00
65.46	48.51	0.00	2.00	0.00	0.00	0.00
65.62	64.17	0.00	2.00	0.00	0.00	0.00
65.78	55.59	0.00	2.00	0.00	0.00	0.00
65.95	164.10	0.06	2.00	0.06	0.00	0.00
66.11	223.79	0.01	2.00	-0.81	0.00	0.00
66.28	239.37	0.00	2.00	-1.05	0.00	0.00
66.44	180.20	0.04	2.00	-0.16	0.00	0.00
66.60	85.14	0.00	2.00	0.00	0.00	0.00
66.77	55.60	0.00	2.00	0.00	0.00	0.00
66.93	41.34	0.00	2.00	0.00	0.00	0.00
67.10	129.44	0.16	2.00	0.50	0.00	0.00
67.26	184.54	0.04	2.00	-0.23	0.00	0.00
67.42	159.47	0.07	2.00	0.12	0.00	0.00
67.59	159.84	0.07	2.00	0.12	0.00	0.00
67.75	171.65	0.05	1.18	-0.04	0.02	0.05
67.92	161.53	0.07	0.86	0.10	0.05	0.10
68.08	166.19	0.06	0.98	0.03	0.04	0.07
68.24	176.95	0.04	1.42	-0.12	0.01	0.03
68.41	166.00	0.06	0.98	0.03	0.04	0.07
68.57	148.49	0.10	0.61	0.27	0.10	0.19
68.74	133.89	0.14	0.46	0.45	0.14	0.28
68.90	131.97	0.15	2.00	0.47	0.00	0.00
69.07	164.78	0.06	2.00	0.05	0.00	0.00
69.23	190.45	0.03	2.00	-0.31	0.00	0.00
69.39	183.42	0.04	2.00	-0.21	0.00	0.00
69.56	185.80	0.03	2.00	-0.24	0.00	0.00
69.72	167.77	0.06	2.00	0.01	0.00	0.00
69.89	64.27	0.00	2.00	0.00	0.00	0.00
70.05	71.41	0.00	2.00	0.00	0.00	0.00
70.21	161.75	0.07	2.00	0.09	0.00	0.00
70.38	187.58	0.03	2.00	-0.27	0.00	0.00
70.54	155.04	0.08	2.00	0.18	0.00	0.00
70.71	246.48	0.00	2.00	-1.16	0.00	0.00
70.87	219.09	0.01	2.00	-0.74	0.00	0.00
71.03	200.82	0.02	2.00	-0.46	0.00	0.00
71.20	190.57	0.03	2.00	-0.31	0.00	0.00
71.36	181.97	0.04	1.74	-0.19	0.01	0.01
71.53	185.88	0.03	2.00	-0.25	0.00	0.00
71.69	193.50	0.03	2.00	-0.36	0.00	0.00
71.85	211.42	0.01	2.00	-0.62	0.00	0.00
72.02	217.60	0.01	2.00	-0.71	0.00	0.00
72.18	229.64	0.01	2.00	-0.90	0.00	0.00
72.35	230.01	0.01	2.00	-0.90	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
72.51	228.18	0.01	2.00	-0.88	0.00	0.00
72.67	207.03	0.02	2.00	-0.56	0.00	0.00
72.84	187.76	0.03	2.00	-0.27	0.00	0.00
73.00	166.25	0.06	2.00	0.03	0.00	0.00
73.17	154.41	0.08	2.00	0.19	0.00	0.00
73.33	163.13	0.07	2.00	0.07	0.00	0.00
73.49	168.33	0.06	2.00	0.00	0.00	0.00
73.66	172.72	0.05	2.00	-0.06	0.00	0.00
73.82	177.53	0.04	2.00	-0.13	0.00	0.00
73.99	196.10	0.02	2.00	-0.39	0.00	0.00
74.15	174.89	0.05	2.00	-0.09	0.00	0.00
74.31	161.74	0.07	2.00	0.09	0.00	0.00
74.48	177.15	0.04	2.00	-0.12	0.00	0.00
74.64	138.59	0.12	0.51	0.39	0.12	0.24
74.81	138.21	0.13	0.50	0.40	0.13	0.26
74.97	191.27	0.03	2.00	-0.32	0.00	0.00
75.13	167.09	0.06	1.02	0.02	0.03	0.07
75.30	56.85	0.00	2.00	0.00	0.00	0.00
75.46	54.58	0.00	2.00	0.00	0.00	0.00
75.63	84.94	0.00	2.00	0.00	0.00	0.00
75.79	82.57	0.00	2.00	0.00	0.00	0.00
75.96	41.04	0.00	2.00	0.00	0.00	0.00
76.12	26.81	0.00	2.00	0.00	0.00	0.00
76.28	141.65	0.12	0.54	0.35	0.12	0.22
76.45	172.54	0.05	1.22	-0.06	0.02	0.05
76.61	183.08	0.04	1.82	-0.20	0.00	0.01
76.78	155.79	0.08	0.74	0.17	0.06	0.13
76.94	119.42	0.20	0.38	0.61	0.20	0.38
77.10	148.88	0.10	0.63	0.26	0.10	0.18
77.27	160.29	0.07	0.83	0.11	0.05	0.10
77.43	178.20	0.04	2.00	-0.14	0.00	0.00
77.60	193.20	0.03	2.00	-0.35	0.00	0.00
77.76	169.30	0.06	2.00	-0.01	0.00	0.00
77.92	61.24	0.00	2.00	0.00	0.00	0.00
78.09	54.07	0.00	2.00	0.00	0.00	0.00
78.25	36.58	0.00	2.00	0.00	0.00	0.00
78.42	59.99	0.00	2.00	0.00	0.00	0.00
78.58	65.68	0.00	2.00	0.00	0.00	0.00
78.74	100.36	0.31	2.00	0.79	0.00	0.00
78.91	207.33	0.02	2.00	-0.56	0.00	0.00
79.07	209.59	0.02	2.00	-0.59	0.00	0.00
79.24	255.22	0.00	2.00	-1.30	0.00	0.00

:: Estimation of post-earthquake lateral Displacements :: (continued)

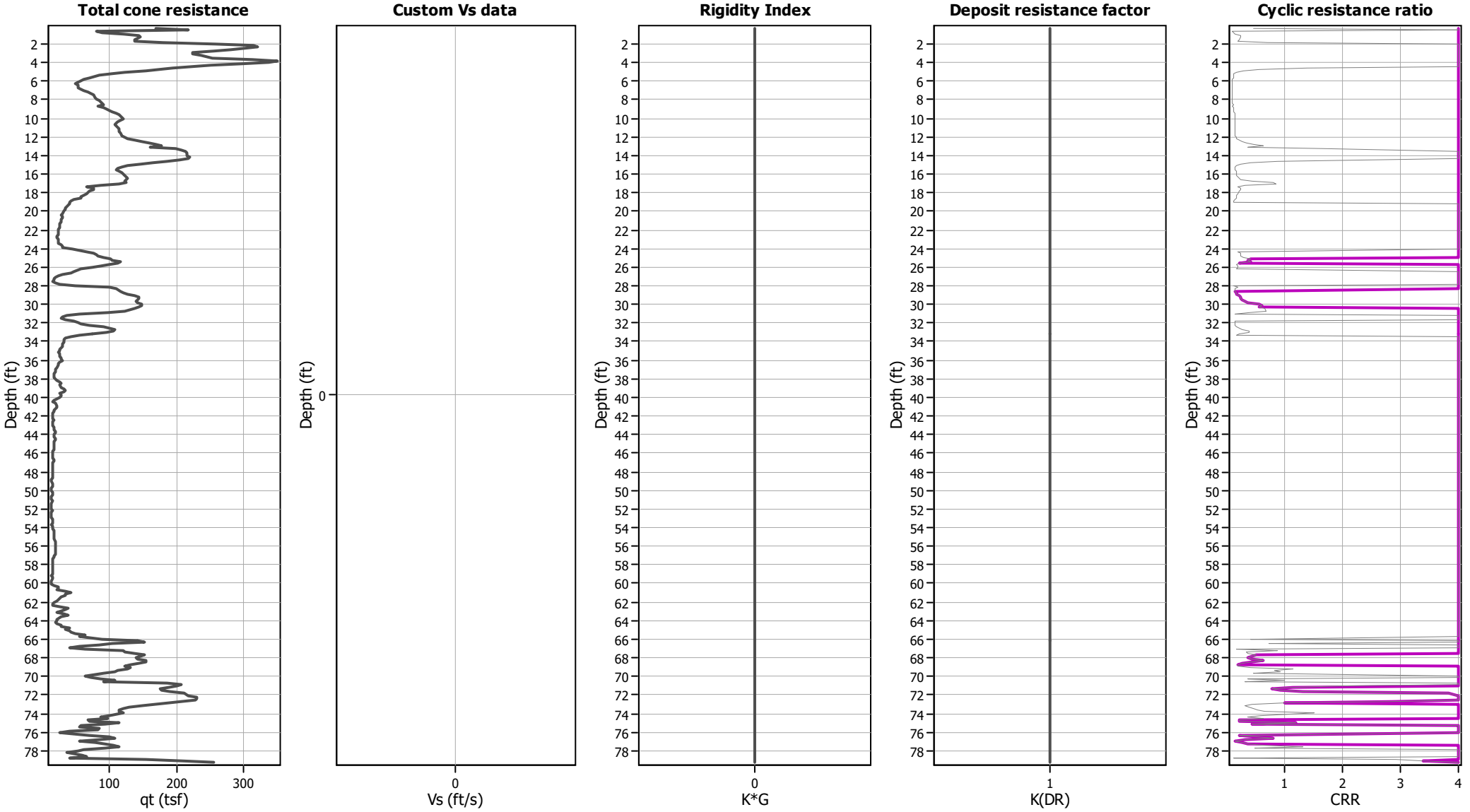
Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI

Total estimated displacement: 4.94

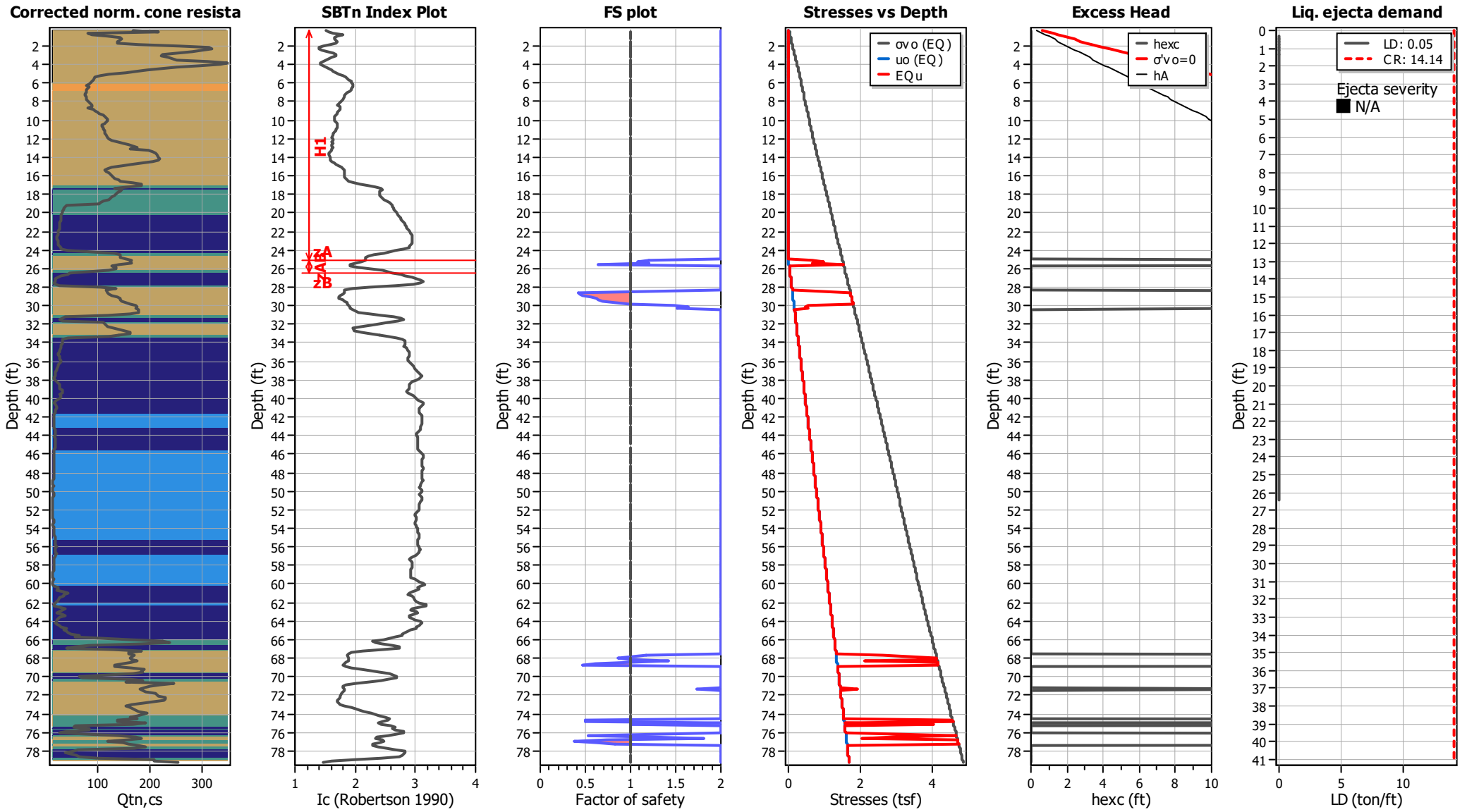
Abbreviations

Depth: Depth of test point
$q_{c1N,cs}$: Adjusted and corrected cone resistance due to fines
$Gamma_{lim}$: Limiting shear strain
FS: Calculated factor of safety against liquefaction
Fa:
$Gamma_{max}$: Maximum cyclic shear strain
Lat. disp.: Lateral displacement

Aging Calculation Estimation



Ejecta Severity Estimation



Appendix G
Phase I Environmental Site Assessment

PHASE I
ENVIRONMENTAL
SITE ASSESSMENT

2092 Oakley Road
Oakley
California

FOR

John D'Ambrosio Family Trust c/o Mercantile Systems, Inc.
9040 Brentwood Boulevard
Brentwood, CA 94513

basics
ENVIRONMENTAL

May 2, 2023
23-ENV6323

655 12TH STREET, #126 • OAKLAND, CA • 94607 • TEL / FAX 510-834-9099 / 9098

basics
ENVIRONMENTAL

May 2, 2023
23-ENV6323

John D'Ambrosio Family Trust c/o Mercantile Systems, Inc.
9040 Brentwood Boulevard
Brentwood, CA 94513

Attention: Mr. Dan Cosgrove

Subject: Phase I Environmental Site Assessment Report
2092 Oakley Road
Oakley, California 94561

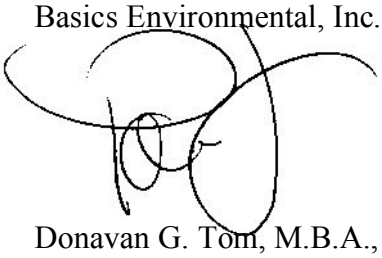
Dear Mr. Cosgrove:

We have performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Practice E 1527-21/AAI of 2092 Oakley Road in Oakley, California, the property. Any exceptions to, or deletions from, this practice are described in Section 1 of this report. This assessment **has** revealed obvious evidence of a recognized environmental condition in connection with the property that warrants further investigation and/or documentation at this time.

Should you have any questions regarding this report, please contact the undersigned.

Sincerely,

Basics Environmental, Inc.



Donavan G. Tom, M.B.A., E.P., R.E.P.A.
Principal Consultant

655 12TH STREET, #126 • OAKLAND, CA • 94607 • TEL / FAX 510-834-9099 / 9098

TABLE OF CONTENTS

PROFESSIONAL CERTIFICATION

1.0 INTRODUCTION 1-1

1.1 Purpose of Investigation 1-1
1.2 Scope of Work 1-1
1.3 Special Terms and Conditions 1-2
1.4 Limitations and Exceptions 1-2
1.5 User Responsibilities 1-2

2.0 SITE DESCRIPTION AND RECONNAISSANCE 2-1

2.1 Site Description and Uses 2-1
2.1.1 Interviews 2-1
2.1.2 Site Description and Uses 2-2
2.1.3 Environmental Land-Use Conditions 2-3
2.2 Adjacent Properties 2-7
2.2.1 Immediate Adjacent Properties 2-7
2.2.2 Wells 2-7
2.3 Non-ASTM E1527 Considerations 2-8
2.3.1 Asbestos Containing Construction Materials 2-8
2.3.2 Lead-Based Paint 2-8
2.3.3 Radon 2-10
2.3.4 Mold 2-11

3.0 PHYSICAL SITE SETTING 3-1

3.1 Geomorphic Description 3-1
3.2 Geologic Setting 3-1
3.3 Hydrogeologic Setting 3-2

4.0 HISTORICAL REVIEW 4-1

5.0 ENVIRONMENTAL DATABASE REVIEW 5-1

5.1 Agency Record Review 5-1
5.2 Local Agency File Review 5-5

6.0 CONCLUSIONS AND RECOMMENDATIONS 6-1

6.1 Conclusions 6-1
6.1.1 Data Gaps 6-1
6.1.2 Environmental Issues/*De Minimis* Conditions 6-1
6.1.3 Recognized Environmental Conditions (RECs) 6-5
6.1.4 Controlled Recognized Environmental Conditions (CRECs) 6-7

6.1.5 Historical Recognized Environmental Conditions (HRECs) 6-7
6.1.6 Recommendations 6-7

List of Drawings

Drawing 1: Site Location
Drawing 2: Aerial Photograph (2020)
Drawing 3: Site Plan

Assessor's Parcel Map
Photographs: 1–16

Appendices

APPENDIX A: Environmental Data Resources, Inc. Report
APPENDIX B: Historical USGS Topographic Maps
APPENDIX C: Historical Aerial Photographs
APPENDIX D: Historical Building Records
APPENDIX E: Phase I Environmental Questionnaire
APPENDIX F: Historical Oakley Vineyard Article (April 12, 2018)
APPENDIX G: Verizon Wireless Hazmat Documents
APPENDIX H: Romiti Site Pesticide Use
APPENDIX I: Statement of Qualifications

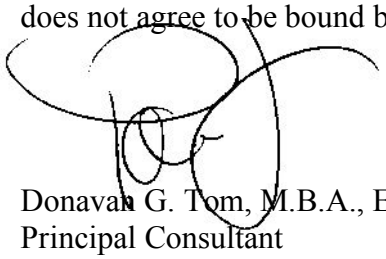
PROFESSIONAL CERTIFICATION

PHASE I ENVIRONMENTAL SITE ASSESSMENT
2092 Oakley Road
Oakley, California
For
John D'Ambrosio Family Trust c/o Mercantile Systems, Inc.
23-ENV6323
May 2, 2023

I declare that, to the best of my professional knowledge and belief, 1 meet the definition of "Environmental Professional" as defined by the Environmental Protection Agency's Final Rule (40 CFR 312.21). I have the specific qualifications based on education, training and experience to assess a property of the nature, history and setting. In performing Phase I Environmental Site Assessments, I develop and perform the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

The findings, interpretations of data, recommendations, specifications or professional opinions are presented within the limits prescribed by available information at the time the report was prepared, in accordance with generally accepted professional environmental practice and within the requirements by the Client. There is no other warranty, either expressed or implied. The data and findings of this report are based on the readily available data and information obtained from numerous public and private agencies regarding the subject site and its immediate vicinity. Additional search (at greater cost) may or may not disclose information which may significantly modify the findings of this report. We accept no liability on completeness or accuracy of the information presented and or provided to us, or any conclusions and decisions which may be made by the Client or others regarding the subject site.

This report was prepared solely for the benefit of Basic's Client. Basics consents to the release of this report to third parties involved in the transaction for which the report was prepared, including without limitation, lenders, title companies, public institutions, attorneys, and other consultants. However, any use of or reliance upon this report shall be solely at the risk of such party and without legal recourse against Basics, or its subcontractors, affiliates, or their respective employees, officers, or directors, regardless of whether the action in which recovery of damage is sought is based upon contract, tort (including the sole, concurrent or other negligence and strict liability of Basics), statute or otherwise. This report shall not be used or relied upon by a party that does not agree to be bound by the above statements.



Donavan G. Tom, M.B.A., E.P., R.E.P.A.
Principal Consultant

1.0 INTRODUCTION

1.1 Purpose of Investigation

Basics Environmental, Inc. (Basics) has performed this Phase I Environmental Site Assessment (ESA) for John D'Ambrosio Family Trust c/o Mercantile Systems, Inc. pursuant to our signed agreement on April 26, 2023. The "subject site" is at 2092 Oakley Road, Oakley, California (APN 037-110-031-4). The purpose of this ESA is to:

- Observe site conditions at the subject site in accordance with the protocols set forth by the *American Society for Testing and Materials (ASTM) Standard E1527-21, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* and *U.S. Environmental Protection Agency's All Appropriate Inquiry (AAI) Final Rule 40 CFR Part 312*, except where modified by the proposal;

- Identify to the extent feasible recognized environmental conditions in connection with the subject site. The ESA is intended to evaluate the potential for the presence of hazardous or toxic chemicals in the soil and/or groundwater resulting from past and present land use activities. To the extent possible, potential sources of hazardous or toxic chemicals from adjacent off-site operations will also be evaluated; and

- Render findings and professional opinions regarding the potential for adverse environmental impacts on or adjacent to the subject site.

1.2 Scope of Work

The scope of work performed for this ESA consisted of the following tasks:

- Field reconnaissance and personal interviews to evaluate environmental land-use conditions on the subject site and view adjacent properties;

- Aerial Photograph, City Directory and/or Fire Insurance/Topographic Map review (typically back to 1940 or first developed use of the property) to evaluate former environmental land-use conditions on the subject site and adjacent properties;

- Review of federal, state and county files and environmental database search report obtained from a commercial service providing up to date and current information;

- Evaluation of the physical setting (geomorphic, geologic and hydrogeologic) of the subject site property; and

- Preparation of this ESA report to present the findings and professional opinions regarding potential recognized environmental conditions at the subject site.

The work for this ESA was performed within the Client approved scope of work and budget as set forth in the proposal.

1.3 Special Terms and Conditions

The goal of this ESA is to identify recognized environmental conditions indicating the presence or likely presence of any hazardous substances or petroleum hydrocarbons in structures, ground, groundwater, or surface water of the property. Recognized environmental conditions are not intended to include *de minimis* conditions that do not present risks to public health or environment and that would not be subject to enforcement actions by government agencies.

1.4 Limitations and Exceptions

This ESA only includes a visual evaluation of the presence of asbestos, lead paint, radon, or mold, if applicable. In addition, this ESA does not include the results of any sampling, monitoring, or other types of field and/or laboratory testing or investigation.

1.5 User Responsibilities

The User of this ESA will be responsible for: (1) determining the relationship of the purchase price to the value of the property; (2) disclosure of specialized knowledge, experience or information which may affect the environmental condition of the subject site; and (3) disclosure of any environmental cleanup liens against the property within recorded land title records, if applicable. None of the above was provided to Basics by the Client for our review.

2.0 SITE DESCRIPTION AND RECONNAISSANCE

2.1 Site Description and Uses

2.1.1 Interviews

A Basics representative (Mr. Donavan Tom, EP, REPA) visited the subject site on April 27, 2023. Basics observed the various facilities and operations conducted at the site and also noted the land-use in the vicinity of the site. Daniel J. Cosgrove, CEO- Chief Executive Officer of Mercantile Systems, Inc. and site representative, provided access to the subject site. Mr. Cosgrove was also briefly interviewed prior to the site visit. A standard environmental questionnaire was provided to Mr. Cosgrove prior to the site visit to obtain disclosure of specialized knowledge, experience or information that may affect the environmental condition of the subject site.

Discussions with and information provided by Mr. Cosgrove indicated the subject site is approximately 9.9-acres improved with two single family residential dwellings, working vineyard and cell tower/marketing sign. The subject site dwellings are 30+ years old and the property has been under the current ownership (John D'Ambrosio Family Trust) for approximately five years (2018). Mr. Cosgrove stated to his knowledge Mr. Al Lucchesi has been maintaining the vineyard for a long time and no barns, pesticides/herbicides or farming equipment is stored onsite. Mr. Cosgrove indicated to his knowledge no hazardous materials or underground storage tanks have been utilized onsite. Mr. Cosgrove indicated that, for purposes of this assessment, he has no other specialized knowledge or experience pertaining to the site or the adjacent properties that is material to RECs in connection with the subject property.

Additional information obtained from interviews of onsite representatives is incorporated within the appropriate sections of this report.

2.1.2 Site Description and Uses

The subject site is located within the City of Oakley, along the north side of Oakley Road, approximately 300 feet west of the intersection of Empire Avenue and Main Street, and approximately one mile south of the San Joaquin River (See Drawings 1 and 2). The subject site consists of an approximately 435,034-square foot/9.987-acre "square" shaped parcel of land (APN 037-110-031-4) improved with an approximately 827-square foot one-story single family residential dwelling (2092 Oakley Road), an approximately 8271,751-square foot one-story single family residential dwelling (2100 Oakley Road), cell tower and vineyard (See Photos 1 – 2).

The one-story single-family residential dwelling (2092 Oakley Road) is constructed of wood framing on a concrete perimeter foundation with wood exterior walls. Interior building materials plaster/sheetrock interior walls and finished ceilings.

The one-story single-family residential dwelling (2100 Oakley Road) is constructed of wood framing on a concrete perimeter foundation with concrete stucco and brick facade exterior walls. Interior building materials sheetrock interior walls and finished ceilings.

Utilities including water, electric, and natural gas service are publicly available. Sewage was reported to be maintained by associated onsite septic tanks (however this could not be confirmed). Underground services for natural gas, water, and sanitary sewers transverse the street along the south side of the subject site. Located along Oakley Road is a telephone mounted electrical transformer owned and operated by PG&E. Such units are notable because they may be a polychlorinated biphenyl (PCB) source. PCB units may subject the owner/operator to various requirements. The release of PCB fluids or their combustion products (in the event of a fire) is a potential environmental liability and may require remediation. Observations of the area surrounding the transformer did not reveal any obvious signs of PCBs, hazardous material stains and/or spills. In addition, the transformer appeared to fairly new with no labels identifying PCBs. Due to the age of the features and lack of PCB labels the probability of PCBs is low.

The general area surrounding the property is developed commercial and zoned C (General Commercial). A site plan illustrating the site and adjacent properties is shown in Drawing 3.

The two single-family residential dwellings (2092 & 2100 Oakley Road) are currently occupied by private residences (Alejandro 925-724-3848 and Vivian 925-207-8424 respectively). The cell tower is maintained by Verizon Wireless (2092 Oakley Road). The vineyard is maintained by Alan Lucchesi (Brownstone Growers, LLC).

2.1.3 Environmental Land-Use Conditions

The subject site was evaluated for the use and storage of hazardous substances and petroleum products; use of aboveground and underground storage tanks, storage and disposal of hazardous wastes; evidence of releases from hazardous materials, and identification of conduits to the subsurface.

<u>One-Story Single-Family Residential Dwelling with Associated Detached Garage/Carport and Yard (2092 Oakley Road) (circa 1943)</u> - The one-story single-family residential dwelling is located on the northeast portion of the subject site (See Photos 9 - 10). The one-story residential dwelling consists of one bedroom, one bath, kitchen, dining area and living room. The exterior includes a small sitting porch, outdoor patio, and associated landscaping. The associated yard of the residential dwelling is enclosed by a wooden fence. The main entrance is located along the east side of the building with an additional personnel door along the west side. Due to private occupancy, observations were limited to the exterior areas only. Discussions with Mr. Cosgrove indicated the building has always been utilized as a residential dwelling and no underground heating oil storage tanks were associated with the building. Visual observations of the exterior of the building did not reveal any obvious evidence of hazardous materials, stains or spills.

Associated One-Story Garage & Carport – The free standing one-story 1-car garage and 3-car carport is located southwest of the residential dwelling and are constructed of wood on a concrete slab (See Photos 11 - 12). Due to private occupancy, observations were limited to the exterior areas only. Discussions with Mr. Cosgrove indicated to his knowledge no hazardous materials, underground storage tanks, drains or sumps are associated with the garage building. Visual observations of the exterior of the building did not reveal any obvious evidence of hazardous materials, stains or spills.

Associated Yard Areas – An associated gravel paved access way is located on the east perimeter of the subject site providing access to the one-story residential dwelling from Oakley Road to the south. An additional gravel paved driveway is located on the east perimeter of the subject site providing access to the one-story residential dwelling from Main Street to the east. A concrete paved patio is located within the rear yard of the residential dwelling. The associated landscaped areas are located within the yard areas of the residential dwelling.

Visual observations of the rest of the associated yard areas did not reveal any obvious signs of hazardous materials, stains or spills. No obvious evidence of underground storage tanks, distressed vegetation, or surface impoundments were observed throughout the site during the inspection.

<u>One-Story Single-Family Residential Dwelling with Associated Attached Garage and Yard (2100 Oakley Road) (circa 1967)</u> - The one-story single-family residential dwelling is located along the center south perimeter of the subject site (See Photos 13 - 14). The one-story residential dwelling consists of three bedrooms, two bath, kitchen, dining area and living room. The exterior includes a front covered porch, outdoor patio, and associated landscaping. The associated rear yard of the residential dwelling is enclosed by a wooden fence. The main entrance is located along the south side of the building with an additional personnel door along the north side. Due to private occupancy, observations were limited to the exterior areas only. Discussions with Mr. Cosgrove indicated the building has always been utilized as a residential dwelling and no underground heating oil storage tanks were associated with the building. Visual observations of the exterior of the building did not reveal any obvious evidence of hazardous materials, stains or spills.

Associated Attached Garage – The attached one-story 2-car garage is located on the southwest portion of the residential dwelling and is constructed of wood framing on a concrete slab (See Photo 13). Due to private occupancy, observations were limited to the exterior areas only. Discussions with Mr. Cosgrove indicated to his knowledge no hazardous materials, underground storage tanks, drains or sumps are associated with the garage building. Visual observations of the exterior of the building did not reveal any obvious evidence of hazardous materials, stains or spills.

Associated Yard Areas – An associated gravel paved access way is located on the southeast perimeter of the subject site providing access to the one-story residential dwelling from Oakley Road to the south. An additional gravel paved driveway is located on the south perimeter of the subject site providing access to the one-story residential dwelling from Oakley Road to the south. A concrete paved patio is located within the rear yard of the residential dwelling. The associated landscaped areas are located within the yard areas of the residential dwelling.

Visual observations of the rest of the associated yard areas did not reveal any obvious signs of hazardous materials, stains or spills. No obvious evidence of underground storage tanks, distressed vegetation, or surface impoundments were observed throughout the site during the inspection.

Cell Tower Facility (2092 Oakley Road) (circa 2015) - The cell tower facility is located on the northeast corner of the subject site (See Photos 7 - 8). The cell tower facility consists of an approximately 67 foot tall wireless communications facility (cellular tower) designed as a faux water tank adorned with a City logo with nine (up to 18) hidden antennas. The structure and ancillary equipment is within a 25 foot by 45 foot screened area. The screened area consists of an eight foot high split-face CMU (concrete masonry unit) wall with capstones and pilasters that screen all of the equipment from public view. It also includes the footprint for the wireless structure. A six foot wide chain link access gate is along the south elevation to provide access the equipment and wireless structures. Due to private occupancy, observations were limited to the exterior. Discussions with Mr. Cosgrove indicated the building has a backup generator and no underground fuel storage tanks are associated with the tower. Visual observations of the cell tower facility did not reveal any obvious evidence of stains or spills.

Associated Vineyard - The associated vineyard occupies the majority of the subject site. The associated vineyard consists of Zinfandel, Morvedra and Carrignan variety of grapes, and is accessible from Oakley Road to the South and Main Street to the east via gravel paved access ways. Located within the vineyards are rows of grape vines. Due to the large area of the subject site, site observations were limited to walking the perimeter boundaries of the associated vineyard. Visual observations of the vineyard did not reveal any obvious signs of hazardous materials, stains or spills.

Discussions with Mr. Cosgrove indicated to his knowledge no pesticides were stored, mixed, or disposed of onsite. However, Mr. Al Lucchesi has been maintaining the vineyard for a long time may have permits to apply pesticides. According to the City of Oakley website, Alan Lucchesi is part of a long-time Oakley family that has planted and cared for grape vines throughout the community for over 100 years. Most recently, Mr. Lucchesi has planted/transplanted dozens of acres of vines at the northeast corner of Rose Ave. and Laurel Rd., the northwest corner of Laurel and Empire Ave., the southwest corner of Empire and Oakley Rd., on the vacant land near the "Legless Lizard Preserve," as well as in other areas. As has been mentioned by the City Council in the past, these plantings are welcomed, provide an attractive landscape, and help to preserve the agricultural heritage of Oakley. Mr. Lucchesi is permitted to utilize the premises exclusively for the transplanting, planting, cultivating and harvesting of grape vines. As part of the agreement, Mr. Lucchesi is not allowed to store, keep, or use hazardous substances on the premises. In addition, Mr. Cosgrove also indicated underground fuel tanks, equipment storage, repair, or maintenance were not located onsite.

Visual observations of the rest of the associated vineyard areas did not reveal any obvious signs of hazardous materials, stains or spills. No obvious evidence of underground storage tanks, distressed vegetation, or surface impoundments were observed throughout the site during the inspection.

2.2 Adjacent Properties

2.2.1 Immediate Adjacent Properties

Sites in the vicinity of the subject site were observed during the sites reconnaissance to evaluate conditions or businesses indicative of hazardous or potentially toxic materials use.

The following are the uses of the adjoining properties.

North - Eagle City Mobile Home Trailer Park (2333 Main Street and Associated Private Streets)
South - Oakley Road followed by Residential Dwellings along Garden Court, Canopy Lane and Residential Farm House and Associated Vineyard (4961 Empire Avenue)
East - Valvoline Instant Oil Change (2435 Main Street), 7-Eleven/Citgo Gas Station (2437 Main Street) and Main Street followed by Residential Dwellings
West - Eagle City Mobile Home Trailer Park (2333 Main Street and Associated Private Streets)

Visual observations of the Valvoline Instant Oil Change (2435 Main Street) and 7-Eleven/Citgo Gas Station (2437 Main Street) revealed obvious business activities indicative to the use, storage, and/or treatment of hazard materials. However, no obvious evidence was noted at the immediate adjacent properties that would represent a significant environmental concern to the subject site at this time.

2.2.2 Wells

No obvious evidence of wells, such as water supply wells and/or groundwater monitoring wells, were observed on the subject site. Mr. Cosgrove stated the vineyard is “dry farmed” meaning there is no water, the roots go deep into the sand to get water as needed.

2.3 Non-ASTM E1527 Considerations

2.3.1 Asbestos Containing Construction Materials

An asbestos survey was not conducted at the property as a part of this assessment. However, the subject site structures were confirmed to have been constructed before the ban on asbestos containing construction materials (ACCMs) in 1979, thus, ACCMs may have been utilized in their construction. No obvious evidence of friable or non-friable suspect asbestos containing materials was observed within easily accessible areas of the structures. Visual observations of the easily accessible areas of the structures appeared to be in fair condition with no obvious signs of significant health risk concerns.

Asbestos is a mineral fiber that occurs in rock and soil. Because of its fiber strength and heat resistance asbestos has been used in a variety of building construction materials for insulation and as a fire retardant. Original building materials not easily accessible including, but not limited to, flooring and masting materials, sheet rock muds and taping compounds, ceiling and roofing materials, and ducting and surfacing materials may contain ACCMs. To confirm if any asbestos materials are contained within the structures on the subject site, an asbestos survey should be performed by an AHERA trained asbestos professional. If the property buildings are slated for renovation or demolition, an asbestos inspection will be required, pursuant to the National Emission Standards for Hazardous Air Pollutant (NESHAPs.

2.3.2 Lead-Based Paint

A lead-based paint survey was not conducted at the property as a part of this assessment. However, the subject site structures were confirmed to have been constructed before the ban on lead-based paints in 1978, thus, lead-based paints may have been utilized in their construction. Visual observations of the easily accessible areas of the painted surfaces of the subject site structures appeared to be in fair condition with no obvious signs of chipping, cracking, and/or significant health risk concerns.

Lead-based paint is any paint, varnish, stain, or other applied coating that has 1 mg per square cm (or 5,000 µg/g by dry weight) or more of lead. In Section 1017 of the Housing and Urban Development Guidelines, Residential Lead-Based Paint Hazard Reduction Act of 1992, otherwise known as " Title X", states that a lead-based paint hazard is "any condition that causes exposure to lead that would result in adverse human health effects" resulting from lead-contaminated dust, bare, lead-contaminated soil, and/or lead-contaminated paint that is deteriorated or present on accessible, friction, or impact surfaces. Therefore, under Title X, intact lead-based paint on most walls and ceilings would not be considered a "hazard," although the paint should be maintained and its condition monitored to ensure that it does not deteriorate and become a hazard.

Common renovation activities like repairing, sanding, cutting, and demolition can create hazardous lead dust and chips by disturbing lead-based paint, which can be harmful to adults and children. If these materials are to be disturbed during renovation or demolition activities, proper lead based paint abatement will be required, pursuant to CAL/OSHA's Lead Construction Safety Orders, Title 8, Section 1532.1. One of the items (among several others) stated within these regulations is requirements to conduct personal air monitoring for airborne lead particulates of employees engaged in disturbance of lead-containing materials. The purpose of the air monitoring is to determine whether employee exposure to lead dust will exceed OSHA's established airborne lead Action Level (AL) and/or airborne Permissible Exposure Limit (PEL). Should personal air monitoring results reveal airborne lead exposure levels at or above CAL/OSHA's AL or PEL, additional requirements in the form of employee lead training, medical surveillance, record keeping, engineering controls, etc. are emphasized.

All potential waste with lead paint attached must be sampled and analyzed (characterized) for lead content prior to disposal as construction debris. If the total lead levels in the waste product are above 1,000 parts per million under TTLC (Total Threshold Limit Concentration) conditions, then the waste is classified as a hazardous lead-containing waste (RCRA waste). If the total lead levels are determined to be below 1,000 ppm under TTLC conditions, then the waste samples must be analyzed per STLC (Soluble Threshold Limit Concentration) conditions (California Waste

Extraction Test (WET)) to confirm whether they should be classified as hazardous or non-hazardous waste.

Property owners who renovate, repair, or prepare surfaces for painting in pre-1978 rental housing or space rented by child-care facilities must, before beginning work, provide tenants with a copy of EPA's lead hazard information pamphlet Renovate Right: Important Lead Hazard Information for Families, Child Care Providers, and Schools. Owners of these rental properties must document compliance with this requirement — EPA's sample pre-renovation disclosure form may be used for this purpose. Under the rule, child-occupied facilities are defined as residential, public or commercial buildings where children under age six are present on a regular basis. The requirements apply to renovation, repair or painting activities. The rule does not apply to minor maintenance or repair activities where less than six square feet of lead-based paint is disturbed in a room or where less than 20 square feet of lead-based paint is disturbed on the exterior. Window replacement is not minor maintenance or repair. After April 2010, property owners who perform these projects in pre-1978 rental housing or space rented by child-care facilities must be certified and follow the lead-safe work practices required by EPA's Renovation, Repair and Remodeling rule.

2.3.3 Radon

Radon testing was not conducted at the property as a part of this assessment. However, based on the Map of Radon Zones provided by the United States Environmental Protection Agency (EPA), there is a low potential that radon concentrations at, or above, 4 picocuries per liter (pCi/l) are present at the site. Concentrations at, or above, 4 pCi/l are considered to be concentrations of concern per Cal-EPA and EPA. Based on the map, radon has been detected in Contra Costa County at average levels less than 2 pCi/l. Additional information can also be obtained from the California Department of Public Health’s Radon Program which provides a list of radon test results from throughout the state which are sorted by zip code.

Radon is a naturally occurring radioactive gas that is odorless, invisible, and without taste. It is released during the natural decay of uranium, which is present in most rock, soil and water. Its occurrence in the state is influenced primarily by geology. Radon can be found throughout California because uranium exists in all rock and soil. Although certain areas of the state are more likely to contain higher radon levels than others, radon is a house-to-house issue. You may live in an area of low radon potential yet your house can have elevated radon but your neighbor's house has a low radon level. Radon, in its natural state cannot be detected with the human senses. To confirm if any radon is contained within the structure on the subject site, testing should be performed by an EPA-authorized state certified radon testing professional.

2.3.4 Mold

A mold survey was not conducted at the property as a part of this assessment. No obvious evidence of mold or water damaged materials were observed within easily accessible areas of the structures.

In general, mold is a subset of the fungi family. Fungi are common and found in most ecosystems. Fungi is needed to help recycle organic material to sustain plant and animal life. In order to reproduce, mold release tiny spores into the air, which eventually attach onto surfaces favorable for growth. A class of fungi, molds have been found to cause a variety of health problems in humans, including allergic, toxicological, and infectious responses. Molds are decomposers of organic materials, and thrive in humid environments, and produce spores to reproduce as plants produce seeds. When mold spores land on a damp spot indoors, they may begin growing and digesting whatever they are growing on in order to survive. When excessive moisture or water accumulates indoors, mold growth will often occur, particularly if the moisture problems remain undiscovered or not addressed.

Currently, there are no established “sound, science-based Permissible Exposure Limits (PELs) for indoor molds at this time”. As mold becomes a more prevalent issue, building owners will need to stay informed on the subject. There are dozens of Internet web sites geared to the topic, and increased litigation in this area is also fueling increased interest. With any new trend there often is misinformation, incorrect conclusions, and conflicting information. Those involved

in the building industry should consider the source and weight of information carefully before drawing conclusions and making decisions.

To confirm if any mold is present within the structure on the subject site, laboratory test and sampling can be performed by a qualified industrial hygienist for various species of fungi such as Aspergillus, Cladosporium, Stachybotris and other mycotoxyns, and bacteria families such as Legionella, etc. However, the only types of evidence that have been related consistently to adverse health effects are the presence of current or past water damage, damp materials, visible mold, and mold odor, *not* the number or type of mold spores nor the presence of other markers of mold in indoor air or dust.

3.0 PHYSICAL SITE SETTING

3.1 Geomorphic Description

The subject site is located within the boundaries of the Sacramento/San Joaquin (Central) Valley, which extends from just north of Red Bluff southward to the Sacramento-San Joaquin River Delta, at approximately 25-30 feet above mean sea level near the western boundary of the Great Valley Geomorphic Province of California. The Central Valley is part of the Great Valley, a large northwest-trending structural trough, bordered on the east by the Sierra Nevada and the on west by the Coast Ranges.

The Central Valley can be divided into three primary geomorphic features; valley floors, uplands, and volcanic buttes (Olmsted and Davis, 1961). The valley floor features are generally composed of younger valley fill sediments and are located in the central part of the valley. On the east and west margins of the valley, upland geomorphic features predominate. These areas are generally composed of low hills, dissected uplands, and terraces mantled with a relatively thin soil cover. The sediments underlying these areas are generally older than those found in the flood plains.

3.2 Geologic Setting

The valley deposits are derived from the Coast Ranges to the west and the Sierra Nevada to the east. Granitic and metamorphic rocks outcrop along the eastern and southeastern flanks of the valley. Marine sedimentary rocks outcrop along most of the western, southwestern, southern, and southeastern flanks; and volcanic rocks and deposits outcrop along the northeastern flanks of the valley. The valley geomorphology includes dissected uplands, low alluvial plains and fans, river flood plains and channels, and overflow lands and lake bottoms. The majority of the native sediments near the site consist of Miocene to Holocene continental rocks and deposits of a heterogeneous mixture of generally poorly sorted clay, silt, sand, and gravel. Some beds of claystone, siltstone, sandstone, and conglomerate are also present.

Information regarding oil and gas fields was researched at the California Department of Conservations website (http://maps.conservation.ca.gov/doggr/), the subject site falls within the River Break Gas Field; however no oil or gas wells, plugged and abandoned dry holes were noted on or nearby the subject site.

Information regarding soil lithology was researched at the California Water Resources Control Board's website at https://geotracker.waterboards.ca.gov/. According to previous subsurface investigations performed at the Rain for Rent site (located at 5301 Live Oak Avenue, approximately 2,500 feet to the northwest), the subsurface soil encountered in the area consists of approximately 120 feet of unconsolidated sands, silts and clays overlying the Montezuma Formation. The Montezuma Formation is semi-consolidated silt and claystone that extends to approximately 390 feet bgs (Caprock 2007).

Based on a previous subsurface investigation performed at the Custom Cleaners site (located 2575 Main Street, approximately 1,000 feet to the south east and perceived up/cross gradient to the subject site), the subsurface is underlain by unconsolidated sands to approximately 12 feet bgs and followed by clay to at least 15 feet bgs (AEI 2001).

3.3 Hydrogeologic Setting

Information regarding local first depth to groundwater and flow direction were researched at the California Water Resources Control Board's website at https://geotracker.waterboards.ca.gov. Information regarding regional groundwater aquifers and basins was researched at the California Department of Water Resources (DWR) website at https://data.cnra.ca.gov/dataset/ca-gw-basin-boundary-descriptions.

Regional Groundwater – The subject site is located within the East Contra Costa Groundwater Basin also referred to as San Joaquin Valley-East Contra Costa Subbasin covers a 168-square mile area (107,596 acres) in the eastern portion of Contra Costa County. The Subbasin includes the communities of Antioch, Bethel Island, Byron, Brentwood, the Town of Discovery Bay (TODB), Knightsen, and Oakley and two agricultural districts (Byron Bethany Irrigation District and East Contra Costa Irrigation District). The Subbasin is bounded on the north, east, and south by the Contra Costa County line, which is contiguous with the San Joaquin River (north)

and Old River (east). In the west, the Subbasin is bounded by marine sediments of the Coast Range. The upper 400 feet of sediments are comprised of alluvial deposits with discontinuous clay layers interspersed with more permeable coarse-grained units.

East Contra Costa Groundwater Basin aquifer system is divided into the upper unconfined Shallow Zone (to about 150 feet below ground surface) and a lower semi-confined to confined Deep Zone (the Corcoran Clay is not present in the Subbasin). Most water wells are constructed within the upper 400 feet of the aquifer system. (DWR 1975).

Local Groundwater – Based on previous subsurface investigations performed at the Rain for Rent site (located at 5301 Live Oak Avenue, approximately 2,500 feet to the northwest and perceived down gradient to the subject site), the ground water within the area has been divided into three general aquifer units, consisting of the surficial, upper, and lower aquifers. The silt and clay layers of the upper unconsolidated material act as locally confining layers between these aquifers on a site specific scale. Groundwater depths range from the ground surface near the San Joaquin River to 10 feet bgs. and has been calculated to flow to the north-northeast towards the San Joaquin River (Caprock 2007).

Based on a previous subsurface investigation performed at the Custom Cleaners site (located 2575 Main Street, approximately 1,000 feet to the south east and perceived up/cross gradient to the subject site), the shallow groundwater has been encountered at 14 feet bgs (AEI 2001). Hillside runoff, aquifer pumping, tidal fluctuations or other factors may influence ground water levels. Seasonal variations should also be anticipated.

4.0 HISTORICAL REVIEW

Site historical information was obtained from a review of Sanborn Fire Insurance Maps, United States Geological Survey (U.S.G.S.) Topographic Maps, aerial photographs, Google Street View Images, Polk, and Haines City Directories. In addition, local building and newspaper records were also reviewed. The following Sanborn maps, topographic maps, and city directories were reviewed on April 28, 2023, within the libraries maintained by the University of California in Berkeley, California and City of Oakland, in Oakland, California. The aerial photographs were reviewed online within the sites maintained by National Environmental Title Research, LLC, TerraServer, and Google Earth. In addition, Sanborn Fire Insurance Maps and additional aerials were obtained from Environmental Data Resources, Inc. (EDR).

Note: Copies of supporting aerials, city directories and maps are not typically included in the report. The historical references are reviewed within local public libraries and are copyright protected and cannot be reproduced without the consent of the owner. As such, our reports properly cite and reference the historical reference in accordance with ASTM E1527-21/AAI protocols. Any incorporation of these documents without the permission of the owner would be against the law.

Reference	Date
U.S.G.S. Topographic Map	1914
U.S.G.S. Topographic Map	1916
Sanborn Fire Insurance Map	1924
Sanborn Fire Insurance Map	1932
Aerial Photograph	1937
Aerial Photograph	1939
U.S.G.S. Topographic Map	1940
Aerial Photograph	1949
Aerial Photograph	1950
U.S.G.S. Topographic Map	1954
Aerial Photograph	1957
Pacific Telephone & Telegraph City Directory	1957
Aerial Photograph	1958
Aerial Photograph	1959
Aerial Photograph	1966
Aerial Photograph	1968

U.S.G.S. Topographic Map	1968
Pacific Telephone & Telegraph City Directory	1968
Aerial Photograph	1970
Aerial Photograph	1972
Haines City Directory	1973
Haines City Directory	1976
U.S.G.S. Topographic Map	1978
Aerial Photograph	1979
Haines City Directory	1980
Aerial Photograph	1982
Aerial Photograph	1984
Haines City Directory	1985
Haines City Directory	1990
Aerial Photograph	1993
Haines City Directory	1995
Aerial Photograph	1998
Haines City Directory	2000
Aerial Photograph	2002
Aerial Photograph	2005
Haines City Directory	2005
Aerial Photograph	2006
Google Street View Image	2007
Aerial Photograph	2009
Aerial Photograph	2010
Haines City Directory	2010
Google Street View Image	2011
Aerial Photograph	2012
Aerial Photograph	2014
Haines City Directory	2015
Google Street View Image	2015
Aerial Photograph	2016
Google Street View Image	2017
Aerial Photograph	2018
Haines City Directory	2018
Google Street View Image	2019
Aerial Photograph	2020
Google Street View Image	2023

According to the East Contra Costa Historical Society, the first accounts of identifiable cultural community in the west delta are attributed to the Bay Miwoks, Yokut and Ohlone Tribes, who occupied the region between 1100 and 1770 AD. During the 1700's when California was part of Spain, Captain Pedro Fages passed through this region of California recording the first history of the area. Doctor John Marsh was the first Anglo settler in Contra Costa County and arrived on the scene in 1836. He built a riverboat freight landing on the San Joaquin River in the 1840's near what is now Oakley.

Most people thought that the sandy soil in this section of Contra Costa County was not good for farming. It was covered with chaparral, oak trees, coyotes and jack rabbits. Early settlers of the area were laughingly referred to as Sandlappers as it was said that "only jack rabbits and coyotes can thrive here". Within a few years Oakley's orchards were blooming, and the little town was booming and no longer was anyone making fun of the settlers. James O'Hara was one of the first settlers in Oakley when he arrived in 1889. He purchased seven hundred acres of government grant land for five dollars an acre. He later sold most of this land to other settlers for fifty dollars an acre. It took his insight and the planting of nut trees and grapes to prove the sandy soil was good for growing crops.

On July 1, 1900, the first Santa Fe train stopped in Oakley. The Santa Fe Railroad provided the spur needed for agricultural growth of the area and afforded local farmers a means of transporting their products to market. By the 1930's there were packing sheds along the Santa Fe spur that shipped carloads of produce to eastern markets.

In the USGS topographic maps of 1914 and 1916, the subject site is shown as undeveloped land approximately one mile west of the settlement of Oakley. During that time, bordering the site is undeveloped land to the north; a paved road (currently Oakley Road) and beyond undeveloped land to the south; a paved road (currently Main Street) and beyond undeveloped land to the east; and undeveloped land to the west.

In the Oakley Sanborn Fire Insurance Maps of 1924 and 1932, the subject site falls beyond the area of coverage and no site-specific map is available.

According to an article within the "The Press Hometown News" dated April 12, 2018, Joe and Clemantina Romiti, grandparents to brothers Bernard and Frank Romiti (owners of the approximately 10-acre subject site in 2018), settled in Jackson after immigrating to the states from Italy. Joe then worked as a stone crusher for a gold mining operation. After the birth of three daughters, the family moved to Oakley and three sons were added to the family. They bought the subject site plot in 1930 for $4,000. According to Frank, it was purchased from the National Bank of Oakley. The bank had taken possession of the land after an embezzlement scheme involving a bank manager and a railroad employee was uncovered in the wake of the stock market crash of 1929. The land was already a well-established vineyard when the Romitis took over, and most of the vines still in production today are original, though no one is exactly sure how old they are. Grapes were not the only crop grown here. Approximately three acres of almond trees shared the land with the vineyard until sometime in the late 1990s, when they were pulled out and replaced with grapevines. Joe and Clemantina built their first home on the property in 1936, and a second was added in 1966. They continued to purchase farm land around Oakley and eventually came to own four separate parcels. Over the years, the other parcels have been sold off.

In the aerial photograph of 1937, the north east portion of the subject site appears as agricultural land (orchard). The remainder of the subject site appears as agricultural land (vineyard). During that time, bordering the site is agricultural land (orchards) and small farm house to the north; no exposure to the south; a paved road (currently Main Street) and beyond agricultural land (vineyard) to the east; and agricultural land (vineyard) to the west.

In the aerial photograph of 1939, the north east portion of the subject site appears as agricultural land (orchard). A small structure (apparently the one-story residential dwelling at 2092 Oakley Road) is also shown on the northeast portion of the subject site. The remainder of the subject site appears as agricultural land (vineyard). During that time, bordering the site is agricultural land (orchards) and small farm house to the north; a paved road (currently Oakley Road) and beyond agricultural land (hay field) to the south; small vineyard and a paved road (currently Main Street) and beyond agricultural land (vineyard) to the east; and agricultural land (vineyard) to the west. Note: Main Street has been redirected (curved to the east), The original

portion of Main Street appears to be the gravel paved access way along the east perimeter of the subject site (as noted during the site reconnaissance).

In the USGS topographic map of 1940, the subject site is shown as agricultural land (orchards) approximately one mile west of the settlement of Oakley. During that time, bordering the site is agricultural land (orchards) to the north; a paved road (currently Oakley Road) and beyond agricultural land (orchards) to the south; a paved road (currently Main Street) and beyond agricultural land (orchards) to the east; and agricultural land (orchards) to the west.

In the aerial photographs of 1949, 1950, 1957, 1958 and 1959, the north east portion of the subject site appears as agricultural land (orchard). A small residential structure with associated out building is also shown on the northeast portion of the subject site. The remainder of the subject site appears as agricultural land (vineyard). During that time, bordering the site is agricultural land (orchards) and small farm house to the north; a paved road (currently Oakley Road) and beyond agricultural land (orchards) and small farm house to the south; small vineyard and a paved road (currently Main Street) and beyond agricultural land (vineyard) and small farm house to the east; and agricultural land (orchard) and small farm house to the west.

In the USGS topographic map of 1954, the subject site is shown as primarily agricultural land (orchards) approximately one mile west of the settlement of Oakley. A small non-descript structure (most likely residential) is shown on the northeast portion of the subject site. During that time, bordering the site is agricultural land (orchards) to the north; a paved road (currently Oakley Road) and beyond agricultural land (orchards) with small non-descript structure (most likely residential) to the south; a paved road (currently Main Street) and beyond agricultural land (orchards) and small non-descript structure (most likely residential) to the east; and agricultural land (orchards) and small non-descript structure (most likely residential) to the west. Note: Main Street has been redirected (curved to the east), The original portion of Main Street appears to be the gravel paved access way along the east perimeter of the subject site (as noted during the site reconnaissance).

In the Pacific Telephone & Telegraph city directories of 1957 and 1968, the subject site address not listed, however several private individuals were listed on Oakley Road with no street numbers.

In the aerial photograph of 1966, the north east portion of the subject site appears as agricultural land (orchard). A small residential structure with associated out building is also shown on the northeast portion of the subject site. The remainder of the subject site appears as agricultural land (vineyard). During that time, bordering the site is a trailer park to the north; a paved road (currently Oakley Road) and beyond agricultural land (orchards) and small farm house to the south; small vacant lot and a paved road (currently Main Street) and beyond agricultural land (vineyard) and small farm houses to the east; and agricultural land (orchard) and small farm house to the west.

According to local building records, the one-story residential dwelling (2100 Oakley Road) was constructed in 1967.

In the USGS topographic map of 1968, the subject site is shown as primarily agricultural land (orchards) approximately one mile west of the settlement of Oakley. A small non-descript structure (most likely residential) is shown on the northeast portion of the subject site. A new small non-descript structure (most likely residential) is shown on the south center portion of the subject site. During that time, bordering the site is a trailer park to the north; a paved road (currently Oakley Road) and beyond agricultural land (orchards) with small non-descript structure (most likely residential) to the south; a vacant lot and paved road (currently Main Street) and beyond agricultural land (orchards) and small non-descript structure (most likely residential) to the east; and agricultural land (orchards) and small non-descript structure (most likely residential) to the west.

In the aerial photographs of 1968 and 1972, the north east portion of the subject site appears as agricultural land (orchard). A small residential structure with associated out building is also shown on the northeast portion of the subject site. A small residential structure is shown on the south center portion of the subject site. The remainder of the subject site appears as agricultural land (vineyard). During that time, bordering the site is a trailer park to the north; a paved road (currently Oakley Road) and beyond agricultural land (orchards) and small farm house to the south; small vacant lot and a paved road (currently Main Street) and beyond agricultural land (vineyard) and small farm houses to the east; and agricultural land (orchard) and small farm house to the west.

In the city directories of 1973, the subject site address not listed, however Romiti along with other several private individuals were listed on Oakley Road with no street numbers.

In the aerial photographs of 1974, 1979, 1982 and 1984, the north east portion of the subject site appears as agricultural land (orchard). A small residential structure with associated out building is also shown on the northeast portion of the subject site. A small residential structure with outdoor pool is shown on the south center portion of the subject site. The remainder of the subject site appears as agricultural land (vineyard). During that time, bordering the site is a trailer park to the north; a paved road (currently Oakley Road) and beyond agricultural land (orchards) and small farm house to the south; small structure and a paved road (currently Main Street) and beyond agricultural land (vineyard) and small farm houses to the east; and trailer park expansion to the west.

In the city directories of 1976, 1980 and 1985, the subject site address not listed, however Romiti along with other several private individuals were listed on Oakley Road with no street numbers.

In the USGS topographic map of 1978, the subject site is shown as primarily agricultural land (orchards) approximately one mile west of the settlement of Oakley. A small non-descript structure (most likely residential) is shown on the northeast portion of the subject site. A small non-descript structure (most likely residential) is shown on the south center portion of the subject site. During that time, bordering the site is a trailer park to the north; a small non-descript structure and a paved road (currently Oakley Road) and beyond agricultural land (orchards) with small non-descript structure (most likely residential) to the south; a paved road (currently Main Street) and beyond agricultural land (orchards) and small non-descript structure (most likely residential) to the east; and agricultural land (orchards) and small non-descript structure (most likely residential) to the west. Note: Main Street has been redirected (curved to the east), The original portion of Main Street appears to be the gravel paved access way along the east perimeter of the subject site (as noted during the site reconnaissance).

In the city directories of 1990, 1995 and 2000, the subject site address not listed, however Romiti along with other several private individuals were listed on Oakley Road with no street numbers.

In the aerial photograph of 1993, the north east portion of the subject site appears as agricultural land (orchard). A small residential structure with associated out building is also shown on the northeast portion of the subject site. A small residential structure with outdoor pool is shown on the south center portion of the subject site. The remainder of the subject site appears as agricultural land (vineyard). During that time, bordering the site is a trailer park to the north; a paved road (currently Oakley Road) and beyond agricultural land (orchards) and small farm house to the south; small structure and a paved road (currently Main Street) and beyond residential development to the east; and trailer park expansion to the west.

In the aerial photograph of 1998, the north east portion of the subject site appears as dry agricultural land (former orchard). A small residential structure with associated out building is also shown on the northeast portion of the subject site. A small residential structure with outdoor pool is shown on the south center portion of the subject site. The remainder of the subject site appears as agricultural land (vineyard). During that time, bordering the site is a trailer park to the north; a paved road (currently Oakley Road) and beyond residential development, agricultural land (orchards) and small farm house to the south; small structure and a paved road (currently Main Street) and beyond residential development to the east; and trailer park expansion to the west.

In the aerial photographs of 2002, 2005, 2006, 2009, 2010, 2012 and 2014, the north east portion of the subject site appears as agricultural land (vineyard). A small residential structure with associated out building is also shown on the northeast portion of the subject site. A small residential structure with former outdoor pool is shown on the south center portion of the subject site. The remainder of the subject site appears as agricultural land (vineyard). During that time, bordering the site is a trailer park to the north; a paved road (currently Oakley Road) and beyond residential development, agricultural land (orchards) and small farm house to the south; new gasoline station, small new structure (current oil changer) and a paved road (currently Main Street) and beyond residential development to the east; and trailer park expansion to the west.

In the city directories of 2005, 2010, 2015 and 2018, the subject site address not listed, however Romiti along with other several private individuals were listed on Oakley Road with no street numbers. In addition, a 7-Eleven gas station is listed at the adjacent addresses of 2435 & 2437 Main Street, respectively.

In the Google Street View Images of (July 2007, June 2011 and June 2015), the subject site appears with a small one-story residential dwelling with associated garage (2092 Oakley Road), a one-story residential dwelling (2100 Oakley Road) and vineyard. During that time, a 7-Eleven/Citgo Gas Station and Oil Can Henry's appear on the adjacent property.

According to local building records, the cell tower (2092 Oakley Road) was constructed inn 2016. The cell tower is disguised as a water tower.

In the aerial photographs of 2016, 2018 and 2020, the north east portion of the subject site appears as agricultural land (vineyard). A small residential structure with associated out building is also shown on the northeast portion of the subject site. A new cell tower facility is shown on the north east corner of the subject site. A small residential structure with former outdoor pool is shown on the south center portion of the subject site. The remainder of the subject site appears as agricultural land (vineyard). During that time, bordering the site is a trailer park to the north; a paved road (currently Oakley Road) and beyond residential development, agricultural land (orchards) and small farm house to the south; new gasoline station, small new structure (current oil changer) and a paved road (currently Main Street) and beyond residential development to the east; and trailer park expansion to the west.

In the Google Street View Images of (April 2017, March 2019 and February 2023), the subject site appears with a small one-story residential dwelling with associated garage, cell tower disguised as a water tower (2092 Oakley Road), a one-story residential dwelling (2100 Oakley Road) and vineyard. During that time, a 7-Eleven/Citgo Gas Station and Valvoline Instant Oil Change appear on the adjacent property.

According to news report by "ABC 7 San Francisco" dated March 23, 2018, the subject site was put up for sale. During that time, six generations had enjoyed farming there but the two brothers who own the land were reluctantly selling. Joe and Clementina Romiti arrived in Oakley from Italy in 1911 and promptly bought land. Frank Romiti says it was a 10-acre parcel with two barns and a house and they purchased it for $10 in gold. Frank Romiti said, "At this point, the fourth generation is not interested in farming anymore and we're getting surrounded by housing so we decided to put it up for sale."

5.0 ENVIRONMENTAL DATABASE REVIEW

5.1 Agency Record Review

Environmental Data Resources, Inc. (EDR) was contracted to compile data from available government agency databases on locations of actual and potentially impacted sites within a one-mile radius of the subject property. Copies of the environmental database lists and the location map for the subject site are included in Appendix A.

The results of the database search by EDR revealed 69 mapped sites and 3 unmapped sites within a one-mile radius, of which 25 mapped sites are within a one-eighth mile radius of the subject site. Based on distance from the subject property and regional hydrogeology the following selected site(s) identified by EDR were deemed to have the highest potential to impact the subject site. In addition, a Tier 1 Vapor Encroachment Screen (VES) pursuant to ASTM E2600-10 was performed on the following selected site(s) to assess whether a potential vapor encroachment condition (VEC) exists at the subject property caused by the release of vapors from contaminated soil or groundwater either on or near the subject site. These sites identified by EDR were located either at, adjacent or possibly up gradient of the subject site.

- **Verizon Wireless Empire Oakley Road** – 2092 Oakley Road.
  Located at the subject site. Listed on the COUNTY and CERS databases.

  According to the information provided by EDR, this site is listed with the County as a site utilizing unspecified hazardous materials in 2017 (CAL EPA# CAC003041132). No reports of spills or unauthorized releases were reported for this site by EDR.

  For additional information, see Section 5.2 Local Agency File Review.

- **7 Eleven, Inc. #32787/Southland Corp** – 2437 Main Street, Oakley
  Located adjacent to the east and perceived cross gradient to the subject site. Listed on the RCRA NON-GEN, COUNTY, UST, CERS, HWTS and HAZNET databases.

  According to the information provided by EDR, this site is listed with the County as having active underground fuel storage tanks. This site is also listed as manifesting off-specification, aged or surplus organics, aqueous solutions with total organic residues and other organic solids from 2002 to 2020 (CAL EPA#s: CAC002559654, CAL000266011).

UST system primary containment was cited in 2022 for not being constructed, operated, and maintained product-tight. The tank system was noted as regularly leaking fuel into secondary containment per the multiple fuel alarms in the '87 turbine sump. Returned to compliance on 02/03/2022. No other reports of major violations, spills or unauthorized releases were noted for this site by EDR. In addition, according to the RWQCB's GeoTracker and Cal-EPA EnviroStor websites, this site is not listed as an active or inactive case.

Based on this information, there is no record of subsurface impact from the adjacent site to the subject site. However, if future environmental investigations indicate an impact to ground water has spread from the adjacent site onto the subject site, it appears unlikely that there will be any financial liability to the owner of the subject site even if it has been impacted by the release. This conclusion is based on established State policy, which has been promulgated in Resolution 92-49 of the RWCQB, which is entitled Policies and Procedures for Investigation and Cleanup and Abatement of Water Discharges Under Water Code Section 13304. The Resolution reads in part, "The Regional Water Board shall... Require the discharger to extend the investigation, and cleanup and abatement, to any location affected by the discharge or threatened discharge; This language and the general practice of the governing regulatory agency are such that it is unlikely that any financial responsibility would be passed to the current or future owner(s) of the subject site in the unlikely event that the remedial investigation were to extend to the subject site.

This site is also within 528 feet of the critical distance to the nearest boundary of the subject site for suspect contaminated sites with petroleum hydrocarbon and MBTEX sources and within 1,760 feet of suspect contaminated sites with chlorinated solvents. The critical distance, as defined in E 2600-10, effectively is the upper limit distance a vapor can reasonably be expected to migrate in relatively permeable soil assuming the path of least resistance is directly from the nearest edge of the contaminated media (such as groundwater) to the nearest subject site boundary. As such, the conclusion from Tier 1 screening is that a VEC cannot be ruled out.

However, based on: (1) no record of subsurface impact at this time; and (2) cross gradient position, the probability of a subsurface environmental impact and/or potential vapor encroachment from this site to the subject site is low. However, based on the proposed residential redevelopment and/or depending on the confidence level required by the client, additional assessment to rule out a VEC may be warranted.

- **Henly Pacific dba Valvoline Instant Oil Change/Valvoline LLC dba Oil Can Henry's/ T & L Oil Company dba Oil Can Henry's/SC Fuels**– 2435 Main Street, Oakley
  Located adjacent to the east and perceived cross gradient to the subject site. Listed on the RCRA NON-GEN, COUNTY, AST, CERS, HWTS and HAZNET Lists.

  According to the information provided by EDR, this site is listed with the County as having active aboveground storage tanks. This site is also listed as manifesting waste oil, mixed oil, oil/water separation sludge, unspecified oil-containing waste and other inorganic solid waste from 2003 to 2020 (CAL EPA#s: CAL000274020, CAC002856703, CAL000419916, CAL000432553, CAL000458346). No reports of major violations, spills or unauthorized releases were noted for this site by EDR. In addition, according to the RWQCB's GeoTracker and Cal-EPA EnviroStor websites, this site is not listed as an active or inactive case.

  Based on this information, there is no record of subsurface impact from the adjacent site to the subject site. However, if future environmental investigations indicate an impact to ground water has spread from the adjacent site onto the subject site, it appears unlikely that there will be any financial liability to the owner of the subject site even if it has been impacted by the release. This conclusion is based on established State policy, which has been promulgated in Resolution 92-49 of the RWCQB, which is entitled Policies and Procedures for Investigation and Cleanup and Abatement of Water Discharges Under Water Code Section 13304. The Resolution reads in part, "The Regional Water Board shall... Require the discharger to extend the investigation, and cleanup and abatement, to any location affected by the discharge or threatened discharge; This language and the general practice of the governing regulatory agency are such that it is unlikely that any financial responsibility would be passed to the current or future owner(s) of the subject site in the unlikely event that the remedial investigation were to extend to the subject site.

  This site is also within 528 feet of the critical distance to the nearest boundary of the subject site for suspect contaminated sites with petroleum hydrocarbon and MBTEX sources and within 1,760 feet of suspect contaminated sites with chlorinated solvents. The critical distance, as defined in E 2600-10, effectively is the upper limit distance a vapor can reasonably be expected to migrate in relatively permeable soil assuming the path of least resistance is directly from the nearest edge of the contaminated media (such as groundwater) to the nearest subject site boundary. As such, the conclusion from Tier 1 screening is that a VEC cannot be ruled out.

  However, based on: (1) no record of subsurface impact at this time; and (2) cross gradient position, the probability of a subsurface environmental impact and/or potential vapor encroachment from this site to the subject site is low. However, based on the proposed residential redevelopment and/or depending on the confidence level required by the client, additional assessment to rule out a VEC may be warranted.

- **Eagle City, Inc.** – 33 Otsego Street, Oakley
  Located adjacent to the north and perceived down gradient to the subject site. Listed on the HWTS and HAZNET databases.

  According to the information provided by EDR, this site is listed as manifesting asbestos containing waste in 2016 (CAL EPA#s: CAC002876098). No reports of major violations, spills or unauthorized releases were noted for this site by EDR. In addition, according to the RWQCB's GeoTracker and Cal-EPA EnviroStor websites, this site is not listed as an active or inactive case. Based on this information, the probability of a subsurface environmental impact and/or potential vapor encroachment from this site to the subject site is low.

- **Custom Cleaners** – 2575 Main Street, Oakley
  Located adjacent to the north and perceived down gradient to the subject site. Listed on the EDR HIST CLEANER, RCRA NON GEN, COUNTY, DRY CLEANERS, HAZNET and CPS-SLIC.

  According to the information provided by EDR, this site is listed as a dry cleaners from at least 1991 to 2014 (CAL EPA# CAL000043941). This site is also listed as manifesting halogenated solvents, liquids with halogenated organic compounds, off-specification, aged or surplus organics and solids or sludges with halogenated organic compounds from 1993 to 2003 (CAL EPA#s: CAL000043941, CAL000209496). Impacts to the subsurface was discovered in 2001.

  According to the CAL EPA DTSC EnviroStor and RWQCB GeoTracker online databases, a dry cleaner operated between about 1990 and 2009. In January 2016 a Phase II assessment relating to a property transaction showed the dry cleaning solvent tetrachloroethene (PCE) in the shallow soil gas up to 2,400 $\mu g/m^3$. A follow-up assessment conducted in March 2016 showed groundwater did not contain (PCE) dry cleaning solvents, however, PCE was detected in soil gas beneath the building and beneath the drive behind the building. The maximum concentration of PCE in soil vapor was 240 ug/m^3.

  Based on the review by the RWQCB, the risk posed by the highest PCE soil vapor concentration is 1×10^{-7} excess cancer risk which is below the threshold of 1×10^{-6}. There no further investigation was required on April 21, 2016.

  Based on this information, there is no record of ground water impact at this site. However, if future environmental investigations indicate an impact to ground water has spread from the adjacent site onto the subject site, it appears unlikely that there will be any financial liability to the owner of the subject site even if it has been impacted by the release. This conclusion is based on established State policy, which has been promulgated in Resolution 92-49 of the RWCQB, which is entitled Policies and Procedures for Investigation and Cleanup and Abatement of Water Discharges Under Water Code Section 13304. The

Resolution reads in part, "The Regional Water Board shall... Require the discharger to extend the investigation, and cleanup and abatement, to any location affected by the discharge or threatened discharge; This language and the general practice of the governing regulatory agency are such that it is unlikely that any financial responsibility would be passed to the current or future owner(s) of the subject site in the unlikely event that the remedial investigation were to extend to the subject site.

This site is also within 528 feet of the critical distance to the nearest boundary of the subject site for suspect contaminated sites with petroleum hydrocarbon and MBTEX sources and within 1,760 feet of suspect contaminated sites with chlorinated solvents. The critical distance, as defined in E 2600-10, effectively is the upper limit distance a vapor can reasonably be expected to migrate in relatively permeable soil assuming the path of least resistance is directly from the nearest edge of the contaminated media (such as groundwater) to the nearest subject site boundary. As such, the conclusion from Tier 1 screening is that a VEC cannot be ruled out.

However, based on: (1) no record of ground water impact at this time; (2) distance from the subject site; and (3) cross gradient position, the probability of a subsurface environmental impact and/or potential vapor encroachment from this site to the subject site is low.

5.2 Local Agency File Review

On April 26, 2023, a Basics representative contacted the California EPA - Department of Toxic Substance Control (CAL EPA DTSC) in Berkeley, California, in regards to any information concerning the subject site.

- **2092 Oakley Road, Oakley CA 94561 (APN 037-110-031-4)**
  The subject site.

  No information regarding the subject site was available within the CAL EPA DTSC hard files. However, according to the CAL EPA Regulated Site Portal online database. the following information was provided for the subject site:

  Verizon Wireless Empire Oakley Road

  This site has a current permit to operate a radio telephone communications facility from at least 2016-Present. As part of onsite operations, a backup battery is utilized for the emergency backup generator.

  See Contra Costa County Health Services Agency – Hazardous Materials Division.

On April 26, 2023, a Basics representative contacted the California Regional Water Quality Control Board (RWQCB) in Oakland, California, in regards to any information concerning the subject site.

- **2092 Oakley Road, Oakley CA 94561 (APN 037-110-031-4)**
  The subject site.

  No information regarding the subject site was available within the RWQCB files or GeoTracker online database. No information regarding hazardous materials, underground storage tanks or unauthorized releases was available for the subject site.

On April 26, 2023, a Basics representative contacted the Bay Area Air Quality Management District (BAAQMD) in San Francisco, California, in regards to any information concerning the subject site.

- **2092 Oakley Road, Oakley CA 94561 (APN 037-110-031-4)**
  The subject site.

  No information regarding the subject site was available within the BAAQMD files. No information regarding hazardous materials, underground storage tanks or unauthorized releases was available for the subject site.

On April 26, 2023, a Basics representative contacted the Contra Costa County Health Services Agency – Hazardous Materials Division (CCCHSA) in Pacheco, California, in regards to any information concerning the subject site:

- **2092 Oakley Road, Oakley CA 94561 (APN 037-110-031-4)**
  The subject site.

  Information provided by the CCCHSA revealed the following information was available for the subject site:

  <u>Verizon Wireless Empire Oakley Road</u>

  This site has a current permit to operate a cell phone transmission tower site from at least 2016-Present (CERS ID# 10666939). As part of onsite operations, an approximately 16.64-gallon backup battery and approximately 132-gallon diesel fuel aboveground storage tank is utilized for the emergency back-up generator.

Inspections were conducted in 2017, 2019 and 2021 by the CCCHSA. No major violations, spills or unauthorized releases were reported.

No other information regarding hazardous materials, underground storage tanks or unauthorized releases was available for the subject site.

On April 26, 2023, a Basics representative contacted the Contra Costa County Agricultural Commission (CCCAC) in Concord, California, in regards to any information concerning the subject site:

- **2092 Oakley Road, Oakley CA 94561 (APN 037-110-031-4)**
  The subject site.

  Information regarding the subject site was available within the CCCAC online website (https://www.contracosta.ca.gov/6242/Pesticide-Use-Reporting-and-Data). According to the CCCAC online database, the following information was provided for the subject site:

  Oakley Road/Empire Avenue

  A current permit issued to Alan Lucchesi (Brownstone Growers, LLC) for cultivation of perennial wine grapes and uncultivated ag.

  According to Mr. Dave Hallinan, Agricultural Biologist/Weights and Measures Inspector with the CCCAC, permits for the use of herbicides or pesticides are tracked only for five years. Mr. Hallinan provided 5 permit application records for surfactants and sulphurs from 2017 to 2022. Earlier records are no longer available.

On April 26, 2023, a Basics representative contacted the East Contra Costa County Fire Protection District (ECCCFPD) in Pittsburg, California, in regards to any information concerning the subject site:

- **2092 Oakley Road, Oakley CA 94561 (APN 037-110-031-4)**
  The subject site.

  No information regarding the subject site was available within the ECCCFPD files. No information regarding hazardous materials, underground storage tanks or unauthorized releases was available for the subject site.

On April 26, 2023, a Basics representative contacted the City of Oakley Building Department (OBD) in Oakley, California, in regards to any information concerning the subject site:

- **2092 Oakley Road, Oakley CA 94561 (APN 037-110-031-4)**
  The subject site.

  According to the information available within the OBD files and review of the City of Oakley Building Department online database (https://aca-prod.accela.com/CONCORD), the following records were provided for the subject site address:

  2015 Design review of a new approximately 67 foot tall wireless communications facility (cellular tower) and Oakley kiosk sign. Owner Frank Romiti.
  2016 Permit and plan check only for Verizon Cell site. Owner Ben Romiti.
  2017 Building permit renewal. Owner Frank Romiti.
  2018 Permit to removal and replace radio heads, surge protection and cable.
  2021 Permit add antennas, surge supressors and cable and replace RRU's Verizon.
  2022 Application by Owen Poole and Dan Cosgrove requesting approval of 1) a General Plan Amendment (GPA 01-22) to redesignate 9.25 acres from Commercial (CO) to Residential Medium (RM); 2) a Rezone (RZ 03-22) of 9.25 acres from C (General Commercial) District to P-1 (Planned Unit Development) District; 3) a Final Development Plan (FDP 01-22) for development of the 9.25 acres site; 4) a Tentative Map (TM 04-22) to subdivide 9.25 acres into 83 single family residential lots, additional on-site parking, a toddler park, community gathering areas, and other improvements; and 5) a Design Review (DR 07-22) for floor plans and architecture of three homes types with three elevations and three color schemes, and landscaping and other improvements throughout the project.
  2023 Building permit renewal. Owner John Di'Ambrosio Family Trust.

  No information regarding hazardous materials, underground storage tanks or unauthorized releases was available for the subject site.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

These conclusions are based on the data collected during performance of this ESA and are therefore subject to the time limitations associated with accessing governmental and site data. The purpose of this assessment was to evaluate the likelihood of soil and ground water degradation as a result of the use, storage, treatment, and/or disposal of hazardous materials/waste on the subject site and sites located within a one-mile radius. Findings are based on a geological and hydrogeological information study, and an evaluation of historical and present property use (historical resource review, regulatory agency database and file review, personal interviews and site reconnaissance study).

6.1.1 Data Gaps

A data gap is the failure to obtain information required by the standard despite good faith efforts by the environmental professional to gather the information. Based on the findings of our investigation, it is our opinion that there are no apparent significant data gaps within the scope of work performed.

6.1.2 Environmental Issues/*De Minimis* Conditions

De Minimis Conditions are defined by the ASTM Standard Practice E1527-21 as condition that generally does not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. On the basis of the information compiled and reviewed by Basics, our findings indicate the following *de minimis* conditions:

(1) Sometime between 1899 and 1930, the subject site was developed as agricultural land approximately one mile west of the settlement of Oakley

According to the East Contra Costa Historical Society, James O'Hara was one of the first settlers in Oakley when he arrived in 1889. He purchased seven hundred acres of government grant land for five dollars an acre. He later sold most of this land to other settlers for fifty dollars an acre. It took his insight and the planting of nut trees and grapes to prove the sandy soil was good for growing crops.

According to an article within the "The Press Hometown News" dated April 12, 2018, Joe and Clemantina Romiti, grandparents to brothers Bernard and Frank Romiti (owners of the approximately 10-acre subject site in 2018), settled in Jackson after immigrating to the states from Italy in 1911. Joe then worked as a stone crusher for a gold mining operation. After the birth of three daughters, the family moved to Oakley and three sons were added to the family. They bought the subject site plot in 1930 for $4,000. According to Frank, it was purchased from the National Bank of Oakley. The bank had taken possession of the land after an embezzlement scheme involving a bank manager and a railroad employee was uncovered in the wake of the stock market crash of 1929. The land was already a well-established vineyard when the Romitis took over, and most of the vines still in production today are original, though no one is exactly sure how old they are. The vineyard currently consists of Zinfandel, Morvedra and Carrignan variety of grapes.

Grapes were not the only crop grown here. Approximately three acres of almond trees occupied the northeast portion of the subject site along side the vineyard until sometime in the late 1990s, when they were pulled out and replaced with grapevines. Joe and Clemantina Romiti continued to purchase farm land around Oakley and eventually came to own four separate parcels. Over the years, the other parcels have been sold off.

According to news report by "ABC 7 San Francisco" dated March 23, 2018, the subject site was put up for sale. During that time, six generations had enjoyed farming there but the two brothers who own the land were reluctantly selling. Frank Romiti said, "At this point, the fourth generation is not interested in farming anymore and we're getting surrounded by housing so we decided to put it up for sale".

The use as agricultural land has an obvious high potential business activity indicative to the storage, treatment or disposal of hazardous or potentially toxic materials.

See Section 6.1.3 - Recognized Environmental Conditions (RECs)

(2) In 1936, the northeast portion of the subject site was developed with a one-story residential dwelling with associated barn/garage and yard (2092 Oakley Road).

Based on the historical references reviewed, Joe and Clemantina Romiti built their first home on the property in 1936 and has been utilized as a private residence since its construction.

The use as a private residence does not appear to have an obvious high potential for business activities indicative to the use, storage and/or treatment of hazardous materials. In addition, no information regarding the use of hazardous materials was uncovered during this time frame within the scope of work performed.

Discussions with Mr. Cosgrove indicated the building has always been utilized as a residential dwelling and no underground heating oil storage tanks were associated with the building.

Note: Prior to PG&E delivering natural gas to northern California in 1930, the furnaces in most homes and commercial businesses used fuel oil stored in a tank. Underground oil tanks were common prior to that time. As such, an underground heating oil tank is typical for a site such as this.

During the site visit, no obvious evidence (i.e. fill port, vent pipes, etc.) was noted during the site inspection. As such, no conclusive evidence of a former underground storage tank was uncovered onsite within the scope of work performed, however the possibility cannot be ruled out. Additional due diligence (i.e. utility search, etc.) can be performed to further assess the potential of a former underground storage tank onsite. Any redevelopment of the subject site should have contingencies to deal with the possible discovery and removal of such tanks (and associated contamination, if any) in accordance with local and state regulations.

(3) In 1966, the south center portion of the subject site was developed with a one-story residential dwelling with associated yard (2100 Oakley Road).

Based on the historical references reviewed, Joe and Clemantina Romiti built their second home on the property in 1966 and has been utilized as a private residence since its construction.

The use as a private residence does not appear to have an obvious high potential for business activities indicative to the use, storage and/or treatment of hazardous materials. In addition, no information regarding the use of hazardous materials was uncovered during this time frame within the scope of work performed.

Discussions with Mr. Cosgrove indicated the building has always been utilized as a residential dwelling and no underground heating oil storage tanks were associated with the building.

(4) In 2016, the northeast corner of the subject site was developed with a 67-foot tall wireless communications facility (cellular tower) (2092 Oakley Road).

Based on the historical references reviewed, the wireless communications facility was listed as being occupied by Verizon Wireless (2016-Present).

The cell tower facility consists of an approximately 67-foot tall wireless communications facility (cellular tower) designed as a faux water tank adorned with a City logo with nine (up to 18) hidden antennas. The structure and ancillary equipment is within a 25 foot by 45 foot screened area. The screened area consists of an eight-foot high split-face CMU (concrete masonry unit) wall with capstones and pilasters that screen all of the equipment from public view. It also includes the footprint for the wireless structure. A six-foot wide chain link access gate is along the south elevation to provide access the equipment and wireless structures.

This site has a current permit to operate a cell phone transmission tower site from at least 2016-Present (CERS ID# 10666939). As part of onsite operations, an approximately 16.64-gallon backup battery and approximately 132-gallon diesel fuel aboveground storage tank is utilized for the emergency back-up generator.

Inspections were conducted in 2017, 2019 and 2021 by the CCCHSA. No major violations, spills or unauthorized releases were reported.

Discussions with Mr. Cosgrove indicated the building has a backup generator and no underground fuel storage tanks are associated with the tower. Visual observations of the cell tower facility did not reveal any obvious evidence of stains or spills.

Because ultimately it remains the user who accepts the liability for having entered into a chain of title, it remains important that the user recognize that the "risk tolerance" of a regulatory agency could change, as could be the case if information is later uncovered to suggest that the de minimus conditions (i.e., those that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies) are of greater significance than once thought.

Based on the *de minimis* conditions stated above, additional scope of services (i.e., baseline environmental sampling), but not limited to, may or may not disclose information which may significantly reduce the "risk tolerance" in connection with the acquisition of a parcel of commercial real estate.

6.1.3 Recognized Environmental Conditions (RECs)

Recognized Environmental Conditions (RECs) are defined by the ASTM Standard Practice E1527-21 as the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to 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. Based on the findings of our investigation, the following RECs were identified onsite:

(1) Perform agricultural sampling in accordance with the CAL EPA Department of Toxics Substance Control's Interim Guidance for Sampling Agricultural Properties, August 7, 2008.

Based on the historical references reviewed, the subject site has been utilized as agricultural land from at least the 1930s to present. The use as agricultural land indicates a potential environmental risk due to the potential use of pesticides and associated farm equipment. Such chemicals are notable because they may be organophosphate sources.

Discussions with Mr. Cosgrove indicated to his knowledge no pesticides were stored, mixed, or disposed of onsite. However, Mr. Al Lucchesi has been maintaining the vineyard for a long time may have permits to apply pesticides.

According to the City of Oakley website, Alan Lucchesi is part of a long-time Oakley family that has planted and cared for grape vines throughout the community for over 100 years. Most recently, Mr. Lucchesi has planted/transplanted dozens of acres of vines at the northeast corner of Rose Ave. and Laurel Rd., the northwest corner of Laurel and Empire Ave., the southwest corner of Empire and Oakley Rd., on the vacant land near the "Legless Lizard Preserve," as well as in other areas. As has been mentioned by the City Council in the past, these plantings are welcomed, provide an attractive landscape, and help to preserve the agricultural heritage of Oakley. Mr. Lucchesi is permitted to utilize the premises exclusively for the transplanting, planting, cultivating and harvesting of grape vines. As part of the agreement, Mr. Lucchesi is not allowed to store, keep, or use

hazardous substances on the premises. In addition, Mr. Cosgrove also indicated underground fuel tanks, equipment storage, repair, or maintenance were not located onsite.

According to Mr. Dave Hallinan, Agricultural Biologist/Weights and Measures Inspector with the CCCAC, permits for the use of herbicides or pesticides are tracked only for five years. Mr. Hallinan provided 5 permit application records for surfactants and sulphurs from 2017 to 2022. Earlier records are no longer available.

Based on the intended change in land use from agricultural to residential, sampling of soil, sediment in drainage ditches, and/or groundwater appears warranted based on the CAL EPA Department of Toxics Substance Control's Interim Guidance for Sampling Agricultural Properties, August 7, 2008.

Generally, sampling of soil, sediment in drainage ditches, and/or groundwater should occur at former agricultural sites if any of the following applies:

- Persistent pesticides were or are likely to have been used.
- Pesticides were or are likely to have been stored, mixed, or disposed of on the property, or pesticide-application equipment was cleaned there.
- There are known or suspected spills or accumulations of pesticides.
- Pesticides are present in groundwater or there is reason to believe they may be present in groundwater.
- The site has ever had intensive management for orchard, nursery, or other high-value crops, including significant use of pesticides and irrigation.

Currently, no obvious evidence of current pesticides being stored, mixed, or disposed was observed onsite. In addition, no obvious evidence of underground or aboveground fuel tanks, equipment storage, repair, or maintenance was observed onsite.

6.1.4 Controlled Recognized Environmental Conditions (CRECs)

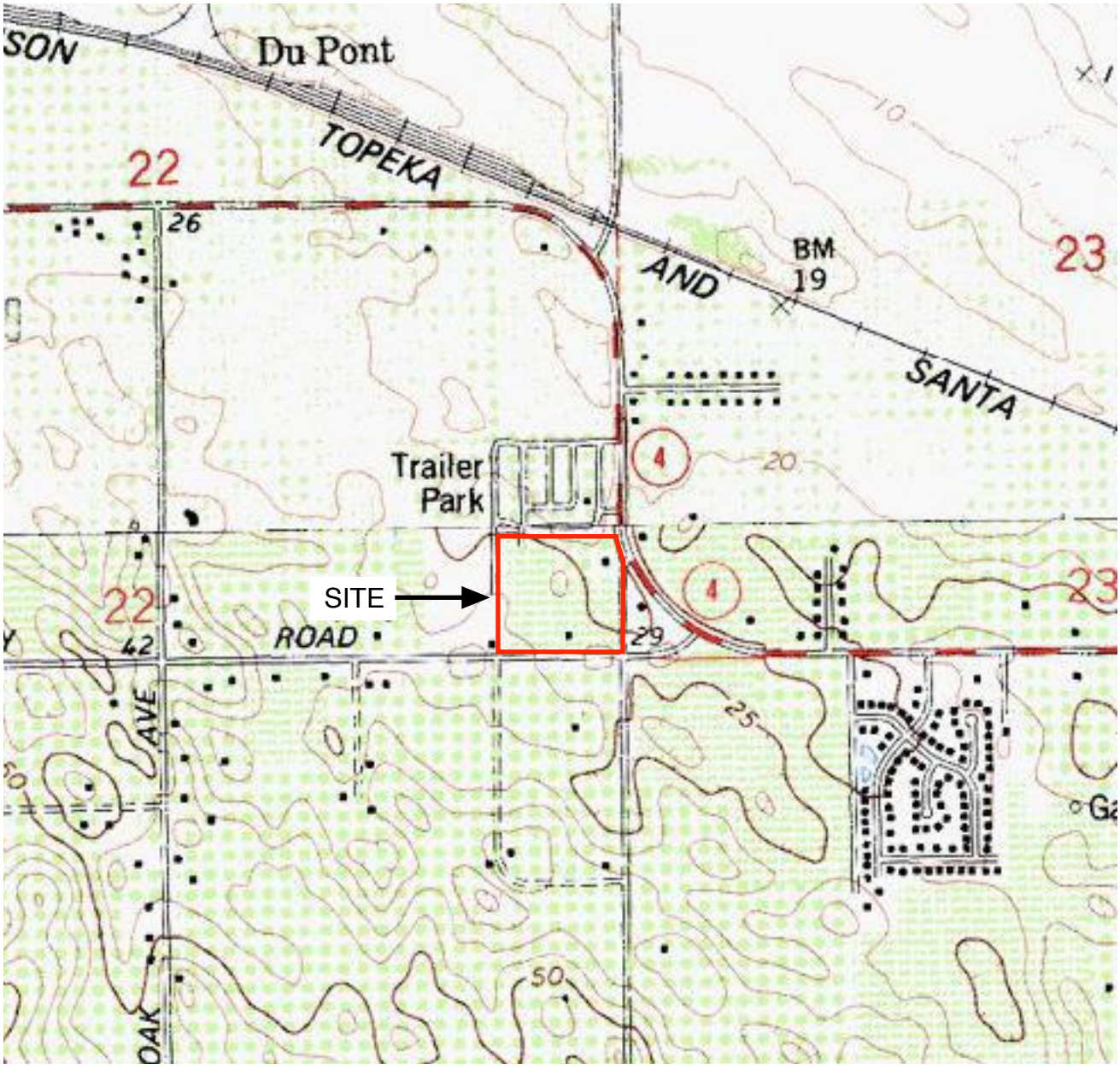
Controlled Recognized Environmental Conditions (CRECs) are defined by the ASTM Standard Practice E1527-21 as a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority, with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls. Based on the findings of our investigation, no apparent CRECs were identified onsite.

6.1.5 Historical Recognized Environmental Conditions (HRECs)

Historical Recognized Environmental Condition (HRECs) are defined by the ASTM Standard Practice E1527-21 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. Based on the findings of our investigation, no apparent HRECs were identified onsite.

6.1.6 Recommendations

This assessment **has** revealed obvious evidence of a recognized environmental condition in connection with the property that warrants further investigation and/or documentation at this time. See Section 6.1.3 - Recognized Environmental Conditions (RECs).



Topographic Map Source: U.S. Geological Survey, 1978 Jersey Island and Brentwood Quadrangles, California

Site Location

basics ENVIRONMENTAL

Phase I Environmental Site Assessment
2092 Oakley Road
Oakley, California

PROJECT NO.
23-ENV6323

DRAWING NO.
1

0 500 1000

APPROXIMATE SCALE IN FEET AS DETERMINED FROM GOOGLE MAPS

N

SITE Aerial Photo Source:U.S. Geological Survey & Google Maps

Aerial Photograph (2020)

basics ENVIRONMENTAL

Phase I Environmental Site Assessment
2092 Oakley Road
Oakley, California

PROJECT NO.
23-ENV6323

DRAWING NO.
2

0 100 200

APPROXIMATE SCALE IN FEET AS DETERMINED FROM GOOGLE MAPS

Site Plan

basics ENVIRONMENTAL

Phase I Environmental Site Assessment
2092 Oakley Road
Oakley, California

PROJECT NO.
23-ENV6323

DRAWING NO.
3

Property Address: **2092 OAKLEY RD 2100 OAKLEY CA 94561-1608**

General Information

County:	**CONTRA COSTA**
Parcel # (APN):	**037-110-031-4** Open Map
Owner:	See Full Detail
Mailing Address:	**3130 BALFOUR RD #269 BRENTWOOD CA 94513-5516**
Legal Description:	**POR SEC 22 T2N R2E**
Use Type:	**AGRICULTURAL**
Tax Rate Area:	**019-083**

Full Detail $14.95 Add to Cart

PLEASE NOTE: If a field is empty on this page, there is no data available, and the field will also be empty on the Full Detail property report.

Assessment

Total Value:	**$2,473,360**	Year Assd:	**2022**
Land:	**$2,179,649**	Zoning:	
Structures:	**$293,711**	Use Code:	See Full Detail
Other:		Census Tract:	See Full Detail
% Improved:	See Full Detail	Price/SqFt:	See Full Detail
Exempt Amt:			
HO Exempt:	**N**		

Sale History

	Sale 1	Sale 2	Sale 3	Transfer
Document Date:	**07/09/2019**			See Full Detail
Document Number:	**105162**			See Full Detail
Document Type:				
Transfer Amount:	**$2,400,000**			
Seller (Grantor):				

Property Characteristics

Bedrooms:		Fireplace:		Units:	
Baths (Full):		A/C:		Stories:	
Baths (Half):		Heating:		Quality:	
Total Rooms:		Pool:		Building Class:	
Bldg/Liv Area:	**2,533**	Park Type:		Condition:	
Lot Acres:	**9.987**	Spaces:		Site Influence:	
Lot SqFt:	**435,034**	Garage SqFt:		Timber Preserve:	
Year Built:	**1967**			Ag Preserve:	
Effective Year:	See Full Detail				

**The information provided here is deemed reliable, but is not guaranteed.

Additional reports on this property

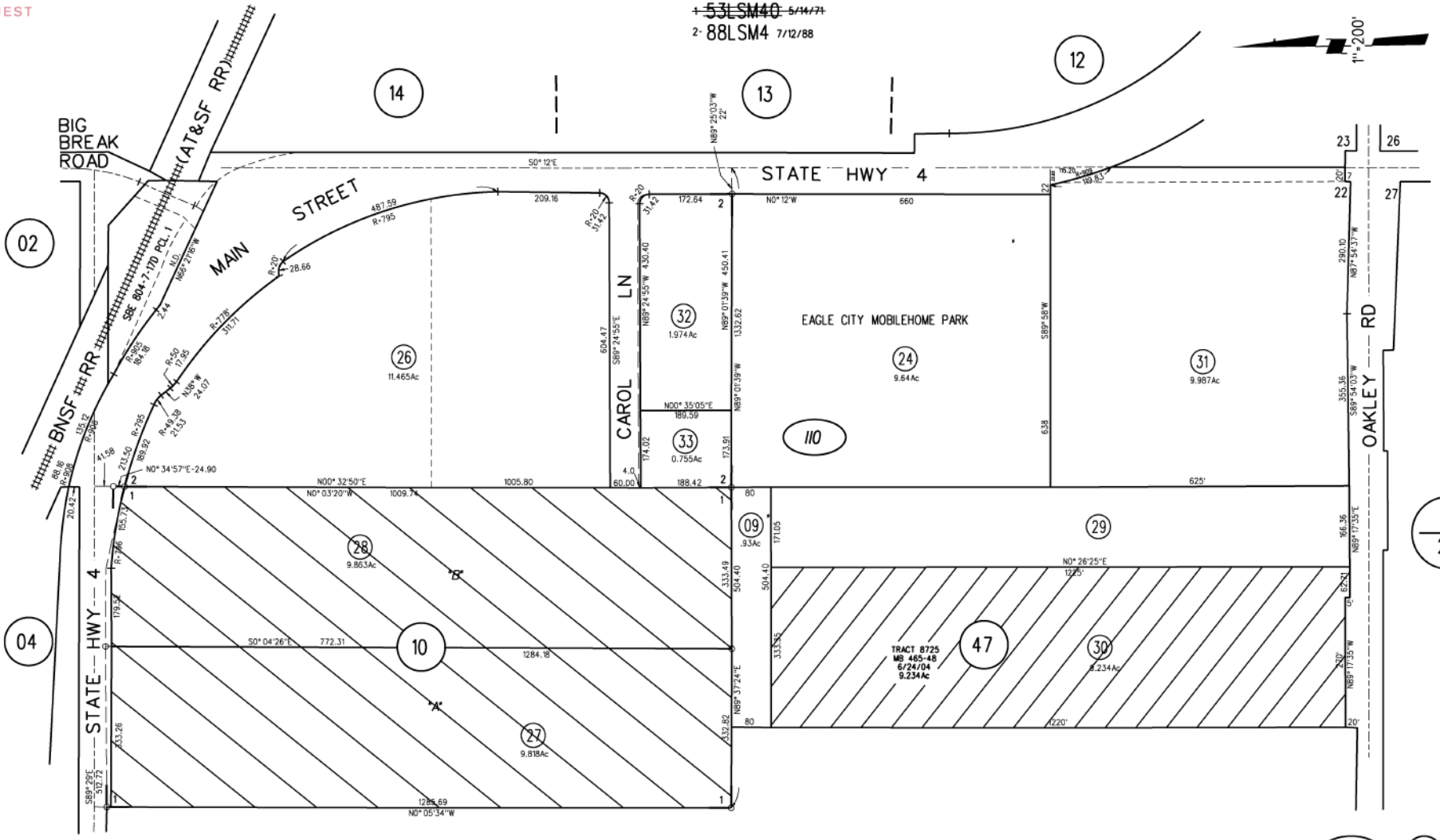
Provided by:
PARCELQUEST

POR SEC 22 T2N R2E MDBM

~~1 53LSM40 5/14/71~~

2 88LSM4 7/12/88

1" = 200'



NOTE: THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSES ONLY. NO LIABILITY IS ASSUMED FOR THE ACCURACY OF THE INFORMATION DELINEATED HEREON. ASSESSOR'S PARCELS MAY NOT COMPLY WITH LOCAL LOT SPLIT OR BUILDING SITE ORDINANCES.

10

110 32,33
09/30/14

23-8
ASSESSOR'S MAP
BOOK 37 PAGE 11
CONTRA COSTA COUNTY, CALIF.

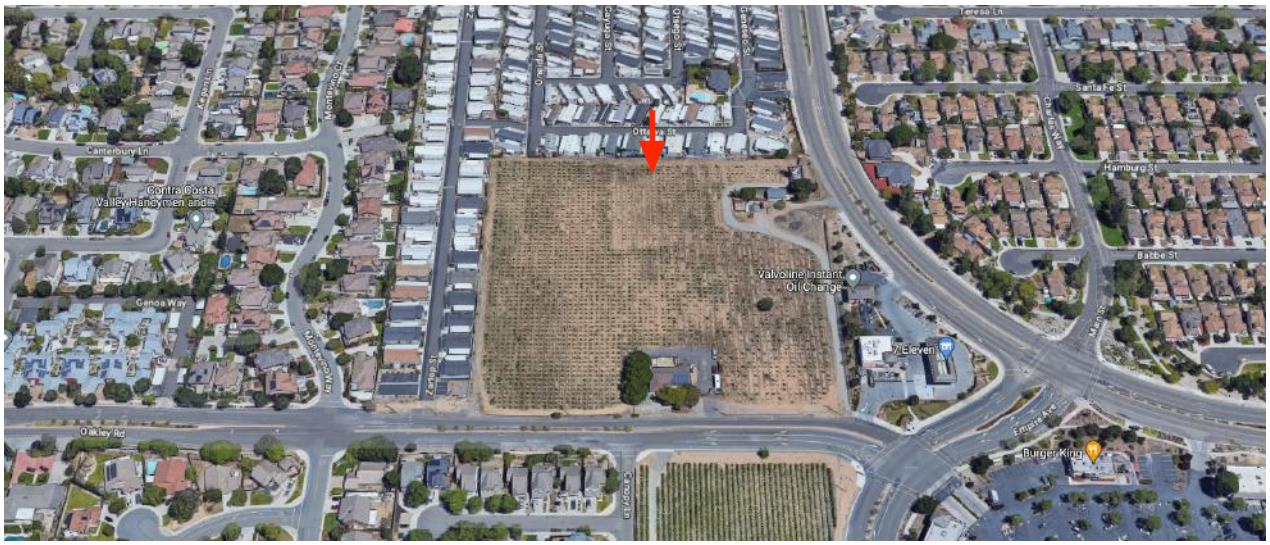


Photo 1: Subject Site (Facing North)
Two (2) One-Story Residential Dwellings (2092 & 2100 Oakley Road) and Associated Vineyard
(Source: Google Maps)

Photo 2: Subject Site (Facing South)
Two (2) One-Story Residential Dwellings (2092 & 2100 Oakley Road) and Associated Vineyard
(Source: Google Maps)

Site Photographs

Photo 3: Subject Site (Facing Northwest)
Two (2) One-Story Residential Dwellings (2092 & 2100 Oakley Road) and Associated Vineyard

Photo 4: Subject Site (Facing Northeast)
Two (2) One-Story Residential Dwellings (2092 & 2100 Oakley Road) and Associated Vineyard

Site Photographs

Photo 5: Subject Site (Facing Southwest)
Two (2) One-Story Residential Dwellings (2092 & 2100 Oakley Road) and Associated Vineyard

Photo 6: Subject Site (Facing Southeast)
Two (2) One-Story Residential Dwellings (2092 & 2100 Oakley Road) and Associated Vineyard

Site Photographs

Photo 7: Subject Site (Facing Southwest)
Elevator Water Tank and Cell Tower and Associated Vineyard

Photo 8: Subject Site (Facing Southwest)
Elevator Water Tank and Cell Tower and Associated Vineyard

Site Photographs

Photo 9: Subject Site (Facing Northwest)
One-Story Residential Dwelling & Associated Yard
(2092 Oakley Road)

Photo 10: Subject Site (Facing Southeast)
One-Story Residential Dwelling & Associated Yard
(2092 Oakley Road)

Site Photographs

Photo 11: Subject Site (Facing Northwest)
One-Story Residential Dwelling Garage
(2092 Oakley Road)

Photo 12: Subject Site (Facing Southeast)
One-Story Residential Dwelling Garage
(2092 Oakley Road)

Site Photographs

Photo 13: Subject Site (Facing Northeast)
One-Story Residential Dwelling & Associated Yard
(2100 Oakley Road)

Photo 14: Subject Site (Facing Southwest)
One-Story Residential Dwelling & Associated Yard
(2100 Oakley Road)

Site Photographs

Photo 15: Adjacent Site (Facing Northeast)
7-Eleven Gas Station and Mart
(2437 Main Street)

Photo 16: Adjacent Site (Facing Northwest)
Valvoline Instant Oil Change Facility
(2435 Main Street)

Site Photographs

Appendix H
Hydrology Report

Bellecci & Associates

HYDROLOGY REPORT

for

THE VILLAGE AT 2092 OAKLEY ROAD

SUBDIVISION 9634
CITY OF OAKLEY
CONTRA COSTA COUNTY
CALIFORNIA

November 2022

City of Oakley
Planning Division

DEC 02, 2022

RECEIVED

Client
Forecast Land Investment, LLC
4021 Port Chicago Highway, Suite H
Concord, CA 94520

CONCORD
2290 Diamond Blvd. Suite 100
Concord, CA 94520-5744

PLEASANTON
7077 Koll Center Parkway, Suite 210
Pleasanton, CA 94566

Civil Engineering Land Surveying

TABLE OF CONTENTS

I. Project Location and Description 3
II. Existing Conditions 3
III. Proposed Conditions 3
IV. Conclusions 4

ATTACHMENTS

Attachment A: CCCFCD Standard - Runoff Coefficients
Attachment B: CCCFCD Mean Seasonal Isohyets (B-166)
Attachment C: CCCFCD Precipitation Duration-Frequency-Depth Curves (B-159)
Attachment D: Hydrology Exhibit

I. PROJECT LOCATION AND DESCRIPTION

The purpose of this report is to design the storm drain facilities for The Village and verify hydraulic capacity for stormwater conveyance. The Rational method was used to calculate the design flows for storm drain sizing.

The proposed 83-lot single family housing project will occupy the 9.99± acres in the City of Oakley, Contra Costa County, California. The site is located north of Oakley Road and west of Main Street in the City of Oakley. According to FEMA map No. 06013C0355G effective date March 21, 2017, the site is in Zone X (Area of Minimal Flood Hazard).

The storm drain lines will feed into two bioretention basins located at the north and east ends of the project site and direct storm water to the existing catch basin at the intersection of Main Street and Carol Lane.

II. EXISTING CONDITIONS

Under existing conditions, project site serves as open space with vegetation and two houses in the southern and eastern parts of the site. Runoff from the site travels via shallow overland flow easterly and infiltrates the ground.

The site is located next to the 7-11 convenience story to the east and the Eagle City mobile home community to the north and west. USGS web soil survey indicated the site falls under soil group "A". Elevation in this site ranges from as low as 23' on the eastern side of project boundary to as high as 33' at the center of the site. Currently the site drainage is overland, with most of the site being self-treating.

III. PROPOSED CONDITIONS

Under proposed conditions, the stormwater will be diverted to the bioretention basins by means of sheet flow and curb cuts. There will be storm drain piping connecting the basins together and ultimately tying into the existing storm drain system on Main Street. The sizing of the basin is proposed to satisfy Contra Costa County C.3 requirements. The bioretention basins are enclosed in parcels dedicated for stormwater treatment purposes.

The following assumptions were made for the hydraulic analysis.

1. Recurrence Interval: 10 years
2. Land Use: Residential P-1 (Min: 2900 Square Feet)
3. Runoff Coefficient "C": 0.69
    - See Attachment A: CCCFCD Standard - Runoff Coefficients.
4. Time of Concentration "tc": varies from 5 – 11 minutes
    - Calculated by summing the times of concentration of roof-to-gutter and gutter flow.
    - For time of concentration of roof-to-gutter, see Attachment A: CCCFCD Standard - Runoff Coefficients.
    - Time of concentration of gutter flow is calculated by dividing longest travel distance via gutter flow over a minimum 2 fps of travel velocity for stormwater runoff within gutters.
5. Mean Seasonal Precipitation: 11.5 inches
    - See Attachment B: CCCFCD Mean Seasonal Isohyets (B-166).
6. Rainfall Intensity "i": varies from 1.68 – 1.85 inches per hour
    - See Attachment C: CCCFCD Precipitation Duration-Frequency-Depth Curves (B-159) and Table 1: Rainfall Intensity.

7. Peak Flow Rate "Q": Q = C*i*A (per the Rational method)
8. Manning's "n" value for HDPE = 0.013
9. Manning's "n" value for RCP = 0.015

Table 1: Rainfall Intensity

Mean Seasonal Precipitation (in)	Time of Concentration "tc" (min)	Precipitation Depth (in)	Rainfall Intensity "i" (in/hr)
11.5	5	0.20	2.4
11.5	6	0.22	2.2
11.5	7	0.23	2.0
11.5	8	0.25	1.9
11.5	9	0.26	1.7
11.5	10	0.28	1.7
11.5	11	0.29	1.6

Under proposed conditions, the project site is divided into 3 drainage areas (see Attachment E: Hydrology Exhibit for drainage area delineation). Each drainage area sheet flows into a bioretention basin for treatment and outfalls to the existing storm drain system on Main Street. The peak flow rates for the drainage areas are shown in Table 2: Proposed Conditions Peak Flow Rates.

Table 2: Proposed Conditions Peak Flow Rates

Drainage Area	Storm Event	Runoff Coefficient "C"	Time of Concentration "tc" (min)	Rainfall Intensity "i" (in/hr)	Tributary Area "A" (ac)	Q = C * i * A (cfs)
DA-1	10-year	0.69	10.2	1.7	2.62	3.04
DA-2	10-year	0.69	9.7	1.7	2.04	2.40
DA-3	10-year	0.69	9.1	1.9	3.72	4.75

IV. CONCLUSIONS

In general, the existing conditions drainage patterns have been maintained to the point that the flow rate leaving the site is not exceeded in the proposed condition.

It is in our opinion that the on-site storm water detention system and storm drain pipe sizing has been designed so that there are no negative impacts on the adjacent properties.

Attachment A: CCCFCD Standard - Runoff Coefficients

CCCFCD STANDARD - RUNOFF COEFFICIENTS

Rational Formula

Land Use	Runoff Coefficient	Average Impervious Area (%)	Time of Concentration-Roof to Gutter (min)
Residential:			
R - 6	.50 - .70	76	3 - 5
R - 10	.45 - .60	53	5 - 7
R - 20	.40 - .50	35	6 - 8
R - 40	.35 - .45	25	8 - 10
Apartment	.60 - .80		3 - 10
Commercial	.70 - .95		3 - 8
Industrial	.60 - .90		3 - 10
Open	.20 - .40		
Street:			
Asphalt	.75 - .95		
Concrete	.80 - .95		
Drives and Walks	.80 - .95		
Roofs	.75 - .95		

Legend

R - 6 = 6,000 ft^2 Lot
R - 10 = 10,000 ft^2 Lot
R - 20 = 20,000 ft^2 Lot
R - 40 = 40,000 ft^2 Lot

Note: For Contra Costa County Land Uses use the highest runoff coefficient in the range. This more closely approximates the peak flows calculated by the Unit Hydrograph method developed for Contra Costa County and calibrated with local rainfall and runoff data.

CONTRA COSTA COUNTY
TABLE OF HEADLOSS FACTORS
THROUGH STRUCTURES

	TYPE OF STRUCTURE	K
1.	Straight run with change in pipe size.....	0.25
2.	Straight run with same pipe size.....	0.17
3.	0° - 45° deflection with change in pipe size.....	0.50
4.	0° - 45° deflection with same pipe size.....	0.42
5.	45° - 90° deflection with change in pipe size.....	0.75
6.	45° - 90° deflection with same pipe size.....	0.75
7.	Approaching 90° deflection.....	1.00
8.	90° deflection.....	1.25
9.	Drop manhole.....	1.25
10.	Short radius curves (50' and shorter).....	0.35

Notes:

County freeboard requirement is 1.25' (15") to grate (not TOC).

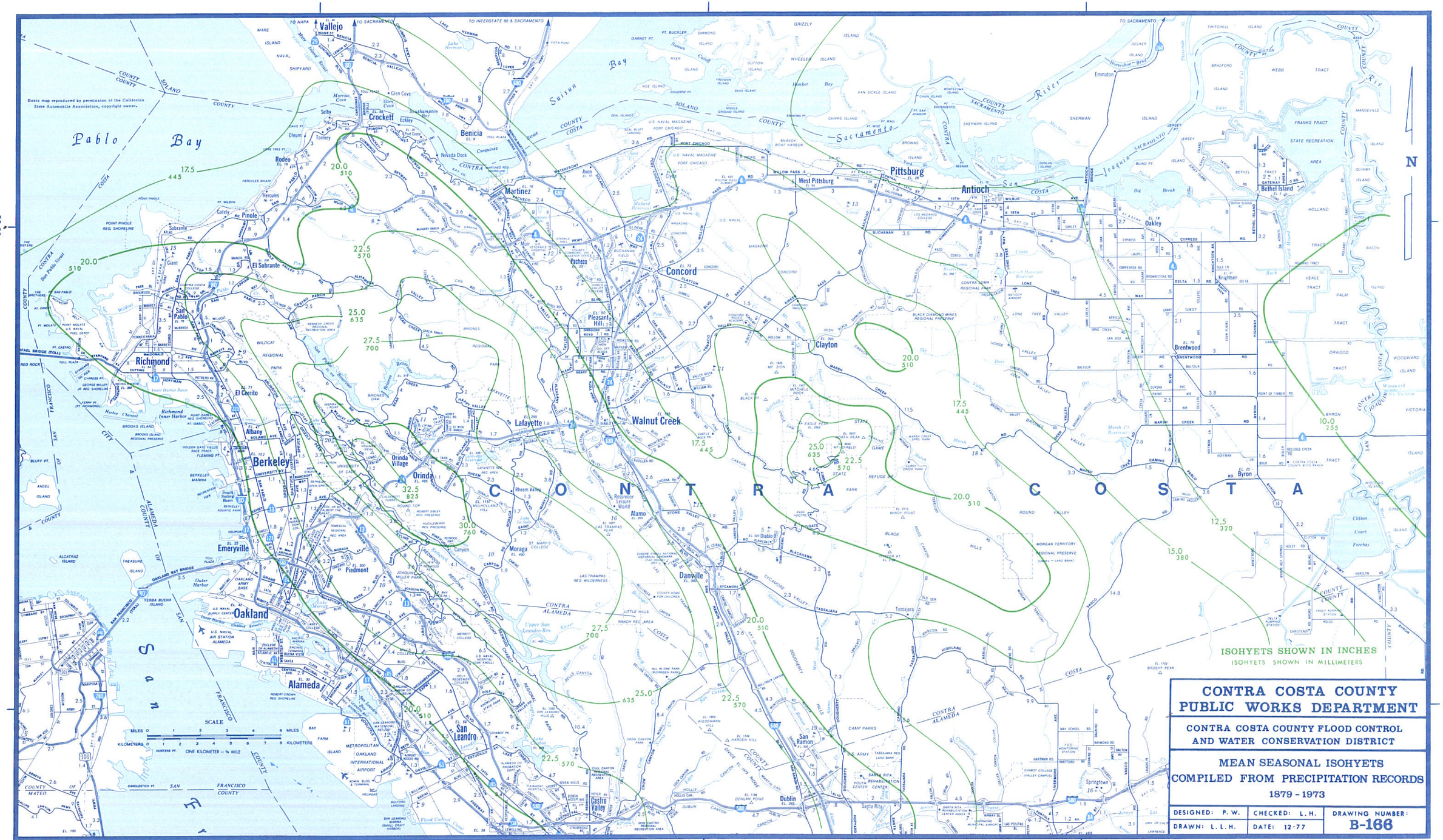
CCC uses Manning's "n" values of 0.015 for RCP, and 0.024 for CMP.

Contributing Watershed (Square Miles)	Design Event
0 to 1	10-year
1 to 4	25-year
Greater than 4 square miles	100-year

Attachment B: CCCFCD Mean Seasonal Isohyets (B-166)

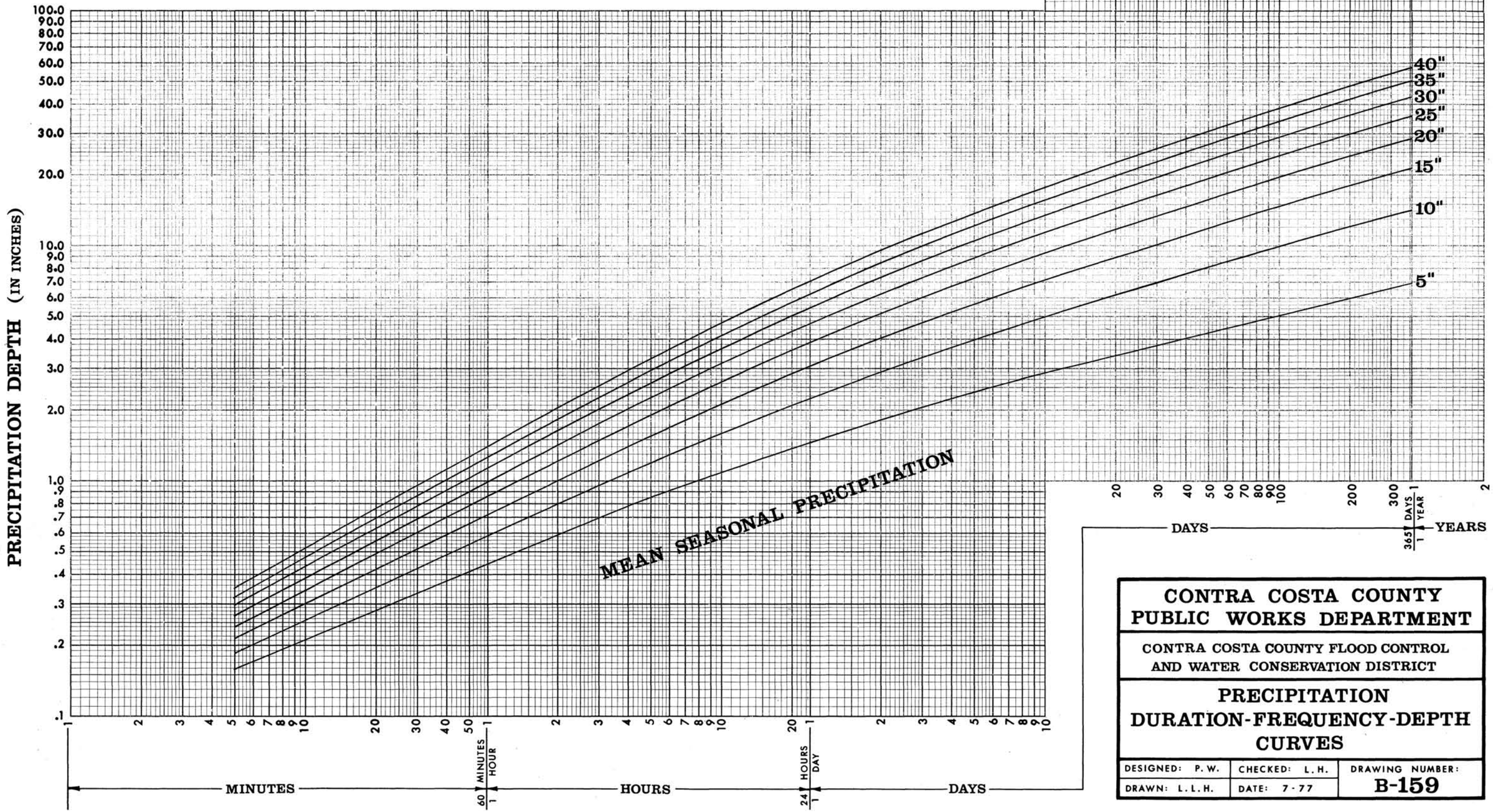
122°15′ 122°00′ 121°45′

38°00′ 37°45′


Basic map reproduced by permission of the California State Automobile Association, copyright owner.
Pablo Bay
Suisun Bay
Sacramento River
San Joaquin River
CONTRA COSTA
ALAMEDA
SAN FRANCISCO BAY
Vallejo
Benicia
Crockett
Martinez
Pittsburg
Antioch
Concord
Pleasant Hill
Walnut Creek
Clayton
Oakley
Brentwood
Knightsen
Byron
Bethel Island
Rodeo
Pinole
San Pablo
Richmond
El Cerrito
Albany
Berkeley
Emeryville
Oakland
Alameda
San Leandro
Lafayette
Orinda
Moraga
Danville
San Ramon
Dublin
Castro Valley
Tassajara
Springtown
Port Chicago
West Pittsburg
Emmaton
Nevada Dock
Glen Cove
Selby
Oleum
Hercules
Sobrante
El Sobrante
Orinda Village
Rheem Valley
Alamo
Piedmont
Diablo
Round Valley
Black Diamond Mines Regional Preserve
Morgan Territory Regional Preserve
Contra Loma Regional Park
Mt. Diablo State Park
Las Trampas Reg. Wilderness
Point Pinole Reg. Shoreline
Robert Crown Reg. Shoreline
Brushy Peak
Mt. Zion
Mt. Mitchell
Mt. Wall
Mt. Diablo
Eagle Peak
Windy Point
Donlan Point
Mt. Hamilton
Las Positas
Santa Rita
Chabot College (Valley Campus)
Oakland International Airport
Metropolitan Oakland International Airport
Castro Valley Flood Control Basin
Lake Herman
Lake Merritt
Upper San Leandro Res.
Briones Dam
Briones Reservoir
Contra Costa Canal
Old River
Middle River
Mokelumne River
Franks Tract
Webb Tract
Bradford Island
Jersey Island
Holland Tract
Veale Tract
Palm Tract
Quimby Island
Mandeville Island
Woodward Island
Victoria Island
Clifton Court Forebay
Rock Slough
Old River
Indian Slough
Marsh Creek Reservoir
Marsh Creek Spec. Area
Marsh Creek State Park
Round Valley Regional Preserve
Las Trampas Regional Wilderness
Contra Loma Regional Park
Black Diamond Mines Regional Preserve
Mt. Diablo State Park
Briones Regional Park
Tilden Regional Park
Wildcat Regional Park
Point Pinole Regional Shoreline
Robert Crown Memorial State Beach
Brushy Peak Regional Preserve
Las Trampas Regional Wilderness
Morgan Territory Regional Preserve
Round Valley Regional Preserve
Contra Costa County Fairgrounds
Delta Fair
Delta Diablo Sanitation District
Delta Diablo Sanitation Plant
Delta Diablo Sanitation Pumping Station
Tracy Blvd. Pumping Station
Kelso Pumping Station
Christensen Pumping Station
Rio Vista Gas Field
Rio Vista Gas Field Storage
Rio Vista Gas Field Storage Area
Rio Vista Gas Field Storage Area
Rio Vista Gas Field Storage Area

Attachment C: CCCFCD Precipitation Duration-Frequency-Depth Curves (B-159)

RECURRENCE INTERVAL
10 YEARS



CONTRA COSTA COUNTY PUBLIC WORKS DEPARTMENT		
CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT		
PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES		
DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER: B-159
DRAWN: L. L. H.	DATE: 7-77	

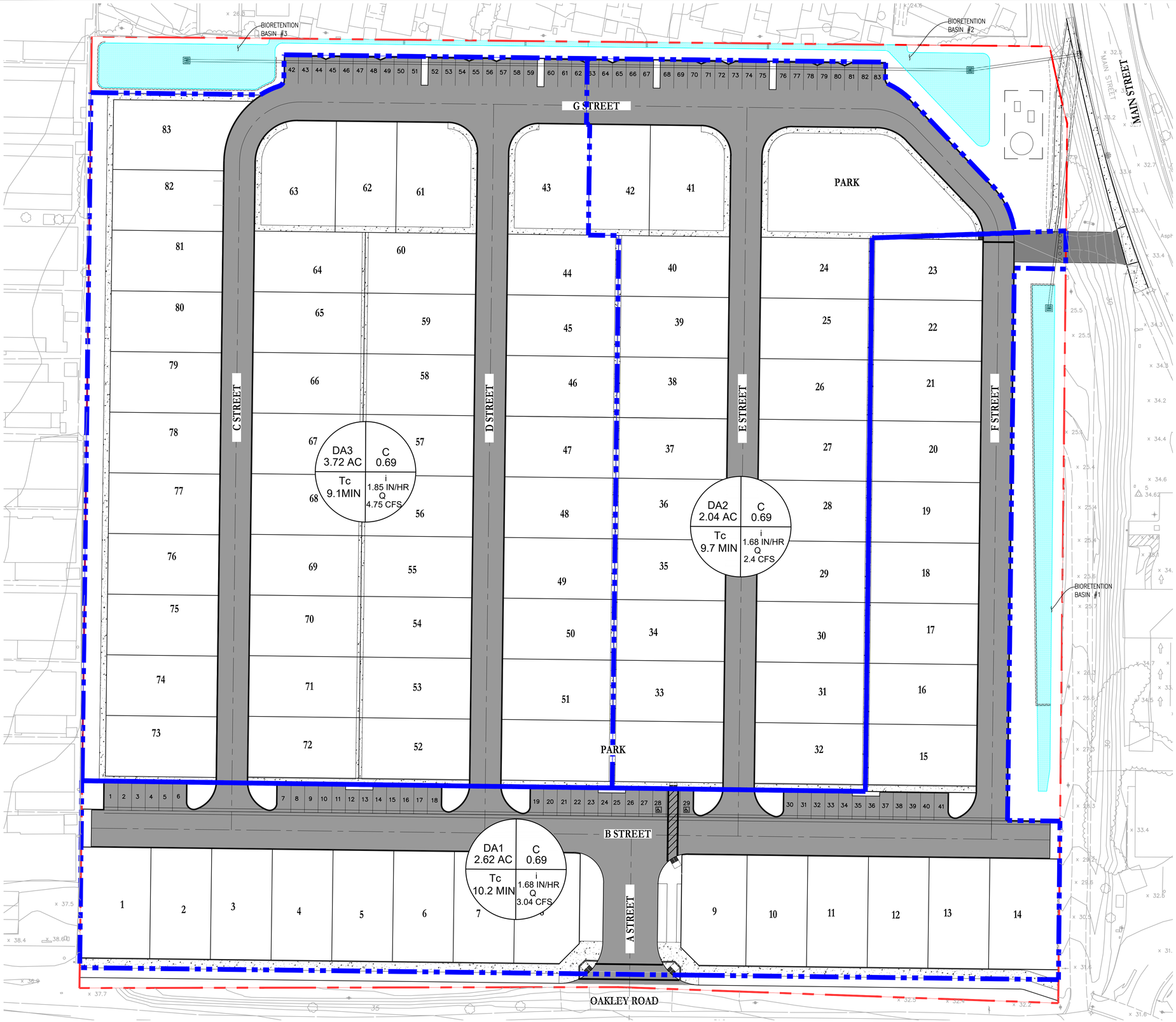
Attachment D: Hydrology Exhibit

SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
HYDROLOGY EXHIBIT

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

NOVEMBER 30, 2022 SCALE: 1"=30'



LEGEND

BOUNDARY LINE

DRAINAGE AREA BOUNDARY

TOTAL PROPERTY AREA = 435,164± SF
PROPOSED ROOF AREA = 98,961 SF
PROPOSED STREETS, DRIVEWAY AREA, SIDEWALKS = 127,223 SF
PROPOSED OPEN SPACE = 208,980 SF

PERVIOUS AREA (OPEN SPACE) = 208,980 SF (4.80 ACRES)
IMPERVIOUS AREA (STREETS, DRIVEWAYS, SIDEWALKS) = 127,223 SF (2.92 ACRES)
IMPERVIOUS AREA (ROOFS) = 98,961 SF (2.27 ACRES)

COMPOSITE "C" RUNOFF COEFFICIENT:

$$\frac{(0.40*4.80) + (0.95*2.92) + (0.95*2.27)}{(4.80 + 2.92 + 2.27)}$$

$$= 0.69$$

N

30 15 0 30 60 90
SCALE IN FEET
GRAPHIC SCALE: 1"=30'

SHEET 1 OF 1
JOB NO. 200056

1000

Appendix I
Preliminary Stormwater Control Plan

STORMWATER CONTROL PLAN

for

THE VILLAGE AT 2092 OAKLEY ROAD

CITY OF OAKLEY, CONTRA COSTA COUNTY
CALIFORNIA

March 2023

Client
John D'Ambrosio
Dan Cosgrove
3130 Balfour Road Suite D #269
Brentwood, CA 94513

prepared by:

Bellecci & Associates Inc.
2290 Diamond Blvd. Suite 100
Concord, CA 94520

TABLE OF CONTENTS

I. Project Data 1

II. Setting 2

II.A. Project Description and Location 2

II.B. Existing Site Condition 2

II.C. Opportunities and Constraints for Stormwater Control 2

III. Low Impact Development Design Strategies 2

III.A. Optimization of Site Layout 2

III.B. Use of Permeable Pavements 3

III.C. Dispersal of Runoff to Pervious Areas 3

III.D. Bioretention or other Integrated Management Practices 3

IV. Documentation of Drainage Design 5

IV.A. Descriptions of each Drainage Management Area 5

IV.A.1. Table of Drainage Management Areas 5

IV.A.2. Drainage Management Area Descriptions 6

IV.B. Tabulation and Sizing Calculations 7

IV.B.1. Information Summary for IMP Design 7

IV.B.2. Self-Treating Areas 7

IV.B.3. Self-Retaining Areas 7

IV.B.4. Areas Draining to Self-Retaining Areas 7

IV.B.5. Areas Draining to IMPs 8

V. Source Control Measures 9

V.A. Site activities and potential sources of pollutants 9

V.B. Source Control Table 10

V.C. Features, Materials, and Methods of Construction of Source Control BMPs 10

VI. Stormwater Facility Maintenance 11

VI.A. Ownership and Responsibility for Maintenance in Perpetuity 11

VI.B. Summary of Maintenance Requirements for Each Stormwater Facility 11

VII. Construction Plan C.3 Checklist 12

VIII. Certifications 12

Tables

Table 1. Project Data 1

Table 2. Drainage Management Areas 5

Table 3. Information Summary for IMP Sizing 7

Table 4. Self-Treating Areas List 7

Table 5. IMP Sizing Calculations 8

Table 6. Source Controls 10

Table 7. Construction Plan C.3 Checklist 10

Figures

Figure 1. Project Location 2
Figure 2. Typical Bioretention Facility 4
Figure 3. Typical Dry Well 4

Attachments

Attachment A: Contra Costa County Bioretention Facilities & Dry Well Information
Attachment B: NRCS Websoil Survey Report
Attachment C: Stormwater Control Plan Exhibit

This Stormwater Control Plan was prepared using the template dated February 2018.

I. PROJECT DATA

Table 1. Project Data

Project Name/Number	The Village at 2092 Oakley Road
Application Submittal Date	November 2022
Project Location	2092 Oakley Road, Oakley CA 94561
Name of Developer	John D'Ambrosio and Dan Cosgrove
Project Phase No.	N/A
Project Type and Description	Residential with 83 single-family homes
Project Watershed	Marsh Creek Watershed
Total Project Site Area (acres)	9.99
Total Area of Land Disturbed (acres)	9.99
Total New Impervious Surface Area (sq. ft.)	226,174 SF
Total Replaced Impervious Surface Area	0
Total Pre-Project Impervious Surface Area	0
Total Post-Project Impervious Surface Area	226,174 SF
50% Rule[*]	Doesn't Apply
Project Density	8.3 DU/Acre
Applicable Special Project Categories	None
Percent LID and non-LID treatment	100%
HM Compliance [†]	Exempt—drains to linear detention basin.

[*50% rule applies if:
Total Replaced Impervious Surface Area > 0.5 x Pre-Project Impervious Surface Area]

[†HM required (unless project meets one of the exemptions on *Guidebook* p. 9) if:
(Total New Impervious Surface Area + Total Replaced Impervious Surface Area) ≥ 1 acre]

II. SETTING

II.A. Project Description and Location

The Village at 2092 Oakley Road will be 83 single family homes and two parks on approximately 0.33 acres. The project is located approximately at 2092 Oakley Road, north of Oakley Road and west of Main Street.

II.B. Existing Site Condition

Figure 1. Project Location

The site varies in elevation from as low as 25 ft at the eastern boundary to as high as 33 ft at the center of the site. There are currently two existing homes on the site that will be demolished prior to grading, but the majority of the site is covered with a mixture of low grass and exposed soil.

A custom soil resource report was created for the project site. The report is a product of the United States Department of Agriculture and the Natural Resources Conservation Service. The report is dated September 13, 2022.

The site primarily consists of sandy soils (NRCS Hydrologic Soil Group "A") which promote for faster infiltration of onsite stormwater. The current flow of the onsite stormwater drains towards the northeastern section of the site.

The existing general plan zoning is commercial. The proposed land use is for single family residential with lots as small as 2,900 square feet

II.C. Opportunities and Constraints for Stormwater Control

Opportunities include permeable soils (soil group A) and a mildly sloping site. Constraints are high density land use (2,900 square foot lots). The site will be extensively graded to create building pads and roads.

Constraints include the location of the tie in structure which is located at the intersection of Main Street and Carol Lane north of the project site. The storm drain will need to be extended along Main Street to provide for a connection point for the treated stormwater.

Fortunately, the site naturally drains to the northeastern section of the site, so it is optimal to place the storm drain basins at the north and eastern boundaries of the project site.

III. LOW IMPACT DEVELOPMENT DESIGN STRATEGIES

III.A. Optimization of Site Layout

Existing conditions have the stormwater naturally draining towards the northeastern section of the project site. It is most optimal to design the bioretention basins at the northeastern section of the

project site for this reason as less fill will be required. The project also proposes to use landscaping to minimize impervious areas.

III.B. Use of Permeable Pavements

Permeable pavers are not used on this site. All stormwater runoff is captured and treated by either dry wells or a bioretention facility.

III.C. Dispersal of Runoff to Pervious Areas

Runoff from roofs will be directed to the alleys, using roof downspouts, and sheet flow towards the treatment facilities using catch basins and curb cuts. The catch basins and curb cuts will direct runoff towards the basin for treatment. These basins—dry wells and bioretention facility—are designed to treat the runoff through infiltration, decrease the time of concentration via evapotranspiration and percolation through engineered soil, and discharge the treated runoff into the storm drain system

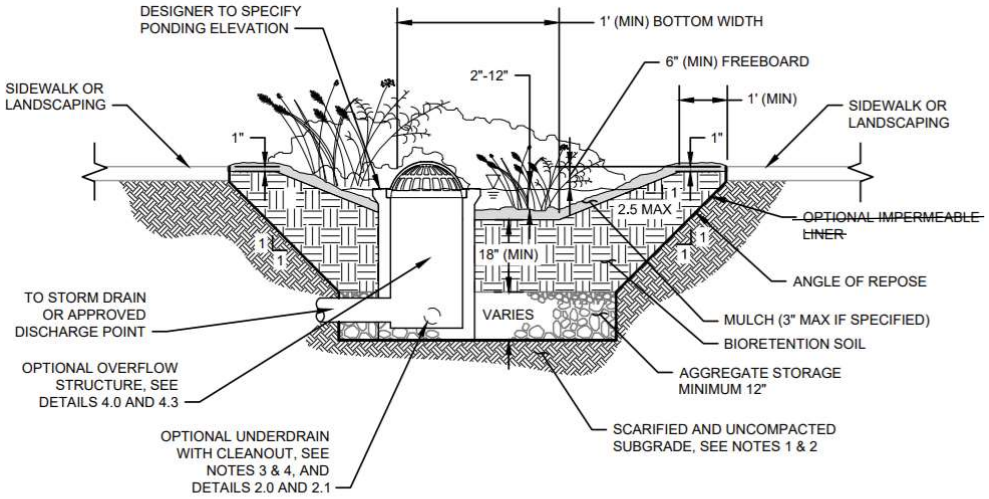
III.D. Bioretention or other Integrated Management Practices

Runoff from roofs and paved areas on each of the 83 residential lots, as well as the streets constructed in connection with the project, will be collected and conveyed to one of the two dry wells or the bioretention facility. Bioretention facilities detain runoff in a surface reservoir, filter it through plant roots and a biologically active soil mix, and then infiltrate it into the ground. Underdrains (4" perforated pipes) are used to convey treated runoff that does not infiltrate to a storm drain. The BMP's are located at the low points of the respective drainage management areas. Each BMP has adequate hydraulic head to allow drainage into and away from the BMP without need for pumps. The sizes of each drainage area and the corresponding BMP are shown in Table 2.

The typical dry well is a prefabricated structure, such as an open-bottomed vault or box, placed in an excavation or boring. The vault may be empty, which provides maximum space efficiency, or may be filled with rock.

An infiltration basin has the same functional components—a volume to store runoff and sufficient area to infiltrate that volume into the native soil—but is open rather than covered.

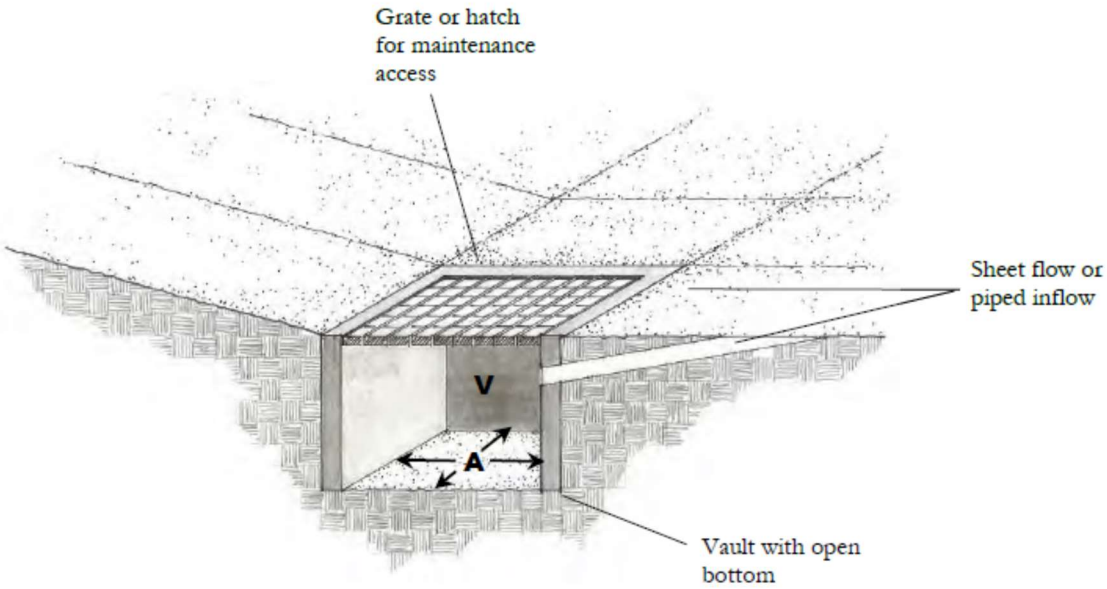
Figure 2. Typical Bioretention Facility



CONSTRUCTION NOTES:

1. AVOID COMPACTION OF EXISTING SUBGRADE BELOW BASIN.
2. SCARIFY SUBGRADE TO A DEPTH OF 3 INCHES (MIN) IMMEDIATELY PRIOR TO PLACEMENT OF AGGREGATE STORAGE AND BIORETENTION SOIL MATERIALS.
3. ~~UNDERDRAIN REQUIRED FOR ALL FACILITIES WITH IMPERMEABLE LINER.~~
4. PROVIDE ONE CLEANOUT PER PLANTER (MIN) FOR FACILITIES WITH UNDERDRAINS. CLEANOUT MUST CONSIST OF A VERTICAL, RIGID, NON-PERFORATED PVC PIPE, WITH A MINIMUM DIAMETER OF 4-INCHES AND A WATERTIGHT CAP.
5. MINIMUM UTILITY SETBACKS AND PROTECTION MEASURES MUST CONFORM TO CURRENT CITY STANDARDS. COORDINATE WITH ENGINEER IN THE EVENT OF UTILITY CROSSING AND UTILITY CONFLICTS.

Figure 3. Typical Dry Well



IV. DOCUMENTATION OF DRAINAGE DESIGN

IV.A. Descriptions of each Drainage Management Area

Impervious areas in the site (roofs, driveways, and walkways) have been divided into distinct drainage areas as shown on the Stormwater Control Plan exhibit. Runoff from each of these areas is managed by routing to the respective vegetative swale.

IV.A.1. Table of Drainage Management Areas

Table 2. Drainage Management Areas (DMA)

DMA Name	*Area (SF)*	*Surface Type/Description*	*Drains to*
DMA 1A	*118,202*	Runoff generated from A Street, B Street, and F Street asphalt, concrete paved areas, and parking stalls, as well as, the roof runoff from Lots 1-23.	*IMP-1*
DMA 1B	*11,211*	Runoff from landscape surrounding IMP 1.	*IMP-1*
DMA 2A	*81,299*	Runoff generated from E Street and half of G Street, concrete paved areas and parking spots, as well as, the runoff from Lots 24-55.	*IMP-2*
DMA 2B	*10,014*	Runoff from landscape surrounding IMP 2, Park Parcel B, and half of Park Parcel A.	*IMP-2*
DMA 3A	*156,910*	Runoff generated from C Street, D Street, and half of G Street, concrete paved areas, parking stalls, as well as, Lots 43-83.	*IMP-3*
DMA 3B	*6,991*	Runoff from landscape surrounding IMP 3.	*IMP-3*
DMA 4	*6,343*	Self-treating existing open space	*N/A*
DMA 10A	*1,024*	Offsite sidewalk along Oakley Rd.	*IMP 10*
DMA 10B	*5,348*	Offsite pavement addition to Oakley Rd.	*IMP 10*
DMA 11A	*2,200*	Offsite sidewalk along Oakley Rd.	*IMP 11*
DMA 11B	*11,009*	Offsite pavement addition to Oakley Rd.	*IMP 11*
DMA 12A	*1,781*	Offsite sidewalk along Oakley Rd.	*IMP 12*
DMA 12B	*12,534*	Offsite pavement addition to Oakley Rd.	*IMP 12*

IV.A.2. Drainage Management Area Descriptions

DMA-1A&1B Runoff generated from the house footprints of Lots 1 through 23, A Street, B Street, F street, all the parking stalls along Street A and Street F, as well as the landscape surrounding IMP1, drain towards the dry well (IMP-1) and discharges northeast. The total surface area of the basin will be approximately 2,743 square feet. Dry Well IMP-1 will be approximately in the shape of a rectangle with a length of 230 feet and a width varying from 12 feet. Perforated 4" pipe will function as an underdrain to transport treated runoff that has not infiltrated the ground to the City's storm system.

DMA-2A&2B: Runoff generated from the house footprints of Lots 24 through 42, E Street, half of G Street, the corresponding portion of the Street G parking, as well as half of the Parcel A park and all of the Parcel B park, drain towards the bioretention basin (IMP-2) and discharges northeast. The total surface area of the basin will be approximately 3,294 square feet. Bioretention Basin IMP-2 will be approximately in the shape of a small rectangle with a length of 200 feet and a width of 5 feet combined with a triangle with a length of 50 feet and width of 50 feet. Perforated 4" pipe will function as an underdrain to transport treated runoff that has not infiltrated the ground to the City's storm system.

DMA-3A&3B: Runoff generated from the house footprints of Lots 43 through 83, C Street, D Street, half of G street, the corresponding portion of the G Street parking, as well as, the landscape area surrounding IMP 3 and along the west side of the site, drains towards the dry well(IMP-3) and discharges northeast. The total surface area of the basin will be approximately 3,556 square feet. Dry Well IMP-3 will be approximately in the shape of a rectangle with a length of 117 feet and a width of 30 feet. Perforated 4" pipe will function as an underdrain to transport treated runoff that has not infiltrated the ground to the City's storm system.

DMA-4: Is the existing self-treating Parcel E. The proposed sidewalk within Parcel E, connecting Main Street to the Site, is less than 5% of the total area. According to the C.3 Guidebook, a self-treating area can be contain 5% or less impervious area.

DMA-10A&10B: Runoff generated from the offsite sidewalk and Oakley Rd. pavement improvements will be captured and treated within the proposed landscape planter fronting the sidewalk. The treatment facility is a dry well with a modified bioretention facility. Dry wells need an additional source of treatment, if intended to treat a heavier trafficked roadway. As such, the dry well surface area has been increased almost ten times the required amount and a bioretention facility is being added to the top of the dry well. The required surface area of the dry well is 127 SF, the total surface area of the basin will be approximately 1,023 square feet. Perforated 4" pipe will function as an underdrain to transport treated runoff that has not infiltrated the ground to the City's storm system.

DMA-11A&11B: Runoff generated from the offsite sidewalk and Oakley Rd. pavement improvements will be captured and treated within the proposed landscape planter fronting the sidewalk. The treatment facility is a dry well with a modified bioretention facility. Dry wells need an additional source of treatment, if intended to treat a heavier trafficked roadway. As such, the dry well surface area has been increased almost ten times the required amount and a bioretention facility is being added to the top of the dry well. The required surface area of the dry well is 264 SF, the total surface area of the basin will be approximately 2,045 square feet. Perforated 4" pipe will function as an underdrain to transport treated runoff that has not infiltrated the ground to the City's storm system.

DMA-12A&12B: Runoff generated from the offsite sidewalk and Oakley Rd. pavement improvements will be captured and treated within the proposed landscape planter fronting the sidewalk. The treatment facility is a dry well with a modified bioretention facility. Dry wells need an additional source of treatment, if intended to treat a heavier trafficked roadway. As such, the dry well

surface area has been increased almost six times the required amount and a bioretention facility is being added to the top of the dry well. The required surface area of the dry well is 286 SF, the total surface area of the basin will be approximately 1,644 square feet. Perforated 4" pipe will function as an underdrain to transport treated runoff that has not infiltrated the ground to the City's storm system.

IV.B. Tabulation and Sizing Calculations

IV.B.1. Information Summary for IMP Design

Table 3. Information Summary for IMP Sizing

Total Project Area (Square Feet)	435,600 SF
Mean Annual Precipitation	12 in
IMPs Designed For:	Treatment Only

IV.B.2. Self-Treating Areas

Table 4. Self-Treating Areas List

I. Self-Treating Areas

DMA Name	Area (sq ft)
DMA 4	6343

IV.B.3. Self-Retaining Areas

There are no self-retaining areas.

IV.B.4. Areas Draining to Self-Retaining Areas

There are no DMAs draining to self-retaining areas.

Table 5. IMP Sizing Calculations

IMP Name: IMP1 (Soil Type: A)

IMP Type: Dry Well

Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor
DMA 1A	118,202	Concrete or Asphalt	1.00	118,202
DMA 1B	11,211	Landscape	0.10	1,121
			Total	119,323

IMP Sizing	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
Area	0.020	1.000	2,386	2,748
Volume	0.068	1.000	8,114	8,244

IMP Name: IMP2 (Soil Type: A)

IMP Type: Bioretention Facility

Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor
DMA 2A	81,299	Concrete or Asphalt	1.00	81,299
DMA 2B	10,014	Landscape	0.10	1,001
			Total	82,300

IMP Sizing	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
Area	0.040	1.000	3,292	3,294

IMP Name: IMP3 (Soil Type: A)

IMP Type: Dry Well

Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor
DMA 3A	156,910	Concrete or Asphalt	1.00	156,910
DMA 3B	6,991	Landscape	0.10	699
			Total	157,609

IMP Sizing	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
Area	0.020	1.000	3,152	3,556
Volume	0.068	1.000	10,717	11,024

IMP Name: DMA10 (Soil Type: A)

IMP Type: Dry Well
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjust-ment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA 10A	1,024	Concrete or Asphalt	1.00	1,024				
DMA 10B	5,348	Concrete or Asphalt	1.00	5,348				
			Total	6,372				
				Area	0.020	1.000	127	1,023
				Volume	0.068	1.000	433	511

IMP Name: DMA11 (Soil Type: A)

IMP Type: Dry Well
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjust-ment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA11A	2,200	Concrete or Asphalt	1.00	2,200				
DMA11B	11,009	Concrete or Asphalt	1.00	11,009				
			Total	13,209				
				Area	0.020	1.000	264	2,045
				Volume	0.068	1.000	898	1,022

IMP Name: DMA12 (Soil Type: A)

IMP Type: Dry Well
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjust-ment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA12A	1,781	Concrete or Asphalt	1.00	1,781				
DMA12B	12,534	Concrete or Asphalt	1.00	12,534				
			Total	14,315				
				Area	0.020	1.000	286	1,644
				Volume	0.068	1.000	973	986

V. SOURCE CONTROL MEASURES

V.A. Site activities and potential sources of pollutants

This single-family residential project will create few potential sources of stormwater pollutants. Sources to be controlled are:

- Potential dumping of washwater or other liquids into storm drain inlets
- Need for future indoor or structural pest control
- Fertilizers and pesticides used in park maintenance and home yard and garden maintenance

- Vehicle washing

V.B. Source Control Table

Table 6. Source Controls

Potential source of runoff pollutants	*Permanent source control BMPs*	*Operational source control BMPs*
On-site storm drain inlets	All accessible on-site inlets will be marked with the words "No dumping! Flows to Bay"	Markings will be periodically repainted or replaced Inlets and pipes conveying stormwater to BMPs will be inspected and maintained as part of BMP Operation and Maintenance Plan
Need for future indoor and structural pest control		Integrated Pest Management (IPM) information will be provided to new homeowners
Landscape/outdoor pesticide use	Final landscape plans will: Be designed to minimize irrigation and runoff and to minimize use of fertilizers and pesticides that can contribute to stormwater pollution. Specify plantings within the vegetated swales that are tolerant of the sandy loam soils and periodic inundation Include pest-resistant plants Include plantings appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	Landscape will be maintained using minimum or no pesticides IPM information will be provided to new homeowners.
Vehicle washing	Driveways and parking areas drain to the vegetated swales	Distribute stormwater pollution prevention information to homeowners

V.C. Features, Materials, and Methods of Construction of Source Control BMPs

Source Control BMP's will be constructed per the Contra Costa County C.3 Guidebook standard requirements.

VI. STORMWATER FACILITY MAINTENANCE

VI.A. Ownership and Responsibility for Maintenance in Perpetuity

All stormwater treatment facilities in this plan will be maintained by the HOA. The owner accepts full responsibility for interim operation and maintenance of the facilities until such time as this responsibility is formally transferred to the HOA.

VI.B. Summary of Maintenance Requirements for Each Stormwater Facility

Bioretention facilities capture runoff from downspouts or sheet flow from paved areas. The runoff briefly floods the surface of the box/basin and then percolates through an active soil layer to drain rock and underdrain system below. Routine maintenance consists of the following:

- Examine downspouts from rooftops or sheet flow from paving to ensure that flow to the planter is unimpeded. Remove any debris and repair any damaged pipes. Check splash blocks or rocks and repair, replace, or replenish as necessary.
- Examine the overflow pipe to make sure it can safely convey excess flows to a storm drain. Repair or replace any damaged or disconnected piping.
- Check the underdrain piping to make sure it is intact and unobstructed.
- Observe the structure of the box and fix any holes, cracks, rotting, or failure.
- Check that the soil is at the appropriate depth to allow a reservoir above the soil surface and is sufficient to effectively filter stormwater. Remove any accumulation of sediment, litter, and debris. Till or replace soil as necessary. Confirm that soil is not clogging and that the planter will drain within 3-4 hours after a storm event.
- Determine whether the vegetation is dense and healthy. Replace dead plants. Prune or remove any overgrown plants or shrubs that may interfere with planter operation. Clean up fallen leaves or debris and replenish mulch. Remove any nuisance or invasive vegetation.
- Bioretention maintenance shall include watering, weeding, pruning, removal of invasive species, and plant replacement to support healthy plant establishment; plant debris and trash removal; and sediment removal from the forebay to maintain flow paths.
- If a facility is not functioning properly, maintenance may involve removing soil media and/or mulch to clean out sediment deposits.
- Specific maintenance requirements, including frequency of each activity and length of contracted maintenance period, shall be detailed in contract documents with HOA, and include the following activities:
    - Ensure irrigation is functioning properly. Look for evidence of broken pipes or sprinklers.
    - Follow recommend pruning practices by plant type for timing and amount to remove.
    - Refer to the Planting Plan in the design documents to identify and remove invasive weeds.
    - Ensure maintenance inspection takes place immediately following storms with rainfall of 0.25 inches or more.
    - Complete and submit inspection checklists and maintenance logs based on the specification requirements.

VII. CONSTRUCTION PLAN C.3 CHECKLIST

Table 7. Construction Plan C.3 Checklist

STORMWATER CONTROL PLAN PAGE #	BMP DESCRIPTION	SEE PLAN SHEET #
6	Dry well (IMP-1) will be designed to treat runoff and decrease the time of concentration before discharging to the storm drain system.	10
6	Bioretention basin (IMP-2) will be designed to treat runoff and decrease the time of concentration before discharging to the storm drain system.	10
7	Dry well (IMP-3) will be designed to treat runoff and decrease the time of concentration before discharging to the storm drain system.	10
8 & 9 (Source Control Table)	On-site drain inlets to be marked with "No Dumping" message.	-
8 & 9 (Source Control Table)	Preservation (if any) of native trees, shrubs or ground cover.	-
8 & 9 (Source Control Table)	Plant selection to minimize irrigation and use of fertilizer and pesticides—pest-resistant.	-

VIII. CERTIFICATIONS

The selection, sizing, and preliminary design of stormwater treatment and other control measures in this plan meet the requirements of Regional Water Quality Control Board Order R2-2015-0049.

By

Print Name

ATTACHMENT A

Bioretention Facilities

Bioretention facilities can be rectangular, linear, or nearly any shape.
Photo by Scott Wikstrom

Bioretention facilities capture runoff in a shallow reservoir on the soil surface, then filter the runoff through plant roots and a biologically active soil mix. The treated runoff then trickles into a subsurface gravel layer. Runoff is held in the gravel layer until it infiltrates it into the ground. If the entire gravel layer becomes saturated, an underdrain conveys excess treated runoff to a storm drain or to surface drainage.

Best Uses

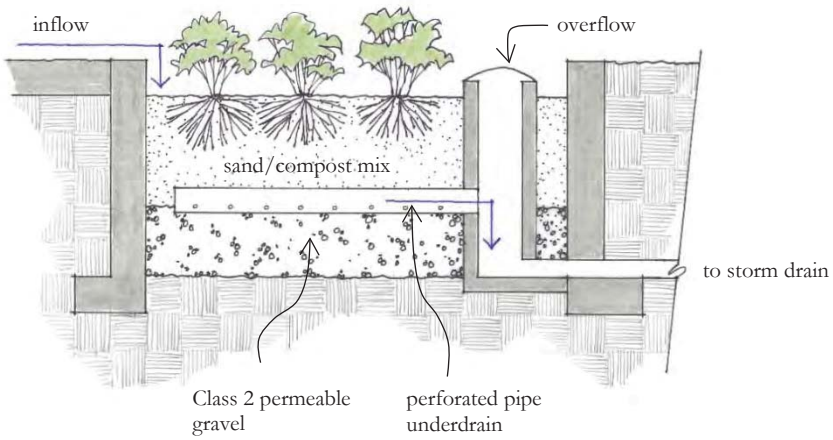
- Commercial areas
- Residential subdivisions
- Industrial facilities
- Roadways
- Parking lots
- Fit in setbacks, medians, and other landscaped areas

Advantages

- Can be any shape
- Low maintenance

Limitations

- Require 4%-15% of tributary impervious square footage
- Typically require 3-4 feet of head
- Irrigation may be required



CONTRA COSTA CLEAN WATER PROGRAM

Stormwater C.3 Guidebook

www.cccleanwater.org

LAYOUT AND SITE DRAINAGE

See the guidance on page 28 regarding how to incorporate bioretention facilities into your site. Also see "Integrating Your LID Design into Your Project" on page 42.

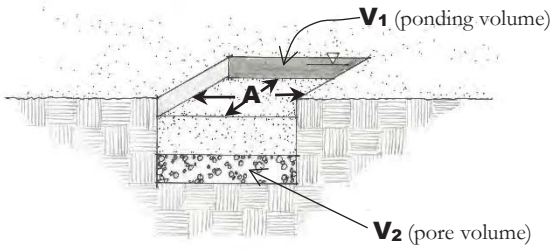
- Place bioretention facilities in visible, well-trafficked areas and make them a focal point in the landscape.
- On flatter sites, use surface drainage, rather than underground pipes, to convey runoff to the bioretention facility inlets. The top of soil elevation should be as high as possible—typically 6 to 12 inches below surrounding grade.
- Where possible, design site drainage so only impervious roofs and pavement drain to the bioretention facility. Avoid high walls or steep slopes adjacent to bioretention facilities. Avoid side slopes within bioretention areas as much as possible. The bioretention soil mix will tend to rill even on very mild slopes (>8:1).
- Integrate bioretention facilities with the landscape design.
- Make the bioretention facilities level around their perimeter.
- Where possible, grade tributary paved areas to sheet flow runoff and disperse it among curb cuts, rather than concentrating flow at one inlet location.
- Place each facility in a common, accessible area. Avoid locating facilities on private residential lots.

► DIMENSIONS AND MATERIALS

For development projects subject only to **runoff treatment requirements**, the following minimum dimensions apply.

Parameter	Criterion
Surface reservoir mean depth	6" minimum
Soil mix surface area	0.04 times tributary impervious area (or equivalent)
Soil mix depth	18" minimum
Gravel layer	12" min. Class 2 permeable
Underdrain discharge	At top of gravel layer

Where **flow-control requirements** also apply, the bioretention facility must be designed to meet the minimum surface area (A), surface volume (V_1), and subsurface volume (V_2) using Equation 3-3 and the sizing factors and equations in Tables 3-6 and 3-7. The IMP Sizing Calculator should be used.



Minimum subsurface volume. For treatment-and-flow-control facilities the minimum subsurface volume V_2 specified in Table 3-6 is the void space, not the entire volume of gravel. Where the native soils are Hydrologic Soil Group C or D, V_2 may be achieved by a 30" deep layer of gravel **of 40% porosity,** extending under the minimum footprint "A". Note that if the facility area is increased, the required depth to achieve the same volume is correspondingly decreased.

Gravel. "Class 2 permeable," Caltrans specification 68-2.02(F)(3), is preferred. Open-graded crushed rock, washed, may be used, but requires 4"-6" washed pea gravel be substituted at the top of the crushed rock layer. **Do not use filter fabric** to separate the soil mix from the gravel drainage layer or the gravel drainage layer from the native soil.

If desired, voids created by buried structures such as pipes or arches, may be substituted, as long as the voids are hydraulically interconnected and the minimum subsurface volume calculated by Equation 3-3 is achieved.

Soil mix. Criteria for the required mix of sand and compost are in Appendix B. It is similar to a loamy sand and must maintain a minimum percolation rate of 5" per hour throughout the life of the facility. It must be suitable for maintaining plant life with a minimum of fertilizer use. A list of suppliers is on the C.3 web pages.

► FACILITY DETAILS

Inlets. Curb cuts should be wide (12" is recommended) to avoid clogging with leaves or debris. Allow for a minimum reveal of 6" between the inlet and soil mix elevations to ensure turf or mulch buildup does not block the inlet. In addition, place an apron of stone or concrete, a foot square or larger, inside each inlet to prevent vegetation from growing up and blocking the inlet.

If the linear slope along the curb is greater than the orthogonal slope of the gutter pan, runoff flows will not enter the inlet efficiently. Use a drop inlet with a grate instead.

Where runoff is concentrated and conveyed to the facility in pipes or swales, protect the landscaping from high-velocity

flows with energy-dissipating cobble of appropriate size. In larger installations, provide cobble-lined channels to better distribute flows throughout the facility.

"Bubble ups" can be used to dissipate energy when runoff is piped from roofs and up-gradient paved areas.

Surface storage and overflow. For treatment-only facilities, the surface reservoir should be a minimum 6" deep. In treatment-and-flow-control facilities, the overflow elevation must be set to achieve the minimum surface storage volume calculated using Equation 3-3 and the V_1 sizing factor.

Ensure the soil mix is installed level and at the specified elevation, and that the elevation does not change when plants are installed.

Overflow structure. A precast concrete catch basin or manhole is best. The overflow elevation is critical and must be designed to achieve the surface reservoir requirements. The outlet should be designed to exclude floating mulch and debris. Design in **freeboard** if needed to prevent flooding or protect adjacent structures.

Underdrains. Underdrains must have their discharge elevation set at the top of gravel layer elevation. Perforated pipe can be laid in a shallow groove dug across the top of the gravel layer, holes facing down, and connected to the overflow structure. Underdrains must be constructed of rigid pipe (SDR 35 or equivalent) and provided with a cleanout.

Flow-control orifice. For treatment-and-flow-control facilities, the underdrain must be routed through a device designed to limit flows to that specified in Equation 3-10 or 3-11 (page 40). Typically, a section of solid pipe is designed to protrude slightly into the overflow structure. The pipe is threaded and fitted with a standard cap; a hole of the specified diameter is drilled into the cap. The cap can then be easily removed for cleaning or adjustment and reinstalled.

► APPLICATIONS

Multi-purpose landscaped areas. Bioretention facilities are easily adapted to serve multiple purposes. The loamy sand soil mix will support either turf or a plant palette suitable to the location and a well-drained soil. See Appendix B for additional guidance on soil, plant selection, and irrigation.

Bioretention facility in El Cerrito with active and passive recreational uses.

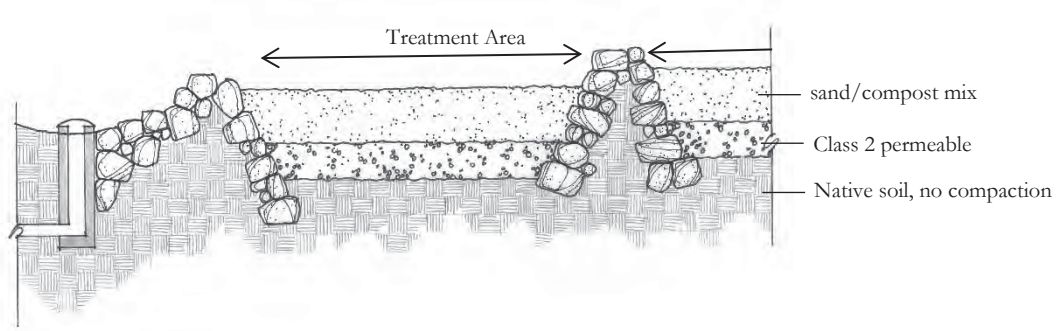
Residential subdivisions. In the design of many subdivisions, it has proven easiest and most effective to drain roofs and driveways to the streets (in the conventional manner) and then drain the streets to bioretention areas, with one bioretention area for each 1 to 10 lots, depending on subdivision layout and topography.

Bioretention areas can be placed on one or more separate, dedicated parcels with joint ownership.

Sloped sites. Bioretention facilities must be constructed as a basin or as a series of basins, with the circumference of each basin level.

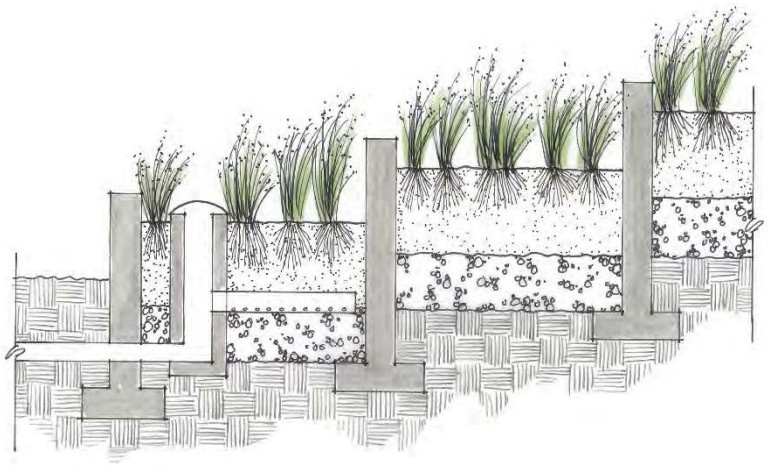
On the surface, a bioretention facility should be one level, shallow basin—or a series of basins. As runoff enters each basin, it should flood and fill throughout before runoff overflows to the outlet or to the next downstream basin. This helps prevent movement of surface mulch and soil mix.

Swales can be used on mild slopes. Check dams should be placed every 4 to 6 inches of elevation change and so that the lip of each dam is at least as high as the toe of the next upstream dam.

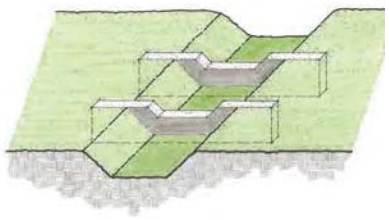


Swale with check dams. Not suitable for steeper slopes. Movement of soil can be a problem even at mild slopes. Design must ensure ponding behind each check dam.

A series of planters is a more robust solution and is required for steeper slopes.



Concrete check dams are a better solution on steeper slopes.



Key check dams into bottom and side slopes.

Solutions for surface storage. Placing a steep-sided depression in an urban landscape poses aesthetic challenges as well as practical challenges. First, use sheet flow, valley gutters, and trench drains, instead of pipes, to move runoff to the bioretention facility, so that inlets can be at or near ground level.

To further avoid the effects of high and steep drop offs, consider:

- Increasing the facility area and reducing the surface depth accordingly.
- Incorporating steps down into the facility.
- Specifying taller, woody plants to block or discourage entry.

Mulch can be mounded a few inches deeper at walkway edges to transition to the top of soil elevation.

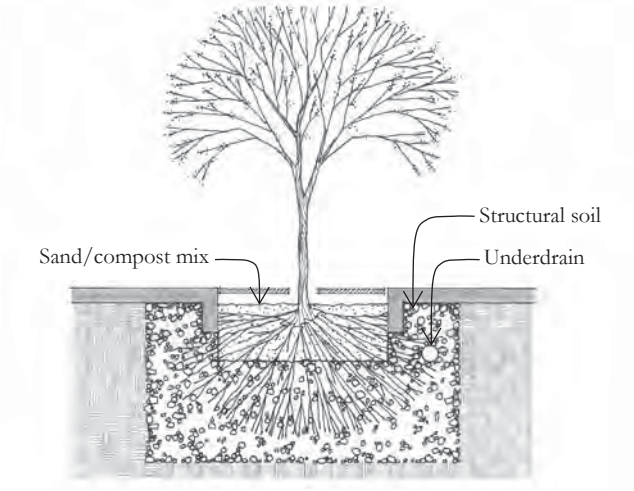
Vaults, utility boxes, backflow preventers, and light standards. Utility features and structures must be located outside the bioretention facility—in adjacent walkways or in a separate area set aside for this purpose.

Emergency overflow. The site grading plan should anticipate extreme events and potential clogging of the overflow, and should route emergency overflows safely.

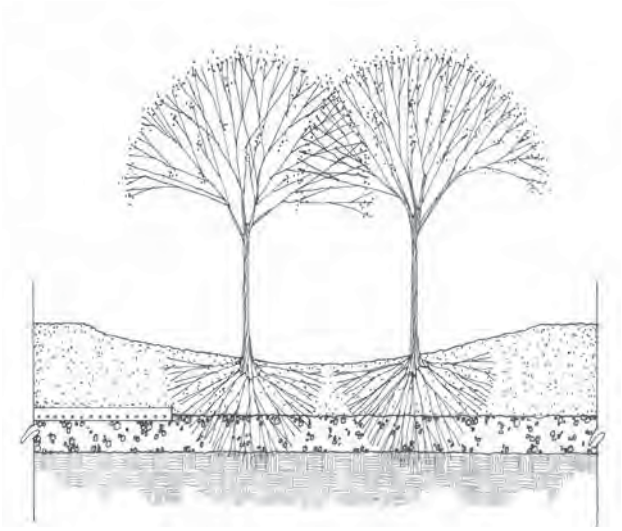
Trees. Bioretention areas can accommodate small or large trees within the minimum areas and volumes calculated by Equation 3-3. Tree canopies intercept rain, and tree roots maintain soil permeability and help retain runoff. Normal maintenance of a bioretention facility should not affect tree lifespan.

Consider the following when designing bioretention facilities to accommodate trees, especially large trees:

- The bioretention facility requires 18" of soil mix over the minimum surface area. Trees can be planted in this soil mix; the area occupied by the tree counts toward the minimum area requirement.
- Trees require sufficient rooting volume to thrive. Structural soils can be used below or around the soil mix.
- Most tree roots extend horizontally near the soil surface.
- The bioretention soil mix has low moisture-holding capacity. Consider planning for tree roots to access native clay soils through the side walls as the tree grows. However, where needed, adjacent paving or structures can be protected with a root barrier.
- A podium of native soil is sometimes constructed so that the root ball can be installed at the correct elevation (so that bioretention soil mix and mulch do not cover the tree's root collar).
- Large trees should be spaced appropriately for their size at maturity.
- Trees may need to be staked for longer because the bioretention soil mix provides little structural support against trees being toppled by wind.



Bioretention facility configured as a tree well.


Larger bioretention facility with trees.

Criteria for Bioretention

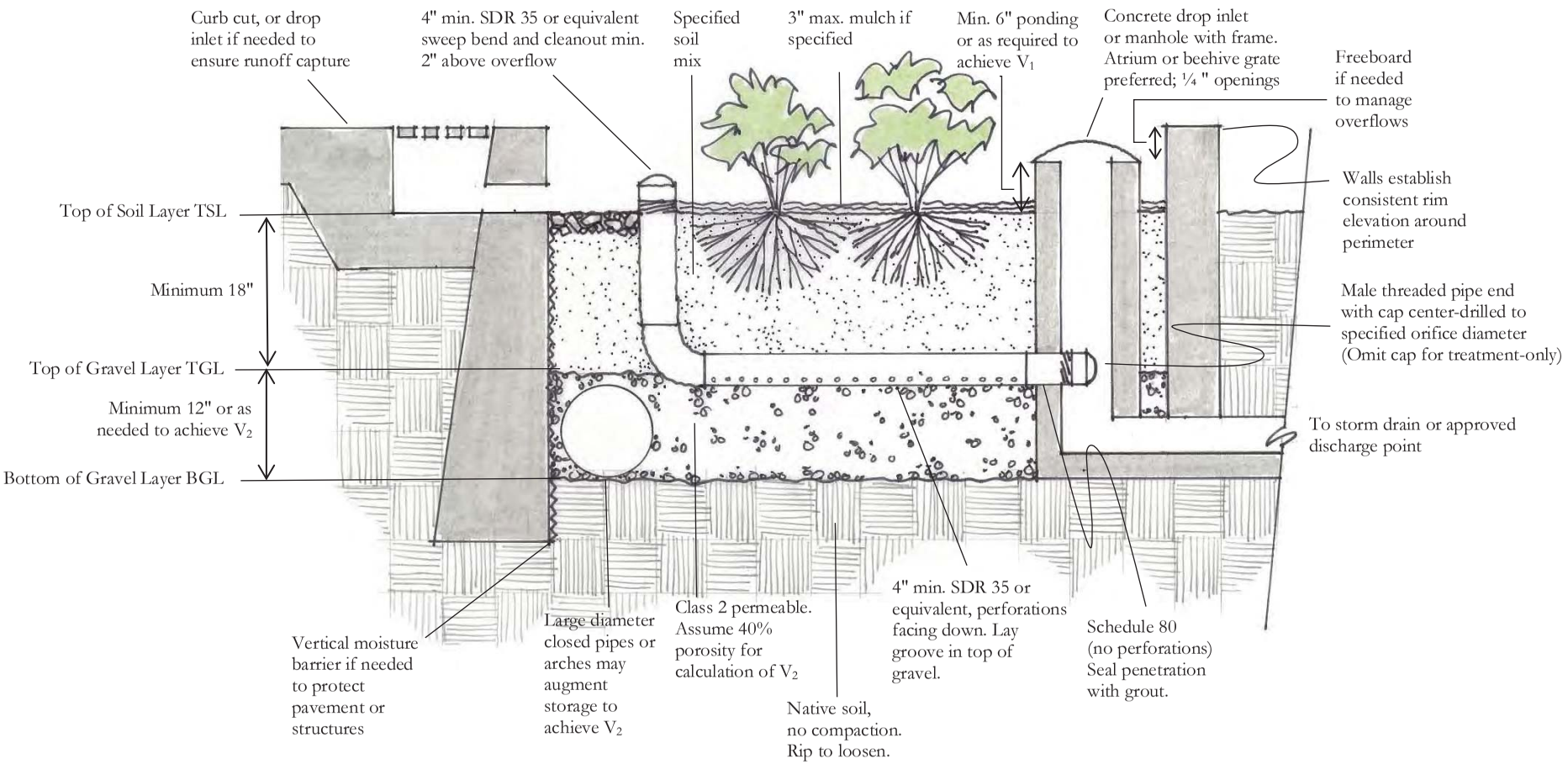
- ❒ Bioretention facilities are located in a visible, well-trafficked area where possible.
- ❒ Top of soil elevation is as high as possible. High walls and steep slopes adjacent to the facility are avoided.
- ❒ Location and footprint of facility are congruent on site plan, landscaping plan, and grading plan.
- ❒ Bioretention area is designed as a basin (level edges) or a series of basins, and grading plan is consistent with these elevations. Check dams, if any, are set so the lip or weir of each dam is at least as high as the toe of the next upstream dam.
- ❒ Volume or depth of surface reservoir meets or exceeds minimum. Freeboard above overflow (1"-2" recommended) is not included in surface reservoir volume.
- ❒ 18" depth specified soil mix (reference *Guidebook* Appendix B).
- ❒ Area of soil mix meets or exceeds minimum.
- ❒ Perforated pipe (PVC SDR 35 or approved equivalent) underdrain with discharge elevation **at the top** of the "Class 2 perm" layer. Holes facing downward. Connection and sufficient head to storm drain or approved discharge point.
- ❒ No filter fabric.
- ❒ Underdrain has a clean-out port consisting of a vertical, rigid, non-perforated PVC pipe, with a minimum diameter of 4 inches and a watertight cap.
- ❒ Curb inlets are 12" wide, have 4"-6" reveal and an apron or other provision to prevent blockage when vegetation grows in, and energy dissipation as needed.
- ❒ Overflow catch basin or manhole connected to a downstream storm drain or approved discharge point.
- ❒ Emergency spillage will be safely conveyed overland.
- ❒ Plantings are suitable to the climate, exposure, and a well-drained soil, and occasional inundation during large storm events.
- ❒ Irrigation system with connection to water supply, on a separate zone. See Appendix B.
- ❒ Vaults, utility boxes, backflow preventers, and light standards are located outside the minimum soil mix surface area.

For treatment-and-flow-control facilities only

- ❒ Volume of surface storage meets or exceeds minimum (V_1).
- ❒ Volume of subsurface storage meets or exceeds minimum (V_2).
- ❒ In "C" and "D" native soils, underdrain is connected to discharge through an appropriately sized orifice or other flow-limiting device.

Bioretention Facility

Cross-section
Not to Scale



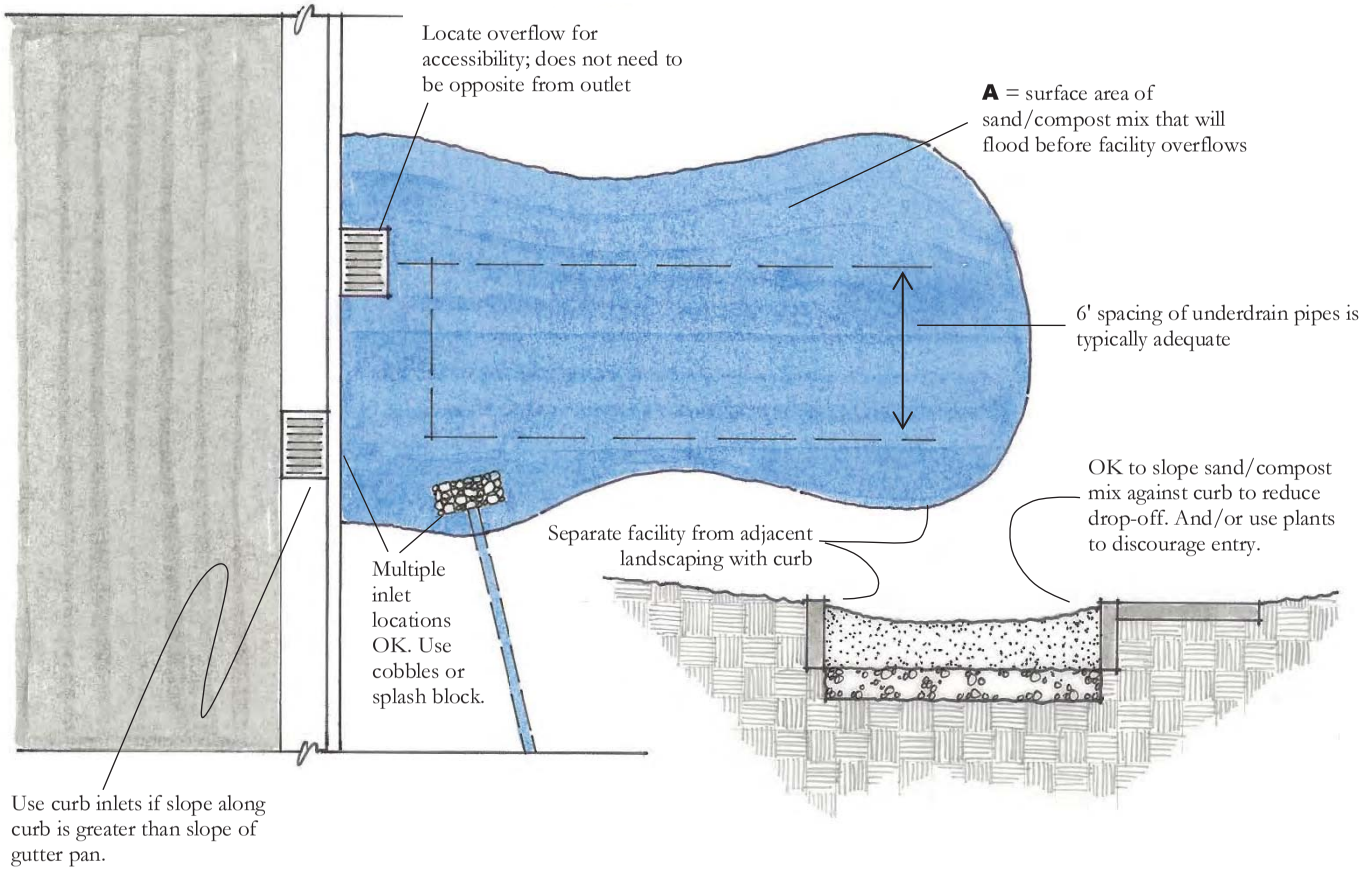
Notes:

- No liner, no filter fabric, no landscape cloth.
- Maintain BGL. TGL, TSL throughout facility area at elevations to be specified on drawing.
- Class 2 perm layer may extend below and underneath drop inlet.
- Elevation of perforated pipe underdrain is atop gravel layer.
- See Appendix B for soil mix specification, planting and irrigation guidance.
- See Chapter 3 for factors and equations used to calculate V_1 V_2 and orifice diameter.

Bioretention Facility

Plan

Not to Scale



Dry Wells and Infiltration Basins

The typical dry well is a prefabricated structure, such as an open-bottomed vault or box, placed in an excavation or boring. The vault may be empty, which provides maximum space efficiency, or may be filled with rock.

An infiltration basin has the same functional components—a volume to store runoff and sufficient area to infiltrate that volume into the native soil—but is open rather than covered.

► CRITERIA

Dry wells and infiltration basins must be designed with the minimum volume and infiltrative area calculated by Equation 3-3 using the sizing factors in Table 3-6.

Consult with the local municipal engineer regarding the need to verify soil permeability and other site conditions are suitable for dry wells and infiltration basins. Some proposed criteria are on Page 5-12 of Caltrans' 2004 *BMP Retrofit Pilot Study Final Report* (CTSW-RT-01-050).

► DETAILS

Dry wells should be sited to facilitate maintenance and allow for the potential future need for removal and replacement.

In locations where native soils are coarser than a medium sand, the area directly beneath the facility should be over-excavated by two feet and backfilled with sand as a groundwater protection measure.

Best Uses

- Projects on sites with permeable soils

Advantages

- Compact footprint
- Can be installed in paved areas

Limitations

- Can be used only on sites with Group "A" or Group "B" soils
- Requires minimum of 10' from bottom of facility to seasonal high groundwater
- Not suitable for drainage from some industrial areas or arterial roads
- Must be maintained to prevent clogging.
- Typically not as aesthetically pleasing as bioretention facilities

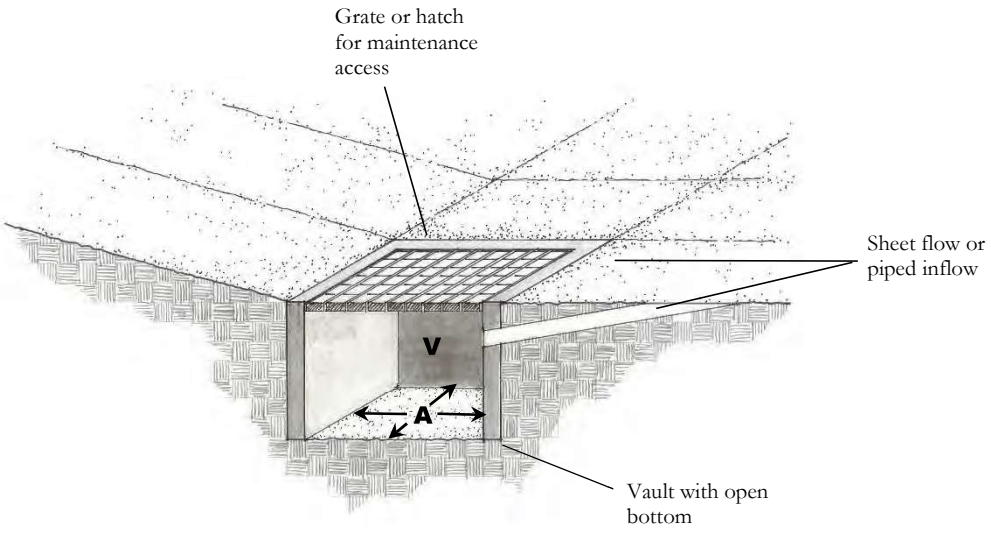
CONTRA COSTA CLEAN WATER PROGRAM

Stormwater C.3 Guidebook

www.cccleanwater.org

Criteria for Dry Wells and Infiltration Basins

- ❒ Volume (V) and infiltrative area (A) meet or exceed minimum.
- ❒ Emergency spillage will be safely conveyed overland.
- ❒ Depth from bottom of the facility to seasonally high groundwater elevation is ≥10'.
- ❒ Areas tributary to the facility do not include automotive repair shops; areas subject to high vehicular traffic (25,000 or greater average daily traffic on main roadway or 15,000 or more average daily traffic on intersecting roadway), car washes; fleet storage areas (bus, truck, etc.); nurseries, or other uses that may present an exceptional threat to groundwater quality.
- ❒ Underlying soils are in Hydrologic Soil Group A or B. Infiltration rate is sufficient to ensure a full basin will drain completely within 72 hours. Soil infiltration rate has been confirmed.
- ❒ 10' setback from structures or as recommended by structural or geotechnical engineer



ATTACHMENT B

United States Department of Agriculture

NRCS

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 Contra Costa County, California

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....8
Soil Map.....9
Legend.....10
Map Unit Legend.....11
Map Unit Descriptions.....11
Contra Costa County, California.....13
DaC—Delhi sand, 2 to 9 percent slopes.....13
References.....15

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

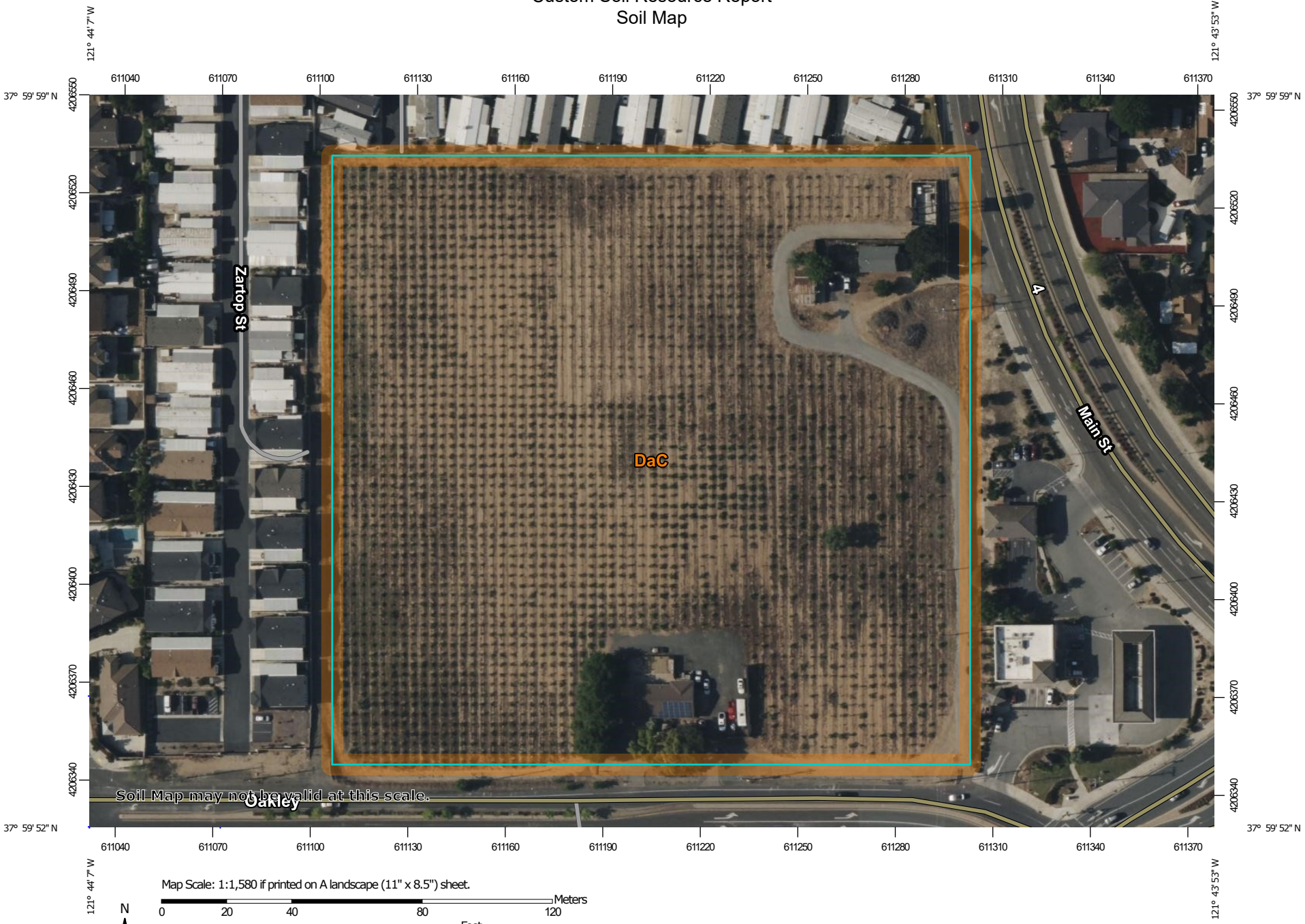
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

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 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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: Contra Costa County, California
Survey Area Data: Version 18, Sep 9, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 23, 2022—Apr 24, 2022

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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
DaC	Delhi sand, 2 to 9 percent slopes	9.1	100.0%
Totals for Area of Interest		**9.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Contra Costa County, California

DaC—Delhi sand, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: h98s
Elevation: 10 to 150 feet
Mean annual precipitation: 12 to 14 inches
Mean annual air temperature: 59 degrees F
Frost-free period: 260 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Delhi and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Delhi

Setting

Landform: Alluvial fans, terraces, flood plains
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits derived from igneous and sedimentary rock

Typical profile

H1 - 0 to 5 inches: sand
H2 - 5 to 60 inches: sand

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R017XY904CA - Subirrigated Deep Alluvial Fans
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 12 percent
Hydric soil rating: No

Laugenour

Percent of map unit: 3 percent
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

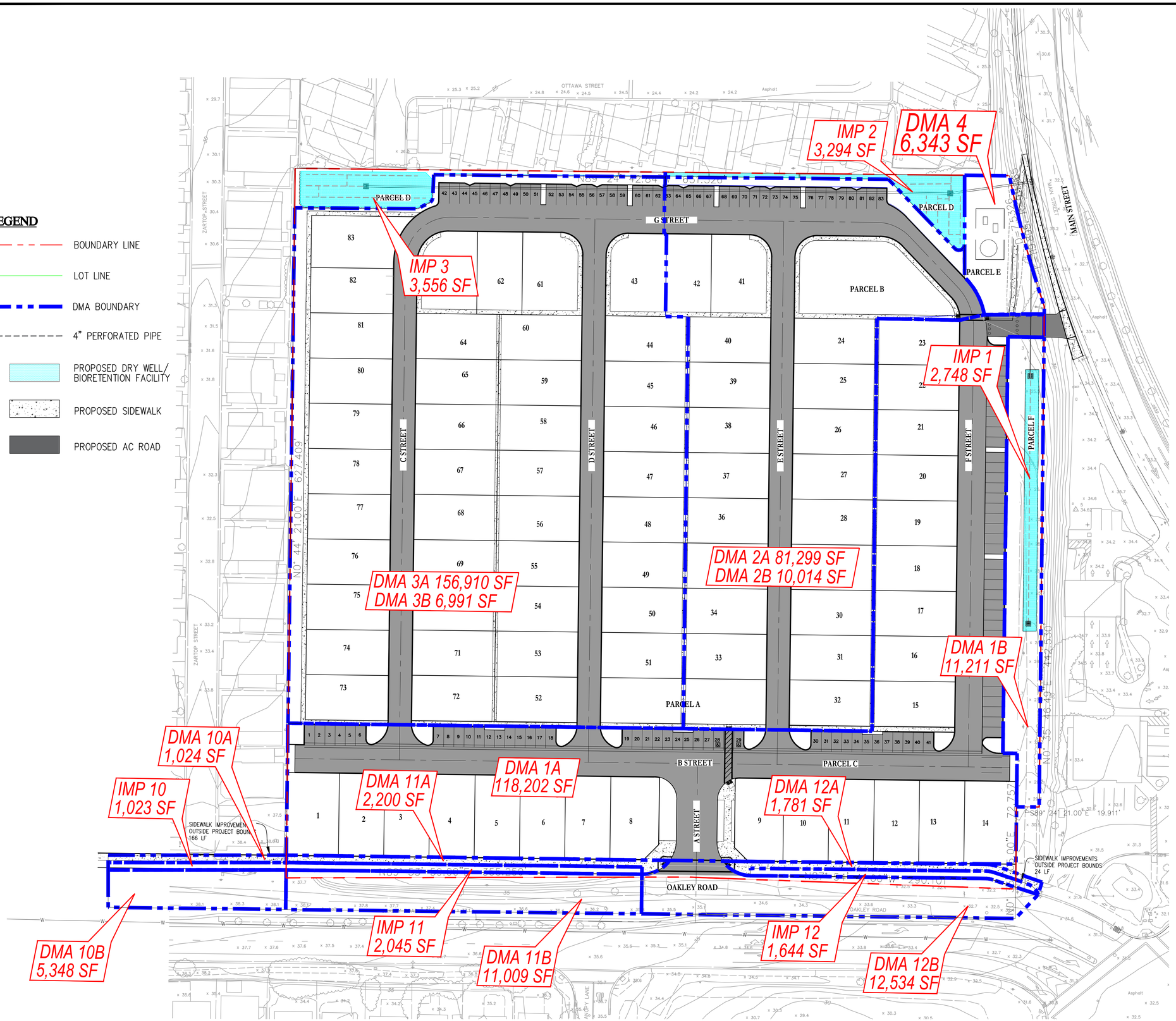
ATTACHMENT C

SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
STORM WATER CONTROL PLAN EXHIBIT

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

MARCH 8, 2023 SCALE: 1"=30'



I. Self-Treating Areas

DMA Name	Area (sq ft)
DMA 4	6343

IV. Areas Draining to IMPs

IMP Name: IMP1 (Soil Type: A)
IMP Type: Dry Well
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing	Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA 1A	118,202	Concrete or Asphalt	1.00	118,202					
DMA 1B	11,211	Landscape	0.10	1,121					
			Total	119,323	Area	0.020	1.000	2,386	2,748
					Volume	0.068	1.000	8,114	8,244

IMP Name: IMP2 (Soil Type: A)
IMP Type: Bioretention Facility
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing	Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA 2A	81,299	Concrete or Asphalt	1.00	81,299					
DMA 2B	10,014	Landscape	0.10	1,001					
			Total	82,300	Area	0.040	1.000	3,292	3,294

IMP Name: IMP3 (Soil Type: A)
IMP Type: Dry Well
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing	Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA 3A	156,910	Concrete or Asphalt	1.00	156,910					
DMA 3B	6,991	Landscape	0.10	699					
			Total	157,609	Area	0.020	1.000	3,152	3,556
					Volume	0.068	1.000	10,717	11,024

IMP Name: DMA10 (Soil Type: A)
IMP Type: Dry Well
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing	Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA 10A	1,024	Concrete or Asphalt	1.00	1,024					
DMA 10B	5,348	Concrete or Asphalt	1.00	5,348					
			Total	6,372	Area	0.020	1.000	127	1,023
					Volume	0.068	1.000	433	511

IMP Name: DMA11 (Soil Type: A)
IMP Type: Dry Well
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing	Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA11A	2,200	Concrete or Asphalt	1.00	2,200					
DMA11B	11,009	Concrete or Asphalt	1.00	11,009					
			Total	13,209	Area	0.020	1.000	264	2,045
					Volume	0.068	1.000	898	1,022

IMP Name: DMA12 (Soil Type: A)
IMP Type: Dry Well
Soil Type: A

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing	Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA12A	1,781	Concrete or Asphalt	1.00	1,781					
DMA12B	12,534	Concrete or Asphalt	1.00	12,534					
			Total	14,315	Area	0.020	1.000	286	1,644
					Volume	0.068	1.000	973	986

SHEET 10 OF 10
JOB NO. 200056

Appendix J
Traffic Study

TECHNICAL MEMORANDUM

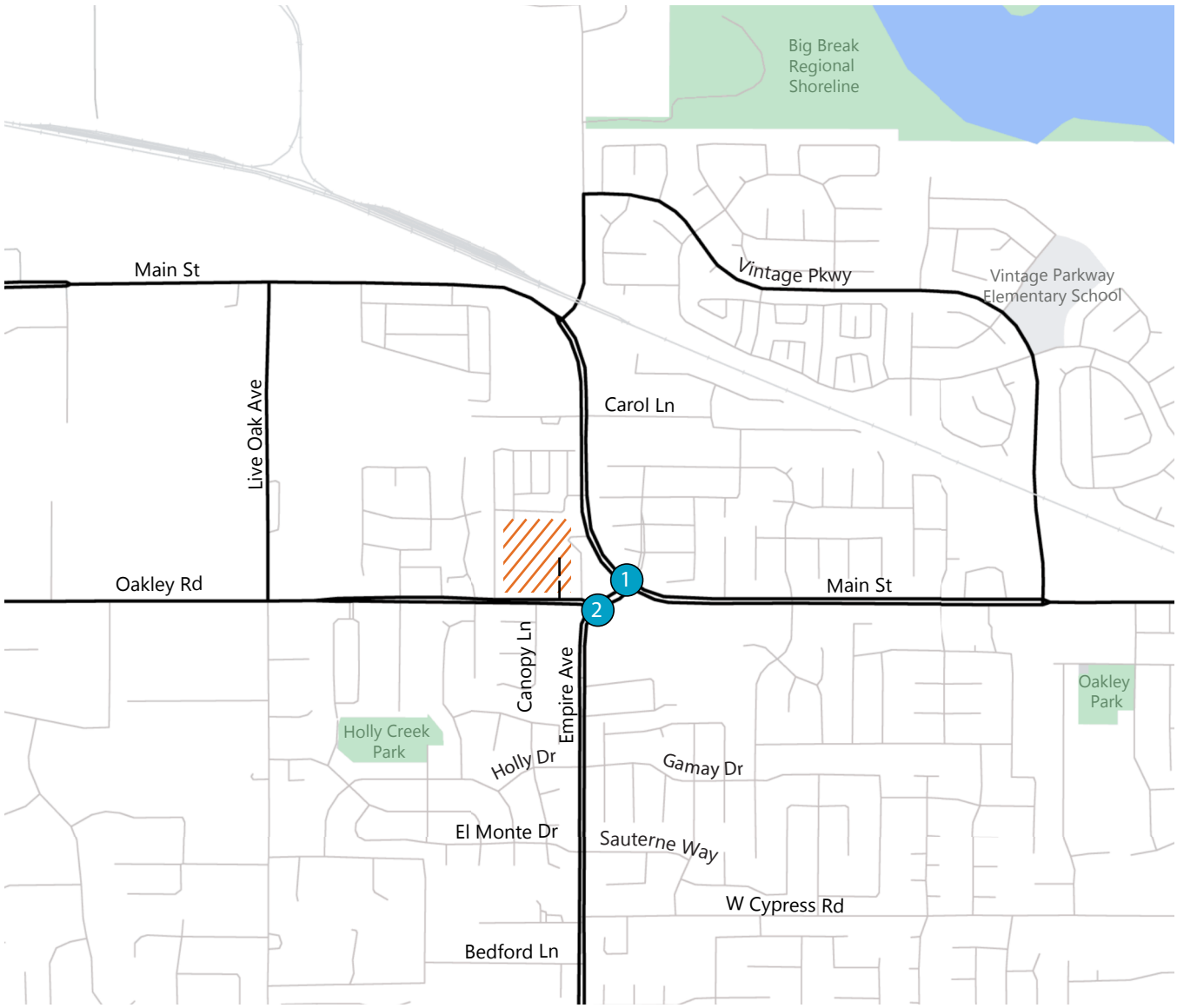
Date:	November 1, 2022
To:	Dan Cosgrove, dan.cosgrove@mercsystems.com
From:	Chris Kinzel, TJKM
Subject:	***Traffic Study for 2092 Oakley Road in Oakley, CA***

Introduction

This memorandum summarizes the results of the Traffic Analysis for the proposed residential development located at 2092 Oakley Road in the City of Oakley. The proposed project would demolish an existing single-family home at 2092 Oakley Road and construct an 83-dwelling unit single-family development. The project is located on the north side of Oakley Road, east of Empire Avenue. Direct access to the project site is proposed to be provided via an existing driveway on the north side of Oakley Road. Surrounding land uses include single-family detached homes, a mobile home neighborhood, and a retail center. **Figure 1** displays the vicinity map. **Figure 2** includes the proposed site plan for the project, dated September 14, 2022.

The purpose of this study is to identify the potential transportation impacts related to the proposed development. The evaluation of potential project traffic impacts follow the standards and methodologies set forth by Traffic Impact Analysis Guidelines, adopted by the City of Oakley in October 2018. As per the Guidelines, the project does not require a full Transportation Impact Study (TIS), however, analysis of site access, on-site parking and circulation, parking supply, sight distance, and project generated vehicle miles travelled are required to ensure the project does not impact traffic on the surrounding area.

Figure 1: Vicinity Map



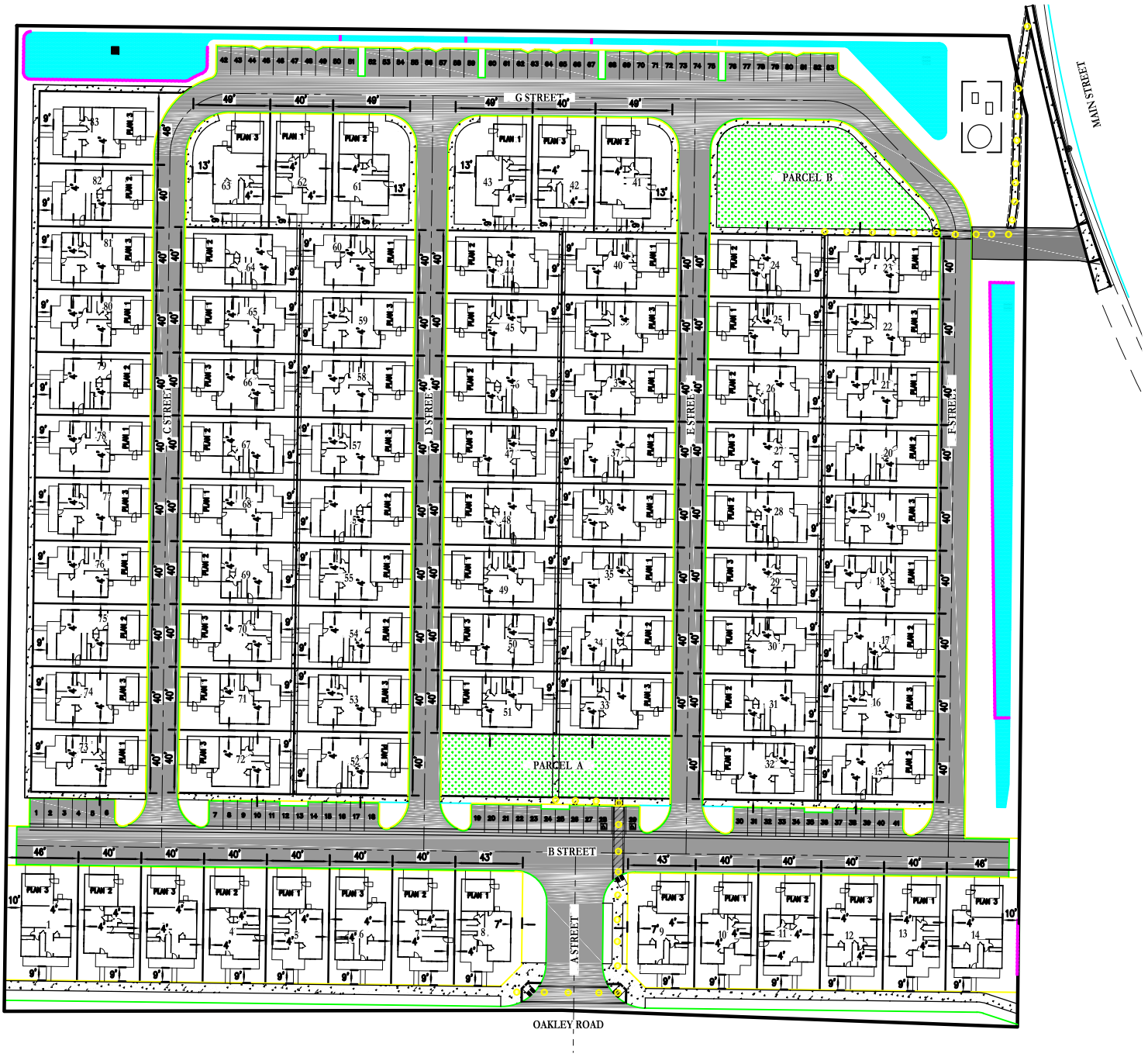
LEGEND

- (x) Study Intersection
- Project Entrance
- Project Site

N

TJKM

Figure 2: Site Plan



N

TJKM

Existing Setting

This section describes the existing conditions of the transportation system within the study area of the project. It describes the transportation facilities in the vicinity of the project site, including the roadway network, transit service, and pedestrian and bicycle facilities.

EXISTING ROADWAY SYSTEM

Important roadways adjacent to the project site are discussed below:

Main Street is an east-west, divided, four-lane major arterial in the vicinity of the project site. The roadway extends between State Route 160 in the west and Delta Road to the southeast. Main Street provides access to several roadways and land uses through the City of Oakley. In the project vicinity, Main Street provides continuous sidewalks on both sides, with crosswalks across all approaches at signalized intersections. The crosswalks feature pedestrian push buttons with countdown signal heads, and ADA-compliant curb ramps. Class II be lanes currently exist along Main Street, in the project vicinity. Street lighting is provided via overhead street lights on the both sides of the roadway. The posted speed limit on Main Street is 40 miles per hour (mph) within the vicinity of the project.

Empire Avenue is a north-south, divided, four-lane major arterial in the vicinity of the project site. Empire Avenue currently extends south from Main Street in the north to its termination at Shady Willow Lane to the south. Empire Avenue provides access to residential roadways and a retail center in the project vicinity. Empire Avenue features a continuous sidewalks on both sides, with signalized crosswalks in the immediate project vicinity. A Class III bike route exists on both sides of the roadway, south of Oakley Road. Street lighting is provided via overhead street lights along the east side of the roadway. The posted speed limit on Empire Avenue is 40 mph within the vicinity of the project.

Oakley Road is an east-west, divided, two- to four-lane street in the vicinity of the project site. Oakley Road is classified as a major arterial between Empire Avenue and Live Oak Avenue, and a minor arterial between Live Oak Avenue and Neroly Road. Oakley Road extends from the City Limits and beyond on the west to Empire Avenue to the east. It provides access to single family residences in the project vicinity. The roadway features continuous sidewalks on the south side between Empire Avenue and 225 feet west of Kenwood Circle but with a gap on the north side along the project frontage. There are no bicycle facilities along the roadway. Street lighting is provided via overhead street lights along both sides of the roadway. Oakley Road provides direct access to the project site via one full access driveway on the north side, near the intersection of Oakley Road and Canopy Lane. The posted speed limit on Oakley Road is 35 mph.

EXISTING PEDESTRIAN FACILITIES

Walkability is defined as the ability to travel easily and safely between various origins and destinations without having to rely on automobiles or other motorized travel. The ideal "walkable" community includes wide sidewalks, a mix of land uses such as residential, employment, and shopping

opportunities, a limited number of conflict points with vehicle traffic, and easy access to transit facilities and services.

Pedestrian facilities include crosswalks, sidewalks, pedestrian signals, and off-street paths, which provide safe and convenient routes for pedestrians to access the destinations such as institutions, businesses, public transportation, and recreation facilities.

In the project vicinity, sidewalks exist on both sides of Main Street and Empire Avenue, and on the south side of Oakley Road. Curb ramps exist along the sidewalks, and crosswalks are present at signalized intersections in the immediate project vicinity.

EXISTING BICYCLE FACILITIES

Bicycle facilities include the following:

- Multi-use Path (Class I) – Off-street two-way bikeways physically separated from motor vehicle traffic and used by people bicycling, walking and other non-motorized users.
- Separated Bike Lanes (Class IV) – Dedicated, on-street bikeway physically distinct from the sidewalk and separated from motor vehicle traffic by a physical object like a curb, post, or parking.
- Bike Lanes (Class II) – Dedicated, on-street space for bicyclists delineated with painted pavement stripes and symbols. May also have striped buffers between bicycles and automobile travel lanes.
- Bike Routes (Class III) – Designated roadways for bicycle use by signs or other markings which may or may not include additional pavement width for cyclists.
- Bike Boulevard (Class III) – Bike routes on calmer streets that are enhanced with traffic calming features.

Class II bike lanes exist along Main Street, between Big Break Road and Vintage Parkway, and along Oakley Road, between Empire Avenue and Kelsey Lane. A Class III bike route exists along Empire Avenue, between Oakley Road and Laurel Road.

The City of Oakley General Plan Update 2021 illustrates existing and proposed bicycle facilities in the City. Class II bike lanes are proposed on Oakley Road and Empire Avenue. A Class IV separated bikeway is proposed along Main Street, in the project vicinity.

EXISTING TRANSIT FACILITIES

Tri Delta Transit operates bus service services in the City of Oakley and surrounding East Contra Costa County. The closest transit stops to the proposed project site are located at the Main Street and Empire Avenue intersection, located 0.4 miles from the project site. These stops are served by Tri Delta Transit local bus routes 300X, 383 and 391. **Table 1** describes weekday and weekend services and frequencies for the local bus routes. **Figure 3** illustrates the existing transit service map in the project area.

Table 1: Existing Transit Services

Route	From	To	Weekdays	
			Operating Hours	Headway (minutes)
300X	Brentwood Park & Ride	Antioch BART	3:59 a.m. – 9:57 p.m.	15-45
383	Adams Lane/O'Hara Ave	Wilbur Ave/ Cavallo Rd	5:04 a.m. – 6:45 p.m.	45-90
391	Pittsburg Center BART	Brentwood Park & Ride	4:06 a.m.-1:28 a.m.	30-74

Source: trideltatransit.com

Figure 3: Transit Service Map

Local Transportation Analysis

The following analysis details trip generation, distribution, intersection level of service, field observations, project site circulation and access, transit access, and bicycle and pedestrian access.

EXISTING CONDITIONS ANALYSIS

TJKM evaluated the existing operations of the study intersections for the highest one-hour volumes during weekday morning and evening peak periods. Turning movement counts for vehicles, bicycles, and pedestrians reflect the weekday a.m. peak period (7:00-9:00 a.m.) and p.m. peak period (4:00-6:00 p.m.) at the study intersections in the most recently approved Oakley Citywide Model (2019). **Figure 4** illustrates the existing lane geometry, and traffic controls at the study intersections. **Figure 5** illustrates the existing a.m. and p.m. peak hour vehicle turning movement volumes at the study intersections.

Intersection Level of Service Analysis – Existing Conditions

Under Existing Conditions, intersections were analyzed based on lane geometries and traffic controls provided by the Existing Conditions scenario of the Citywide Traffic Model and observed in the field. **Table 2** summarizes peak hour levels of service at the study intersections under Existing Conditions.

Under this scenario, both study intersections operate at an acceptable LOS D or better during both a.m. and p.m. peak hours. Detailed LOS worksheets for this scenario are provided in **Appendix A**.

Table 2: Intersection Level of Service Analysis – Existing Conditions

#	Study Intersections	Control	Peak Hour[1]	Existing Conditions		
				V/C[2]	Average Delay[3]	LOS[4]
1	Main St/Empire Ave	Signal	AM	0.49	36.3	D
			PM	0.50	26.4	C
2	Empire Ave/Oakley Rd	Signal	AM	0.29	22.9	C
			PM	0.30	29.6	C

Notes:

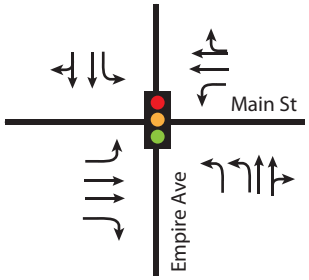
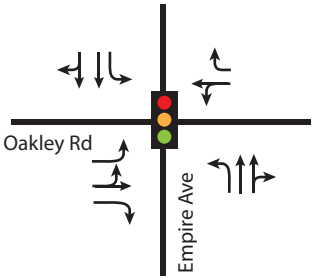
[1]AM – morning peak hour; PM – evening peak hour.

[2]V/C – Volume-to capacity ratio.

[3]Delay: Average control delay in seconds per vehicle, reported values are overall for signalized and all-way-stop-control intersections; and critical minor approaches for one- and two-way stop-control intersections.

[4]LOS: Level of Service.

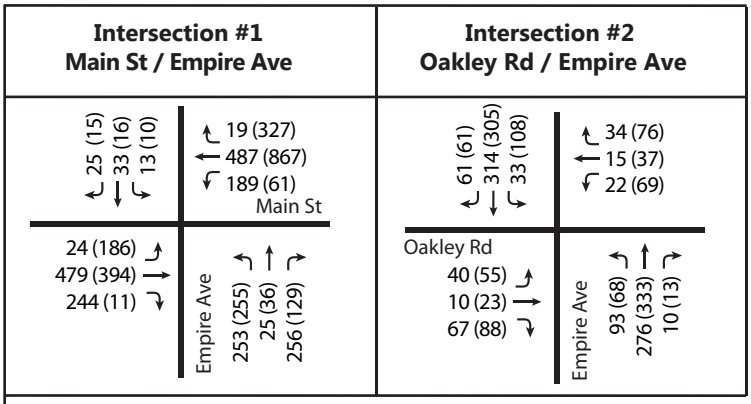
Figure 4: Existing Lane Patterns and Traffic Control

Intersection #1 Main St / Empire Ave	Intersection #2 Oakley Rd / Empire Ave
	

LEGEND

Traffic Signal

Figure 5: Existing Peak Hour Traffic Volumes



LEGEND

XX	AM Peak Hour Traffic Volume
(XX)	PM Peak Hour Traffic Volume

EXISTING PLUS PROJECT CONDITIONS ANALYSIS

PROJECT TRIP GENERATION

TJKM developed estimated project trip generation for the proposed project based on published trip generation rates from the *Institution of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition* (2021). TJKM used published trip rates for the ITE land use Single-Family Detached Housing (ITE Code 210) for both the proposed and existing land uses. Additionally, **Table 3** shows the expected trips generated by the proposed project. The proposed project is expected to generate a total of 774 net new daily trips, 57 weekday a.m. peak hour trips (15 inbound, 42 outbound) and 77 weekday p.m. peak hour trips (48 inbound trips, 29 outbound trips).

Vehicle Trip Distribution

The distribution of peak-hour vehicle trips generated by the project was determined based on the methodology used for the Citywide Traffic Model (2019). Based on that methodology, trip distribution for residential developments are as follows: 45 percent of peak-hour trips are to/from origins and designations west of Oakley via SR 4; 15 percent are to/from origins and destinations south/east of Oakley via SR 4; 20 percent are to/from other destinations near Oakley via other routes; and 20 percent are internal to Oakley.

Figure 6 illustrates the trip distribution and assignment for the proposed project.

Table 3: Project Trip Generation

Trip Generation for a Housing Development on Honey Lane, Oakley, CA														
	Size[2]		Daily		Weekday AM Peak					Weekday PM Peak				
			Rate	*Trips*	Rate	In:Out %	In	Out	Total	Rate	In:Out %	In	Out	Total
Proposed Land Use														
Single-Family Detached (ITE Code 210)[1]	83	DU	9.43	783	0.70	26:74	15	43	58	0.94	63:37	49	29	78
Existing Land Use														
Single-Family Detached (ITE Code 210)[1]	1	DU	9.43	9	0.70	26:74	0	1	1	0.94	63:37	1	0	1
Total Net Trips				**774**			**15**	**42**	**57**			**48**	**29**	**77**

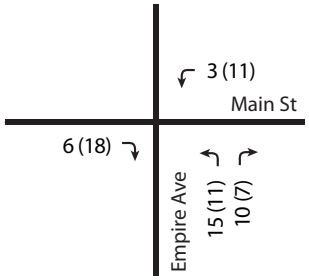
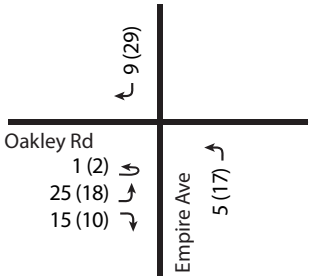
Source: ITE Trip Generation Manual, 11th Edition, 2021.

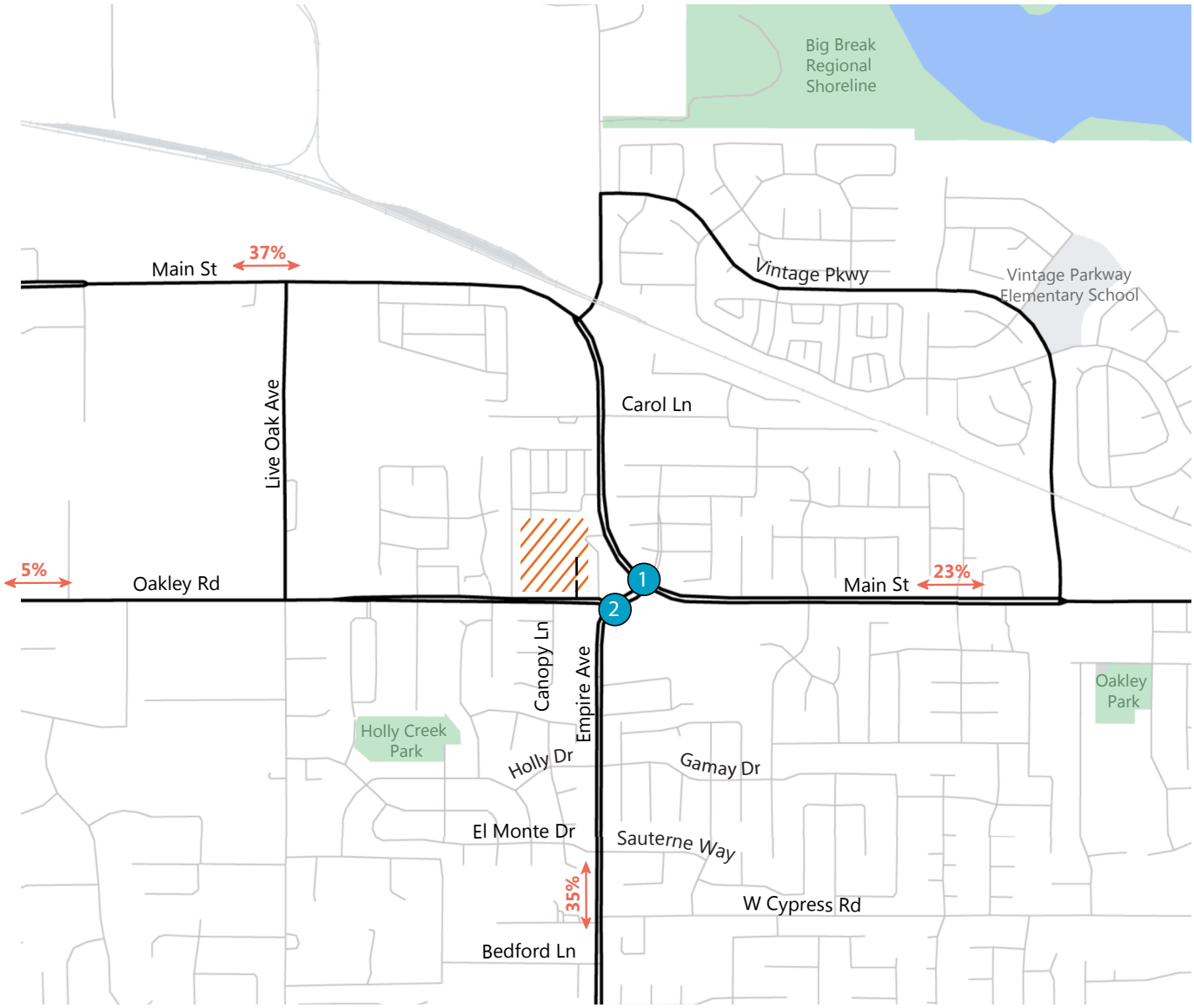
Notes:

[1]Single-Family Detached Housing (ITE Code 210) vehicle trip rates are based upon number of dwelling units.

[2]DU – dwelling units.

Figure 6: Trip Distribution & Assignment

Intersection #1 Main St / Empire Ave	Intersection #2 Oakley Rd / Empire Ave
	



LEGEND

XX	AM Peak Hour Project Trips	XX%	Trip Distribution
(XX)	PM Peak Hour Project Trips		

TJKM

Intersection Level of Service Analysis – Existing plus Project Conditions

Under Existing plus Project Conditions, intersections were analyzed based on lane geometries and traffic controls provided by the Existing Conditions scenario of the Citywide Traffic Model and observed in the field, except for Oakley Road, which will be expanded to four lanes (two lanes per direction) with the project completion. Under this scenario, the project driveway on the north side of Oakley Road was also analyzed as a study intersection. **Figure 7** shows the peak hour volumes at each intersection under Existing plus Project Conditions. **Table 4** summarizes peak hour levels of service at the study intersections under Existing Conditions.

Under this scenario, all study intersections operate at an acceptable LOS D or better during both a.m. and p.m. peak hours. Thus, the project impact to the study intersections are insignificant under Existing plus Project Conditions. Detailed LOS worksheets for this scenario are provided in **Appendix B**.

Table 4: Intersection Level of Service Analysis – Existing plus Project Conditions

#	Study Intersections	Control	Peak Hour[1]	Existing Conditions			Existing plus Project Conditions			Significant Impact (Y/N)
				V/C[2]	Average Delay[3]	LOS[4]	V/C[2]	Average Delay[3]	LOS[4]	
1	Main St/Empire Ave	Signal	AM	0.49	36.3	D	0.51	37.7	D	N
			PM	0.50	26.4	C	0.51	27.2	C	N
2	Empire Ave/Oakley Rd	Signal	AM	0.29	22.9	C	0.31	24.5	C	N
			PM	0.30	29.6	C	0.31	30.3	C	N
3	Oakley Rd/Project Dwy	One-Way Stop	AM	-	-	-	0.04	9.0	A	N
			PM	-	-	-	0.05	9.1	A	N

Notes:

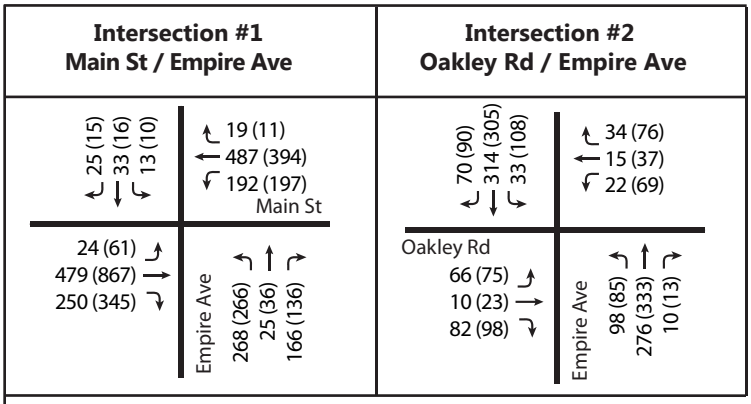
[1]AM – morning peak hour; PM – evening peak hour.

[2]V/C – Volume-to capacity ratio.

[3]Delay: Average control delay in seconds per vehicle, reported values are overall for signalized and all-way-stop-control intersections; and critical minor approaches for one- and two-way stop-control intersections.

[4]LOS: Level of Service.

Figure 7: Existing plus Project Peak Hour Traffic Volumes



LEGEND

XX AM Peak Hour Traffic Volume

(XX) PM Peak Hour Traffic Volume

BACKGROUND CONDITIONS ANALYSIS

Using the calibrated and validated Citywide Traffic Model, additional traffic projected to be generated from approved developments was forecasted for Background Conditions. The Background Conditions scenario includes additional traffic that would be generated by various approved projects completed within the City of Oakley and redistribution of traffic due to the Laurel Road extension. The approved projects include the Acacia Residential, Emerson Ranch Commercial, and Burroughs/WestGate Ventures Residential projects previously completed by TJKM, along with the following projects approved by the City of Oakley:

- Wendy's Restaurant at Bridgehead Rd/Main Street
- Diablo Water District Corporation Yard Office and Shopping Building
- Oakley Village Residential Subdivision

Intersection Level of Service Analysis – Background Conditions

Lane geometry under Background Conditions reflects the Citywide Traffic Model, with the expansion of Oakley Road to its ultimate four-lane standard. **Figure 8** shows the forecasted volumes at each intersection under Background Conditions. **Table 5** summarizes peak hour levels of service at the study intersections under Background Conditions without the proposed Project.

Under this scenario, both study intersections operate at an acceptable LOS D or better during both a.m. and p.m. peak hours. Detailed LOS worksheets for this scenario are provided in **Appendix C**.

Table 5: Intersection Level of Service Analysis – Background Conditions

#	Study Intersections	Control	Peak Hour[1]	Background Conditions		
				V/C[2]	Average Delay[3]	LOS[4]
1	Main St/Empire Ave	Signal	AM	0.64	44.9	D
			PM	0.81	46.5	D
2	Empire Ave/Oakley Rd	Signal	AM	0.33	22.6	C
			PM	0.35	29.7	C

Notes:

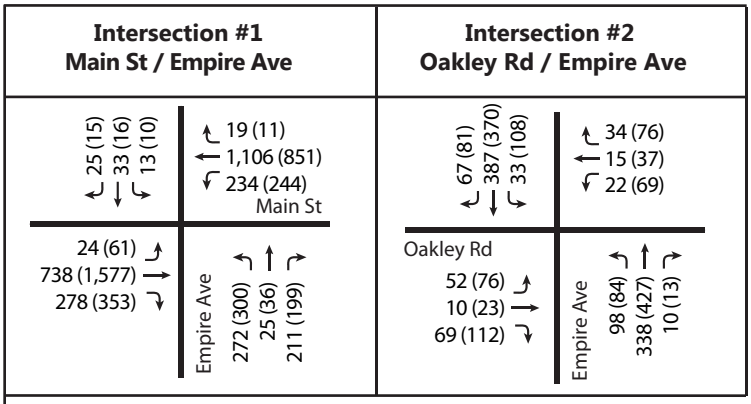
[1]AM – morning peak hour; PM – evening peak hour.

[2]V/C – Volume-to capacity ratio.

[3]Delay: Average control delay in seconds per vehicle, reported values are overall for signalized and all-way-stop-control intersections; and critical minor approaches for one- and two-way stop-control intersections.

[4]LOS: Level of Service.

Figure 8: Background Conditions Peak Hour Traffic Volumes



LEGEND

XX AM Peak Hour Traffic Volume

(XX) PM Peak Hour Traffic Volume

Intersection Level of Service Analysis – Background plus Project Conditions

Under Background plus Project Conditions, intersections were analyzed based on lane geometries and traffic controls provided by the Background Conditions scenario of the Citywide Traffic Model and observed in the field. Under this scenario, the project driveway on the north side of Oakley Road was also analyzed as a study intersection, and Oakley Road is considered at its ultimate four-lane standard. **Figure 9** shows the peak hour volumes at each intersection under Existing plus Project Conditions. **Table 6** summarizes peak hour levels of service at the study intersections under Existing Conditions.

Under this scenario, all study intersections operate at an acceptable LOS D or better during both a.m. and p.m. peak hours. Thus, the project impact to the study intersections are insignificant under Background plus Project Conditions. Detailed LOS worksheets for this scenario are provided in **Appendix D**.

Table 4: Intersection Level of Service Analysis – Background plus Project Conditions

#	Study Intersections	Control	Peak Hour[1]	Background Conditions			Background plus Project Conditions			Significant Impact (Y/N)
				V/C[2]	Average Delay[3]	LOS[4]	V/C[2]	Average Delay[3]	LOS[4]	
1	Main St/Empire Ave	Signal	AM	0.64	44.9	D	0.65	46.8	D	N
			PM	0.81	46.5	D	0.83	47.8	D	N
2	Empire Ave/Oakley Rd	Signal	AM	0.33	22.6	C	0.35	24.8	C	N
			PM	0.35	29.7	C	0.37	30.8	C	N
3	Oakley Rd/Project Dwy	One-Way Stop	AM	-	-	-	0.04	9.0	A	N
			PM	-	-	-	0.03	9.1	A	N

Notes:

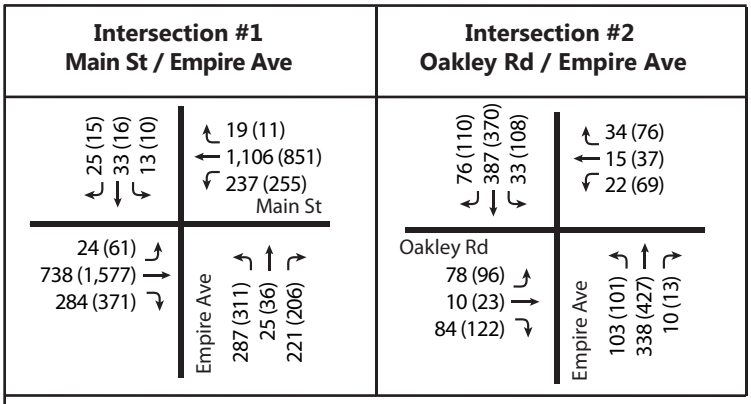
[1]AM – morning peak hour; PM – evening peak hour.

[2]V/C – Volume-to capacity ratio.

[3]Delay: Average control delay in seconds per vehicle, reported values are overall for signalized and all-way-stop-control intersections; and critical minor approaches for one- and two-way stop-control intersections.

[4]LOS: Level of Service.

Figure 9: Background plus Project Peak Hour Traffic Volumes



LEGEND

XX AM Peak Hour Traffic Volume

(XX) PM Peak Hour Traffic Volume

Vehicle Miles Travelled (VMT) Analysis

TJKM conducted a Vehicle Miles Traveled (VMT) analysis for the proposed housing project located at the 2092 Oakley Road in the City of Oakley. The project proposes to build 83 single family housing units in a residential subdivision west of Main Street.

The VMT Analysis was performed for this project in the Contra Costa Transportation Authority (CCTA) Model. The Travel Analysis Zone (TAZ) for this project in the model is #30200. 83 single family dwelling units were added into the TAZ for the base year to see if the project creates significant VMT impacts. **Figure 10** illustrates the project TAZ and surrounding TAZs in the project area.

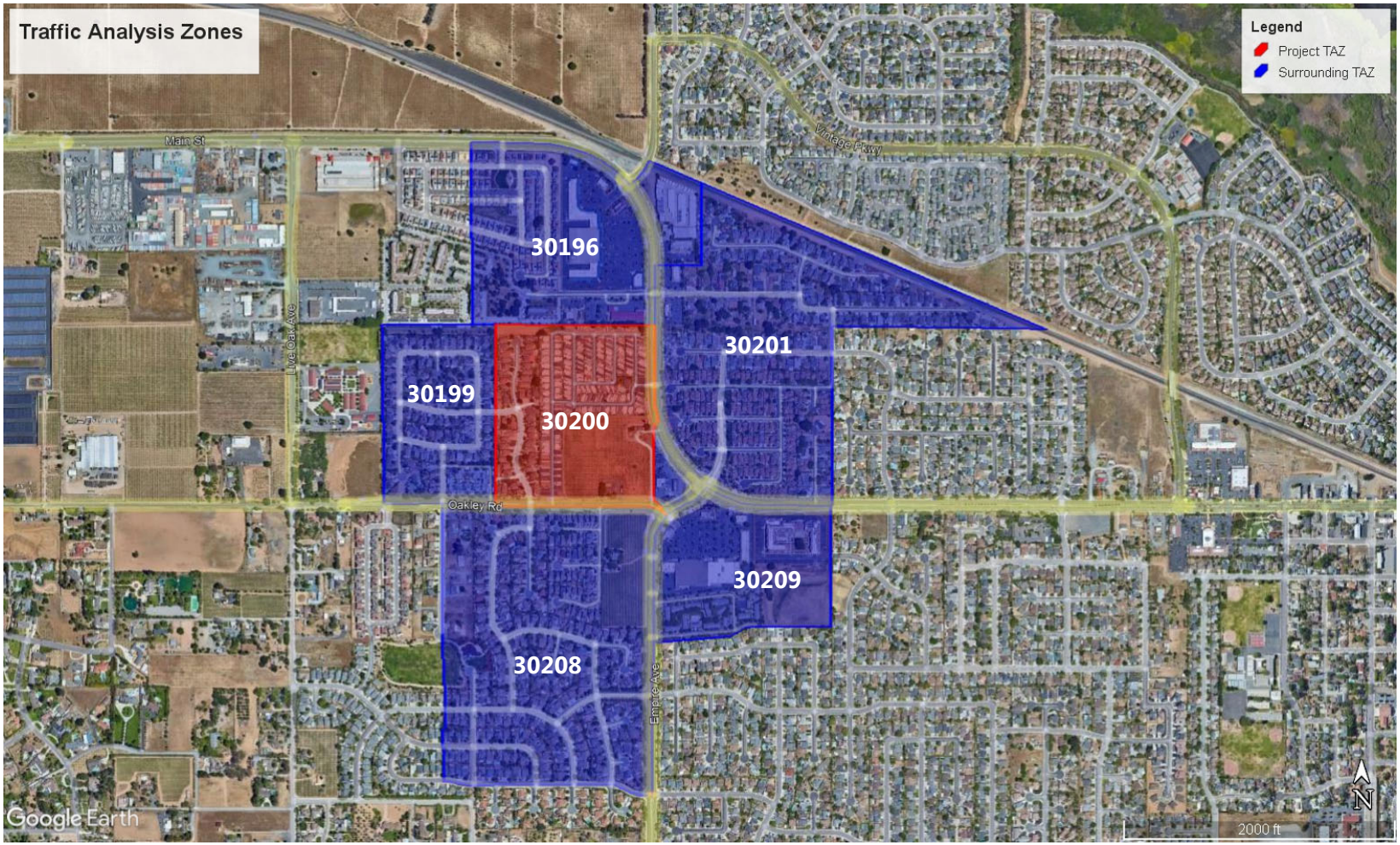
As this project is not screened out from VMT analysis, two full model runs were performed for this project in accordance to CCTA VMT methodology. The first one is a base year 2020 run to analyze existing VMT per capita numbers for the City of Oakley. The second run is a base year plus project 2020 run with the housing units added in to see if its impact on VMT is significant.

From the 2020 Base Year run, the home based VMT per capita for the City of Oakley is **26.76**. For a project to not be significant, the 85% threshold is set at 0.85 x 26.76 which is **22.75**. This value is the less stringent home-based VMT per capita number as mentioned in the CCTA VMT methodology guidelines.

The 2020 Base Year plus Project model run added 83 single family dwelling Units into TAZ #30267. The resultant home based VMT per capita for the project TAZ is **19.09**.

Since 19.09 is lower than the threshold of 22.75 for Oakley City, the 2092 Oakley Road Residential Project is found to have an **insignificant** VMT impact.

Figure 10: Traffic Analysis Zones in Project Study Area



1070

Additional Analysis

SITE ACCESS AND ON-SITE CIRCULATION

This section analyzes site access and internal circulation for vehicles, pedestrians and bicycles. The following analysis is subject to change per the finalization of the site plan.

Vehicle Access

Per the site plan (**Figure 2**), vehicle access to the proposed residential development is provided via A Street. A Street provides right-in and right-out only access to and from the project site on the north side of Oakley Road, near the Oakley Road and Canopy Lane intersection. The project will widen the north side of Oakley Road along the project frontage and increase the westbound direction from one to two lanes. It will also add curb, gutters and a sidewalk. It should be noted the project should follow City of Oakley requirements for driveways. A Street also facilitates traffic into the project site to four internal roadways, which all accommodate two-way traffic. The internal roadways will not connect to the mobile home park streets on the north and west sides of the project site. Based on the evaluation, the existing and proposed roadways are expected to provide adequate project site access for passenger vehicles.

TJKM also considered the adequacy of on-site circulation for vehicles, garbage trucks and emergency vehicles. Garbage trucks will also access the project site via A Street, on the north side of Oakley Road. Emergency vehicle access is provided via a paved driveway on the west side of Main Street, in the northwest area of the project site. The site plan does not provide roadway widths, however, all internal roadways will accommodate two-way traffic. TJKM recommends the project driveway (A Street), emergency access driveway, and the internal roadways accommodate turning radii for garbage and emergency vehicles, and City of Oakley standards. Additionally, all driveways providing access to the single family residences should comply with City of Oakley Guidelines for residential driveways. Overall, the proposed on-site vehicle circulation should not result in any significant operational issues on City streets.

Pedestrian Access

In the project vicinity, continuous sidewalks are present along both sides of Main Street and Empire Avenue, and along the south side of Oakley Road. Sidewalks facilitate pedestrian traffic to and from the project site and the surrounding retail and residential land uses, along with transit stops located on Main Street. The nearby intersections of Main Street/Empire Avenue and Oakley Road/Empire Avenue provide curb ramps and signalized crosswalks with pedestrian push buttons across all approach legs. Currently, adequate street lighting is continuously provided on the south side of Oakley Road along the project frontage. The project will provide a pedestrian access to Main Street near the northwest corner of the site.

The project proposes to provide sidewalks on the north side of Oakley Road, along the project frontage, and for a short segment on the west side of Main Street, along the project frontage.

Additionally, the project proposes to provide internal sidewalks and pedestrian pathways, connecting pedestrians to the residences, parking and park areas, and to the sidewalk on Main Street. Crosswalks are proposed across A Street, at the A Street and Oakley Road intersection, and at two crossings across internal roadways, B Street and F Street.

An adverse effect to pedestrians occurs if the proposed project disrupts existing pedestrian facilities; or conflicts and/or creates inconsistencies with adopted pedestrian system plans, guidelines, and policies. TJKM recommends the project provides adequate curb ramps, which comply with City of Oakley standards, at all internal intersections and driveways. New sidewalks and curb ramps should comply with American Disabilities Act (ADA) standards, and should conform to the existing pedestrian network in the project vicinity. Per the site plan (**Figure 2**), the proposed sidewalks will not interrupt the traffic lanes on Oakley Road and Main Street, and thus, adverse impacts to existing and future planned pedestrian facilities are not expected.

Bicycle Access

In the project vicinity, Class II bike lanes exist along Main Street, and along the project frontage on Oakley Road, between Empire Avenue and Kelsey Lane. A Class III bike route exists along Empire Avenue, between Oakley Road and Laurel Road.

An adverse effect to bicyclists occurs if the proposed project disrupts existing bicycle facilities; or conflicts and/or creates inconsistencies with adopted bicycle system plans, guidelines, and policies. The City of Oakley General Plan Update 2021 illustrates existing and proposed bicycle facilities in the City. The project does not propose bicycle facilities along surrounding roadways, thus adverse impacts to existing and future planned bicycle facilities are not expected.

Transit Access

The proposed project may add only a few trips to the existing transit services, which can be accommodated by the existing transit capacity. The nearest transit stops are located at the intersection of Main Street and Empire Avenue, approximately 0.4 miles north from the project site. The project proposes to provide sidewalks connecting the project site to Empire Avenue and Main Street, which will facilitate pedestrian traffic to the nearby transit stops. Thus, the project will not have an adverse effect on existing and future planned transit facilities in the immediate project vicinity.

Conclusions

Project Trip Generation

The proposed project is expected to generate a total of 774 net new daily trips, 57 weekday a.m. peak hour trips (15 inbound, 42 outbound) and 77 weekday p.m. peak hour trips (48 inbound trips, 29 outbound trips).

Traffic Signal Impact

Traffic signals exist in the immediate vicinity of the project site, at the intersections of Main Street/Empire Avenue and Oakley Road/Empire Avenue. TJKM evaluated the intersections under Existing and Background traffic conditions, without and with the addition of project traffic. Under Existing and Background scenarios, the proposed project is not expected to significantly impact traffic conditions at the study intersections during the a.m. and p.m. peak hours.

Site Access and On-Site Circulation

Vehicles will access the project site via a right-in and right-out only driveway on the north side of Oakley Road, near the intersection of Oakley Road and Canopy Lane. The project will widen Oakley Road to its ultimate four lane standard along the project frontage. The existing and proposed roadways are expected to provide adequate project site access for passenger vehicles.

TJKM recommends the project driveway accommodates turning radii for garbage and emergency vehicles, and City of Oakley standards. Overall, the proposed on-site vehicle circulation should not result in any significant operational issues on City streets.

Pedestrian, Bicycle and Transit Adverse Effects

The project will add frontage sidewalks and a pedestrian and bicycle connection with Main Street and does not conflict with existing and future planned pedestrian or bicycle facilities. The proposed project will add very few trips to the existing transit facilities, which can be accommodated by the existing transit capacity and the transit stops at the Main Street and Empire Avenue intersection.

Vehicle Miles Travelled (VMT) Analysis

Based on the 2020 Base Year plus Project model run, the home based VMT per capita for the project TAZ is **19.09**, which is lower than the threshold of 22.75 for Oakley City. Thus, the 2092 Oakley Road residential project is found to have an **insignificant** VMT impact.

APPENDIX A

Intersection Level of Service Worksheets – Existing Conditions

Intersection Level Of Service Report
Intersection 1: Main St/Empire Ave

Control Type:	Signalized	Delay (sec / veh):	36.3
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.495

Intersection Setup

Name	Empire Ave			Charles Way			Main St			Main St		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Entry Pocket Length [ft]	120.00	100.00	100.00	100.00	100.00	100.00	205.00	100.00	100.00	190.00	100.00	250.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Empire Ave			Charles Way			Main St			Main St		
Base Volume Input [veh/h]	253	25	156	13	33	25	189	487	19	24	479	244
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	253	25	156	13	33	25	189	487	19	24	479	244
Peak Hour Factor	0.7300	0.7300	0.7300	0.6100	0.6100	0.6100	0.8900	0.8900	0.8900	0.7700	0.7700	0.7700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	87	9	53	5	14	10	53	137	5	8	156	79
Total Analysis Volume [veh/h]	347	34	214	21	54	41	212	547	21	31	622	317
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	2			0			3			0		
v_di, Inbound Pedestrian Volume crossing m	3			0			2			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	54.0
Offset Reference	Lagging Force-Off
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	3	0	0	4	0	1	6	0	5	2	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	4	0	0	4	0	4	10	0	4	10	0
Maximum Green [s]	0	21	0	0	25	0	12	34	0	10	33	0
Amber [s]	0.0	4.4	0.0	0.0	3.6	0.0	3.0	4.8	0.0	3.0	4.4	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	26	0	0	30	0	16	40	0	14	38	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.5	3.5	0.0	2.5	3.5	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	19	0	0	20	0	0	19	0	0	24	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.4	0.0	0.0	2.6	0.0	2.0	3.8	0.0	2.0	3.4	0.0
Minimum Recall		No			No		No	Yes		No	Yes	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	C	R	L	C	C	L	C	R
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.40	5.40	5.40	4.60	4.60	4.00	5.80	5.80	4.00	5.40	5.40
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.40	3.40	3.40	2.60	2.60	2.00	3.80	3.80	2.00	3.40	3.40
g_i, Effective Green Time [s]	17	17	17	6	6	12	64	64	2	55	55
g / C, Green / Cycle	0.16	0.16	0.16	0.06	0.06	0.11	0.58	0.58	0.02	0.50	0.50
(v / s)_i Volume / Saturation Flow Rate	0.10	0.02	0.14	0.04	0.03	0.12	0.15	0.15	0.02	0.17	0.20
s, saturation flow rate [veh/h]	3459	1870	1574	1844	1589	1781	1870	1846	1781	3560	1589
c, Capacity [veh/h]	547	296	249	108	93	194	1086	1072	41	1774	792
d1, Uniform Delay [s]	43.33	39.71	45.05	50.84	50.06	49.00	11.41	11.41	53.45	16.79	17.31
k, delay calibration	0.04	0.04	0.14	0.04	0.04	0.45	0.50	0.50	0.08	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.46	0.06	10.88	3.02	1.23	87.43	0.59	0.60	19.40	0.55	1.51
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.63	0.12	0.86	0.70	0.44	1.09	0.26	0.26	0.76	0.35	0.40
d, Delay for Lane Group [s/veh]	43.79	39.77	55.93	53.86	51.29	136.43	12.00	12.01	72.86	17.33	18.82
Lane Group LOS	D	D	E	D	D	F	B	B	E	B	B
Critical Lane Group	No	No	Yes	Yes	No	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	4.35	0.78	6.29	2.13	1.13	9.93	3.36	3.33	1.06	4.65	5.08
50th-Percentile Queue Length [ft/ln]	108.81	19.51	157.23	53.33	28.28	248.17	84.12	83.14	26.40	116.23	126.90
95th-Percentile Queue Length [veh/ln]	7.77	1.40	10.40	3.84	2.04	15.63	6.06	5.99	1.90	8.19	8.77
95th-Percentile Queue Length [ft/ln]	194.35	35.12	260.05	95.99	50.91	390.81	151.42	149.65	47.51	204.64	219.27

Movement, Approach, & Intersection Results

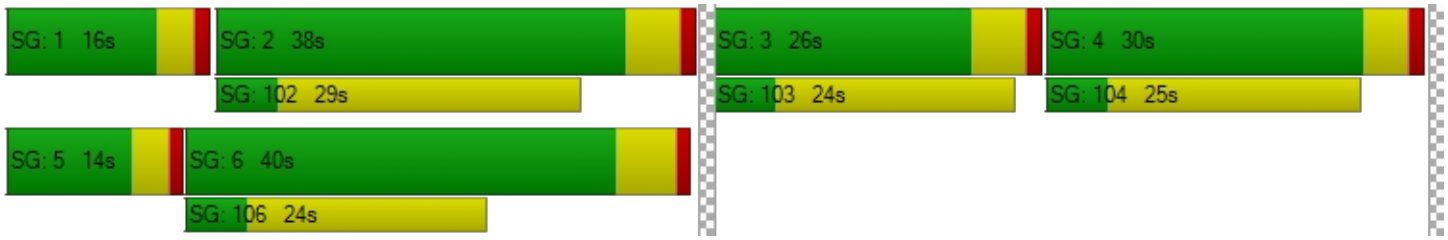
d_M, Delay for Movement [s/veh]	43.79	39.77	55.93	53.86	53.86	51.29	136.43	12.01	12.01	72.86	17.33	18.82
Movement LOS	D	D	E	D	D	D	F	B	B	E	B	B
d_A, Approach Delay [s/veh]	47.93			52.95			45.83			19.59		
Approach LOS	D			D			D			B		
d_I, Intersection Delay [s/veh]	36.33											
Intersection LOS	D											
Intersection V/C	0.495											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	1062.58	0.00
d_p, Pedestrian Delay [s]	46.37	46.37	46.37	46.37
l_p,int, Pedestrian LOS Score for Intersection	2.719	2.006	2.737	2.877
Crosswalk LOS	B	B	B	C
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	375	462	622	593
d_b, Bicycle Delay [s]	36.33	32.53	26.12	27.23
l_b,int, Bicycle LOS Score for Intersection	2.541	1.751	2.203	2.360
Bicycle LOS	B	A	B	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2: Empire Ave/Oakley Rd

Control Type:	Signalized	Delay (sec / veh):	22.9
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.290

Intersection Setup

Name	Oakley Rd			Empire Ave			Empire Ave			Driveway		
Approach	Eastbound			Northeastbound			Southwestbound			Northwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	1	0	0	0	0	0
Entry Pocket Length [ft]	315.00	100.00	100.00	110.00	100.00	100.00	140.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00			40.00			40.00			15.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Oakley Rd			Empire Ave			Empire Ave			Driveway		
Base Volume Input [veh/h]	40	10	67	93	276	10	33	314	61	22	15	34
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	40	10	67	93	276	10	33	314	61	22	15	34
Peak Hour Factor	0.7700	0.7700	0.7700	0.8200	0.8200	0.8200	0.7300	0.7300	0.7300	0.7700	0.7700	0.7700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	13	3	22	28	84	3	11	108	21	7	5	11
Total Analysis Volume [veh/h]	52	13	87	113	337	12	45	430	84	29	19	44
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	1			1			1			0		
v_di, Inbound Pedestrian Volume crossing m	1			1			0			1		
v_co, Outbound Pedestrian Volume crossing	2			1			2			2		
v_ci, Inbound Pedestrian Volume crossing mi	2			2			2			1		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	1			1			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	1.0
Offset Reference	Lagging Force-Off
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split
Signal Group	0	4	0	5	2	0	1	6	0	0	8	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	Lead	-	-	-	-	-
Minimum Green [s]	0	4	0	4	4	0	4	4	0	0	4	0
Maximum Green [s]	0	11	0	15	38	0	12	35	0	0	30	0
Amber [s]	0.0	4.1	0.0	3.0	4.4	0.0	3.0	4.4	0.0	0.0	3.0	0.0
All red [s]	0.0	1.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0	0.0	1.0	0.0
Split [s]	0	16	0	19	44	0	16	41	0	0	34	0
Vehicle Extension [s]	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	4	0
Pedestrian Clearance [s]	0	23	0	0	23	0	0	23	0	0	26	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.1	0.0	2.0	4.4	0.0	2.0	4.4	0.0	0.0	2.0	0.0
Minimum Recall		No		No	No		No	No			No	
Maximum Recall		No		No	Yes		No	Yes			No	
Pedestrian Recall		No		No	No		No	No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	C	L	C	C	C	R
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.10	5.10	5.10	4.00	6.40	6.40	4.00	6.40	6.40	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.10	3.10	3.10	2.00	4.40	4.40	2.00	4.40	4.40	2.00	2.00
g_i, Effective Green Time [s]	8	8	8	9	73	73	4	68	68	5	5
g / C, Green / Cycle	0.08	0.08	0.08	0.08	0.67	0.67	0.03	0.62	0.62	0.05	0.05
(v / s)_i Volume / Saturation Flow Rate	0.02	0.02	0.06	0.06	0.09	0.09	0.03	0.14	0.14	0.03	0.03
s, saturation flow rate [veh/h]	1781	1815	1554	1781	1870	1844	1781	1870	1764	1815	1579
c, Capacity [veh/h]	137	140	120	140	1244	1227	58	1158	1092	87	75
d1, Uniform Delay [s]	47.72	47.71	49.56	49.86	6.80	6.80	52.80	9.27	9.29	51.23	51.30
k, delay calibration	0.04	0.04	0.04	0.04	0.50	0.50	0.04	0.50	0.50	0.04	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.32	0.31	3.13	4.12	0.24	0.24	7.86	0.46	0.49	2.05	2.65
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.24	0.23	0.73	0.81	0.14	0.14	0.77	0.23	0.23	0.55	0.58
d, Delay for Lane Group [s/veh]	48.04	48.02	52.69	53.98	7.04	7.04	60.66	9.73	9.78	53.29	53.95
Lane Group LOS	D	D	D	D	A	A	E	A	A	D	D
Critical Lane Group	No	No	Yes	Yes	No	No	No	No	Yes	No	Yes
50th-Percentile Queue Length [veh/ln]	0.84	0.85	2.41	3.15	1.41	1.40	1.34	2.68	2.57	1.38	1.27
50th-Percentile Queue Length [ft/ln]	20.97	21.17	60.34	78.87	35.28	35.02	33.44	67.02	64.27	34.39	31.82
95th-Percentile Queue Length [veh/ln]	1.51	1.52	4.34	5.68	2.54	2.52	2.41	4.83	4.63	2.48	2.29
95th-Percentile Queue Length [ft/ln]	37.74	38.11	108.60	141.97	63.50	63.03	60.20	120.64	115.68	61.91	57.28

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	48.04	48.02	52.69	53.98	7.04	7.04	60.66	9.75	9.78	53.29	53.29	53.95
Movement LOS	D	D	D	D	A	A	E	A	A	D	D	D
d_A, Approach Delay [s/veh]	50.70			18.52			13.85			53.61		
Approach LOS	D			B			B			D		
d_I, Intersection Delay [s/veh]	22.88											
Intersection LOS	C											
Intersection V/C	0.290											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	8.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	1867.90	3721.41	6829.45	2599.84
d_p, Pedestrian Delay [s]	46.37	46.37	47.29	46.37
l_p,int, Pedestrian LOS Score for Intersection	2.247	2.573	2.680	1.978
Crosswalk LOS	B	B	B	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	198	684	629	545
d_b, Bicycle Delay [s]	44.66	23.84	25.84	29.09
l_b,int, Bicycle LOS Score for Intersection	1.810	1.941	2.021	1.711
Bicycle LOS	A	A	B	A

Sequence

Ring 1	1	2	4	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 1: Main St/Empire Ave

Control Type:	Signalized	Delay (sec / veh):	26.4
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.500

Intersection Setup

Name	Empire Ave			Charles Way			Main St			Main St		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Entry Pocket Length [ft]	120.00	100.00	100.00	100.00	100.00	100.00	205.00	100.00	100.00	190.00	100.00	250.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Empire Ave			Charles Way			Main St			Main St		
Base Volume Input [veh/h]	255	36	129	10	16	15	186	394	11	61	867	327
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	255	36	129	10	16	15	186	394	11	61	867	327
Peak Hour Factor	0.9300	0.9300	0.9300	0.7900	0.7900	0.7900	0.9500	0.9500	0.9500	0.8600	0.8600	0.8600
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	69	10	35	3	5	5	49	104	3	18	252	95
Total Analysis Volume [veh/h]	274	39	139	13	20	19	196	415	12	71	1008	380
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	2			0			3			0		
v_di, Inbound Pedestrian Volume crossing m	3			0			2			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	54.0
Offset Reference	Lagging Force-Off
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	3	0	0	4	0	1	6	0	5	2	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	4	0	0	4	0	4	10	0	4	10	0
Maximum Green [s]	0	17	0	0	25	0	16	37	0	11	33	0
Amber [s]	0.0	4.4	0.0	0.0	3.6	0.0	3.0	4.8	0.0	3.0	4.4	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	22	0	0	30	0	20	43	0	15	38	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.5	3.5	0.0	2.5	3.5	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	19	0	0	20	0	0	19	0	0	24	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.4	0.0	0.0	2.6	0.0	2.0	3.8	0.0	2.0	3.4	0.0
Minimum Recall		Yes			No		No	Yes		No	Yes	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	C	R	L	C	C	L	C	R
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.40	5.40	5.40	4.60	4.60	4.00	5.80	5.80	4.00	5.40	5.40
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.40	3.40	3.40	2.60	2.60	2.00	3.80	3.80	2.00	3.40	3.40
g_i, Effective Green Time [s]	13	13	13	3	3	14	69	69	6	61	61
g / C, Green / Cycle	0.11	0.11	0.11	0.03	0.03	0.13	0.62	0.62	0.05	0.55	0.55
(v / s)_i Volume / Saturation Flow Rate	0.08	0.02	0.09	0.02	0.01	0.11	0.11	0.11	0.04	0.28	0.24
s, saturation flow rate [veh/h]	3459	1870	1569	1834	1589	1781	1870	1852	1781	3560	1589
c, Capacity [veh/h]	397	214	180	54	47	225	1167	1156	91	1968	879
d1, Uniform Delay [s]	46.82	44.03	47.24	52.73	52.41	47.15	8.77	8.77	51.55	15.35	14.46
k, delay calibration	0.04	0.04	0.04	0.04	0.04	0.23	0.50	0.50	0.08	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.81	0.15	2.66	3.98	2.04	18.31	0.35	0.35	9.96	0.96	1.55
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.69	0.18	0.77	0.61	0.40	0.87	0.18	0.18	0.78	0.51	0.43
d, Delay for Lane Group [s/veh]	47.63	44.18	49.90	56.71	54.45	65.47	9.12	9.12	61.51	16.30	16.01
Lane Group LOS	D	D	D	E	D	E	A	A	E	B	B
Critical Lane Group	No	No	Yes	Yes	No	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	3.57	0.95	3.75	0.97	0.55	6.29	2.08	2.06	2.15	7.51	5.53
50th-Percentile Queue Length [ft/ln]	89.33	23.84	93.63	24.19	13.65	157.24	52.02	51.61	53.75	187.83	138.25
95th-Percentile Queue Length [veh/ln]	6.43	1.72	6.74	1.74	0.98	10.40	3.75	3.72	3.87	12.01	9.39
95th-Percentile Queue Length [ft/ln]	160.79	42.91	168.54	43.54	24.57	260.06	93.64	92.90	96.75	300.22	234.67

Movement, Approach, & Intersection Results

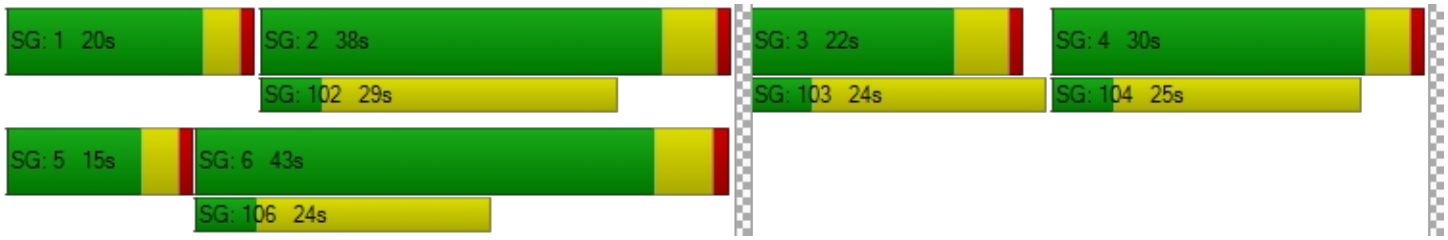
d_M, Delay for Movement [s/veh]	47.63	44.18	49.90	56.71	56.71	54.45	65.47	9.12	9.12	61.51	16.30	16.01
Movement LOS	D	D	D	E	E	D	E	A	A	E	B	B
d_A, Approach Delay [s/veh]	48.03			55.88			26.85			18.43		
Approach LOS	D			E			C			B		
d_I, Intersection Delay [s/veh]	26.38											
Intersection LOS	C											
Intersection V/C	0.500											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	1256.05	0.00
d_p, Pedestrian Delay [s]	46.37	46.37	46.37	46.37
l_p,int, Pedestrian LOS Score for Intersection	2.691	1.998	2.775	2.934
Crosswalk LOS	B	A	C	C
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	302	462	676	593
d_b, Bicycle Delay [s]	39.65	32.53	24.09	27.23
l_b,int, Bicycle LOS Score for Intersection	2.305	1.645	2.074	2.763
Bicycle LOS	B	A	B	C

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2: Empire Ave/Oakley Rd

Control Type:	Signalized	Delay (sec / veh):	29.6
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.300

Intersection Setup

Name	Empire Ave			Empire Ave			Driveway			Oakley Rd		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	1	0	0
Entry Pocket Length [ft]	110.00	100.00	100.00	140.00	100.00	100.00	100.00	100.00	100.00	315.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			40.00			15.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Empire Ave			Empire Ave			Driveway			Oakley Rd		
Base Volume Input [veh/h]	68	333	13	108	305	61	69	37	76	55	23	88
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	68	333	13	108	305	61	69	37	76	55	23	88
Peak Hour Factor	0.9200	0.9200	0.9200	0.9300	0.9300	0.9300	0.8900	0.8900	0.8900	0.8500	0.8500	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	18	90	4	29	82	16	19	10	21	16	7	26
Total Analysis Volume [veh/h]	74	362	14	116	328	66	78	42	85	65	27	104
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	2			2			1			1		
v_di, Inbound Pedestrian Volume crossing m	1			1			2			2		
v_co, Outbound Pedestrian Volume crossing	1			0			1			0		
v_ci, Inbound Pedestrian Volume crossing mi	1			0			1			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			1			0			2		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	1.0
Offset Reference	Lagging Force-Off
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	5	2	0	1	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	4	4	0	4	4	0	0	4	0	0	4	0
Maximum Green [s]	13	38	0	10	35	0	0	30	0	0	13	0
Amber [s]	3.0	4.4	0.0	3.0	4.4	0.0	0.0	3.0	0.0	0.0	4.1	0.0
All red [s]	1.0	2.0	0.0	1.0	2.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Split [s]	17	44	0	14	41	0	0	34	0	0	18	0
Vehicle Extension [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Walk [s]	0	5	0	0	5	0	0	4	0	0	5	0
Pedestrian Clearance [s]	0	23	0	0	23	0	0	26	0	0	23	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	4.4	0.0	2.0	4.4	0.0	0.0	2.0	0.0	0.0	3.1	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	Yes		No	Yes			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	R	L	C	R
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	4.00	6.40	6.40	4.00	6.40	6.40	4.00	4.00	5.10	5.10	5.10
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	4.40	4.40	2.00	4.40	4.40	2.00	2.00	3.10	3.10	3.10
g_i, Effective Green Time [s]	6	61	61	9	64	64	10	10	10	10	10
g / C, Green / Cycle	0.05	0.56	0.56	0.08	0.59	0.59	0.09	0.09	0.09	0.09	0.09
(v / s)_i Volume / Saturation Flow Rate	0.04	0.10	0.10	0.07	0.11	0.11	0.07	0.05	0.03	0.03	0.07
s, saturation flow rate [veh/h]	1781	1870	1845	1781	1870	1749	1811	1574	1781	1832	1547
c, Capacity [veh/h]	96	1044	1030	143	1093	1023	170	148	161	166	140
d1, Uniform Delay [s]	51.39	11.94	11.94	49.79	10.63	10.66	48.36	47.70	46.70	46.69	48.69
k, delay calibration	0.04	0.50	0.50	0.13	0.50	0.50	0.04	0.04	0.04	0.04	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.94	0.38	0.39	12.40	0.37	0.41	2.00	1.31	0.35	0.34	2.91
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.77	0.18	0.18	0.81	0.18	0.19	0.71	0.57	0.28	0.28	0.74
d, Delay for Lane Group [s/veh]	56.33	12.32	12.33	62.19	11.01	11.07	50.36	49.01	47.05	47.02	51.60
Lane Group LOS	E	B	B	E	B	B	D	D	D	D	D
Critical Lane Group	No	No	Yes	Yes	No	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	2.11	2.24	2.22	3.57	2.22	2.13	3.37	2.34	1.17	1.19	2.86
50th-Percentile Queue Length [ft/ln]	52.66	56.02	55.57	89.13	55.49	53.34	84.27	58.58	29.26	29.78	71.50
95th-Percentile Queue Length [veh/ln]	3.79	4.03	4.00	6.42	4.00	3.84	6.07	4.22	2.11	2.14	5.15
95th-Percentile Queue Length [ft/ln]	94.80	100.84	100.02	160.43	99.89	96.01	151.68	105.44	52.67	53.61	128.71

Movement, Approach, & Intersection Results

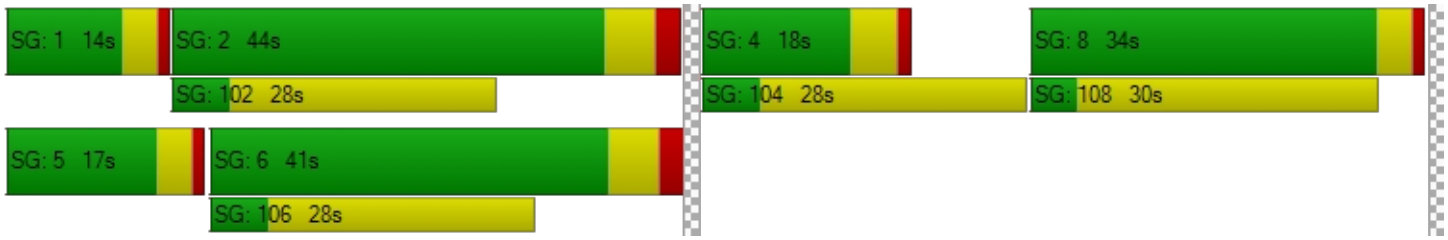
d_M, Delay for Movement [s/veh]	56.33	12.33	12.33	62.19	11.03	11.07	50.36	50.36	49.01	47.05	47.02	51.60
Movement LOS	E	B	B	E	B	B	D	D	D	D	D	D
d_A, Approach Delay [s/veh]	19.56			22.67			49.80			49.46		
Approach LOS	B			C			D			D		
d_I, Intersection Delay [s/veh]	29.59											
Intersection LOS	C											
Intersection V/C	0.300											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	8.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	2422.80	2123.23	3886.57	0.00
d_p, Pedestrian Delay [s]	46.37	47.29	46.37	46.37
l_p,int, Pedestrian LOS Score for Intersection	2.561	2.686	2.010	2.250
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	684	629	545	235
d_b, Bicycle Delay [s]	23.83	25.85	29.09	42.90
l_b,int, Bicycle LOS Score for Intersection	1.931	1.980	1.898	1.883
Bicycle LOS	A	A	A	A

Sequence

Ring 1	1	2	4	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



APPENDIX B

Intersection Level of Service Worksheets – Existing plus Project Conditions

Intersection Level Of Service Report
Intersection 1: Main St/Empire Ave

Control Type:	Signalized	Delay (sec / veh):	37.7
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.511

Intersection Setup

Name	Empire Ave			Charles Way			Main St			Main St		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Entry Pocket Length [ft]	120.00	100.00	100.00	100.00	100.00	100.00	205.00	100.00	100.00	190.00	100.00	250.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Empire Ave			Charles Way			Main St			Main St		
Base Volume Input [veh/h]	253	25	156	13	33	25	189	487	19	24	479	244
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	15	0	10	0	0	0	3	0	0	0	0	6
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	268	25	166	13	33	25	192	487	19	24	479	250
Peak Hour Factor	0.7300	0.7300	0.7300	0.6100	0.6100	0.6100	0.8900	0.8900	0.8900	0.7700	0.7700	0.7700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	92	9	57	5	14	10	54	137	5	8	156	81
Total Analysis Volume [veh/h]	367	34	227	21	54	41	216	547	21	31	622	325
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	2			0			3			0		
v_di, Inbound Pedestrian Volume crossing m	3			0			2			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	54.0
Offset Reference	Lagging Force-Off
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	3	0	0	4	0	1	6	0	5	2	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	4	0	0	4	0	4	10	0	4	10	0
Maximum Green [s]	0	21	0	0	25	0	12	34	0	10	33	0
Amber [s]	0.0	4.4	0.0	0.0	3.6	0.0	3.0	4.8	0.0	3.0	4.4	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	26	0	0	30	0	16	40	0	14	38	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.5	3.5	0.0	2.5	3.5	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	19	0	0	20	0	0	19	0	0	24	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.4	0.0	0.0	2.6	0.0	2.0	3.8	0.0	2.0	3.4	0.0
Minimum Recall		No			No		No	Yes		No	Yes	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	C	R	L	C	C	L	C	R
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.40	5.40	5.40	4.60	4.60	4.00	5.80	5.80	4.00	5.40	5.40
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.40	3.40	3.40	2.60	2.60	2.00	3.80	3.80	2.00	3.40	3.40
g_i, Effective Green Time [s]	18	18	18	6	6	12	63	63	2	54	54
g / C, Green / Cycle	0.17	0.17	0.17	0.06	0.06	0.11	0.57	0.57	0.02	0.49	0.49
(v / s)_i Volume / Saturation Flow Rate	0.11	0.02	0.14	0.04	0.03	0.12	0.15	0.15	0.02	0.17	0.20
s, saturation flow rate [veh/h]	3459	1870	1575	1844	1589	1781	1870	1846	1781	3560	1589
c, Capacity [veh/h]	571	309	260	108	93	194	1073	1059	41	1748	780
d1, Uniform Delay [s]	42.88	39.04	44.71	50.84	50.06	49.00	11.80	11.80	53.45	17.27	17.91
k, delay calibration	0.04	0.04	0.18	0.04	0.04	0.46	0.50	0.50	0.08	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.45	0.06	13.58	3.02	1.23	95.17	0.61	0.62	19.40	0.57	1.64
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.64	0.11	0.87	0.70	0.44	1.11	0.27	0.27	0.76	0.36	0.42
d, Delay for Lane Group [s/veh]	43.33	39.09	58.30	53.86	51.29	144.17	12.41	12.42	72.86	17.84	19.55
Lane Group LOS	D	D	E	D	D	F	B	B	E	B	B
Critical Lane Group	No	No	Yes	Yes	No	Yes	No	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	4.59	0.77	6.85	2.13	1.13	10.34	3.44	3.40	1.06	4.73	5.34
50th-Percentile Queue Length [ft/ln]	114.68	19.32	171.33	53.33	28.28	258.62	86.04	85.03	26.40	118.37	133.46
95th-Percentile Queue Length [veh/ln]	8.10	1.39	11.15	3.84	2.04	16.29	6.19	6.12	1.90	8.30	9.13
95th-Percentile Queue Length [ft/ln]	202.49	34.77	278.67	96.00	50.91	407.34	154.87	153.06	47.51	207.58	228.18

Movement, Approach, & Intersection Results

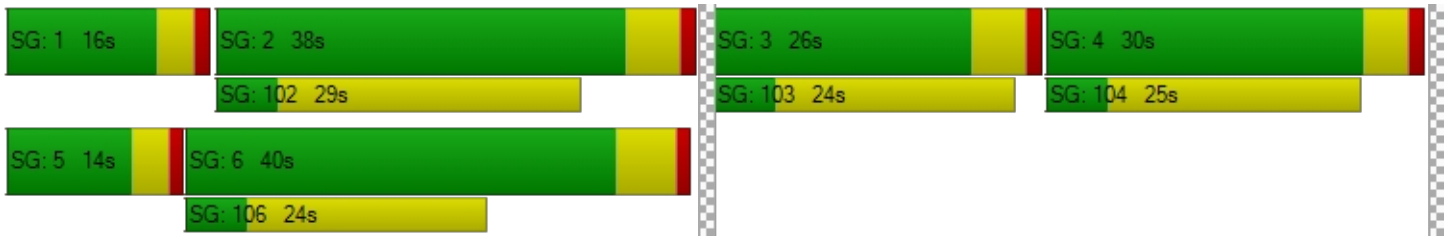
d_M, Delay for Movement [s/veh]	43.33	39.09	58.30	53.86	53.86	51.29	144.17	12.42	12.42	72.86	17.84	19.55
Movement LOS	D	D	E	D	D	D	F	B	B	E	B	B
d_A, Approach Delay [s/veh]	48.51			52.95			48.72			20.15		
Approach LOS	D			D			D			C		
d_I, Intersection Delay [s/veh]	37.71											
Intersection LOS	D											
Intersection V/C	0.511											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	1029.04	0.00
d_p, Pedestrian Delay [s]	46.37	46.37	46.37	46.37
l_p,int, Pedestrian LOS Score for Intersection	2.729	2.006	2.741	2.883
Crosswalk LOS	B	B	B	C
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	375	462	622	593
d_b, Bicycle Delay [s]	36.33	32.53	26.12	27.23
l_b,int, Bicycle LOS Score for Intersection	2.596	1.751	2.206	2.366
Bicycle LOS	B	A	B	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2: Empire Ave/Oakley Rd

Control Type:	Signalized	Delay (sec / veh):	24.5
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.309

Intersection Setup

Name	Oakley Rd			Empire Ave			Empire Ave			Driveway		
Approach	Eastbound			Northeastbound			Southwestbound			Northwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	1	0	0	0	0	0
Entry Pocket Length [ft]	315.00	100.00	100.00	110.00	100.00	100.00	140.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00			40.00			40.00			15.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Oakley Rd			Empire Ave			Empire Ave			Driveway		
Base Volume Input [veh/h]	40	10	67	93	276	10	33	314	61	22	15	34
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	26	0	15	5	0	0	0	0	9	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	66	10	82	98	276	10	33	314	70	22	15	34
Peak Hour Factor	0.7700	0.7700	0.7700	0.8200	0.8200	0.8200	0.7300	0.7300	0.7300	0.7700	0.7700	0.7700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	3	27	30	84	3	11	108	24	7	5	11
Total Analysis Volume [veh/h]	86	13	106	120	337	12	45	430	96	29	19	44
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	1			1			1			0		
v_di, Inbound Pedestrian Volume crossing m	1			1			0			1		
v_co, Outbound Pedestrian Volume crossing	2			1			2			2		
v_ci, Inbound Pedestrian Volume crossing mi	2			2			2			1		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	1			1			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	1.0
Offset Reference	Lagging Force-Off
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split
Signal Group	0	4	0	5	2	0	1	6	0	0	8	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	Lead	-	-	-	-	-
Minimum Green [s]	0	4	0	4	4	0	4	4	0	0	4	0
Maximum Green [s]	0	11	0	15	38	0	12	35	0	0	30	0
Amber [s]	0.0	4.1	0.0	3.0	4.4	0.0	3.0	4.4	0.0	0.0	3.0	0.0
All red [s]	0.0	1.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0	0.0	1.0	0.0
Split [s]	0	16	0	19	44	0	16	41	0	0	34	0
Vehicle Extension [s]	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	4	0
Pedestrian Clearance [s]	0	23	0	0	23	0	0	23	0	0	26	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.1	0.0	2.0	4.4	0.0	2.0	4.4	0.0	0.0	2.0	0.0
Minimum Recall		No		No	No		No	No			No	
Maximum Recall		No		No	Yes		No	Yes			No	
Pedestrian Recall		No		No	No		No	No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	C	L	C	C	C	R
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.10	5.10	5.10	4.00	6.40	6.40	4.00	6.40	6.40	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.10	3.10	3.10	2.00	4.40	4.40	2.00	4.40	4.40	2.00	2.00
g_i, Effective Green Time [s]	10	10	10	9	72	72	4	66	66	5	5
g / C, Green / Cycle	0.09	0.09	0.09	0.08	0.65	0.65	0.03	0.60	0.60	0.05	0.05
(v / s)_i Volume / Saturation Flow Rate	0.03	0.03	0.07	0.07	0.09	0.09	0.03	0.14	0.15	0.03	0.03
s, saturation flow rate [veh/h]	1781	1803	1556	1781	1870	1844	1781	1870	1752	1815	1579
c, Capacity [veh/h]	158	160	138	148	1222	1205	58	1128	1057	87	75
d1, Uniform Delay [s]	46.96	46.96	48.93	49.61	7.29	7.29	52.80	10.11	10.13	51.23	51.30
k, delay calibration	0.04	0.04	0.07	0.04	0.50	0.50	0.04	0.50	0.50	0.04	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.41	0.41	5.62	4.07	0.25	0.25	7.86	0.50	0.54	2.05	2.65
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.31	0.31	0.77	0.81	0.14	0.14	0.77	0.24	0.24	0.55	0.58
d, Delay for Lane Group [s/veh]	47.38	47.36	54.55	53.68	7.53	7.54	60.66	10.61	10.68	53.29	53.95
Lane Group LOS	D	D	D	D	A	A	E	B	B	D	D
Critical Lane Group	No	No	Yes	Yes	No	No	No	No	Yes	No	Yes
50th-Percentile Queue Length [veh/ln]	1.27	1.28	3.02	3.34	1.48	1.47	1.34	2.92	2.79	1.38	1.27
50th-Percentile Queue Length [ft/ln]	31.80	32.06	75.61	83.59	37.06	36.78	33.44	73.10	69.69	34.39	31.82
95th-Percentile Queue Length [veh/ln]	2.29	2.31	5.44	6.02	2.67	2.65	2.41	5.26	5.02	2.48	2.29
95th-Percentile Queue Length [ft/ln]	57.23	57.70	136.11	150.46	66.71	66.21	60.20	131.58	125.44	61.91	57.28

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	47.37	47.36	54.55	53.68	7.54	7.54	60.66	10.64	10.68	53.29	53.29	53.95
Movement LOS	D	D	D	D	A	A	E	B	B	D	D	D
d_A, Approach Delay [s/veh]	51.08			19.34			14.59			53.61		
Approach LOS	D			B			B			D		
d_I, Intersection Delay [s/veh]	24.53											
Intersection LOS	C											
Intersection V/C	0.309											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	8.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	1837.33	3624.60	6829.45	2599.84
d_p, Pedestrian Delay [s]	46.37	46.37	47.29	46.37
l_p,int, Pedestrian LOS Score for Intersection	2.411	2.580	2.690	1.978
Crosswalk LOS	B	B	B	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	198	684	629	545
d_b, Bicycle Delay [s]	44.66	23.84	25.84	29.09
l_b,int, Bicycle LOS Score for Intersection	1.898	1.947	2.031	1.711
Bicycle LOS	A	A	B	A

Sequence

Ring 1	1	2	4	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 3: Oakley Rd/Project Dwy

Control Type:	Two-way stop	Delay (sec / veh):	9.0
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.044

Intersection Setup

Name										Oakley Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			25.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name										Oakley Rd		
Base Volume Input [veh/h]	0	0	0	0	0	0	0	117	0	0	169	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	42	0	41	0	0	0	15
Total Hourly Volume [veh/h]	0	0	0	0	0	42	0	158	0	0	169	15
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	0	11	0	40	0	0	42	4
Total Analysis Volume [veh/h]	0	0	0	0	0	42	0	158	0	0	169	15
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.45	11.22	8.73	0.00	0.00	8.98	0.00	0.00	0.00	0.00	0.00	0.00
Movement LOS	B	B	A			A		A	A		A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	3.48	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.13			8.98			0.00			0.00		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.98											
Intersection LOS	A											

Intersection Level Of Service Report
Intersection 1: Main St/Empire Ave

Control Type:	Signalized	Delay (sec / veh):	27.2
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.510

Intersection Setup

Name	Empire Ave			Charles Way			Main St			Main St		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Entry Pocket Length [ft]	120.00	100.00	100.00	100.00	100.00	100.00	205.00	100.00	100.00	190.00	100.00	250.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			40.00			40.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Empire Ave			Charles Way			Main St			Main St		
Base Volume Input [veh/h]	255	36	129	10	16	15	186	394	11	61	867	327
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	11	0	7	0	0	0	11	0	0	0	0	18
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	266	36	136	10	16	15	197	394	11	61	867	345
Peak Hour Factor	0.9300	0.9300	0.9300	0.7900	0.7900	0.7900	0.9500	0.9500	0.9500	0.8600	0.8600	0.8600
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	72	10	37	3	5	5	52	104	3	18	252	100
Total Analysis Volume [veh/h]	286	39	146	13	20	19	207	415	12	71	1008	401
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	2			0			3			0		
v_di, Inbound Pedestrian Volume crossing m	3			0			2			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	54.0
Offset Reference	Lagging Force-Off
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	3	0	0	4	0	1	6	0	5	2	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	4	0	0	4	0	4	10	0	4	10	0
Maximum Green [s]	0	17	0	0	25	0	16	37	0	11	33	0
Amber [s]	0.0	4.4	0.0	0.0	3.6	0.0	3.0	4.8	0.0	3.0	4.4	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	22	0	0	30	0	20	43	0	15	38	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.5	3.5	0.0	2.5	3.5	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	19	0	0	20	0	0	19	0	0	24	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.4	0.0	0.0	2.6	0.0	2.0	3.8	0.0	2.0	3.4	0.0
Minimum Recall		Yes			No		No	Yes		No	Yes	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	C	R	L	C	C	L	C	R
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.40	5.40	5.40	4.60	4.60	4.00	5.80	5.80	4.00	5.40	5.40
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.40	3.40	3.40	2.60	2.60	2.00	3.80	3.80	2.00	3.40	3.40
g_i, Effective Green Time [s]	13	13	13	3	3	15	68	68	6	60	60
g / C, Green / Cycle	0.12	0.12	0.12	0.03	0.03	0.13	0.62	0.62	0.05	0.54	0.54
(v / s)_i Volume / Saturation Flow Rate	0.08	0.02	0.09	0.02	0.01	0.12	0.11	0.11	0.04	0.28	0.25
s, saturation flow rate [veh/h]	3459	1870	1569	1834	1589	1781	1870	1852	1781	3560	1589
c, Capacity [veh/h]	410	222	186	54	47	236	1160	1148	91	1932	863
d1, Uniform Delay [s]	46.58	43.63	47.05	52.73	52.41	46.83	8.96	8.96	51.55	16.04	15.38
k, delay calibration	0.04	0.04	0.04	0.04	0.04	0.26	0.50	0.50	0.08	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.81	0.14	2.84	3.98	2.04	20.41	0.35	0.36	9.96	1.01	1.80
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.70	0.18	0.78	0.61	0.40	0.88	0.18	0.19	0.78	0.52	0.46
d, Delay for Lane Group [s/veh]	47.38	43.77	49.89	56.71	54.45	67.24	9.31	9.31	61.51	17.05	17.18
Lane Group LOS	D	D	D	E	D	E	A	A	E	B	B
Critical Lane Group	No	No	Yes	Yes	No	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	3.72	0.95	3.94	0.97	0.55	6.76	2.11	2.09	2.15	7.74	6.13
50th-Percentile Queue Length [ft/ln]	93.10	23.71	98.50	24.19	13.65	169.12	52.78	52.36	53.75	193.44	153.16
95th-Percentile Queue Length [veh/ln]	6.70	1.71	7.09	1.74	0.98	11.03	3.80	3.77	3.87	12.30	10.19
95th-Percentile Queue Length [ft/ln]	167.58	42.67	177.30	43.54	24.57	275.76	95.01	94.25	96.75	307.49	254.65

Movement, Approach, & Intersection Results

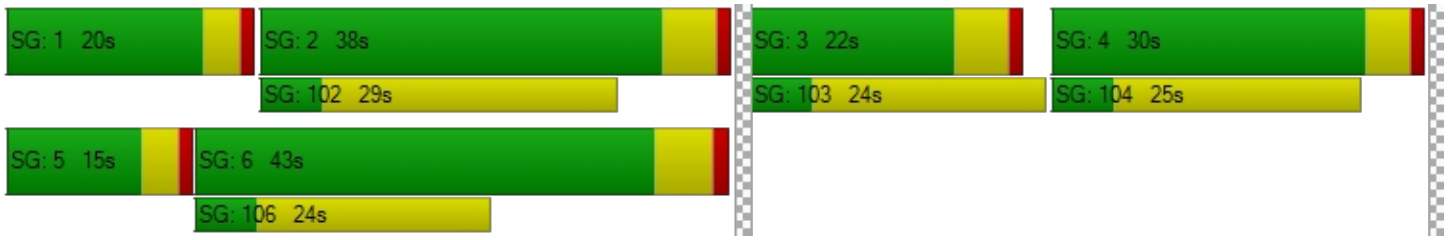
d_M, Delay for Movement [s/veh]	47.38	43.77	49.89	56.71	56.71	54.45	67.24	9.31	9.31	61.51	17.05	17.18
Movement LOS	D	D	D	E	E	D	E	A	A	E	B	B
d_A, Approach Delay [s/veh]	47.86			55.88			28.23			19.22		
Approach LOS	D			E			C			B		
d_I, Intersection Delay [s/veh]	27.22											
Intersection LOS	C											
Intersection V/C	0.510											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	1237.99	0.00
d_p, Pedestrian Delay [s]	46.37	46.37	46.37	46.37
l_p,int, Pedestrian LOS Score for Intersection	2.702	1.998	2.779	2.941
Crosswalk LOS	B	A	C	C
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	302	462	676	593
d_b, Bicycle Delay [s]	39.65	32.53	24.09	27.23
l_b,int, Bicycle LOS Score for Intersection	2.337	1.645	2.083	2.781
Bicycle LOS	B	A	B	C

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2: Empire Ave/Oakley Rd

Control Type:	Signalized	Delay (sec / veh):	30.3
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.312

Intersection Setup

Name	Empire Ave			Empire Ave			Driveway			Oakley Rd		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	0	0	0	1	0	0
Entry Pocket Length [ft]	110.00	100.00	100.00	140.00	100.00	100.00	100.00	100.00	100.00	315.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			40.00			15.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Empire Ave			Empire Ave			Driveway			Oakley Rd		
Base Volume Input [veh/h]	68	333	13	108	305	61	69	37	76	55	23	88
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	17	0	0	0	0	29	0	0	0	20	0	10
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	85	333	13	108	305	90	69	37	76	75	23	98
Peak Hour Factor	0.9200	0.9200	0.9200	0.9300	0.9300	0.9300	0.8900	0.8900	0.8900	0.8500	0.8500	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	23	90	4	29	82	24	19	10	21	22	7	29
Total Analysis Volume [veh/h]	92	362	14	116	328	97	78	42	85	88	27	115
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	2			2			1			1		
v_di, Inbound Pedestrian Volume crossing m	1			1			2			2		
v_co, Outbound Pedestrian Volume crossing	1			0			1			0		
v_ci, Inbound Pedestrian Volume crossing mi	1			0			1			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			1			0			2		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	1.0
Offset Reference	Lagging Force-Off
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split	Split	Split	Split
Signal Group	5	2	0	1	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	4	4	0	4	4	0	0	4	0	0	4	0
Maximum Green [s]	13	38	0	10	35	0	0	30	0	0	13	0
Amber [s]	3.0	4.4	0.0	3.0	4.4	0.0	0.0	3.0	0.0	0.0	4.1	0.0
All red [s]	1.0	2.0	0.0	1.0	2.0	0.0	0.0	1.0	0.0	0.0	1.0	0.0
Split [s]	17	44	0	14	41	0	0	34	0	0	18	0
Vehicle Extension [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
Walk [s]	0	5	0	0	5	0	0	4	0	0	5	0
Pedestrian Clearance [s]	0	23	0	0	23	0	0	26	0	0	23	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.0	4.4	0.0	2.0	4.4	0.0	0.0	2.0	0.0	0.0	3.1	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	Yes		No	Yes			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	C	R	L	C	R
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	4.00	6.40	6.40	4.00	6.40	6.40	4.00	4.00	5.10	5.10	5.10
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	2.00	4.40	4.40	2.00	4.40	4.40	2.00	2.00	3.10	3.10	3.10
g_i, Effective Green Time [s]	7	61	61	9	62	62	10	10	11	11	11
g / C, Green / Cycle	0.07	0.55	0.55	0.08	0.57	0.57	0.09	0.09	0.10	0.10	0.10
(v / s)_i Volume / Saturation Flow Rate	0.05	0.10	0.10	0.07	0.12	0.12	0.07	0.05	0.03	0.03	0.07
s, saturation flow rate [veh/h]	1781	1870	1845	1781	1870	1715	1811	1574	1781	1821	1549
c, Capacity [veh/h]	117	1032	1018	143	1059	971	170	148	173	177	150
d1, Uniform Delay [s]	50.65	12.30	12.30	49.79	11.72	11.76	48.36	47.70	46.33	46.32	48.35
k, delay calibration	0.04	0.50	0.50	0.13	0.50	0.50	0.04	0.04	0.04	0.04	0.05
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.41	0.39	0.40	12.40	0.44	0.50	2.00	1.31	0.41	0.40	3.54
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.79	0.18	0.18	0.81	0.21	0.21	0.71	0.57	0.33	0.33	0.77
d, Delay for Lane Group [s/veh]	55.05	12.69	12.70	62.19	12.17	12.25	50.36	49.02	46.74	46.72	51.89
Lane Group LOS	E	B	B	E	B	B	D	D	D	D	D
Critical Lane Group	Yes	No	No	No	No	Yes	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh/ln]	2.59	2.29	2.27	3.57	2.59	2.45	3.37	2.34	1.46	1.49	3.18
50th-Percentile Queue Length [ft/ln]	64.74	57.13	56.65	89.13	64.73	61.14	84.27	58.58	36.55	37.14	79.58
95th-Percentile Queue Length [veh/ln]	4.66	4.11	4.08	6.42	4.66	4.40	6.07	4.22	2.63	2.67	5.73
95th-Percentile Queue Length [ft/ln]	116.53	102.83	101.96	160.43	116.52	110.05	151.68	105.44	65.80	66.85	143.24

Movement, Approach, & Intersection Results

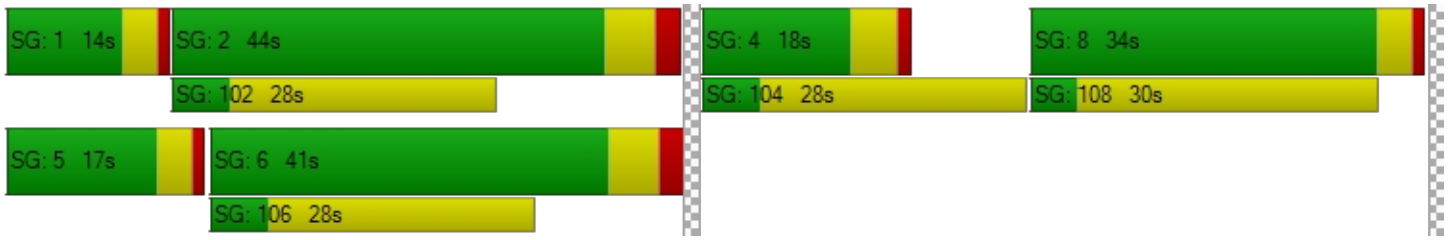
d_M, Delay for Movement [s/veh]	55.05	12.69	12.70	62.19	12.20	12.25	50.36	50.36	49.02	46.73	46.72	51.89
Movement LOS	E	B	B	E	B	B	D	D	D	D	D	D
d_A, Approach Delay [s/veh]	21.02			22.93			49.80			49.31		
Approach LOS	C			C			D			D		
d_I, Intersection Delay [s/veh]	30.33											
Intersection LOS	C											
Intersection V/C	0.312											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	8.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	2385.45	2123.23	3886.57	0.00
d_p, Pedestrian Delay [s]	46.37	47.29	46.37	46.37
l_p,int, Pedestrian LOS Score for Intersection	2.568	2.698	2.010	2.416
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	684	629	545	235
d_b, Bicycle Delay [s]	23.83	25.85	29.09	42.90
l_b,int, Bicycle LOS Score for Intersection	1.946	2.006	1.898	1.939
Bicycle LOS	A	B	A	A

Sequence

Ring 1	1	2	4	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 3: Oakley Rd/Project Dwy

Control Type:	Two-way stop	Delay (sec / veh):	9.1
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.046

Intersection Setup

Name										Oakley Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			25.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name										Oakley Rd		
Base Volume Input [veh/h]	0	0	0	0	0	0	0	166	0	0	166	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	13	0	13	0	0	0	19
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	29	0	30	0	0	0	48
Total Hourly Volume [veh/h]	0	0	0	0	0	42	0	209	0	0	166	67
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	0	11	0	52	0	0	42	17
Total Analysis Volume [veh/h]	0	0	0	0	0	42	0	209	0	0	166	67
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.92	12.08	8.87	0.00	0.00	9.13	0.00	0.00	0.00	0.00	0.00	0.00
Movement LOS	B	B	A			A		A	A		A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	3.61	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.62			9.13			0.00			0.00		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.79											
Intersection LOS	A											

APPENDIX C

Intersection Level of Service Worksheets – Background Conditions

Intersection Level Of Service Report
Intersection 1: Main St/Empire Ave

Control Type:	Signalized	Delay (sec / veh):	44.9
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.641

Intersection Setup

Name	Empire Ave			Charles Way			Main St			Main St		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Entry Pocket Length [ft]	120.00	100.00	100.00	100.00	100.00	100.00	205.00	100.00	100.00	190.00	100.00	250.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Empire Ave			Charles Way			Main St			Main St		
Base Volume Input [veh/h]	253	25	156	13	33	25	189	487	19	24	479	244
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	19	0	55	0	0	0	45	559	0	0	216	34
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	60	0	0	43	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	272	25	211	13	33	25	234	1106	19	24	738	278
Peak Hour Factor	0.7300	0.7300	0.7300	0.6100	0.6100	0.6100	0.8900	0.8900	0.8900	0.7700	0.7700	0.7700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	93	9	72	5	14	10	66	311	5	8	240	90
Total Analysis Volume [veh/h]	373	34	289	21	54	41	263	1243	21	31	958	361
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	2			0			3			0		
v_di, Inbound Pedestrian Volume crossing m	3			0			2			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	54.0
Offset Reference	Lagging Force-Off
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	3	0	0	4	0	1	6	0	5	2	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	4	0	0	4	0	4	10	0	4	10	0
Maximum Green [s]	0	21	0	0	25	0	12	34	0	10	33	0
Amber [s]	0.0	4.4	0.0	0.0	3.6	0.0	3.0	4.8	0.0	3.0	4.4	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	26	0	0	30	0	16	40	0	14	38	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.5	3.5	0.0	2.5	3.5	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	19	0	0	20	0	0	19	0	0	24	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.4	0.0	0.0	2.6	0.0	2.0	3.8	0.0	2.0	3.4	0.0
Minimum Recall		No			No		No	Yes		No	Yes	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	C	R	L	C	C	L	C	R
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.40	5.40	5.40	4.60	4.60	4.00	5.80	5.80	4.00	5.40	5.40
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.40	3.40	3.40	2.60	2.60	2.00	3.80	3.80	2.00	3.40	3.40
g_i, Effective Green Time [s]	21	21	21	6	6	12	61	61	2	52	52
g / C, Green / Cycle	0.19	0.19	0.19	0.06	0.06	0.11	0.55	0.55	0.02	0.47	0.47
(v / s)_i Volume / Saturation Flow Rate	0.11	0.02	0.18	0.04	0.03	0.15	0.34	0.34	0.02	0.27	0.23
s, saturation flow rate [veh/h]	3459	1870	1577	1844	1589	1781	1870	1859	1781	3560	1589
c, Capacity [veh/h]	648	350	295	108	93	194	1031	1025	41	1670	745
d1, Uniform Delay [s]	40.72	37.00	44.40	50.84	50.07	49.00	16.72	16.74	53.45	21.22	20.07
k, delay calibration	0.04	0.04	0.34	0.04	0.04	0.50	0.50	0.50	0.08	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.30	0.04	38.19	3.03	1.23	189.04	2.73	2.76	19.40	1.44	2.25
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.58	0.10	0.98	0.70	0.44	1.35	0.61	0.62	0.76	0.57	0.48
d, Delay for Lane Group [s/veh]	41.02	37.04	82.60	53.87	51.30	238.04	19.45	19.50	72.86	22.66	22.32
Lane Group LOS	D	D	F	D	D	F	B	B	E	C	C
Critical Lane Group	No	No	Yes	Yes	No	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	4.52	0.75	10.73	2.13	1.13	15.51	11.12	11.09	1.07	9.07	6.69
50th-Percentile Queue Length [ft/ln]	113.02	18.72	268.15	53.34	28.29	387.72	277.92	277.24	26.75	226.68	167.24
95th-Percentile Queue Length [veh/ln]	8.01	1.35	16.10	3.84	2.04	24.53	16.58	16.55	1.93	14.01	10.93
95th-Percentile Queue Length [ft/ln]	200.19	33.69	402.43	96.01	50.92	613.13	414.62	413.77	48.16	350.14	273.28

Movement, Approach, & Intersection Results

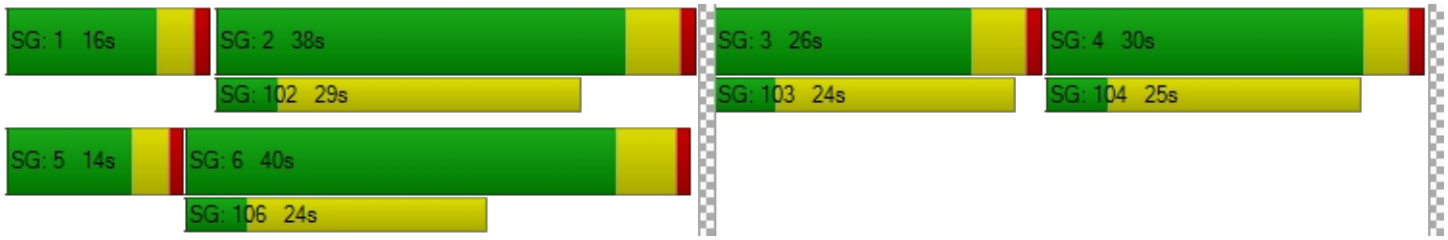
d_M, Delay for Movement [s/veh]	41.02	37.04	82.60	53.87	53.87	51.30	238.04	19.47	19.50	72.86	22.66	22.32
Movement LOS	D	D	F	D	D	D	F	B	B	E	C	C
d_A, Approach Delay [s/veh]	58.09			52.96			57.12			23.72		
Approach LOS	E			D			E			C		
d_I, Intersection Delay [s/veh]	44.95											
Intersection LOS	D											
Intersection V/C	0.641											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	869.10	0.00
d_p, Pedestrian Delay [s]	46.37	46.37	46.37	46.37
l_p,int, Pedestrian LOS Score for Intersection	2.762	2.006	2.856	2.953
Crosswalk LOS	C	B	C	C
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	375	462	622	593
d_b, Bicycle Delay [s]	36.33	32.53	26.12	27.23
l_b,int, Bicycle LOS Score for Intersection	2.708	1.751	2.819	2.673
Bicycle LOS	B	A	C	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2: Empire Ave/Oakley Rd

Control Type:	Signalized	Delay (sec / veh):	22.6
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.332

Intersection Setup

Name	Oakley Rd			Empire Ave			Empire Ave			Driveway		
Approach	Eastbound			Northeastbound			Southwestbound			Northwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	1	0	0	0	0	0
Entry Pocket Length [ft]	315.00	100.00	100.00	110.00	100.00	100.00	140.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00			40.00			40.00			15.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Oakley Rd			Empire Ave			Empire Ave			Driveway		
Base Volume Input [veh/h]	40	10	67	93	276	10	33	314	61	22	15	34
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	12	0	2	5	62	0	0	73	6	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	52	10	69	98	338	10	33	387	67	22	15	34
Peak Hour Factor	0.6800	0.6800	0.6800	0.8200	0.8200	0.8200	0.7300	0.7300	0.7300	0.7700	0.7700	0.7700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	19	4	25	30	103	3	11	133	23	7	5	11
Total Analysis Volume [veh/h]	76	15	101	120	412	12	45	530	92	29	19	44
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	1			1			1			0		
v_di, Inbound Pedestrian Volume crossing m	1			1			0			1		
v_co, Outbound Pedestrian Volume crossing	0			1			0			2		
v_ci, Inbound Pedestrian Volume crossing mi	0			2			0			1		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	1			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	1.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split
Signal Group	0	4	0	5	2	0	1	6	0	0	8	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	Lead	-	-	-	-	-
Minimum Green [s]	0	4	0	4	4	0	4	4	0	0	4	0
Maximum Green [s]	0	11	0	15	38	0	12	35	0	0	30	0
Amber [s]	0.0	4.1	0.0	3.0	4.4	0.0	3.0	4.4	0.0	0.0	3.0	0.0
All red [s]	0.0	1.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0	0.0	1.0	0.0
Split [s]	0	16	0	19	44	0	16	41	0	0	34	0
Vehicle Extension [s]	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	4	0
Pedestrian Clearance [s]	0	23	0	0	23	0	0	23	0	0	26	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.1	0.0	2.0	4.4	0.0	2.0	4.4	0.0	0.0	2.0	0.0
Minimum Recall		No		No	No		No	No			No	
Maximum Recall		No		No	Yes		No	Yes			No	
Pedestrian Recall		No		No	No		No	No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	C	L	C	C	C	R
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.10	5.10	5.10	4.00	6.40	6.40	4.00	6.40	6.40	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.10	3.10	3.10	2.00	4.40	4.40	2.00	4.40	4.40	2.00	2.00
g_i, Effective Green Time [s]	9	9	9	9	72	72	4	67	67	5	5
g / C, Green / Cycle	0.09	0.09	0.09	0.08	0.66	0.66	0.03	0.61	0.61	0.05	0.05
(v / s)_i Volume / Saturation Flow Rate	0.03	0.03	0.06	0.07	0.11	0.11	0.03	0.17	0.17	0.03	0.03
s, saturation flow rate [veh/h]	1781	1809	1555	1781	1870	1851	1781	1870	1775	1815	1553
c, Capacity [veh/h]	153	155	133	148	1228	1215	58	1134	1076	87	74
d1, Uniform Delay [s]	47.17	47.16	49.09	49.61	7.32	7.32	52.80	10.27	10.28	51.23	51.30
k, delay calibration	0.04	0.04	0.05	0.04	0.50	0.50	0.04	0.50	0.50	0.04	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.40	0.39	3.74	4.07	0.31	0.31	7.86	0.62	0.66	2.05	2.80
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.30	0.29	0.76	0.81	0.17	0.17	0.77	0.28	0.28	0.55	0.59
d, Delay for Lane Group [s/veh]	47.56	47.55	52.83	53.68	7.63	7.64	60.66	10.89	10.94	53.28	54.10
Lane Group LOS	D	D	D	D	A	A	E	B	B	D	D
Critical Lane Group	No	No	Yes	Yes	No	No	No	No	Yes	No	Yes
50th-Percentile Queue Length [veh/ln]	1.17	1.18	2.82	3.34	1.82	1.81	1.34	3.52	3.37	1.38	1.28
50th-Percentile Queue Length [ft/ln]	29.25	29.53	70.40	83.59	45.50	45.17	33.44	88.07	84.36	34.39	31.88
95th-Percentile Queue Length [veh/ln]	2.11	2.13	5.07	6.02	3.28	3.25	2.41	6.34	6.07	2.48	2.30
95th-Percentile Queue Length [ft/ln]	52.65	53.16	126.73	150.46	81.90	81.31	60.20	158.53	151.86	61.91	57.38

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	47.56	47.55	52.83	53.68	7.63	7.64	60.66	10.91	10.94	53.28	53.28	54.10
Movement LOS	D	D	D	D	A	A	E	B	B	D	D	D
d_A, Approach Delay [s/veh]	50.33			17.79			14.27			53.68		
Approach LOS	D			B			B			D		
d_I, Intersection Delay [s/veh]	22.61											
Intersection LOS	C											
Intersection V/C	0.332											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	8.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	3650.08	6829.45	2599.84
d_p, Pedestrian Delay [s]	46.37	46.37	47.29	46.37
l_p,int, Pedestrian LOS Score for Intersection	2.407	2.624	2.725	1.978
Crosswalk LOS	B	B	B	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	198	684	629	545
d_b, Bicycle Delay [s]	44.66	23.83	25.84	29.11
l_b,int, Bicycle LOS Score for Intersection	1.876	2.008	2.110	1.711
Bicycle LOS	A	B	B	A

Sequence

Ring 1	1	2	4	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 1: Main St/Empire Ave

Control Type:	Signalized	Delay (sec / veh):	46.5
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.813

Intersection Setup

Name	Empire Ave			Charles Way			Main St			Main St		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Entry Pocket Length [ft]	120.00	100.00	100.00	100.00	100.00	100.00	205.00	100.00	100.00	190.00	100.00	250.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Empire Ave			Charles Way			Main St			Main St		
Base Volume Input [veh/h]	255	36	129	10	16	15	186	394	11	61	867	327
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	45	0	70	0	0	0	58	383	0	0	621	26
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	74	0	0	89	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	300	36	199	10	16	15	244	851	11	61	1577	353
Peak Hour Factor	0.9300	0.9300	0.9300	0.7900	0.7900	0.7900	0.9500	0.9500	0.9500	0.8600	0.8600	0.8600
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	81	10	53	3	5	5	64	224	3	18	458	103
Total Analysis Volume [veh/h]	323	39	214	13	20	19	257	896	12	71	1834	410
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	2			0			3			0		
v_di, Inbound Pedestrian Volume crossing m	3			0			2			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	54.0
Offset Reference	Lagging Force-Off
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	3	0	0	4	0	1	6	0	5	2	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	4	0	0	4	0	4	10	0	4	10	0
Maximum Green [s]	0	17	0	0	25	0	16	37	0	11	33	0
Amber [s]	0.0	4.4	0.0	0.0	3.6	0.0	3.0	4.8	0.0	3.0	4.4	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	22	0	0	30	0	20	43	0	15	38	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.5	3.5	0.0	2.5	3.5	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	19	0	0	20	0	0	19	0	0	24	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.4	0.0	0.0	2.6	0.0	2.0	3.8	0.0	2.0	3.4	0.0
Minimum Recall		Yes			No		No	Yes		No	Yes	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	C	R	L	C	C	L	C	R
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.40	5.40	5.40	4.60	4.60	4.00	5.80	5.80	4.00	5.40	5.40
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.40	3.40	3.40	2.60	2.60	2.00	3.80	3.80	2.00	3.40	3.40
g_i, Effective Green Time [s]	17	17	17	3	3	16	65	65	6	55	55
g / C, Green / Cycle	0.15	0.15	0.15	0.03	0.03	0.15	0.59	0.59	0.05	0.50	0.50
(v / s)_i Volume / Saturation Flow Rate	0.09	0.02	0.14	0.02	0.01	0.14	0.24	0.24	0.04	0.52	0.26
s, saturation flow rate [veh/h]	3459	1870	1574	1834	1589	1781	1870	1861	1781	3560	1589
c, Capacity [veh/h]	522	282	238	54	47	259	1100	1094	91	1771	791
d1, Uniform Delay [s]	43.74	40.50	45.82	52.73	52.41	46.94	12.34	12.34	51.55	27.64	18.71
k, delay calibration	0.04	0.04	0.25	0.04	0.04	0.40	0.50	0.50	0.08	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.45	0.08	23.13	3.98	2.04	48.13	1.15	1.16	9.95	31.10	2.42
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.62	0.14	0.90	0.61	0.40	0.99	0.41	0.41	0.78	1.04	0.52
d, Delay for Lane Group [s/veh]	44.18	40.58	68.95	56.71	54.45	95.07	13.49	13.50	61.51	58.73	21.14
Lane Group LOS	D	D	E	E	D	F	B	B	E	F	C
Critical Lane Group	No	No	Yes	Yes	No	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	4.06	0.91	7.12	0.97	0.55	10.44	6.18	6.15	2.18	29.61	7.41
50th-Percentile Queue Length [ft/ln]	101.49	22.67	177.92	24.19	13.65	260.98	154.47	153.83	54.58	740.27	185.37
95th-Percentile Queue Length [veh/ln]	7.31	1.63	11.49	1.74	0.98	15.74	10.26	10.22	3.93	39.62	11.88
95th-Percentile Queue Length [ft/ln]	182.68	40.81	287.29	43.54	24.57	393.45	256.38	255.53	98.25	990.45	297.02

Movement, Approach, & Intersection Results

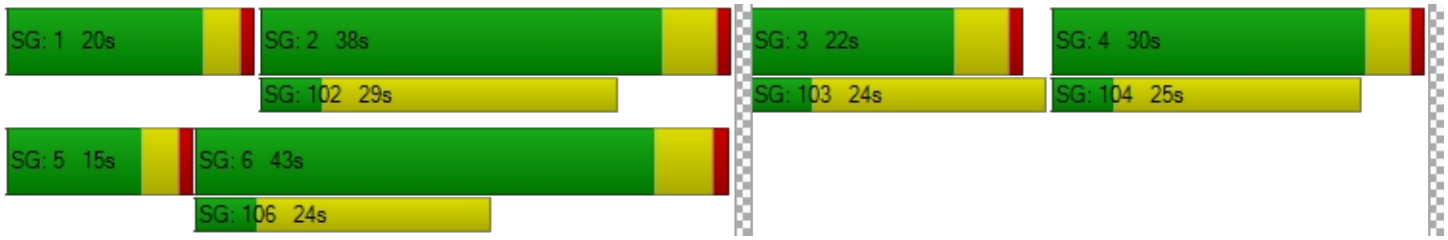
d_M, Delay for Movement [s/veh]	44.18	40.58	68.95	56.71	56.71	54.45	95.07	13.49	13.50	61.51	58.73	21.14
Movement LOS	D	D	E	E	E	D	F	B	B	E	F	C
d_A, Approach Delay [s/veh]	53.14			55.88			31.49			52.16		
Approach LOS	D			E			C			D		
d_I, Intersection Delay [s/veh]	46.48											
Intersection LOS	D											
Intersection V/C	0.813											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	1062.58	0.00
d_p, Pedestrian Delay [s]	46.37	46.37	46.37	46.37
l_p,int, Pedestrian LOS Score for Intersection	2.738	1.998	2.940	3.041
Crosswalk LOS	B	A	C	C
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	302	462	676	593
d_b, Bicycle Delay [s]	39.65	32.53	24.09	27.23
l_b,int, Bicycle LOS Score for Intersection	2.510	1.645	2.521	3.469
Bicycle LOS	B	A	B	C

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2: Empire Ave/Oakley Rd

Control Type:	Signalized	Delay (sec / veh):	29.7
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.345

Intersection Setup

Name	Oakley Rd			Empire Ave			Empire Ave			Driveway		
Approach	Eastbound			Northeastbound			Southwestbound			Northwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	1	0	0	0	0	0
Entry Pocket Length [ft]	315.00	100.00	100.00	110.00	100.00	100.00	140.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00			40.00			40.00			15.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Oakley Rd			Empire Ave			Empire Ave			Driveway		
Base Volume Input [veh/h]	55	23	88	68	333	13	108	305	61	69	37	76
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	21	0	24	16	94	0	0	65	20	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	76	23	112	84	427	13	108	370	81	69	37	76
Peak Hour Factor	0.8500	0.8500	0.8500	0.9200	0.9200	0.9200	0.9300	0.9300	0.9300	0.8900	0.8900	0.8900
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	22	7	33	23	116	4	29	99	22	19	10	21
Total Analysis Volume [veh/h]	89	27	132	91	464	14	116	398	87	78	42	85
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	1			2			2			1		
v_di, Inbound Pedestrian Volume crossing m	2			1			1			2		
v_co, Outbound Pedestrian Volume crossing	0			1			0			1		
v_ci, Inbound Pedestrian Volume crossing mi	0			1			0			1		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	2			0			1			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	1.0
Offset Reference	Lagging Force-Off
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split
Signal Group	0	4	0	5	2	0	1	6	0	0	8	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	Lead	-	-	-	-	-
Minimum Green [s]	0	4	0	4	4	0	4	4	0	0	4	0
Maximum Green [s]	0	13	0	13	38	0	10	35	0	0	30	0
Amber [s]	0.0	4.1	0.0	3.0	4.4	0.0	3.0	4.4	0.0	0.0	3.0	0.0
All red [s]	0.0	1.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0	0.0	1.0	0.0
Split [s]	0	18	0	17	44	0	14	41	0	0	34	0
Vehicle Extension [s]	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	4	0
Pedestrian Clearance [s]	0	23	0	0	23	0	0	23	0	0	26	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.1	0.0	2.0	4.4	0.0	2.0	4.4	0.0	0.0	2.0	0.0
Minimum Recall		No		No	No		No	No			No	
Maximum Recall		No		No	Yes		No	Yes			No	
Pedestrian Recall		No		No	No		No	No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	C	L	C	C	C	R
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.10	5.10	5.10	4.00	6.40	6.40	4.00	6.40	6.40	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.10	3.10	3.10	2.00	4.40	4.40	2.00	4.40	4.40	2.00	2.00
g_i, Effective Green Time [s]	12	12	12	7	60	60	9	61	61	10	10
g / C, Green / Cycle	0.11	0.11	0.11	0.06	0.54	0.54	0.08	0.56	0.56	0.09	0.09
(v / s)_i Volume / Saturation Flow Rate	0.03	0.03	0.09	0.05	0.13	0.13	0.07	0.13	0.14	0.07	0.05
s, saturation flow rate [veh/h]	1781	1821	1551	1781	1870	1851	1781	1870	1747	1811	1574
c, Capacity [veh/h]	190	195	166	116	1013	1003	143	1042	973	170	148
d1, Uniform Delay [s]	45.34	45.34	47.85	50.69	13.24	13.25	49.79	12.45	12.47	48.36	47.70
k, delay calibration	0.04	0.04	0.12	0.04	0.50	0.50	0.13	0.50	0.50	0.04	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.33	0.32	8.94	4.43	0.55	0.56	12.40	0.54	0.59	2.00	1.31
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.30	0.30	0.80	0.79	0.24	0.24	0.81	0.24	0.24	0.71	0.57
d, Delay for Lane Group [s/veh]	45.67	45.65	56.80	55.11	13.79	13.80	62.19	12.99	13.07	50.36	49.02
Lane Group LOS	D	D	E	E	B	B	E	B	B	D	D
Critical Lane Group	No	No	Yes	No	No	Yes	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	1.45	1.48	3.89	2.56	3.09	3.06	3.57	3.08	2.94	3.37	2.34
50th-Percentile Queue Length [ft/ln]	36.36	36.97	97.32	64.07	77.14	76.54	89.13	77.00	73.38	84.27	58.58
95th-Percentile Queue Length [veh/ln]	2.62	2.66	7.01	4.61	5.55	5.51	6.42	5.54	5.28	6.07	4.22
95th-Percentile Queue Length [ft/ln]	65.45	66.54	175.18	115.32	138.85	137.78	160.43	138.60	132.08	151.68	105.44

Movement, Approach, & Intersection Results

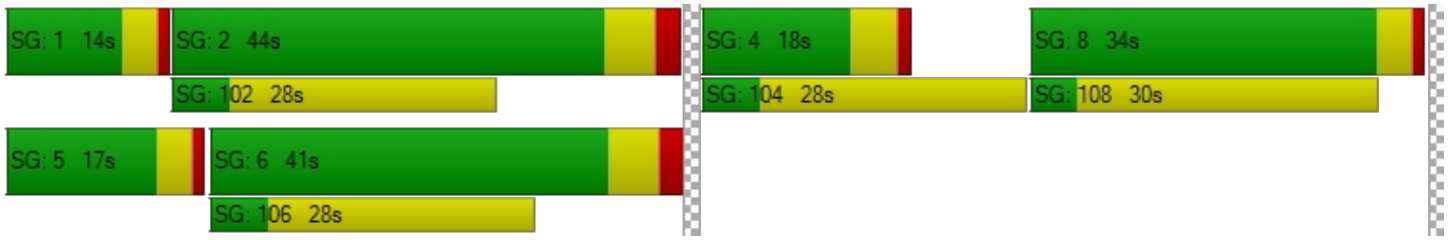
d_M, Delay for Movement [s/veh]	45.67	45.65	56.80	55.11	13.80	13.80	62.19	13.02	13.07	50.36	50.36	49.02
Movement LOS	D	D	E	E	B	B	E	B	B	D	D	D
d_A, Approach Delay [s/veh]	51.59			20.41			22.52			49.80		
Approach LOS	D			C			C			D		
d_I, Intersection Delay [s/veh]	29.67											
Intersection LOS	C											
Intersection V/C	0.345											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	8.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	2327.71	2123.23	3886.57
d_p, Pedestrian Delay [s]	46.37	46.37	47.29	46.37
l_p,int, Pedestrian LOS Score for Intersection	2.417	2.617	2.733	2.010
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	235	684	629	545
d_b, Bicycle Delay [s]	42.90	23.83	25.85	29.09
l_b,int, Bicycle LOS Score for Intersection	1.969	2.029	2.055	1.898
Bicycle LOS	A	B	B	A

Sequence

Ring 1	1	2	4	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



APPENDIX D

Intersection Level of Service Worksheets – Background plus Project Conditions

Intersection Level Of Service Report
Intersection 1: Main St/Empire Ave

Control Type:	Signalized	Delay (sec / veh):	46.8
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.651

Intersection Setup

Name	Empire Ave			Charles Way			Main St			Main St		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Entry Pocket Length [ft]	120.00	100.00	100.00	100.00	100.00	100.00	205.00	100.00	100.00	190.00	100.00	250.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Empire Ave			Charles Way			Main St			Main St		
Base Volume Input [veh/h]	253	25	156	13	33	25	189	487	19	24	479	244
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	19	0	55	0	0	0	45	559	0	0	216	34
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	60	0	0	43	0
Other Volume [veh/h]	15	0	10	0	0	0	3	0	0	0	0	6
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	287	25	221	13	33	25	237	1106	19	24	738	284
Peak Hour Factor	0.7300	0.7300	0.7300	0.6100	0.6100	0.6100	0.8900	0.8900	0.8900	0.7700	0.7700	0.7700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	98	9	76	5	14	10	67	311	5	8	240	92
Total Analysis Volume [veh/h]	393	34	303	21	54	41	266	1243	21	31	958	369
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	2			0			3			0		
v_di, Inbound Pedestrian Volume crossing m	3			0			2			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	54.0
Offset Reference	Lagging Force-Off
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	3	0	0	4	0	1	6	0	5	2	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	4	0	0	4	0	4	10	0	4	10	0
Maximum Green [s]	0	21	0	0	25	0	12	34	0	10	33	0
Amber [s]	0.0	4.4	0.0	0.0	3.6	0.0	3.0	4.8	0.0	3.0	4.4	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	26	0	0	30	0	16	40	0	14	38	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.5	3.5	0.0	2.5	3.5	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	19	0	0	20	0	0	19	0	0	24	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.4	0.0	0.0	2.6	0.0	2.0	3.8	0.0	2.0	3.4	0.0
Minimum Recall		No			No		No	Yes		No	Yes	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	C	R	L	C	C	L	C	R
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.40	5.40	5.40	4.60	4.60	4.00	5.80	5.80	4.00	5.40	5.40
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.40	3.40	3.40	2.60	2.60	2.00	3.80	3.80	2.00	3.40	3.40
g_i, Effective Green Time [s]	21	21	21	6	6	12	61	61	2	52	52
g / C, Green / Cycle	0.19	0.19	0.19	0.06	0.06	0.11	0.55	0.55	0.02	0.47	0.47
(v / s)_i Volume / Saturation Flow Rate	0.11	0.02	0.19	0.04	0.03	0.15	0.34	0.34	0.02	0.27	0.23
s, saturation flow rate [veh/h]	3459	1870	1577	1844	1589	1781	1870	1859	1781	3560	1589
c, Capacity [veh/h]	648	350	295	108	93	194	1031	1025	41	1670	745
d1, Uniform Delay [s]	40.99	37.00	44.62	50.84	50.07	49.00	16.72	16.74	53.45	21.22	20.20
k, delay calibration	0.04	0.04	0.38	0.04	0.04	0.50	0.50	0.50	0.08	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.34	0.04	52.29	3.03	1.23	195.35	2.73	2.76	19.40	1.44	2.34
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.61	0.10	1.03	0.70	0.44	1.37	0.61	0.62	0.76	0.57	0.50
d, Delay for Lane Group [s/veh]	41.33	37.04	96.91	53.87	51.30	244.35	19.45	19.50	72.86	22.66	22.54
Lane Group LOS	D	D	F	D	D	F	B	B	E	C	C
Critical Lane Group	No	No	Yes	Yes	No	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	4.80	0.75	12.09	2.13	1.13	15.85	11.12	11.09	1.07	9.07	6.89
50th-Percentile Queue Length [ft/ln]	119.91	18.72	302.15	53.34	28.29	396.24	277.91	277.24	26.75	226.68	172.23
95th-Percentile Queue Length [veh/ln]	8.39	1.35	18.03	3.84	2.04	25.07	16.58	16.55	1.93	14.01	11.19
95th-Percentile Queue Length [ft/ln]	209.70	33.69	450.65	96.01	50.92	626.75	414.61	413.78	48.16	350.14	279.85

Movement, Approach, & Intersection Results

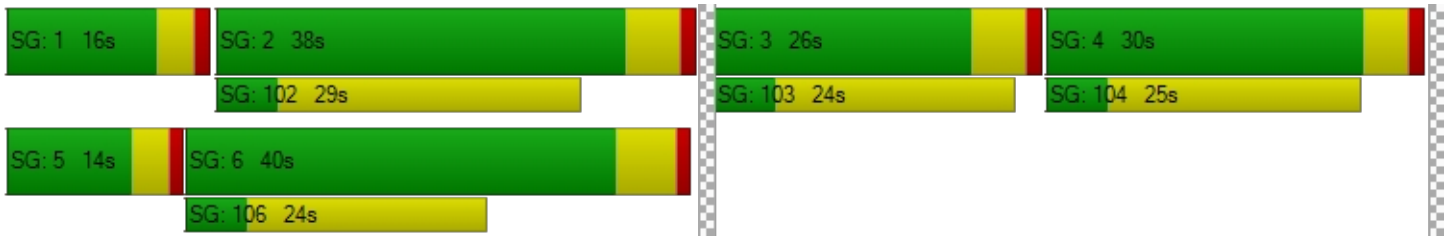
d_M, Delay for Movement [s/veh]	41.33	37.04	96.91	53.87	53.87	51.30	244.35	19.47	19.50	72.86	22.66	22.54
Movement LOS	D	D	F	D	D	D	F	B	B	E	C	C
d_A, Approach Delay [s/veh]	64.20			52.96			58.57			23.78		
Approach LOS	E			D			E			C		
d_I, Intersection Delay [s/veh]	46.84											
Intersection LOS	D											
Intersection V/C	0.651											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	832.99	0.00
d_p, Pedestrian Delay [s]	46.37	46.37	46.37	46.37
l_p,int, Pedestrian LOS Score for Intersection	2.771	2.006	2.859	2.957
Crosswalk LOS	C	B	C	C
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	375	462	622	593
d_b, Bicycle Delay [s]	36.33	32.53	26.12	27.23
l_b,int, Bicycle LOS Score for Intersection	2.764	1.751	2.822	2.680
Bicycle LOS	C	A	C	B

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2: Empire Ave/Oakley Rd

Control Type:	Signalized	Delay (sec / veh):	24.8
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.354

Intersection Setup

Name	Oakley Rd			Empire Ave			Empire Ave			Driveway		
Approach	Eastbound			Northeastbound			Southwestbound			Northwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	1	0	0	0	0	0
Entry Pocket Length [ft]	315.00	100.00	100.00	110.00	100.00	100.00	140.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00			40.00			40.00			15.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Oakley Rd			Empire Ave			Empire Ave			Driveway		
Base Volume Input [veh/h]	40	10	67	93	276	10	33	314	61	22	15	34
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	12	0	2	5	62	0	0	73	6	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	26	0	15	5	0	0	0	0	9	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	78	10	84	103	338	10	33	387	76	22	15	34
Peak Hour Factor	0.6800	0.6800	0.6800	0.8200	0.8200	0.8200	0.7300	0.7300	0.7300	0.7700	0.7700	0.7700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	29	4	31	31	103	3	11	133	26	7	5	11
Total Analysis Volume [veh/h]	115	15	124	126	412	12	45	530	104	29	19	44
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	1			1			1			0		
v_di, Inbound Pedestrian Volume crossing m	1			1			0			1		
v_co, Outbound Pedestrian Volume crossing	0			1			0			2		
v_ci, Inbound Pedestrian Volume crossing mi	0			2			0			1		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	1			0			0			1		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	1.0
Offset Reference	Lead Green - Beginning of First Green
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split
Signal Group	0	4	0	5	2	0	1	6	0	0	8	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	Lead	-	-	-	-	-
Minimum Green [s]	0	4	0	4	4	0	4	4	0	0	4	0
Maximum Green [s]	0	11	0	15	38	0	12	35	0	0	30	0
Amber [s]	0.0	4.1	0.0	3.0	4.4	0.0	3.0	4.4	0.0	0.0	3.0	0.0
All red [s]	0.0	1.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0	0.0	1.0	0.0
Split [s]	0	16	0	19	44	0	16	41	0	0	34	0
Vehicle Extension [s]	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	4	0
Pedestrian Clearance [s]	0	23	0	0	23	0	0	23	0	0	26	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.1	0.0	2.0	4.4	0.0	2.0	4.4	0.0	0.0	2.0	0.0
Minimum Recall		No		No	No		No	No			No	
Maximum Recall		No		No	Yes		No	Yes			No	
Pedestrian Recall		No		No	No		No	No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	C	L	C	C	C	R
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.10	5.10	5.10	4.00	6.40	6.40	4.00	6.40	6.40	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.10	3.10	3.10	2.00	4.40	4.40	2.00	4.40	4.40	2.00	2.00
g_i, Effective Green Time [s]	11	11	11	9	71	71	4	65	65	5	5
g / C, Green / Cycle	0.10	0.10	0.10	0.09	0.64	0.64	0.03	0.59	0.59	0.05	0.05
(v / s)_i Volume / Saturation Flow Rate	0.04	0.04	0.08	0.07	0.11	0.11	0.03	0.17	0.17	0.03	0.03
s, saturation flow rate [veh/h]	1781	1801	1557	1781	1870	1851	1781	1870	1765	1815	1553
c, Capacity [veh/h]	176	178	154	154	1203	1191	58	1102	1040	87	74
d1, Uniform Delay [s]	46.32	46.32	48.42	49.40	7.90	7.90	52.80	11.22	11.23	51.23	51.30
k, delay calibration	0.04	0.04	0.15	0.04	0.50	0.50	0.04	0.50	0.50	0.04	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.47	0.47	12.64	4.03	0.32	0.33	7.86	0.68	0.73	2.05	2.81
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.37	0.37	0.80	0.82	0.18	0.18	0.77	0.30	0.30	0.55	0.59
d, Delay for Lane Group [s/veh]	46.80	46.79	61.06	53.43	8.22	8.23	60.66	11.90	11.96	53.29	54.10
Lane Group LOS	D	D	E	D	A	A	E	B	B	D	D
Critical Lane Group	No	No	Yes	Yes	No	No	No	No	Yes	No	Yes
50th-Percentile Queue Length [veh/ln]	1.66	1.68	3.83	3.51	1.92	1.91	1.34	3.83	3.65	1.38	1.28
50th-Percentile Queue Length [ft/ln]	41.58	41.92	95.65	87.63	48.01	47.66	33.44	95.73	91.22	34.39	31.88
95th-Percentile Queue Length [veh/ln]	2.99	3.02	6.89	6.31	3.46	3.43	2.41	6.89	6.57	2.48	2.30
95th-Percentile Queue Length [ft/ln]	74.84	75.46	172.17	157.74	86.41	85.79	60.20	172.32	164.20	61.91	57.38

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	46.79	46.79	61.06	53.43	8.22	8.23	60.66	11.92	11.96	53.29	53.29	54.10
Movement LOS	D	D	E	D	A	A	E	B	B	D	D	D
d_A, Approach Delay [s/veh]	53.76			18.58			15.16			53.68		
Approach LOS	D			B			B			D		
d_I, Intersection Delay [s/veh]	24.83											
Intersection LOS	C											
Intersection V/C	0.354											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	8.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	3532.89	6829.45	2599.84
d_p, Pedestrian Delay [s]	46.37	46.37	47.29	46.37
l_p,int, Pedestrian LOS Score for Intersection	2.425	2.632	2.736	1.978
Crosswalk LOS	B	B	B	A
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	198	684	629	545
d_b, Bicycle Delay [s]	44.66	23.83	25.84	29.11
l_b,int, Bicycle LOS Score for Intersection	1.979	2.013	2.120	1.711
Bicycle LOS	A	B	B	A

Sequence

Ring 1	1	2	4	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 3: Oakley Rd/Project Dwy

Control Type:	Two-way stop	Delay (sec / veh):	9.0
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.045

Intersection Setup

Name										Oakley Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			25.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name										Oakley Rd		
Base Volume Input [veh/h]	0	0	0	0	0	0	0	117	0	0	169	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	14	0	0	11	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	42	0	41	0	0	0	15
Total Hourly Volume [veh/h]	0	0	0	0	0	42	0	172	0	0	180	15
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	0	11	0	43	0	0	45	4
Total Analysis Volume [veh/h]	0	0	0	0	0	42	0	172	0	0	180	15
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.63	11.42	8.77	0.00	0.00	9.01	0.00	0.00	0.00	0.00	0.00	0.00
Movement LOS	B	B	A			A		A	A		A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	3.51	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.27			9.01			0.00			0.00		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.93											
Intersection LOS	A											

Intersection Level Of Service Report
Intersection 1: Main St/Empire Ave

Control Type:	Signalized	Delay (sec / veh):	47.8
Analysis Method:	HCM 6th Edition	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.825

Intersection Setup

Name	Empire Ave			Charles Way			Main St			Main St		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	1	0	0	1	0	1
Entry Pocket Length [ft]	120.00	100.00	100.00	100.00	100.00	100.00	205.00	100.00	100.00	190.00	100.00	250.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	40.00			25.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Empire Ave			Charles Way			Main St			Main St		
Base Volume Input [veh/h]	255	36	129	10	16	15	186	394	11	61	867	327
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	45	0	70	0	0	0	58	383	0	0	621	26
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	74	0	0	89	0
Other Volume [veh/h]	11	0	7	0	0	0	11	0	0	0	0	18
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	311	36	206	10	16	15	255	851	11	61	1577	371
Peak Hour Factor	0.9300	0.9300	0.9300	0.7900	0.7900	0.7900	0.9500	0.9500	0.9500	0.8600	0.8600	0.8600
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	84	10	55	3	5	5	67	224	3	18	458	108
Total Analysis Volume [veh/h]	334	39	222	13	20	19	268	896	12	71	1834	431
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	2			0			3			0		
v_di, Inbound Pedestrian Volume crossing m	3			0			2			0		
v_co, Outbound Pedestrian Volume crossing	0			0			0			0		
v_ci, Inbound Pedestrian Volume crossing mi	0			0			0			0		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	54.0
Offset Reference	Lagging Force-Off
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	3	0	0	4	0	1	6	0	5	2	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	4	0	0	4	0	4	10	0	4	10	0
Maximum Green [s]	0	17	0	0	25	0	16	37	0	11	33	0
Amber [s]	0.0	4.4	0.0	0.0	3.6	0.0	3.0	4.8	0.0	3.0	4.4	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	22	0	0	30	0	20	43	0	15	38	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.5	3.5	0.0	2.5	3.5	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	5	0
Pedestrian Clearance [s]	0	19	0	0	20	0	0	19	0	0	24	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.4	0.0	0.0	2.6	0.0	2.0	3.8	0.0	2.0	3.4	0.0
Minimum Recall		Yes			No		No	Yes		No	Yes	
Maximum Recall		No			No		No	No		No	No	
Pedestrian Recall		No			No		No	No		No	No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	C	R	L	C	C	L	C	R
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.40	5.40	5.40	4.60	4.60	4.00	5.80	5.80	4.00	5.40	5.40
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.40	3.40	3.40	2.60	2.60	2.00	3.80	3.80	2.00	3.40	3.40
g_i, Effective Green Time [s]	17	17	17	3	3	16	65	65	6	55	55
g / C, Green / Cycle	0.15	0.15	0.15	0.03	0.03	0.15	0.59	0.59	0.05	0.50	0.50
(v / s)_i Volume / Saturation Flow Rate	0.10	0.02	0.14	0.02	0.01	0.15	0.24	0.24	0.04	0.52	0.27
s, saturation flow rate [veh/h]	3459	1870	1574	1834	1589	1781	1870	1861	1781	3560	1589
c, Capacity [veh/h]	522	282	238	54	47	259	1100	1094	91	1771	791
d1, Uniform Delay [s]	43.89	40.50	46.09	52.73	52.41	47.00	12.34	12.34	51.55	27.64	19.05
k, delay calibration	0.04	0.04	0.28	0.04	0.04	0.43	0.50	0.50	0.08	0.50	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.49	0.08	30.04	3.98	2.04	61.25	1.15	1.16	9.95	31.10	2.69
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.64	0.14	0.93	0.61	0.40	1.03	0.41	0.41	0.78	1.04	0.54
d, Delay for Lane Group [s/veh]	44.38	40.58	76.13	56.71	54.45	108.25	13.49	13.50	61.51	58.73	21.74
Lane Group LOS	D	D	E	E	D	F	B	B	E	F	C
Critical Lane Group	No	No	Yes	Yes	No	Yes	No	No	No	Yes	No
50th-Percentile Queue Length [veh/ln]	4.21	0.91	7.82	0.97	0.55	11.45	6.18	6.15	2.18	29.61	7.96
50th-Percentile Queue Length [ft/ln]	105.36	22.67	195.38	24.19	13.65	286.21	154.46	153.83	54.58	740.27	198.93
95th-Percentile Queue Length [veh/ln]	7.58	1.63	12.40	1.74	0.98	17.27	10.26	10.22	3.93	39.62	12.58
95th-Percentile Queue Length [ft/ln]	189.53	40.81	309.99	43.54	24.57	431.77	256.38	255.53	98.25	990.45	314.59

Movement, Approach, & Intersection Results

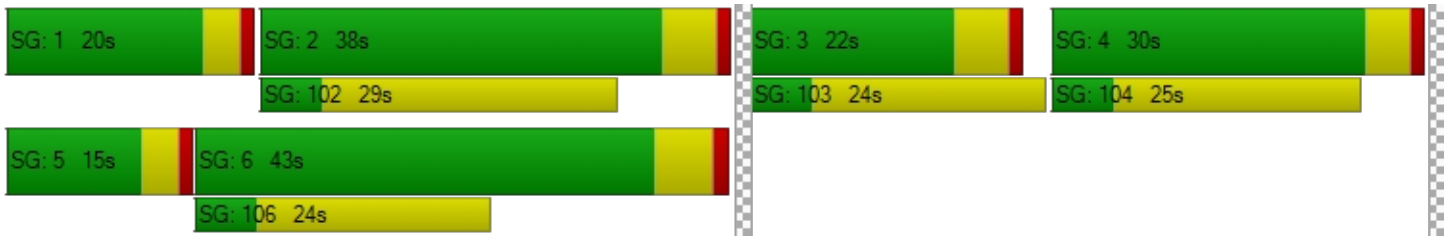
d_M, Delay for Movement [s/veh]	44.38	40.58	76.13	56.71	56.71	54.45	108.25	13.49	13.50	61.51	58.73	21.74
Movement LOS	D	D	E	E	E	D	F	B	B	E	F	C
d_A, Approach Delay [s/veh]	55.98			55.88			35.09			51.99		
Approach LOS	E			E			D			D		
d_I, Intersection Delay [s/veh]	47.83											
Intersection LOS	D											
Intersection V/C	0.825											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	9.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	0.00	1041.94	0.00
d_p, Pedestrian Delay [s]	46.37	46.37	46.37	46.37
l_p,int, Pedestrian LOS Score for Intersection	2.749	1.998	2.944	3.047
Crosswalk LOS	B	A	C	C
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	302	462	676	593
d_b, Bicycle Delay [s]	39.65	32.53	24.09	27.23
l_b,int, Bicycle LOS Score for Intersection	2.541	1.645	2.530	3.487
Bicycle LOS	B	A	B	C

Sequence

Ring 1	1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 2: Empire Ave/Oakley Rd

Control Type:	Signalized	Delay (sec / veh):	30.8
Analysis Method:	HCM 6th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.366

Intersection Setup

Name	Oakley Rd			Empire Ave			Empire Ave			Driveway		
Approach	Eastbound			Northeastbound			Southwestbound			Northwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	1	0	0	1	0	0	0	0	0
Entry Pocket Length [ft]	315.00	100.00	100.00	110.00	100.00	100.00	140.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	35.00			40.00			40.00			15.00		
Grade [%]	0.00			0.00			0.00			0.00		
Curb Present	No			No			No			No		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Oakley Rd			Empire Ave			Empire Ave			Driveway		
Base Volume Input [veh/h]	55	23	88	68	333	13	108	305	61	69	37	76
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	21	0	24	16	94	0	0	65	20	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	20	0	10	17	0	0	0	0	29	0	0	0
Right Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	96	23	122	101	427	13	108	370	110	69	37	76
Peak Hour Factor	0.8500	0.8500	0.8500	0.9200	0.9200	0.9200	0.9300	0.9300	0.9300	0.8900	0.8900	0.8900
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	28	7	36	27	116	4	29	99	30	19	10	21
Total Analysis Volume [veh/h]	113	27	144	110	464	14	116	398	118	78	42	85
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
v_do, Outbound Pedestrian Volume crossing	1			2			2			1		
v_di, Inbound Pedestrian Volume crossing m	2			1			1			2		
v_co, Outbound Pedestrian Volume crossing	0			1			0			1		
v_ci, Inbound Pedestrian Volume crossing mi	0			1			0			1		
v_ab, Corner Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	2			0			1			0		

Intersection Settings

Located in CBD	No
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	1.0
Offset Reference	Lagging Force-Off
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Split	Split	Split
Signal Group	0	4	0	5	2	0	1	6	0	0	8	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	Lead	-	-	Lead	-	-	-	-	-
Minimum Green [s]	0	4	0	4	4	0	4	4	0	0	4	0
Maximum Green [s]	0	13	0	13	38	0	10	35	0	0	30	0
Amber [s]	0.0	4.1	0.0	3.0	4.4	0.0	3.0	4.4	0.0	0.0	3.0	0.0
All red [s]	0.0	1.0	0.0	1.0	2.0	0.0	1.0	2.0	0.0	0.0	1.0	0.0
Split [s]	0	18	0	17	44	0	14	41	0	0	34	0
Vehicle Extension [s]	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0
Walk [s]	0	5	0	0	5	0	0	5	0	0	4	0
Pedestrian Clearance [s]	0	23	0	0	23	0	0	23	0	0	26	0
Delayed Vehicle Green [s]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest In Walk		No			No			No			No	
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	3.1	0.0	2.0	4.4	0.0	2.0	4.4	0.0	0.0	2.0	0.0
Minimum Recall		No		No	No		No	No			No	
Maximum Recall		No		No	Yes		No	Yes			No	
Pedestrian Recall		No		No	No		No	No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering 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

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	R	L	C	C	L	C	C	C	R
C, Cycle Length [s]	110	110	110	110	110	110	110	110	110	110	110
L, Total Lost Time per Cycle [s]	5.10	5.10	5.10	4.00	6.40	6.40	4.00	6.40	6.40	4.00	4.00
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	3.10	3.10	3.10	2.00	4.40	4.40	2.00	4.40	4.40	2.00	2.00
g_i, Effective Green Time [s]	13	13	13	8	59	59	9	59	59	10	10
g / C, Green / Cycle	0.11	0.11	0.11	0.08	0.54	0.54	0.08	0.54	0.54	0.09	0.09
(v / s)_i Volume / Saturation Flow Rate	0.04	0.04	0.09	0.06	0.13	0.13	0.07	0.14	0.15	0.07	0.05
s, saturation flow rate [veh/h]	1781	1814	1552	1781	1870	1851	1781	1870	1715	1811	1574
c, Capacity [veh/h]	203	206	176	137	1000	990	143	1007	923	170	148
d1, Uniform Delay [s]	44.96	44.95	47.51	49.97	13.64	13.65	49.79	13.68	13.71	48.36	47.70
k, delay calibration	0.04	0.04	0.16	0.04	0.50	0.50	0.13	0.50	0.50	0.04	0.04
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.37	0.36	12.80	4.15	0.57	0.57	12.40	0.64	0.72	2.00	1.31
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.34	0.34	0.82	0.80	0.24	0.24	0.81	0.27	0.27	0.71	0.57
d, Delay for Lane Group [s/veh]	45.33	45.32	60.30	54.12	14.21	14.22	62.19	14.32	14.43	50.36	49.02
Lane Group LOS	D	D	E	D	B	B	E	B	B	D	D
Critical Lane Group	No	No	Yes	Yes	No	No	No	No	Yes	Yes	No
50th-Percentile Queue Length [veh/ln]	1.75	1.78	4.42	3.07	3.15	3.12	3.57	3.53	3.31	3.37	2.34
50th-Percentile Queue Length [ft/ln]	43.84	44.50	110.58	76.86	78.67	78.05	89.13	88.26	82.85	84.27	58.58
95th-Percentile Queue Length [veh/ln]	3.16	3.20	7.87	5.53	5.66	5.62	6.42	6.36	5.96	6.07	4.22
95th-Percentile Queue Length [ft/ln]	78.91	80.10	196.80	138.34	141.60	140.48	160.43	158.88	149.12	151.68	105.44

Movement, Approach, & Intersection Results

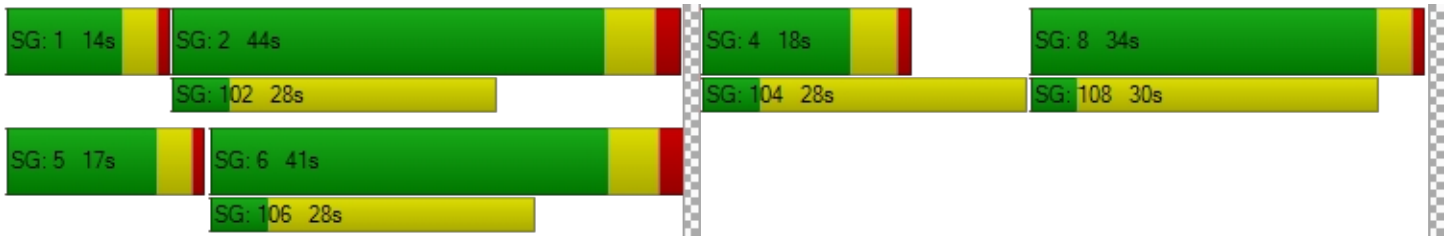
d_M, Delay for Movement [s/veh]	45.32	45.32	60.30	54.12	14.22	14.22	62.19	14.36	14.43	50.36	50.36	49.02
Movement LOS	D	D	E	D	B	B	E	B	B	D	D	D
d_A, Approach Delay [s/veh]	52.92			21.68			23.15			49.80		
Approach LOS	D			C			C			D		
d_I, Intersection Delay [s/veh]	30.79											
Intersection LOS	C											
Intersection V/C	0.366											

Other Modes

g_Walk,mi, Effective Walk Time [s]	9.0	9.0	8.0	9.0
M_corner, Corner Circulation Area [ft²/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft²/ped]	0.00	2286.95	2123.23	3886.57
d_p, Pedestrian Delay [s]	46.37	46.37	47.29	46.37
l_p,int, Pedestrian LOS Score for Intersection	2.437	2.625	2.745	2.010
Crosswalk LOS	B	B	B	B
s_b, Saturation Flow Rate of the bicycle lane	2000	2000	2000	2000
c_b, Capacity of the bicycle lane [bicycles/h]	235	684	629	545
d_b, Bicycle Delay [s]	42.90	23.83	25.85	29.09
l_b,int, Bicycle LOS Score for Intersection	2.028	2.045	2.081	1.898
Bicycle LOS	B	B	B	A

Sequence

Ring 1	1	2	4	8	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
Intersection 3: Oakley Rd/Project Dwy

Control Type:	Two-way stop	Delay (sec / veh):	9.1
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.032

Intersection Setup

Name										Oakley Rd		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			25.00			35.00			35.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name										Oakley Rd		
Base Volume Input [veh/h]	0	0	0	0	0	0	0	166	0	0	166	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	44	0	0	35	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	29	0	30	0	0	0	48
Total Hourly Volume [veh/h]	0	0	0	0	0	29	0	240	0	0	201	48
Peak Hour Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	0	0	0	0	7	0	60	0	0	50	12
Total Analysis Volume [veh/h]	0	0	0	0	0	29	0	240	0	0	201	48
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	11.31	12.53	8.96	0.00	0.00	9.12	0.00	0.00	0.00	0.00	0.00	0.00
Movement LOS	B	B	A			A		A	A		A	A
95th-Percentile Queue Length [veh/ln]	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.00	0.00	0.00	0.00	0.00	2.49	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.93			9.12			0.00			0.00		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.51											
Intersection LOS	A											

ORDINANCE NO. -24

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF OAKLEY APPROVING A REZONE TO REZONE A 9.99-ACRE SITE FROM C (GENERAL COMMERCIAL) DISTRICT TO P-1 (PLANNED UNIT DEVELOPMENT) DISTRICT FOR THE PROJECT KNOWN AS 2092 THE VILLAGE AT OAKLEY ROAD SUBDIVISION 9634 (RZ 03-22) APN 037-110-031

FINDINGS

WHEREAS, on September 20, 2022, Owen Poole and Dan Cosgrove ("Applicant") filed an application requesting approval of the following entitlements ("Project"):

- General Plan Amendment (GPA 01-22) to redesignate 9.99 acres from Commercial (CO) to Residential Medium (RM);
- Rezone (RZ 03-22) of 9.99 acres from C (General Commercial) District to P-1 (Planned Unit Development) District;
- Final Development Plan (FDP 02-22) for development of the 9.99 acres site;
- Tentative Map (TM 04-22) to subdivide 9.99 acres into 83 single family residential lots, additional on-site parking, a toddler park, community gathering areas, and other improvements;
- Design Review (DR 07-22) for floor plans and architecture of three home types with three elevations and three color schemes, and landscaping and other improvements throughout the project; and

WHEREAS, the proposed homes consist of three two two-story house plans each with three elevations. Floor plans range from 1,848 to 2,236 square feet of livable area; and

WHEREAS, the project site is located at 2092 Oakley Road Avenue and is zoned C (General Commercial) District. (APN: 037-110-031); and

WHEREAS, the proposal complies with the requirements of the rezoning application requirements of Section 2.4.012 (a) of the Oakley Municipal Code; and

WHEREAS, pursuant to the requirements of the California Environmental Quality Act ("CEQA"), the City prepared a Draft Initial Study/Mitigated Negative Declaration ("IS/MND"). The Notice of Intent ("NOI") to Adopt an MND and IS was circulated for public review and comment from November 16, 2023 to December 18, 2023. It was filed with the County Clerk and Governor's Office of Planning and Research ("OPR"), emailed or mailed out to over 60 public agencies and parties requesting such notice, and posted in the same manner as a Notice of Public hearing, which is at locations throughout the City and at the project site; and

WHEREAS, on February 6, 2024, the Planning Commission held a duly noticed public hearing on the project at which it received a report from City Staff, oral and written testimony from the public, and deliberated on the project. At the conclusion of its deliberations, the Planning Commission held a vote and adopted Planning Commission Resolution No. 2-24 recommending the City Council approve the project, as revised by the Planning Commission during its deliberations; and

WHEREAS, the Applicant submitted revised plans consistent with Planning Commission Resolution No. 2-24; and

WHEREAS, on or before March 1, 2024, the Notice of Public Hearing for the Project was duly noticed in the Contra Costa Times, a newspaper of general distribution, was posted at the Project site, at Oakley City Hall located at 3231 Main Street, outside the gym at Delta Vista Middle School located at 4901 Frank Hengel Way, and outside the library at Freedom High School located at 1050 Neroly Road, was posted to the City's website, and was mailed out to all owners of property within a 500-foot radius of the project's boundaries, to parties requesting such notice, and to outside agencies; and

WHEREAS, on March 12, 2024, the City Council opened the public hearing at which it received a report from City Staff, oral and written testimony from the public, and deliberated on the project. At the conclusion of its deliberations, the City Council took a vote and adopted this resolution adopting the CEQA MND and approving the project, as conditioned; and

WHEREAS, on March 12, 2024, the City Council adopted the Project's CEQA IS/MND in conjunction with approval of the proposed Final Development Plan (FDP 02-22), Tentative Map (TM 04-22), and Design Review (DR 07-22).

The City Council of the City of Oakley does ordain as follows:

SECTION 1. Findings

A. Pursuant to Section 2.4.012 of the Oakley Municipal Code, the City Council of the City of Oakley hereby finds and determines as follows:

1. The change proposed will comply with the General Plan in that the proposed rezone from C District to P-1 District will not result in a use or density that is not in line with the underlying General Plan Land Use Designation of Residential Medium (RM); and

2. The uses authorized or proposed in the land use district are compatible within the district and to uses authorized in adjacent districts in that the residential density will be similar to residential densities in the general vicinity and the project has been designed in order to reduce conflicts with nearby commercial land uses; and

3. Community need, but not necessarily future financial success, has been demonstrated for the use proposed in that the project will result in the construction of additional housing units, which is necessary to meet demand in the community since the City of Oakley falls under the jurisdiction of the Association of Bay Area Governments (ABAG), and ABAG uses a predominately demographic formula to allocate the regional housing needs among the incorporated cities and unincorporated county. This process results in a Regional Housing Needs Assessment (RHNA) and the number reflected in that assessment becomes part the City of Oakley's estimated housing needs. The development of this project will help the City meet its regional fair share housing goal.

B. Pursuant to Section 9.1.1002 of the Oakley Municipal Code, the City Council of the City of Oakley hereby finds and determines as follows:

1. The Applicant intends for the start of construction within two (2) years from the effective date of zoning change and plan approval in that, whether the Applicant acts as developer or broker, construction within two years is reasonable depending on market conditions;

2. The proposed Planned Unit Development is consistent with the City of Oakley General Plan in that the density and type of development is consistent with the RM General Plan Land use Designation;

3. The project will constitute a residential environment of sustained desirability and stability, and will be in harmony with the character of the surrounding neighborhood in that:

   a. The project and integrates pedestrian connectivity to Main Street and nearby commercial developments;

   b. Vehicular transportation will have almost immediate access to major arterials such as Empire Avenue and Main Street;

   c. The type of development is expected to be desirable in that it includes a variety of homes sizes on smaller lots with an HOA which can appeal to those less interested in large private yards that require maintenance and that may value nearby access to public transportation and walkable amenities;

   d. The other HOA amenities such as the park and public gathering areas are additional attractions for the project; and

4. The development will be a harmonious and integrated plan that includes exceptions from the normal application of the Oakley Municipal Code due to the number and size of amenities usually found in larger subdivisions, such as a park, public gathering areas, and pedestrian-only entries to front

porches. The P-1 District is justified to allow for project-specific development regulations in order to design a feasible project within the allowable range of the General Plan Land Use Designation of RM.

SECTION 2. Property Defined and Rezoned

A. 9.99 acres of real property located at 2092 Oakley Road, Oakley, CA 94561 (APN 037-110-031).

SECTION 3. California Environmental Quality Act (CEQA) Finding

Pursuant to California State Law, an Initial Study was conducted by the Planning Division to evaluate the potential effects of this project upon the environment. The Initial Study analysis found there were no potentially significant impacts, and therefore a Mitigated Negative Declaration was prepared. Based upon the findings contained in the Initial Study it has been determined that this project will not have a significant impact upon the environment.

SECTION 4. Severability

If any provision of this ordinance or the application thereof to any person or circumstance is held invalid, the remainder of the ordinance, including the application of such part or provision to other persons or circumstances shall not be affected thereby and shall continue in full force and effect. To this end, the provisions of this ordinance are severable. The City Council hereby declares that it would have passed each section, subsection, subdivision, paragraph, sentence, clause, or phrase thereof, irrespective of the fact that any one or more sections, subsections, subdivisions, paragraphs, sentences, clauses or phrases may be held unconstitutional, invalid or unenforceable.

SECTION 5. Effective Date and Posting

This ordinance shall take effect and be in force thirty (30) days from and after the date of its passage. The City Clerk shall cause the ordinance to be published within fifteen (15) days after its passage in a newspaper of general circulation, or by publishing a summary of the proposed ordinance, posting a certified copy of the proposed office in the City Clerk's Office at least five (5) days prior to the City Council meeting at which the ordinance is to be adopted, and within fifteen (15) days after its adoption, publishing a summary of the ordinance with the names of the Council Members voting for and against the ordinance.

The foregoing ordinance was adopted with the reading waived at a regular meeting of the Oakley City Council on _____, 2024 by the following vote:

AYES:

NOES:

ABSTENTIONS:

ABSENT:

APPROVED:

_____

Anissa Williams, Mayor Date

ATTEST:

_____

Libby Vreonis, City Clerk Date

RESOLUTION NO. -24

A RESOLUTION OF THE CITY OF OAKLEY CITY COUNCIL MAKING FINDINGS TO APPROVE A GENERAL PLAN AMENDMENT TO REDESIGNATE 9.99 ACRES FROM COMMERCIAL (CO) TO RESIDENTIAL MEDIUM (RM) FOR THE PROJECT TITLED "THE VILLAGE AT 2092 OAKLEY ROAD SUBDIVISION 9634 GENERAL PLAN AMENDMENT (GPA 01-22)"
APNS 033-110-031

WHEREAS, this is an application by Owen Poole and Dan Cosgrove ("Applicant") requesting approval of a General Plan Amendment (GPA 01-22) to redesignate 9.99 acres from Commercial (CO) to Residential Medium (RM). This project includes compliance with the California Environmental Quality Act ("CEQA") and adoption of a Mitigated Negative Declaration is proposed. The site is located at 2092 Oakley Road and is zoned C (General Commercial) District. APN 037-110-031; and

WHEREAS, pursuant to the requirements of the California Environmental Quality Act ("CEQA"), the City prepared a Draft Initial Study/Mitigated Negative Declaration ("IS/MND"). The Notice of Intent ("NOI") to Adopt an MND and IS was circulated for public review and comment from November 16, 2023 to December 18, 2023. It was filed with the County Clerk and Governor's Office of Planning and Research ("OPR"), emailed or mailed out to over 60 public agencies and parties requesting such notice, and posted in the same manner as a Notice of Public hearing, which is at locations throughout the City and at the project site; and

WHEREAS, on February 6, 2024, the Planning Commission held a duly noticed public hearing on the project at which it received a report from City Staff, oral and written testimony from the public, and deliberated on the project. At the conclusion of its deliberations, the Planning Commission held a vote and adopted Planning Commission Resolution No. 2-24 recommending the City Council approve the project, as revised by the Planning Commission during its deliberations; and

WHEREAS, the Applicant submitted revised plans consistent with Planning Commission Resolution No. 2-24; and

WHEREAS, on or before March 1, 2024, the Notice of Public Hearing for the Project was duly noticed in the Contra Costa Times, a newspaper of general distribution, was posted at the Project site, at Oakley City Hall located at 3231 Main Street, outside the gym at Delta Vista Middle School located at 4901 Frank Hengel Way, and outside the library at Freedom High School located at 1050 Neroly Road, was posted to the City's website, and was mailed out to all owners of property within a 500-foot radius of the project's boundaries, to parties requesting such notice, and to outside agencies; and

WHEREAS, on March 12, 2024, the City Council opened the public hearing at which it received a report from City Staff, oral and written testimony from the public, and deliberated on the project. At the conclusion of its deliberations, the City Council took a vote and adopted this resolution adopting the CEQA MND and approving the project, as conditioned; and

WHEREAS, these Findings are based on the City's General Plan and the City's Zoning Ordinance, and the information submitted to the City Council at its March 12, 2024 meeting, both written and oral, as reflected in the minutes of such meetings, together with the documents contained in the file for the Project (hereafter the "Record").

NOW, THEREFORE, on the basis of the above findings of fact and the entire Record, the City Council makes the following findings regarding the General Plan Amendment as shown in "Exhibit A" of this resolution in support of the recommended approvals:

A. The change in Land Use Designation will provide for the orderly, well planned and balanced growth within the City in that:

1. Amending the General Plan Land Use designation to Residential Medium ("RM") would make the property more consistent with surrounding residential uses and will allow for additional infill housing that will be located near public transit and existing commercial uses;

2. The project design and conditions of approval will minimize the potential issues that could arise with residential and commercial adjacent to teach other; and

3. Infill development of residential uses will assist in meeting the demand due to the shortage of housing in California.

BE IT FURTHER RESOLVED THAT, on the basis of the foregoing Findings and the entire Record, the City Council hereby approves the amendment to the General Plan as shown in "Exhibit A" of this resolution.

PASSED AND ADOPTED by the City Council of the City of Oakley at a meeting held on the 12th day of March 2024 by the following vote:

AYES:
NOES:
ABSTENTIONS:
ABSENT:

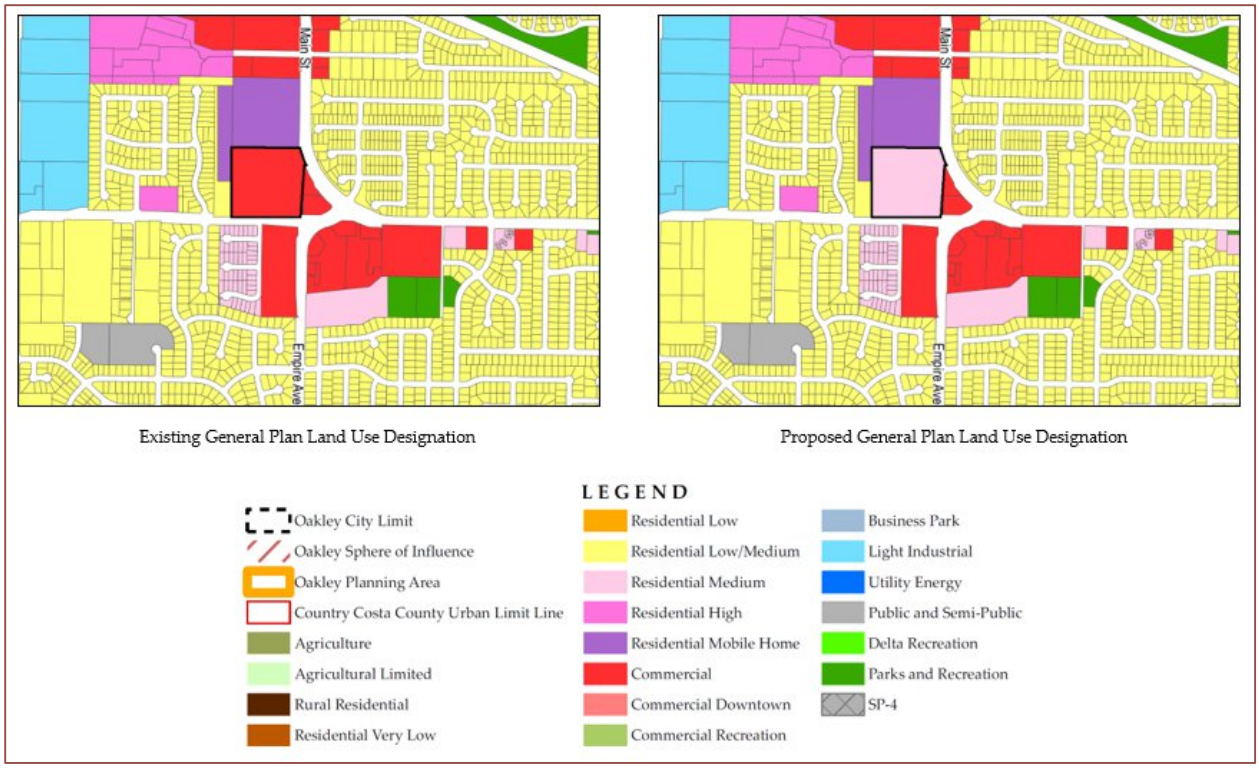
APPROVED:

_____
Anissa Williams, Mayor Date

ATTEST:

_____
Libby Vreonis, City Clerk Date

The Village at 2092 Oakley Road General Plan Amendment (GPA 01-22)



RESOLUTION NO. -24

A RESOLUTION OF THE CITY OF OAKLEY CITY COUNCIL MAKING FINDINGS AND ADOPTING A MITIGATED NEGATIVE DELCARATION AND RESOLUTION APPROVING THE PROJECT KNOWN AS THE VILLAGE AT 2092 OAKLEY ROAD SUBDIVISION 9634 (FDP 02-22, TM 04-22, DR 07-22) APN 037-110-031

WHEREAS, on September 20, 2022, Owen Poole and Dan Cosgrove ("Applicant") filed an application requesting approval of: 1) a General Plan Amendment (GPA 01-22) to redesignate 9.99 acres from Commercial (CO) to Residential Medium (RM); 2) a Rezone (RZ 03-22) of 9.99 acres from C (General Commercial) District to P-1 (Planned Unit Development) District; 3) a Final Development Plan (FDP 02-22) for development of the 9.99 acres site; 4) a Tentative Map (TM 04-22) to subdivide 9.99 acres into 83 single family residential lots, additional on-site parking, a toddler park, community gathering areas, and other improvements; and 5) a Design Review (DR 07-22) for floor plans and architecture of three home types with three elevations and three color schemes, and landscaping and other improvements throughout the project ("Project"). The site is located at 2092 Oakley Road and is zoned C (General Commercial) District. APN 037-110-031; and

WHEREAS, this Resolution applies to the Final Development Plan (FDP 02-22), Tentative Map (TM 04-22), and Design Review (DR 07-22) entitlements; and

WHEREAS, on April 12, 2023, the project application was deemed complete per Government Code section 65920 et. seq; and

WHEREAS, the project site is designated as Commercial (CO) in the Oakley General Plan, and zoned C (General Commercial) District; and

WHEREAS, pursuant to the requirements of the California Environmental Quality Act ("CEQA"), the City prepared a Draft Initial Study/Mitigated Negative Declaration ("IS/MND"). The Notice of Intent ("NOI") to Adopt an MND and IS was circulated for public review and comment from November 16, 2023 to December 18, 2023. It was filed with the County Clerk and Governor's Office of Planning and Research ("OPR"), emailed or mailed out to over 60 public agencies and parties requesting such notice, and posted in the same manner as a Notice of Public hearing, which is at locations throughout the City and at the project site; and

WHEREAS, on February 6, 2024, the Planning Commission held a duly noticed public hearing on the project at which it received a report from City Staff, oral and written testimony from the public, and deliberated on the project. At the conclusion of its deliberations, the Planning Commission held a vote and adopted Planning Commission Resolution No. 2-24 recommending the City Council approve the project, as revised by the Planning Commission during its deliberations; and

WHEREAS, the Applicant submitted revised plans consistent with Planning Commission Resolution No. 2-24; and

WHEREAS, on or before March 1, 2024, the Notice of Public Hearing for the Project was duly noticed in the Contra Costa Times, a newspaper of general distribution, was posted at the Project site, at Oakley City Hall located at 3231 Main Street, outside the gym at Delta Vista Middle School located at 4901 Frank Hengel Way, and outside the library at Freedom High School located at 1050 Neroly Road, was posted to the City's website, and was mailed out to all owners of property within a 500-foot radius of the project's boundaries, to parties requesting such notice, and to outside agencies; and

WHEREAS, on March 12, 2024, the City Council opened the public hearing at which it received a report from City Staff, oral and written testimony from the public, and deliberated on the project. At the conclusion of its deliberations, the City Council took a vote and adopted this resolution adopting the CEQA MND and approving the project, as conditioned; and

WHEREAS, these Findings are based on the City's General Plan and the City's Zoning Ordinance, and the information submitted to the City Council at its March 12, 2024 meeting, both written and oral, as reflected in the minutes of such meetings, together with the documents contained in the file for the Project (hereafter the "Record").

NOW, THEREFORE, BE IT RESOLVED THAT, on the basis of the above findings of fact and the entire Record, the City Council makes the following additional findings in support of the recommendation to the City Council to approve the CEQA MND and Project, as conditioned:

A. The Project's Initial Study and Mitigated Negative Declaration ("IS/MND") was prepared in accordance with CEQA Guidelines and is recommended to be adopted by the City Council in conjunction with the Project's General Plan Amendment (GPA 01-22), Rezone (RZ 03-22), Final Development Plan (FDP 02-22), Tentative Map (TM 04-22), and Design Review (DR 07-22) approvals. Development of the project is subject to all adopted mitigation measures as included in the IS/MND Mitigation Monitoring Program ("MMP"), attached as Exhibit A to this Resolution, unless modified pursuant to the CEQA Guidelines and adopted by the City Council.

B. In regard to the application requesting approval of a Final Development Plan (FDP 02-22) in conjunction with the project's P-1 District, the Planning Commission finds that:

    1. The Final Development Plan together with the other components of the proposed project's submitted materials includes all of the applicable required information as required by the Oakley Municipal Code, including, but not limited to the information included on the sheet titled "Final Development Plan", the Tentative Map and its associated sheets, and the Design Review plans such as the home elevations and landscape plans.

C. In regard to the application requesting approval of Tentative Map 9634 (TM 04-22) to subdivide 9.99 acres into 83 single family residential lots, additional on-site parking, a toddler park, community gathering areas, and other improvements, the Planning Commission that:

1. The Project's Initial Study and Mitigated Negative Declaration were prepared in accordance with CEQA Guidelines; and

2. The proposed Tentative Map ("TM"), together with the provisions of its design and improvements, is consistent with the Zoning Ordinance, and applicable portions of the Residential Medium (RM) General Plan Land Use Designation, in that the TM's gross density (approximately 8.3 du/ga) falls within the gross density range of the RM General Plan Land Use Designation of 5.5-9.6 du/ga, and the TM is tied to a P-1 District, which sets its own development regulations, such as required yard setbacks and minimum lot sizes; and

3. The site is physically suitable for the project in that: it is accessible; not physically constrained other than the reduction in net developable acres due to frontage right of way dedication, onsite stormwater detention and treatment, in-tract park, and in-tract public gathering areas; is similar to surrounding residentially developed projects; and it is also able to accommodate the proposed density of development in a manner consistent with the underlying land use designation of RM; and

4. The site is physically suitable for the proposed density and number of dwelling units in that the proposed TM falls within the allowable density while creating lots compliant with the project's P-1 District, and public roads to access the homes; and

5. The design of the subdivision and type of improvements are not likely to cause serious public health problems in that the proposed subdivision consists of 83 single family residential lots. Construction and grading of the project are subject to building or grading permits, and violations of any such permits are subject to appropriate enforcement; and

6. Public improvements are proposed and conditioned to occur as a result of the subdivision, which is a benefit to the public and surrounding residents and property owners of the vicinity. One such improvement will be the dedication and frontage improvements along Oakley Road, which currently lacks any sort of curb, gutter, or sidewalk for pedestrian or bicycle safety; and

7. The design of the subdivision and the type of improvements will not conflict with easements, acquired by the public at large, for access through or use of property within the proposed subdivision.

D. In regard to the application requesting approval of Design Review (DR 07-22) for floor plans and architecture of three home types with three elevations and three color schemes, and landscaping and other improvements throughout the project, the Planning Commission that:

1. The proposed Design Review plans are consistent with the applicable General Plan designation of Residential Medium (RM) and the project's Tentative Map, P-1 District zoning, and Final Development Plan; and

2. The proposed Residential Siting and Lot Design is consistent with the City of Oakley Residential Design Guidelines in that while the homes do not have substantial variation in setbacks, the pedestrian alley-loaded paseo entrances to the homes provide for a landscaped, walkable entry way to the homes with front facade and porch designs that create aesthetic variations, and changes in roof plans among the same floor plan assist in giving the overall neighborhood more visual variety in overall vertical massing along the streetscape; and

3. The Architectural Character of the proposed single-family homes is consistent with the applicable City of Oakley Residential Design Guidelines in that a variety of materials and architectural styles are used allowing for several different color schemes, and the homes will have unique exterior lighting designs for each architectural type, use of false shutters to enhance the exterior appearances, and a different garage door design for each architectural type.

E. The project complies with Measure J Growth Management requirements.

BE IT FURTHER RESOLVED THAT, on the basis of the above Findings and the Record, the City Council approves of the Applicant's request for a **Final Development Plan (FDP 02-22), Tentative Map (TM 04-22), and Design Review (DR 07-22),** subject to the following Conditions of Approval:

Conditions of Approval

Applicant shall comply with the requirements of the Oakley Municipal Code. Any exceptions must be stipulated in these Conditions of Approval. Conditions of Approval are based on the application received by the Planning Division dated **September 20, 2022**, as well as additional information acquired since that time and made part of the project file.

THE FOLLOWING PLANNING AND BUILDING CONDITIONS OF APPROVAL SHALL BE SATISFIED PRIOR TO THE ISSUANCE OF A BUILDING PERMIT UNLESS OTHERWISE NOTED:

PLANNING DIVISION CONDITIONS OF APPROVAL

General:

1. The proposed project is approved, as shown on the revised plan included as attachments to the March 12, 2024 City Council Staff Report, and as modified by or with the following conditions of approval.

2. These approvals shall be effectuated within a period of three (3) years from the effective date of the related Rezone approval by recording a final map and if not effectuated shall expire on that same date three years later. Prior to the expiration date, the applicant may apply for a Tentative Map Extension pursuant to the provisions of the Zoning Code and Subdivision Map Act, which would include extension of the related entitlements.

3. All construction drawings submitted for plan check shall be in substantial compliance with the plans presented to and approved by the City Council on March 12, 2024.

4. All conditions of approval shall be satisfied by the owner/developer. All costs associated with compliance with the conditions shall be at the owner/developer's expense.

5. Noise generating construction activities, including such things as power generators, shall be limited to the hours of 7:30 a.m. to 5:30 p.m. Monday through Friday, and shall be prohibited on City, State and Federal Holidays. The restrictions on allowed working days and times may be modified on prior written approval by the Community Development Director.

6. Should archaeological materials be uncovered during grading, trenching or other on- site excavation(s), earthwork within 30 yards of these materials shall be stopped until a professional archaeologist who is certified by the Society of Professional Archaeology (SOPA) has had an opportunity to evaluate the significance of the find and suggest appropriate mitigation(s), if deemed necessary.

7. All mitigation measures addressed in the environmental document shall be complied with and addressed as outlined in the Mitigation Monitoring Program approved for this project (incorporated as Exhibit A), per the review and approval of the Community Development Director.

8. The applicant shall comply with all mitigation measures contained within the HCP Planning Survey Report for the Project, per the review and approval of the Community Development Director.

9. The applicant shall indemnify, defend, and hold harmless the City of Oakley, the City Approving Authorities, and the officers, agents, and employees of the City from any and all claims, damages and liability (including, but not limited to, damages, attorney fees, expenses of litigation, costs of court).

10. The applicant shall post a copy of the City of Oakley General Plan 2020 Land Use Diagram, in a conspicuous place, within the model homes or sales office.

Final Development Plan/Development Standards:

11. The project development standards, such as minimum setbacks, shall be listed in table form on the Final Development Plan that are presented to the City Council for their consideration. The Development Standards shall match those shown on the plans and as described in the Planning Commission Staff Report.

12. The final location of the 8-foot tall decorative split-face CMU wall between the project site and adjacent commercial development shall be subject to review and approval by the Community Development Director and City Engineer.

13. The Final Development Plan shall include regulations either prohibiting or regulating accessory structures.

Design Review

14. The applicant shall explore the use of garage doors with windows or false windows and if feasible, a minimum of sixty percent (60%) of the garage doors throughout the subdivision shall have decorative windows or false windows.

Parks and Landscaping:

15. This project will include a Homeowners Association which will own and maintain the park, gathering areas, and other common areas. If the park is available to the general public, the applicant will be credited the appropriate amount on their per lot park impact fees. If the park is only available to members of the HOA, the applicant will be required to pay the full in-lieu park impact fees on each lot.

16. The final landscape plan shall include all trees as shown on the conceptual landscape plans approved with the project. Modifications to the species, size, or location of the trees is subject to the review and approval of the Community Development Director and City Engineer. It is the responsibility of the applicant to plan utilities, joint trenches, and other improvements that could interfere with

placement of trees in a manner to allow the trees to be planted without conflict to those other improvements.

17. All trees located along the Oakley Road frontage and along the entryway to the subdivision shall be 36” box size at installation.

18. A landscaping and irrigation plan for all front yard, right-of-way, parks, open space, and trail landscaping shall conform to the Oakley Water Efficient Landscape Ordinance and the Guidelines for Implementation of the City of Oakley Water Efficient Landscape Ordinance and shall be installed prior to final occupancy. The plan shall be prepared by a licensed landscape architect and shall be certified in compliance with the City’s Water Conservation Ordinance.

19. California native drought tolerant plants shall be used as much as possible. All trees shall be a mix of fifteen-gallon, 24” box, and 36” box where conditioned; all shrubs shall be a minimum five-gallon size, except as otherwise noted.

20. All landscaped areas not covered by shrubs or groundcover shall be covered with bark or acceptable alternative as reviewed and approved by the Community Development Director. On slopes greater than 3 to 1, the applicant shall use an alternative to bark per the review and approval of the Community Development Director. Areas covered with bark shall use a weed barrier.

21. The applicant shall maintain all private landscaping until occupancy.

Fences and Walls:

22. Good neighbor fences between private properties shall be six-foot tall, constructed of wood that is resistant to rotting and warping, and erected with galvanized metal posts surrounded and completely hidden by wood fascia that matches the main fencing. Posts and fascia shall be capped by either a decorative upper fence rail or post cap. Good neighbor fences facing a street shall be constructed of a durable material such as, but not limited to, masonry, vinyl, enhanced wood, composite or other durable material, or stained or painted on both sides to prevent water damage, subject to the review and approval of the Community Development Director.

23. Any CMU walls, such as landscape retaining walls, shall use colored (i.e., non-grey) split-face CMU for all publicly and privately visible portions of the wall.

24. Anti-graffiti techniques shall be used on sound walls.

Subdivision Design:

25. Driveway openings shall be a maximum 18’ in width or up to 25% of a lot’s frontage.

26. The street names shall be approved by the Community Development Department and the Contra Costa County Fire Protection District.

Subdivision Disclosures:

27. The model home complex shall have a copy of the City of Oakley's General Plan land use map posted within the sales office or included with the informational material provided to prospective home buyers.

28. Where a lot/parcel is located within 300' of a high voltage electric transmission line, the applicant shall record the following notice:

> "The subject property is located near a high voltage electric transmission line. Purchasers should be aware that there is ongoing research on possible potential adverse health effects caused by the exposure to a magnetic field generated by high voltage lines. Although much more research is needed before the question of whether magnetic fields actually cause adverse health effects can be resolved, the basis for such a hypothesis is established. At this time, no risk assessment has been made."

When a Final Subdivision Public Report issued by the California Department of Real Estate is required, the applicant shall also request that the Department of Real Estate insert the above note in the report.

29. The following statements shall be recorded at the County Recorder's Office for each parcel to notify future owners of the parcels that they own property in an agricultural area:

> "This document shall serve as notification that you have purchased land in an agricultural area where you may regularly find farm equipment using local roads; farm equipment causing dust or blowing sand; crop dusting and spraying occurring regularly; burning associated with agricultural activities; noise associated with farm equipment such as zon guns and aerial crop dusting and certain animals, including equestrian trails as well as flies may exist on surrounding properties. This statement is again notification that this is part of the agricultural way of life in the open space areas of the City of Oakley and you should be fully aware of this at the time of purchase.

30. The following statement shall be recorded at the County Recorder's Office for each parcel to notify the future owners of the parcel that they are within the Antioch School District and shall be prominently displayed in sales office for the public to view:

This document shall serve as notification that you have purchased land within the Antioch Unified School District. Properties located within Antioch Unified School District boundaries are subject to Mello Roos tax. Potential property owners should be fully aware of this at the time of purchase."

Energy Efficiency:

31. Water heaters shall provide an energy efficiency factor of 0.62 or better.

32. Dual zone air conditioning shall be provided on all two-story residential units.

33. Air conditioning condenser units shall be located to take advantage of natural shade. Condensers should not be placed on the west or south elevation of a home unless shade is provided. The location of the condenser shall be added to all plot plans for review and approval of the Community Development Director.

34. Design and site units so as to take advantage of natural heating and cooling, sin and wind exposure, and solar energy opportunities.

Waste Management Plan:

35. The applicant shall submit a Waste Management Plan that complies with the City of Oakley Construction and Demolition Debris Recycling Ordinance.

BUILDING DIVISION CONDITIONS OF APPROVAL

36. Plans shall meet the currently adopted Uniform Codes as well as the newest T-24 Energy requirements from the State of California Energy Commission. To confirm the most recently adopted codes please contact the Building Division at (925) 625-7005.

37. An Automatic Life Safety Sprinkler System shall be required in all new construction pursuant to Ordinance 22-06. The automatic Life Safety Sprinkler Systems in commercial and industrial buildings shall be designed and installed to the standards and requirements found in the most recent version of the NFPA (National Fire Protection Association). Automatic Life Safety Sprinkler Systems in hotels and apartments shall be installed to the standards and requirements found in the most recent version of the NFPA Standard 13R. After July 1, 2011, the Automatic Life Safety Sprinkler Systems in one and two family dwellings, and townhouses not more than three stories above grade plane, shall be designed and installed to the standards and requirements found in the 2010 California Residential Code section R313.

38. Prior to requesting a Certificate of Occupancy from the Building Division, all Conditions of Approval required for occupancy must be completed. When the

Public Works Division and the Planning Division place Conditions of Approval on the project, those divisions will sign off on the project prior to the request for a Building division final inspection. Similarly, if the Health Department and/or Fire Department reviewed and approved the original plans, those departments must sign off on the project prior to the request for a final inspection by the Building Division.

PUBLIC WORKS AND ENGINEERING CONDITIONS OF APPROVAL

THE FOLLOWING SHALL BE SATISFIED PRIOR TO THE ISSUANCE OF AN ENCROACHMENT AND/OR GRADING PERMIT:

39. GENERAL. All public improvements shall be made according to the latest adopted City Standard Drawings and Specifications. All work shall conform to the applicable City ordinances. The adjacent public right-of-way shall be kept clear of all job-related dirt and debris at the end of the day. Dirt and debris shall not be washed into storm drainage facilities. The storing of goods and materials on the sidewalk and/or the street will not be allowed unless a special permit is issued. The developer's representative in charge shall be at the job site during all working hours. Failure to maintain the public right-of-way according to this condition may result in the City performing the required maintenance at the developer's expense.

40. ENCROACHMENT PERMIT. All work in the public right-of-way, including any blockage or partial closure of sidewalks will require an Encroachment Permit. Special provisions such as limitations on work hours, protective enclosures, or other means to facilitate public access in a safe manner may be required.

41. GRADING PERMIT. All earthwork must comply with the City's Grading Ordinance. A Grading Permit must be issued by the public works department prior to site disturbance.

42. PUBLIC WORKS INSPECTIONS. The developer or their representative shall notify the Engineering Inspector at least forty-eight (48) hours before starting any work pertaining to on-site drainage facilities, grading or paving, and all improvements in approved plans. Failure to do so will result in rejection of work that was completed without inspection.

43. PRECONSTRUCTION MEETING. Prior to issuance of any permit or the commencement of any site work, the general contractor shall:

    a) Along with the project applicant, attend a pre-construction meeting with the City Engineer to discuss the project conditions of approval, working hours, site maintenance and other construction matters.

    b) Acknowledge in writing that they have read and understand the project conditions of approval and will make certain that all project sub-contractors

have read and understand them prior to commencing work and that a copy of the project conditions of approval will be posted on site at all times during construction.

44. CONSTRUCTION STREET PARKING. No vehicle having a manufacturer's rated gross vehicle weight exceeding ten thousand (10,000) pounds shall be allowed to park on the portion of a street which abuts property in a residential zone without prior approval from the City Engineer.

45. EROSION CONTROL. Interim and final erosion control plans shall be prepared and submitted to the Public Works Department. A Notice of Intent (NOI) and Storm Water Pollution Prevention Plan (SWPPP) shall be submitted to the State SMARTS system for projects disturbing more than one acre and obtain a WDID number. A maximum of two weeks is allowed between clearing of an area and stabilizing/building on an area if grading is allowed during the rainy season. Interim erosion control measures, to be carried out during construction and before installation of the final landscaping shall be included. Interim erosion control method shall include, but are not limited to: silt fences, fiber rolls (with locations and details), erosion control blankets, City standard seeding specification, filter berms, check dams, retention basins, etc. Provide erosion control measures as needed to protect downstream water quality during winter months. The grading, drainage, erosion control plans and SWPPP shall comply with applicable measures contained in the City of Oakley's NPDES Permit.

46. DUST CONTROL. Blowing dust shall be reduced by timing construction activities so that paving and building construction begin as soon as possible after completion of grading, and by landscaping disturbed soils as soon as possible. Further, water trucks shall be present and in use at the construction site. All portions of the site subject to blowing dust shall be watered as often as deemed necessary by the City, or a minimum of three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites to ensure proper control of blowing dust for the duration of the project. Watering on public streets shall not occur. Streets will be cleaned by street sweepers or by hand as often as deemed necessary by the City Engineer, or at least once a day. Watering associated with on-site construction activity shall take place between the hours of 8 a.m. and 5 p.m. and shall include at least one late-afternoon watering to minimize the effects of blowing dust. All public streets soiled or littered due to this construction activity shall be cleaned and swept daily during the workweek to the satisfaction of the City. Demolition or earthwork activities shall be halted when wind speeds (instantaneous gusts) exceed 25 MPH. All trucks hauling soil, sand, or other loose debris shall be covered.

47. SILT AND MUD IN PUBLIC RIGHT-OF-WAY. It is the responsibility of contractor and homeowner to make sure that all dirt tracked into the public right-of-way is cleaned up daily. Mud, silt, concrete, and other construction debris SHALL NOT

be washed into the City's storm drains. Construction entrances must be in place per the Erosion Control Plan.

48. TRAFFIC CONTROL PLAN. The project sponsor will be required to work with the Public Works Department to develop a traffic control plan per the current California MUTCD. This plan will include, but not be limited to, the following measures:

    a) Construction activities shall be strategically timed and coordinated to minimize traffic disruption for schools, residents, businesses, and special events. The schools located on the haul route shall be contacted to help with the coordination of the trucking operation to minimize traffic disruption.

    b) Flag persons shall be placed at locations necessary to control one-way traffic flow, if required. All flag persons shall have the capability of communicating with each other to coordinate the operation.

    c) Prior to construction, advance notification of all affected residents and emergency services shall be made regarding one-way operation, specifying dates and hours of operation and lane closures on main arterial and collector streets, and will be permitted only between the hours of 8:30AM to 2:30PM on M, T, TH & F. 8:30AM to 12:00PM on W.

    d) The traffic control plan shall be reviewed for compliance with the project's Haul Route, approved by the City of Oakley.

    e) A full road closure will require a detour plan and a road closure permit issued by the Public Works Department.

49. CONSTRUCTION MANAGEMENT PLAN. The Applicant shall submit a construction management plan that shall incorporate at a minimum the Earth Movement Plan, Traffic Control Plan, Project Schedule, site security fencing, employee parking, construction staging area, construction trailer, and proposed outhouse locations. The public street shall not be used for any construction related activities, including parking for workers and storage of vehicles.

50. RESTORATION OF PUBLIC IMPROVEMENTS. The developer shall repair or replace all existing improvements not designated for removal that are damaged or removed because of developer's operations. Improvements such as, but not limited to: curbs, gutters, sidewalks, driveways, signs, pavements, raised pavement markers, thermoplastic pavement markings, etc. shall be repaired and replaced to a condition equal to or better than the original condition. Existing improvement to be repaired or replaced shall be at the direction of the Public Works & Engineering Inspector and shall comply with all Title 24 Disabled Access provisions. Developer shall request a walk-through with the Engineering Construction Inspector before the start of construction to verify existing conditions.

51. SIDEWALK REPAIR. The developer shall repair and replace to existing City standards any sidewalk damaged now or during construction of this project. Sidewalk repair shall match existing color, texture, and design, and shall be constructed per City Standard Details. The limits of sidewalk repair will be determined by the Public Works Inspector during the construction phase of the project.

52. CURB AND GUTTER. The developer shall repair and replace to existing City standards any curb and gutter damaged now or during construction of this project. New curb and gutter shall be constructed per City Standard Details. The limits of curb and gutter repair will be determined by the Public Works Inspector during the construction phase of the project.

53. CONSTRUCTION NOISE. Between the hours of 7:30 a.m. to 5:30 p.m., weekdays and 9:00 a.m. to 5:30 p.m. weekends and holidays, construction, alteration, or repair activities shall be allowed. No individual piece of equipment shall produce a noise level exceeding eighty-five (85) dBA at twenty-five (25) feet. If the device is located within a structure on the property, the measurement shall be made at distances as close to twenty-five (25) feet from the device as possible. The noise level at any point outside of the property plane shall not exceed eighty-five (85) dBA. Pickup and delivery of materials and equipment is restricted to the hours listed above unless prior written approval is obtained by the Public Works Department.

54. GOOD HOUSEKEEPING. Good housekeeping practices shall be observed at all times during the course of construction. Superintendence of construction shall be diligently performed by a person or persons authorized to do so at all times during working hours. The storing of goods and/or materials on the sidewalk and/or the street will not be allowed unless a special permit is issued by the Engineering Division. The adjacent public right-of-way shall be kept clear of all job-related dirt and debris at the end of the day. Dirt and debris shall not be washed into storm drainage facilities. The storing of goods and materials on the sidewalk and/or the street will not be allowed unless a special permit is issued. The developer's representative in charge shall be at the job site during all working hours. Failure to maintain the public right-of-way according to this condition may result in the City performing the required maintenance at the developer's expense.

THE FOLLOWING SHALL BE SATISFIED PRIOR TO THE APPROVAL OF THE GRADING PLAN:

55. EXISTING WELLS. Provide documentation that any gas wells located onsite have been abandoned per regulations.

56. GEOLOGY AND SOIL MITIGATION MEASURES. A geotechnical investigation shall be conducted for the project to determine the surface and sub-surface conditions at the site and to determine the potential for surface fault rupture on the

site. The geotechnical study shall provide recommendations for site grading as well as the design of foundations, retaining walls, concrete slab-on-grade construction, excavation, drainage, on-site utility trenching and pavement sections. The soils report shall include specific criteria and standards governing site grading, drainage, pavement design, retaining wall design, and erosion control. All recommendations of the investigation shall be incorporated into project plans. One copy of the geologic report shall be submitted with the grading permit and public improvement application. Prior to issuance of any permit, the applicant's soils engineer shall review the final grading and drainage plans to ensure that designs for foundations, retaining walls, site grading, and site drainage are in accordance with their recommendations. The applicant's soils engineer's approval shall then be conveyed to the City either by letter or by signing the plans.

57. GRADING

a) Grade any slopes with a vertical height of four (4) feet or more at a slope no steeper than 3H to 1V. Retaining walls that may be installed to reduce the slope must be masonry and comply with the City's building code.

b) Retaining wall or other suitable option acceptable by the City Engineer is required where the grade differential between property or adjacent lots are greater than 6". Retaining walls are required to be identified on the grading plans and shall have a note stating a separate building permit is required for retaining wall greater than four (4) feet in height, measured from the bottom of footing to top of wall.

c) At least one week prior to commencement of grading, the applicant shall post at the site and mail to the owners of property within 300 feet of the exterior boundary of the project site noticing that construction work will commence. The notice shall include a list of contact persons with their name, title, phone number and area of responsibility. The person responsible for maintaining the list shall be included. The list shall always be kept current and shall consist of persons with authority to indicate and implement corrective action in their area of responsibility. The names of the individual responsible for noise and litter control shall be expressly identified in the notice. The notice shall be reissued with each phase of major grading activity. A copy of the notice shall be concurrently transmitted to the City Engineer. The notice shall be accompanied by a list of the names and addresses of the property owners noticed, and a map identifying the area noticed.

d) Submit a Haul Route Plan to the City Engineer for review and approval prior to importing or exporting any material from the site. The plan shall include the location of the borrow or fill area, the proposed haul routes, the estimated number and frequency of trips, and the proposed schedule of hauling. Based on this plan, the City Engineer shall determine whether pavement condition surveys must be conducted along the proposed haul routes to determine what

impacts the trucking activities may have. The project proponents shall be responsible to repair to their pre-construction condition any roads along the utilized routes.

e) Prior to commencement of any site work that will result in a land disturbance of one acre or more, the applicant shall provide evidence to the City Engineer that the requirements for obtaining a State General Construction Permit have been met. Such evidence may be a copy of the Notice of Intent Letter sent by the State Water Resources Control Board. The WDID Number shall be shown on the grading plan prior to approval by the City Engineer.

f) The burying of any construction debris is prohibited on construction sites.

58. NPDES – NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM. Comply with all rules, regulations and procedures of the NPDES for municipal, construction and industrial activities as promulgated by the California State Water Resources Control Board, the Regional Water Quality Control Board (Central Valley – Region IV), including the Stormwater C.3 requirements as detailed in the Guidebook available at www.cccleanwater.org

Compliance shall include developing long-term best management practices (BMP's) for the reduction or elimination of storm water pollutants. The project design shall incorporate, wherever feasible, the following long-term BMPs in accordance with the Contra Costa Clean Water Program for the site's storm water drainage.

- Offer pavers for household driveways and/or walkways as an option to buyers.
- Minimize the amount of directly connected impervious surface area.
- Delineate all storm drains with "No Dumping, Drains to the Delta" permanent metal markers per City Standards.
- Construct concrete driveway weakened plane joints at angles to assist in directing run-off to landscaped/pervious areas prior to entering the street curb and gutter.
- Distribute public information items regarding the Clean Water Program to buyers.
- Other alternatives as approved by the City Engineer.
- Prepare an Operations and Maintenance Manual for the project's storm water control measures.

THE FOLLOWING SHALL BE SATISFIED PRIOR TO THE APPROVAL OF THE IMPROVEMENT PLAN:

59. PUBLIC IMPROVEMENTS. Construct the project streets within public right of way to City public road standards and as shown on the Tentative Map with the following exceptions:

a) The minimum street grade may be lowered from the standard 1% to 0.75% provided that the project proponent demonstrates that the City's drainage standards can be achieved.

b) Submit a turning radius exhibit to the City Engineer for review and approval to illustrate that the ninety-degree turns of project streets can accommodate the largest expected vehicle to use the streets without the inclusion of City standard elbows. If the exhibit illustrates that elbows are necessary to accommodate the expected traffic, then they shall be included in the improvement plans.

60. ROADWAY IMPROVEMENTS. The following improvements shall be installed by the developer as shown on the Tentative Map. Plans for these roadway improvements shall be prepared by a California registered civil engineer, reviewed, and approved by the City, to the satisfaction of the City Engineer.

a) Design and construct the frontage improvements for Oakley Road as shown on the Vesting Tentative Map. The improvements must be consistent with the City of Oakley standard for a four-lane divided arterial roadway. The median island will need to be improved to its ultimate width. The Developer must continue the coordination efforts with the adjacent property owner west of the project to fully construct the improvements of Oakley Road between Montevino Way to the eastern limits for the project frontage to the satisfaction of the City Engineer.

b) Design and construct the project entrance from Oakley Road for a right-in and right-out only driveway as outlined in the Traffic Report prepared for this development. The driveway must be designed to accommodate turning radii for garbage and emergency vehicles. The project driveway must be designed to meet standard sight distance requirements.

c) Design and construct the frontage improvements for MainStreet as shown on the Vesting Tentative Map. The improvements must be consistent with the City of Oakley standard for a six-lane divided arterial.

61. Install traffic calming measures consistent with the City's Neighborhood Traffic Management Program. The traffic calming measures shall be included on the improvement plans and are subject to the review and approval of the City Engineer.

62. Install traffic control devices such as stop signs and other signing and striping on the project streets to the satisfaction of the City Engineer.

63. Construct emergency vehicle access from Main Street to F Street as shown on the approved Tentative Map. The design and configuration of the accesses shall be per the current City standard and shall be subject to the review and approval of the City Engineer and the Contra Costa County Fire Protection District.

64. Construct an asphalt concrete overlay for the entire width of the northern half of Oakley Road up to the median curb adjacent to the project to be coordinated with the pavement widening required for the project. The City Engineer shall determine the depth and extent of the overlay. The extent of utility trenching pavement repair must be completed to the satisfaction of the City Engineer.

65. Design all public and private pedestrian facilities in accordance with Title 24 (Handicap Access) and the Americans with Disabilities Act.

66. DRAINAGE IMPROVEMENTS

    a) Collect and convey all stormwater entering and /or originating on this property, without diversion and within an adequate storm drainage facility, to an adequate natural watercourse having definable bed and banks, or to an existing adequate public storm drainage facility that conveys the storm waters to an adequate natural watercourse.

    b) Submit a final hydrology and hydraulic report including 10-year and 100-year frequency event calculations for the proposed drainage system and stormwater pond to the city Engineer for review and approval. The report shall include study of the downstream storm drain facilities to confirm its adequacy and mitigate on-site so that the peak flows of post-project conditions do not exceed the pre-project peak flows. The report must include a narrative that describes the project's proposed overland release for storm water runoff. In the event of a failure of the project's storm drain system, the overland release path shall convey storm water runoff to a public street right-of-way or drainage channel. All pad elevations shall be designed to be at a minimum 12 inches above the 100-year storm elevation scenario.

    c) Design and construct all storm drainage facilities in compliance with the Municipal Code and City design standards.

    d) Prevent storm drainage from draining across the sidewalk(s) and driveway(s) in a concentrated manner.

    e) Dedicate a public drainage easement over the drainage system that conveys storm water run-off from public streets.

    f) On-site parking areas and driveways shall not surface drain across public sidewalk or driveway aprons.

67. SIGHT DISTANCE EXHIBIT. For the project driveways' ingress and egress, provide an exhibit that will analyze the sight distance required for the appropriate speed limit identified with this project as required by the City Engineer.

68. DESIGN CHANGES. The Applicant's registered Engineer shall notify the City Engineer, in writing, at least 72 hours in advance of all differences between the proposed work and the design indicated on the plans. Any proposed changes shall be subject to the approval of the City before altered work is started. A plan revision must be submitted for approval by the City Engineer.

69. JOINT TRENCH PLANS. The applicant shall submit Joint Trench Composite Plans to the City for review prior to approval of improvement plans or recordation of the final map. The developer shall provide joint trench composite plans for the underground electrical, gas, telephone, cable television and communication conduits and cables including the size, location and details of all trenches, locations of building utility service stubs and meters and placements or arrangements of junction structures as a part of the improvement Plan submittals for the project. The composite drawings and/or utility improvement plans shall be signed by a licensed civil engineer. The joint trench plans shall include street and/or site lighting and associated photometrics. A letter shall be provided by PG&E stating that public streetlight billing will be per Rule LS2A, and that private lights shall be metered with billing to the owner. Pole numbers, assigned by PG&E, shall be clearly delineated on the plans.

70. UTILITIES & UNDERGROUNDING

    a) Underground all new and existing utility distribution facilities per City of Oakley code section Title 6 Chapter 8 Underground Utility Districts.

    b) All utility boxes shall be installed underground, and all wires and cables must be installed in conduits. Compliance with this condition shall be at the discretion of the City Engineer.

    c) Above ground utility boxes shall be camouflaged per the review and approval of the City Engineer.

    d) A written approval from Diablo Water District and Iron House Sanitary District must be provided that all underground utility improvements have passed all testing requirements prior to commencement of paving a street.

71. The Developer must coordinate with the adjacent property owner west of the project to underground the existing utilities along Oakley Road as required by the Deferred Improvement Agreement to the satisfaction of the City Engineer.

72. STREETLIGHTS. Install streetlights along all public streets as required by the City Engineer. The City Engineer shall determine the final number and location of the lights, and the lights shall be on an LS2-A rate service. Streetlights shall be spun aluminum “cobra head” style or decorative residential streetlights as required by the City of Oakley Standard Plans.

73. LANDSCAPING IN PUBLIC RIGHT OF WAY

    a) Prepare landscape plans for landscape improvements within the public right of way. Landscape plans shall be prepared by a licensed landscape architect.

    b) Install public right-of-way landscaping along the project's frontages as required by the City Engineer and Community Development Director.

    c) Maintain all landscaping within the public right-of-way until such time that the adjacent roadway improvements have been accepted for maintenance.

    d) Prior to the issuance of certificate of occupancy, an inspection will be performed to verify the health and location of the street trees. Trees in poor health or those without adequate clearance from utilities will require replacement or relocation.

74. FENCING. Any proposed fencing and walls shall be located on private property and maintained by the property owner or owner.

75. SOUNDWALL. Soundwalls along any right of way or public property shall be installed within private property and not within public right of way. The soundwall must match the proposed soundwalls in this area or as required to the satisfaction of the Community Development Director.

76. MAINTENANCE EXHIBIT. Submit a maintenance exhibit showing the responsible maintenance entity of proposed subdivision improvements. The exhibit must clearly show which areas are to be maintained by the City of Oakley.

    a) Parcels A, B, C, D, E, and F are to be retained and maintained by the Owner/Developer/HOA.

    b) Bioretention Areas to be maintained by the Owner/Developer/HOA.

THE FOLLOWING PUBLIC WORKS AND ENGINEERING CONDITIONS OF APPROVAL SHALL BE SATISFIED PRIOR TO THE APPROVAL OF THE FINAL MAP:

77. BONDS. The applicant shall supply suitable securities for all improvements that are a part of the development in a form acceptable to the City in the amount of 100% (performance), 50% (labor and material) prior to issuance of any permit.

78. FINAL MAP. Submit a Final Map prepared by a Licensed Land Surveyor. The final map shall be recorded, and the Subdivision Agreement must be executed before any building permits are issued. Insurance shall be provided per the terms of the Subdivision Agreement.

79. DEDICATIONS. The following shall be dedicated on the final map. The dedication shall be recorded before any permits are issued and under specific timelines listed below:

    a) Dedicate the required right-of-way along the project frontage on Oakley Road and MainStreet as shown in the typical sections of the Tentative Map.

    b) Relinquish abutter's rights of access along all non-primary frontages to the satisfaction of the City Engineer.

    c) Public Utility Easement (PUE): 5' PUE beyond public right of way as required.

    d) Ingress-egress, storm drainage easements, emergency access easements as required.

    Any necessary rights of way, rights of entry, permits and/or easements for the construction of off-site, temporary or permanent, public and private road, utility and drainage improvements shall be furnished to the City. Prior to the issuance of the first building permit, the applicant must provide the necessary documentation that any existing easements no longer necessary have been quitclaimed.

80. PRIVATE EASEMENTS. Agreements detailing rights, limitations, and responsibilities of involved parties shall accompany each private easement. The easements and associated agreements shall be recorded simultaneously with the final map.

81. UTILITY SETBACKS. Building foundations shall be set back from utility lines a sufficient distance to allow excavation of the utility without undermining the house foundation. The City Engineer shall determine the appropriate setback based on the depth of the utility, input from the project soils engineer, and the type of foundation.

82. DRAINAGE FEES. Applicant shall comply with the drainage fee requirements as adopted by the County Board of Supervisors. The applicant shall pay the fee in effect at the time of final map approval. Certain improvements required by the Conditions of Approval for this development, or the Code may be eligible for credit or reimbursement against the drainage area fee. The developer should contact the City Engineer to personally determine the extent of any credit or reimbursement for which they might be eligible. Any credit or reimbursements shall be determined prior to filing the final map or as approved by the Flood Control District.

83. ANNEXATIONS

a) The applicant shall establish a funding mechanism to cover the ongoing financial impact their project has on fire protection services provided in the City. All costs associated with meeting this condition of approval shall be paid for by the applicant. Compliance with this requirement shall be to the satisfaction of the City Engineer and shall be completed prior to final map approval.

b) The applicant shall establish a funding mechanism to cover the ongoing financial impact their project has on police services provided in the City. All costs associated with meeting this condition of approval shall be paid for by the applicant. Compliance with this requirement shall be to the satisfaction of the City Engineer and shall be completed prior to final map approval.

c) The applicant shall establish a funding mechanism to cover the ongoing financial impact their project has on maintenance and operation services associated with public landscaping, parks, streetlighting, and stormwater facilities. All costs associated with meeting this condition of approval shall be paid for by the applicant. Compliance with this requirement shall be to the satisfaction of the City Engineer and shall be completed prior to final map approval.

THE FOLLOWING SHALL BE SATISFIED PRIOR TO THE ISSUANCE OF THE BUILDING PERMIT:

84. PAD CERTIFICATION. A letter from a licensed land surveyor stating that the building pad was constructed in accordance with the approved plans shall be provided prior to the issuance of the building permit.

85. SOILS ENGINEER CONSTRUCTION OBSERVATION. During construction, all excavations and grading shall be inspected by the applicant's soils engineer prior to placement of concrete and/or backfill so they can verify that the actual conditions are as anticipated in the design-level geotechnical report and recommend appropriate changes in the recommendations contained in the report, if necessary. The results of the construction observation and testing should be documented in an "as-built" letter/report prepared by the applicants' soils engineer and submitted to the City before any building permit is granted.

86. AGREEMENT FOR STORMWATER BEST MANAGEMENT PRACTICES INSPECTION AND MAINTENANCE OBLIGATIONS. The property owner shall enter into an agreement with the City for maintenance of the stormwater filtration devices required to be installed on this project. The agreement will specify that certain routine maintenance shall be performed by the property owner and will specify device maintenance reporting requirements. The agreement will also specify routine inspection requirements, permits and payment of fees. The agreement shall be recorded prior to release of any occupancy permits.

87. AS-BUILT PLANS. After completion of the construction of all work, the original plans shall have all changes (change orders and field changes) clearly marked. The "as-built" plans shall again be signed and "wet-stamped" by the civil engineer who prepared the plans, attesting to the changes. The original "as-built" plans shall be reviewed and approved by the Engineering Inspector. A Mylar and AutoCAD disk of the approved "as-built" plans shall be provided to the City before acceptance of improvements.

88. IMPACT FEES. Comply with the requirements of the development impact fees listed below, in addition to those noticed by the City Council in Resolution 85-00 and 08-03. The applicant shall pay the fees in the amounts in effect at the time each building permit is issued.

    a) Traffic Impact Fee (authorized by Ordinance No. 14-00, adopted by Resolution 49-03, update Resolution No 91-21);

    b) Regional Transportation Development Impact Mitigation Fee or any future alternative regional fee adopted by the City (authorized by Ordinance No. 14-00, adopted by Resolution No. 73-05);

    c) Park Land Dedication In-Lieu Fee (adopted by Ordinance No. 03-03, updated Resolution No. 48-17);

    d) Park Impact Fee (authorized by Ordinance No. 05-00, adopted by Resolution No. 19-03, updated Resolution No. 48-17);

    e) Public Facilities Fee (authorized by Ordinance No. 05-00, adopted by Resolution No. 18-03);

    f) Fire Facilities Impact Fee (adopted by Resolution No. 24-21);

    g) General Plan Fee (adopted by Resolution No. 53-03);

    h) East Contra Costa County Habitat Conservation Plan Fee (adopted by Ordinance 6-23).

The applicant should contact the City Engineer prior to constructing any public improvements to determine if any of the required improvements are eligible for credits or reimbursements against the applicable traffic benefit fees or from future developments.

ADVISORY NOTES

The following Advisory Notes are provided to the applicant as a courtesy but are not a part of the conditions of approval. Advisory Notes are provided for the purpose of informing the applicant of additional ordinance requirements that must be met in order to proceed with development.

A. The applicant/owner should be aware of the expiration dates and renewing requirements prior to requesting building or grading permits.

B. The project will require a grading permit pursuant to the Oakley Municipal Code.

C. The applicant shall comply with the requirements of Ironhouse Sanitary District.

D. The applicant shall comply with the requirements of the Diablo Water District.

E. The applicant shall comply with the requirements of the Contra Costa Water District.

F. The applicant shall comply with the requirements of the Contra Costa County Fire Protection District.

G. The applicant shall comply with the requirements of Contra Costa Environmental Health if subject to applicable permits.

H. The applicant shall comply with the requirements of the Building Inspection Division. Building permits are required prior to the construction of most structures.

I. This project may be subject to the requirements of the Department of Fish and Wildlife. It is the applicant's responsibility to notify the Department of Fish and Wildlife, P.O. Box 47, Yountville, California 94599, of any proposed construction within this development that may affect any fish and wildlife resources, per the Fish and Game Code.

J. The applicant shall be responsible for paying applicable CEQA filing fees for the County Clerk for the Notice of Determination as well as the State Department of Fish and Wildlife's Filing Fee.

K. This project may be subject to the requirements of the Army Corps of Engineers. It is the applicant's responsibility to notify the appropriate district of the Corps of Engineers to determine if a permit is required, and if it can be obtained.

L. The applicant shall obtain an encroachment permit for construction within existing City rights of way.

M. The applicant shall obtain an encroachment permit from Caltrans for construction within the State right of way.

PASSED AND ADOPTED by the City Council of the City of Oakley at a meeting held on the 12th day of March 2024 by the following vote:

AYES:

NOES:

ABSENT:

ABSTENTIONS:

APPROVED:

Anissa Williams, Mayor Date

ATTEST:

Libby Vreonis, City Clerk Date

The Village at 2092 Oakley Road Subdivision
Mitigation Monitoring Program

– January 2024

The California Environmental Quality Act (CEQA) and CEQA Guidelines require Lead Agencies to adopt a program for monitoring the mitigation measures required to avoid significant environmental impacts of a project. The Mitigation Monitoring Program ensures that mitigation measures imposed by the City are completed at the appropriate time in the development process.

The mitigation measures identified in The Village at 2092 Oakley Road Subdivision Initial Study/Mitigated Negative Declaration are listed below along with the party responsible for implementation of the mitigation measure, the party responsible for monitoring implementation of the mitigation measure, the milestones for implementation and monitoring, and a sign off that the mitigation measure has been implemented.

MITIGATION MONITORING PROGRAM The Village at 2092 Oakley Road Subdivision					
Impact Number	**Impact**	**Mitigation Measure**	**Monitoring Agency**	**Implementation Schedule**	**Sign-off**
Cultural Resources					
V (b,c).	Would the project cause a substantial adverse change in the significance of a unique archaeological resource pursuant to Section 15064.5; or disturb any human remains, including those interred outside of dedicated cemetaries?	*V-1.* *If buried archaeological, paleontological, and/or cultural resources are encountered during site grading or other site work, all such work shall be halted immediately within 100 feet of the discovery and the developer shall immediately notify the City of Oakley Planning Division of the discovery. In such case, the developer shall be required, at their own expense, to retain the services of a qualified archaeologist for the purpose of recording, protecting, or curating the discovery, as appropriate. The archaeologist shall be required to submit to the City of Oakley Planning Division for review and approval a report of the findings and method of curation or protection of the resources. Further grading or site work within the area of discovery would not be allowed until the preceding work has occurred.* *The foregoing requirements shall be noted on the project improvement plans and disclosed to any subcontractors by the general contractor or job superintendent during pre-construction meetings, subject to review and approval by the City of Oakley Planning Division.*	City of Oakley Planning Division Qualified Archaeologist	If buried archaeological, paleontological, and/or cultural resources are encounterd during site grading or other site work.	
		V-2. *Pursuant to State Health and Safety Code §7050.5 (c) State Public Resources Code §5097.98, if human bone or bone of unknown origin is found during construction, all work shall stop within 100 feet of the find and the Contra Costa County Coroner shall be contacted immediately. If the remains are determined to be Native American, the Coroner shall notify the Native American Heritage Commission, who shall notify the person believed to be the most likely descendant. The most likely descendant shall*	City of Oakley Planning Division Contra Costa County Coroner Native American Heritage	If human bone or bone of unknown origin is found during construction.	

MITIGATION MONITORING PROGRAM The Village at 2092 Oakley Road Subdivision					
Impact Number	**Impact**	**Mitigation Measure**	**Monitoring Agency**	**Implementation Schedule**	**Sign-off**
		work with the contractor to develop a program for re-internment of the human remains and any associated artifacts. Additional work is not to take place within 100 feet of the find until the identified appropriate actions have been implemented. *The foregoing requirements shall be noted on the project improvement plans and disclosed to any subcontractors by the general contractor or job superintendent during pre-construction meetings, subject to review and approval of compliance by the City of Oakley Planning Division.*	Commission		
Geology and Soils					
VII (a[iii,iv], c,d).	Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction, or landslides; or be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse; or be located on expansive soil, as defined in Table 18-1B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	*VII-1.* *Prior to approval of any grading permits, the project Civil Engineer shall show on the project plans that the project design adheres to all engineering recommendations provided in the site-specific Geotechnical Investigation prepared for the proposed project by BAEZ Geotechnical Group. Proof of compliance with all recommendations specified in the Geotechnical Investigation shall be subject to review and approval by the City Engineer.* *The project plans shall include, but not be limited to, engineering recommendations related to site preparation and grading, utility trench excavation, backfill, foundations, concrete slab-on-grade floors, exterior concrete flatwork, retaining walls, pavement areas, and project review and construction monitoring.* *The site demolition activities shall also specify that any underground structures, such as abandoned irrigation lines, septic tanks, and leach fields, encountered during demolition and construction shall be properly removed, all*	City of Oakley Planning Division City Engineer	Prior to approval of any grading permits.	

MITIGATION MONITORING PROGRAM The Village at 2092 Oakley Road Subdivision					
Impact Number	**Impact**	**Mitigation Measure**	**Monitoring Agency**	**Implementation Schedule**	**Sign-off**
		excavations left open for backfilling, and loose material created by the demolition of existing structures should be excavated and replaced as engineered fill.			
VII (f).	Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	*VII-2.* *Implement Mitigation Measures V-1 and V-2.*	See Mitigation Measures V-1 and V-2	See Mitigation Measures V-1 and V-2.	
Greenhouse Gas Emissions					
VIII (a,b).	Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gasses?	*VIII-1.* *Consistent with the BAAQMD's thresholds of significance, prior to issuance of building permits for the proposed project, the project applicant shall demonstrate via project design and/or notation included on project design that natural gas infrastructure shall be prohibited. Natural gas infrastructure may be allowed if the applicant implements alternative methods that reduce the project's greenhouse gas emissions in an equally effective or superior manner as would exist without natural gas emission infrastructure.* *Conformance with the foregoing requirement shall be confirmed through review and approval of building permit plans by the City of Oakley Planning Division.*	City of Oakley Planning Division	Prior to the issuance of building permits.	
Hazards and Hazardous Materials					
IX (b).	Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the likely release of hazardous materials into the environment?	*IX-1.* *Prior to initiation of construction activities on the proposed project site, the project applicant shall complete an analysis of on-site soils to determine whether substantial concentrations of organochloride pesticides, arsenic, or other soil contaminants are present above the applicable direct exposure Environmental Screening Levels (ESLs) set by the Regional Water Quality Control Board, the residential screening levels set by the Department of Toxic Substances Control's Human Health Risk Assessment Note 3, and/or*	City of Oakley Planning Division	Prior to initiation of construction activities.	

MITIGATION MONITORING PROGRAM The Village at 2092 Oakley Road Subdivision					
Impact Number	**Impact**	**Mitigation Measure**	**Monitoring Agency**	**Implementation Schedule**	**Sign-off**
		the U.S. Environmental Protection Agency's Regional Screening Levels for Region 9. If contaminants are not detected above applicable ESLs/RSLs, then further mitigation is not required. If contaminants are detected above the applicable ESLs/RSLs, then the soils shall be remediated by off-hauling to a licensed landfill facility. Such remediation activities shall be performed by a licensed hazardous waste contractor (Class A) and contractor personnel that have completed 40-hour OSHA hazardous training. Impacted soils shall be managed in accordance with the recommendations of applicable federal, State, and local standards, to the satisfaction of the City of Oakley and the Contra Costa County Environmental Health Division. The results of soil sampling and analysis, as well as verification of proper remediation and disposal, shall be submitted to the City of Oakley Planning Division for review and approval.			
		IX-2. Prior to issuance of a demolition permit by the City for any on-site structures, the project applicant shall provide a site assessment that determines whether any structures to be demolished contain lead-based paint (LBP), asbestos, mercury, or polychlorinated biphenyl caulk. Sampling shall be conducted in accordance with the California Department of Toxic Substances Control's 2006 Interim Guidance Evaluation of School Sites with Potential Contamination from Lead based Paint, Termiticides, and Electrical Transformers. If structures do not contain the aforementioned chemicals, further mitigation is not required; however, if LBP is found, all loose and peeling paint shall be removed and disposed of by a	City of Oakley Planning Division City Engineer	Prior to issuance of a demolition permit.	

MITIGATION MONITORING PROGRAM The Village at 2092 Oakley Road Subdivision					
Impact Number	**Impact**	**Mitigation Measure**	**Monitoring Agency**	**Implementation Schedule**	**Sign-off**
		licensed and certified lead paint removal contractor, in accordance with CARB recommendations and OSHA requirements. If asbestos is found, all construction activities shall comply with all requirements and regulations promulgated through the National Emission Standards for Hazardous Air Pollutants (NESHAP). The demolition contractor shall be informed that all paint on the buildings shall be considered as containing lead and/or asbestos. The contractor shall follow all work practice standards set forth in the Asbestos National Emission Standards for Hazardous Air Pollutants (Asbestos NESHAP, 40 CFR, Part 61, Subpart M) regulations, as well as Section V, Chapter 3 of the OSHA Technical Manual. Should mercury or polychlorinated biphenyl caulk be detected, the removal, demolition, and disposal of such chemicals shall be conducted in compliance with California environmental regulations and policies. Work practice standards generally include appropriate precautions to protect construction workers and the surrounding community, and appropriate disposal methods for construction waste containing lead paint or asbestos in accordance with federal, State, and local regulations subject to approval by the City Engineer.			
		IX-3. During ground-disturbing activities, if one or more wells and/or septic systems are identified on-site, the project applicant shall hire a licensed contractor to obtain the applicable abandonment permit from Contra Costa County Environmental Health Division (CCCEHD), and properly abandon the on-site wells and/or septic systems	CCCEHD City of Oakley Planning Division	During ground-disturbing activities.	

MITIGATION MONITORING PROGRAM The Village at 2092 Oakley Road Subdivision					
Impact Number	**Impact**	**Mitigation Measure**	**Monitoring Agency**	**Implementation Schedule**	**Sign-off**
		for review and approval by the CCCEHD and the City of Oakley Planning Division.			
IX (f).	Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	*IX-4.* *Prior to issuance of demolition or grading permits, the project applicant shall prepare and submit a Traffic Control Plan to the City for review and approval. The Traffic Control Plan shall include, but not be limited to, the following items, to the satisfaction of the City Engineer:* • *Truck drivers shall be notified of and required to use the most direct route between the site and SR 4, as determined by the City Engineering Department;* • *All site ingress and egress shall occur only at the main driveways to the project site and construction activities may require installation of temporary (or ultimate) traffic signals as determined by the City Engineer;* • *Specifically-designated travel routes for large vehicles shall be monitored and controlled by flaggers for large construction vehicle ingress and egress;* • *Warning signs indicating frequent truck entry and exit shall be posted on Oakley Road and Main Street;* • *Any debris and mud on nearby streets caused by trucks shall be monitored daily and may require instituting a street cleaning program;* • *Construction employee parking shall be provided on the project site to eliminate conflicts with nearby areas. Construction of the project shall be staggered so that employee parking demand is met primarily by using on-site parking; and*	City of Oakley Planning Division City Engineer	Prior to issuance of demolition or grading permits.	

MITIGATION MONITORING PROGRAM The Village at 2092 Oakley Road Subdivision					
Impact Number	**Impact**	**Mitigation Measure**	**Monitoring Agency**	**Implementation Schedule**	**Sign-off**
		• *If importation and exportation of material becomes a traffic nuisance, the City Engineer shall limit the hours the activities can take place.*			
Noise					
XIII (a).	Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinacnce, or applicable standards of other agencies?	*XIII-1. Prior to approval of grading permits, the following criteria shall be established and noted on graded plans, subject to review and approval by the City of Oakley Planning Division:* • *Construction activities shall be limited to between the daytime hours of 7:30 AM to 7:00 PM Monday through Friday, and 9:00 AM to 7:00 PM on Saturdays, Sundays, and holidays.* • *Construction equipment shall be properly maintained and equipped with noise-reduction intake and exhaust mufflers and engine shrouds, in accordance with manufacturers' recommendations. Equipment engine shrouds shall be closed during equipment operation.* • *When not in use, motorized construction equipment shall not be left idling for more than five minutes.* • *Stationary equipment (power generators, compressors, etc.) shall be located at the furthest practical distance from nearby noise-sensitive land uses or sufficiently shielded to reduce noise-related impacts.*	City of Oakley Planning Division	Prior to the approval of grading permits.	

MITIGATION MONITORING PROGRAM The Village at 2092 Oakley Road Subdivision					
Impact Number	**Impact**	**Mitigation Measure**	**Monitoring Agency**	**Implementation Schedule**	**Sign-off**
XIII (b).	Would the project result in the generation of excessive groundborne vibration or groundborne noise levels?	*XIII-2. Throughout the duration of construction, any compaction required within 26 feet from the adjacent residential structures to the north and west shall be accomplished by using static drum rollers, which use weight instead of vibrations to achieve soil compaction. As an alternative to this requirement, preconstruction crack documentation and construction vibration monitoring could be conducted to ensure that construction vibrations do not cause damage to any adjacent structures. Proof of compliance with this measure shall be submitted to the City of Oakley Public Works and Engineering Department for review and approval.*	City of Oakley Public Works and Engineering Department	Throughout the duration of construction.	
Transportation					
XVII (c,d).	Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment); or result in inadequate emergency access ?	*XVII-1. Implement Mitigation Measure IX-4.*	See Mitigation Measure IX-4	See Mitigation Measure IX-4.	
Tribal Cultural Resources					
XVIII (a,b).	Would the project cause a substantial adverse change in the significance of a tribal cultural resource listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020. 1(k); or a resource determined by the lead agency, in its descretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resources	*XVIII-1. Implement Mitigation Measures V-1 and V-2.*	See Mitigation Measures V-1 and V-2	See Mitigation Measures V-1 and V-2.	

MITIGATION MONITORING PROGRAM The Village at 2092 Oakley Road Subdivision					
Impact Number	**Impact**	**Mitigation Measure**	**Monitoring Agency**	**Implementation Schedule**	**Sign-off**
	Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.				

Business Name	Primary Contact Email Address	Primary Address Phone #	Full Primary Address	Active Licenses
ASUCENA'S TAX SERVICES, LLC	SUZY9407@YAHOO.COM	(925) 642-9094	333 SLATE ST OAKLEY CA 94561	HOME BASED BUSINESS LICENSE
BMO BANK N.A.	BLIC@BMO.COM	(925) 625-2211	2195 MAIN ST OAKLEY CA 94561	BUSINESS LICENSE
CACHIROS YARD MAINTENANCE	CACHIRO1971@YAHOO.COM	(925) 978-3377	5328 ELM LN OAKLEY CA 94561	BUSINESS LICENSE
CHELYS HOUSE CLEANING	ARACELIHERNANDEZ61@YAHOO.COM	(925) 354-1801	5328 ELM LN OAKLEY CA 94561	HOME BASED BUSINESS LICENSE
HAUOLI CO LLC	HAUOLICO@OUTLOOK.COM	(510) 393-3202	67 SUN CHASE CT OAKLEY CA 94561	HOME BASED BUSINESS LICENSE
JENELLE'S TREASURES	jellebean07@aol.com	(510) 757-6100	5685 MAIN ST RANCHO CO-OP OAKLEY CA 94561	BUSINESS LICENSE
JTB JAVIER THE BARBER	EASAI14@GMAIL.COM	(925) 303-0455	3460 MAIN ST MAIN STREET SALON SUITES OAKLEY CA 94561	BUSINESS LICENSE
PIN-CO STUCCO INC	PIN.CO.STUCCO@GMAIL.COM	(925) 848-6986	313 DEERPARK WAY OAKLEY CA 94561-3160	HOME BASED BUSINESS LICENSE
PORTERFIELD'S MARKETING CONSULTANTS	PORTERFIELDMARKETING.925@GMAIL.COM	(925) 628-2576	4650 WINCHESTER DR OAKLEY CA 94561	HOME BASED BUSINESS LICENSE
RISING SUN HR, A PROFESSIONAL CORPORATION	SMADISON@RSUNHR.COM	(510) 269-7608	1458 BIG REDWOOD DR OAKLEY CA 94561	HOME BASED BUSINESS LICENSE
RONZ TUTORING	RONEELKUMAR100@GMAIL.COM	(925) 252-3444	517 BRINWOOD WAY OAKLEY CA 94561	HOME BASED BUSINESS LICENSE
S&S SCRAP & METAL, LTD., LLC		(916) 254-9619	252 AGATA WAY OAKLEY CA 94561	HOME BASED BUSINESS LICENSE
ZIPPY'S HAUL SERVICES AND MORE	rminick8@aol.com	(925) 698-7926	20 MINARET RD OAKLEY CA 94561	HOME BASED BUSINESS LICENSE