City of Oakley
Planning Division

OAKLEY
CALIFORNIA

The Village at 2092 Oakley Road Subdivision

Initial Study/Mitigated Negative Declaration

November 2023

Prepared by

RANEY PLANNING & MANAGEMENT, INC. 20 years
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Appendices

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.
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14. California Air Resources Board. *Air Quality and Land Use Handbook: A Community Health Perspective*. April 2005.
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16. California Department of Conservation. *California Earthquake Hazards Zone Application.* Available at: https://maps.conservation.ca.gov/cgs/EQZApp/app/. Accessed June 2023.
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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.
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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.
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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.
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44. Tom Origer & Associates. *The Results of an Historic Evaluation of the Property at 2092 Oakley Road, Oakley, Contra Costa County.* September 28, 2023.
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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

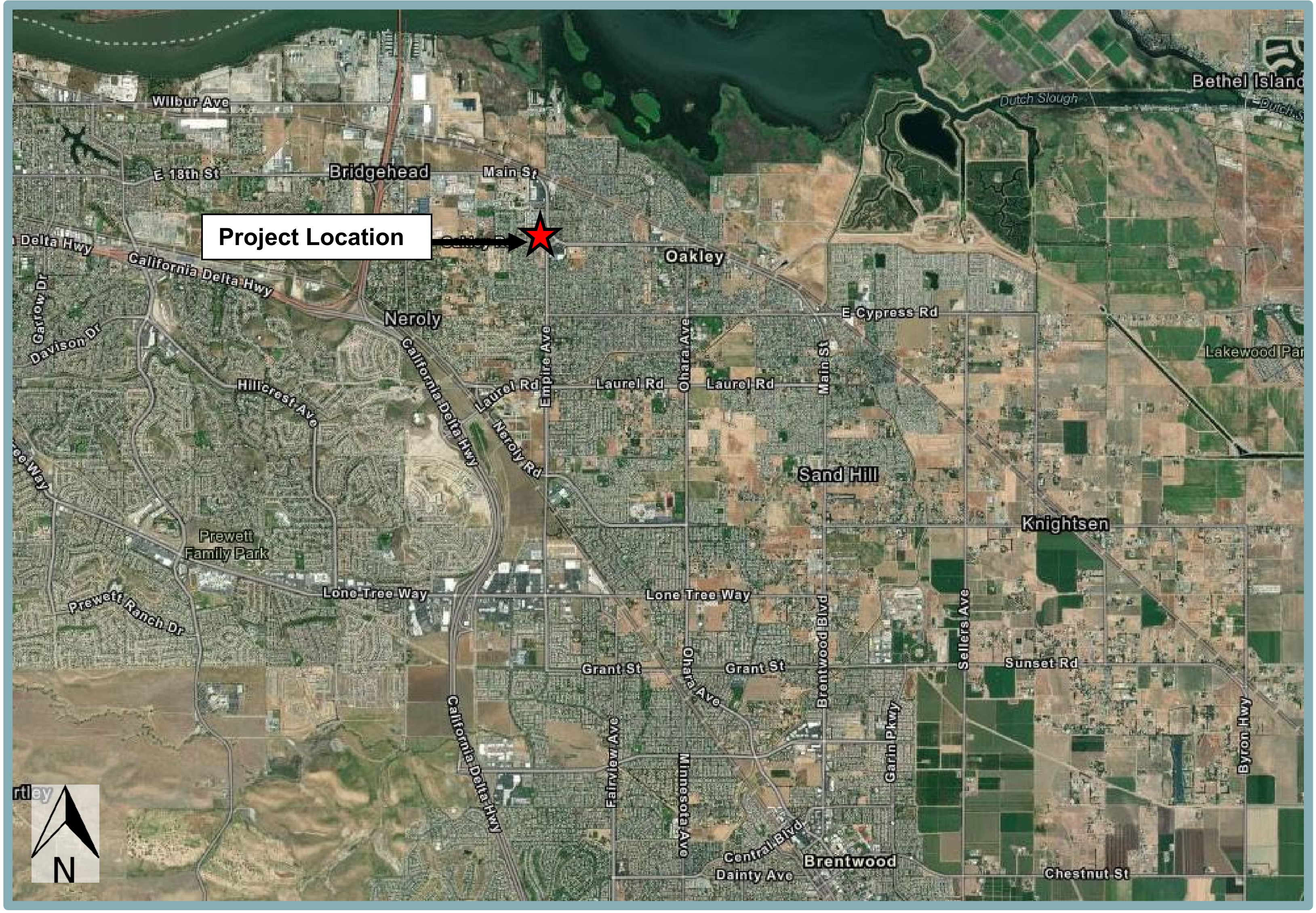


Figure 2
Project Site Boundaries

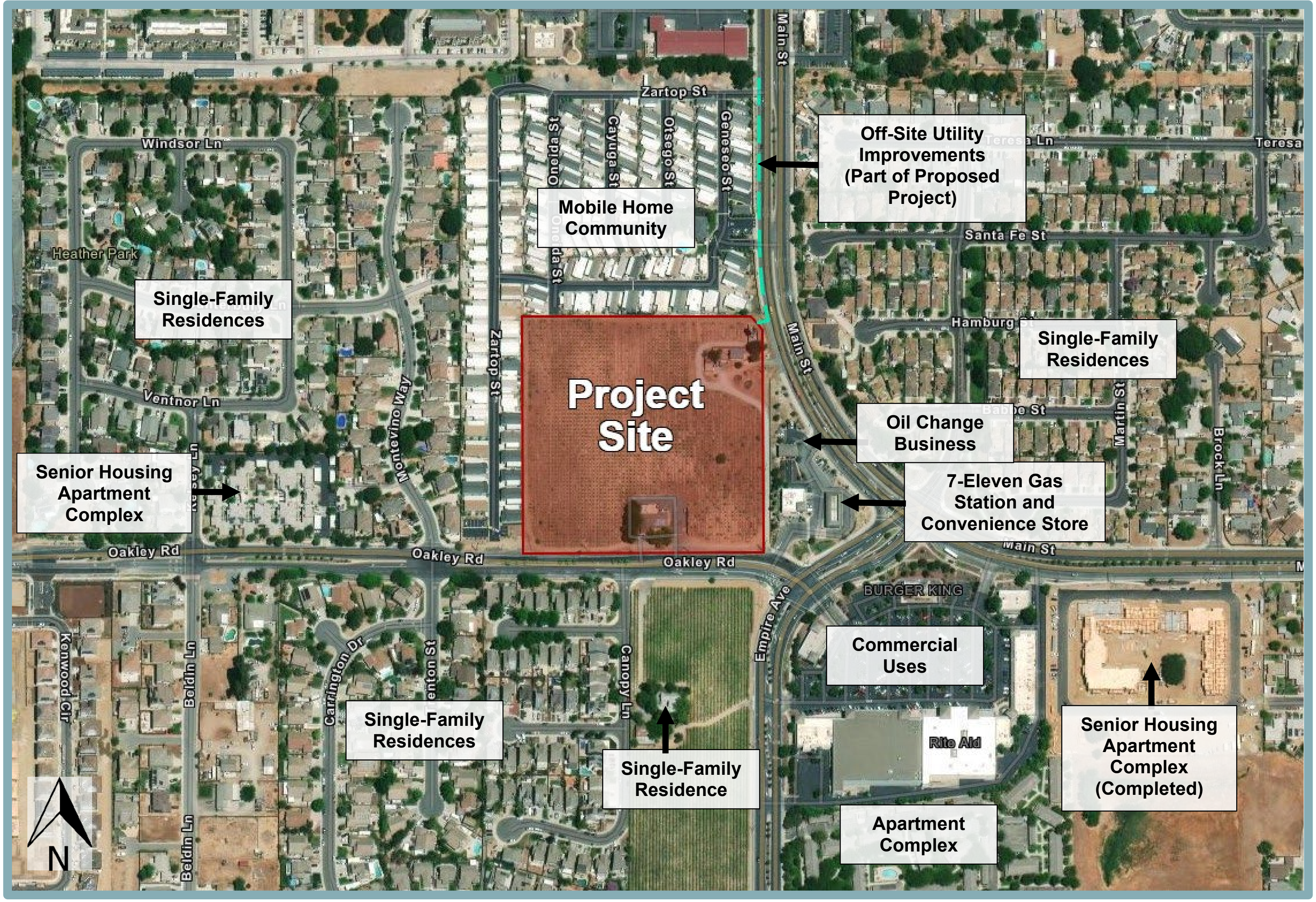
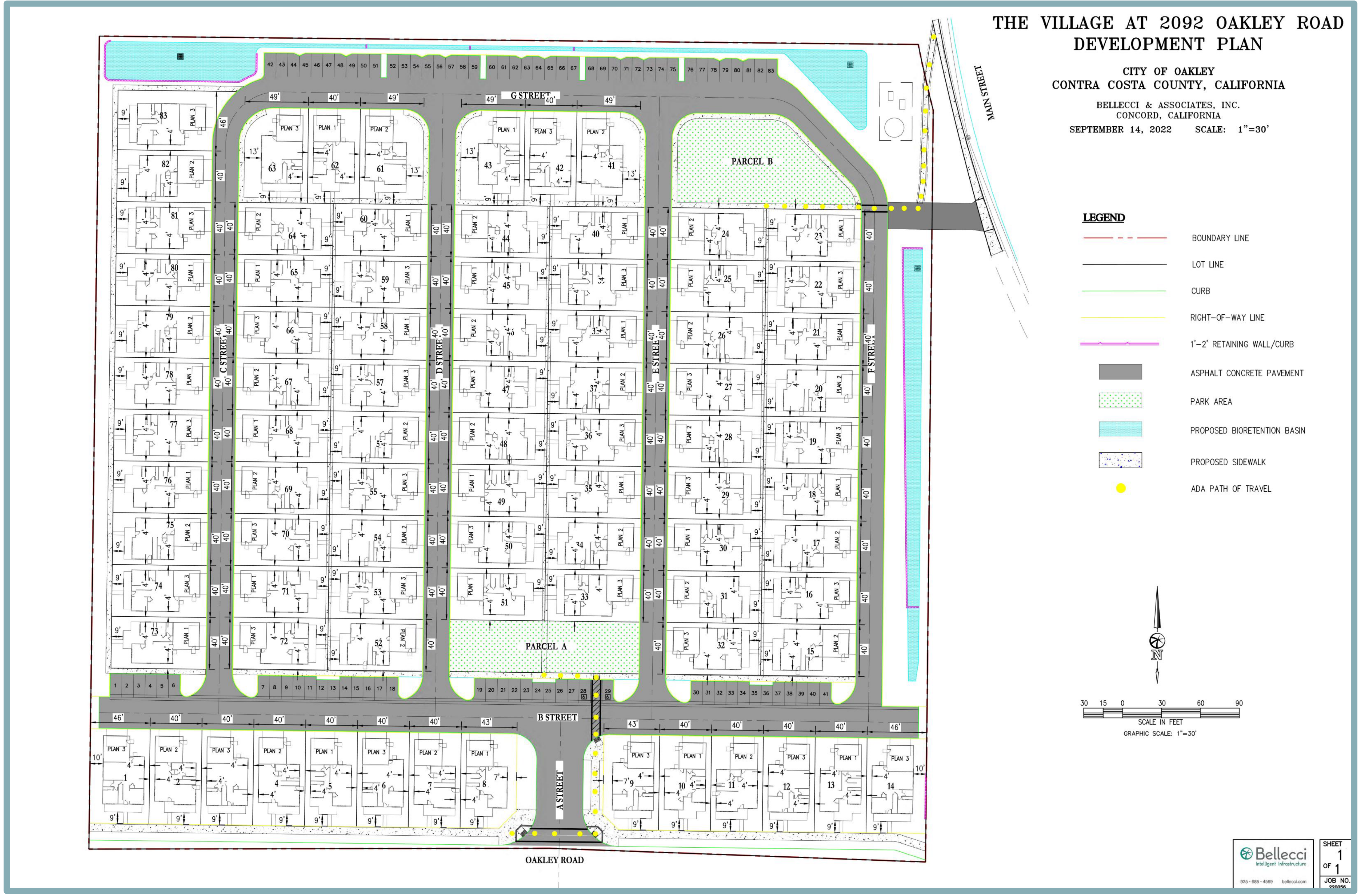


Figure 3
Development Plan



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

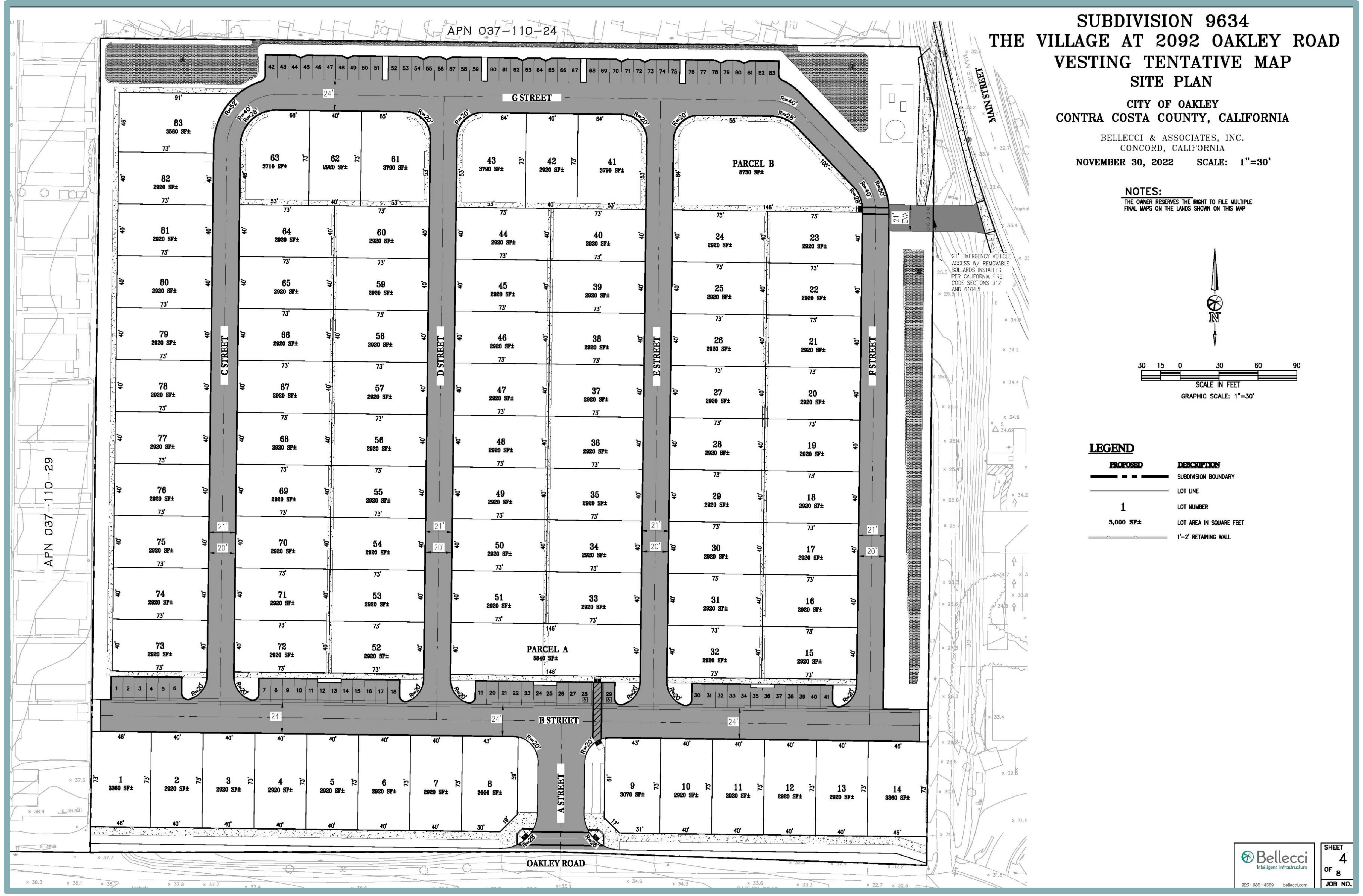


Figure 5
Preliminary Roadway Sections

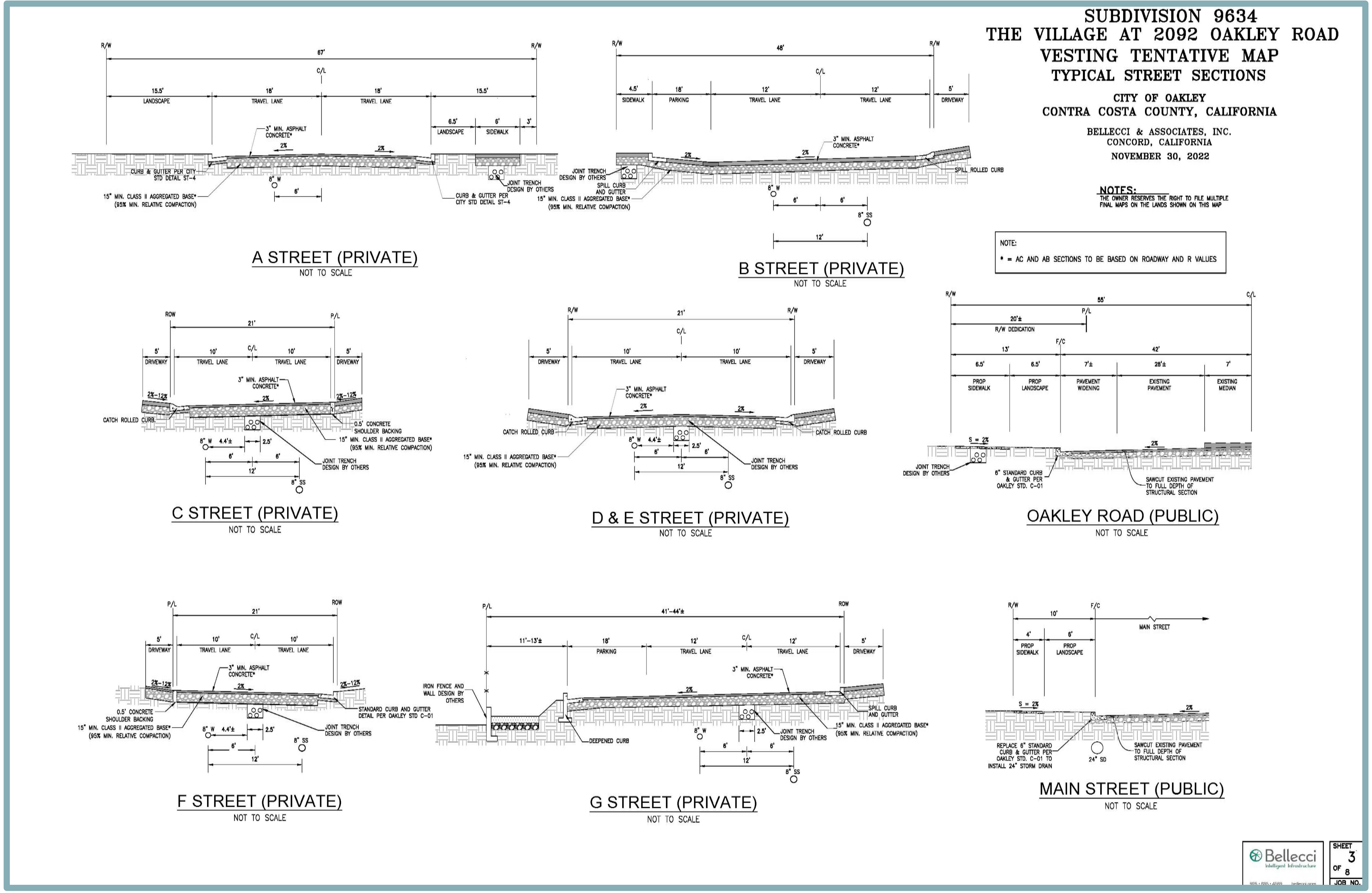


Figure 6
Landscape Plan

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

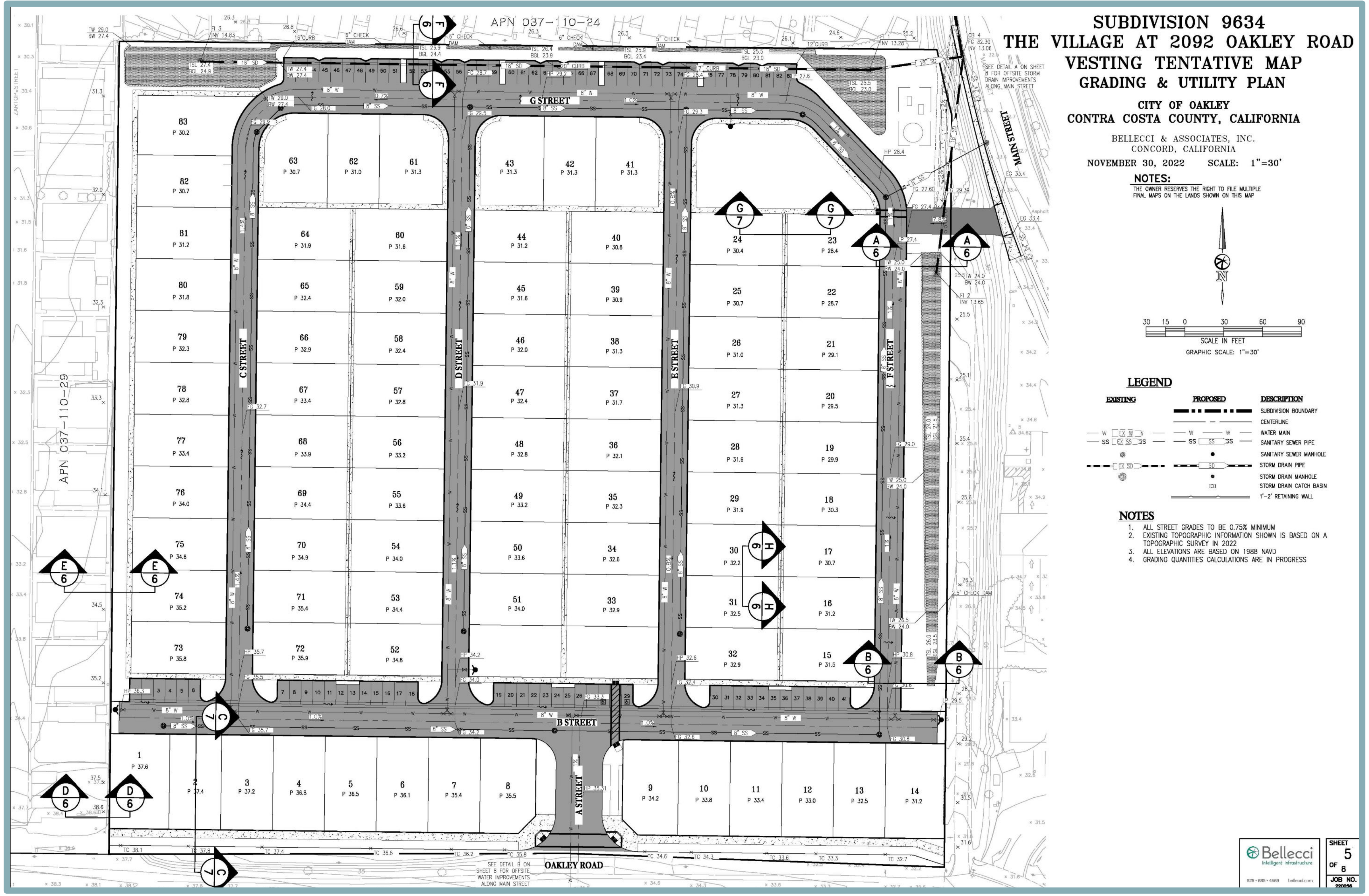
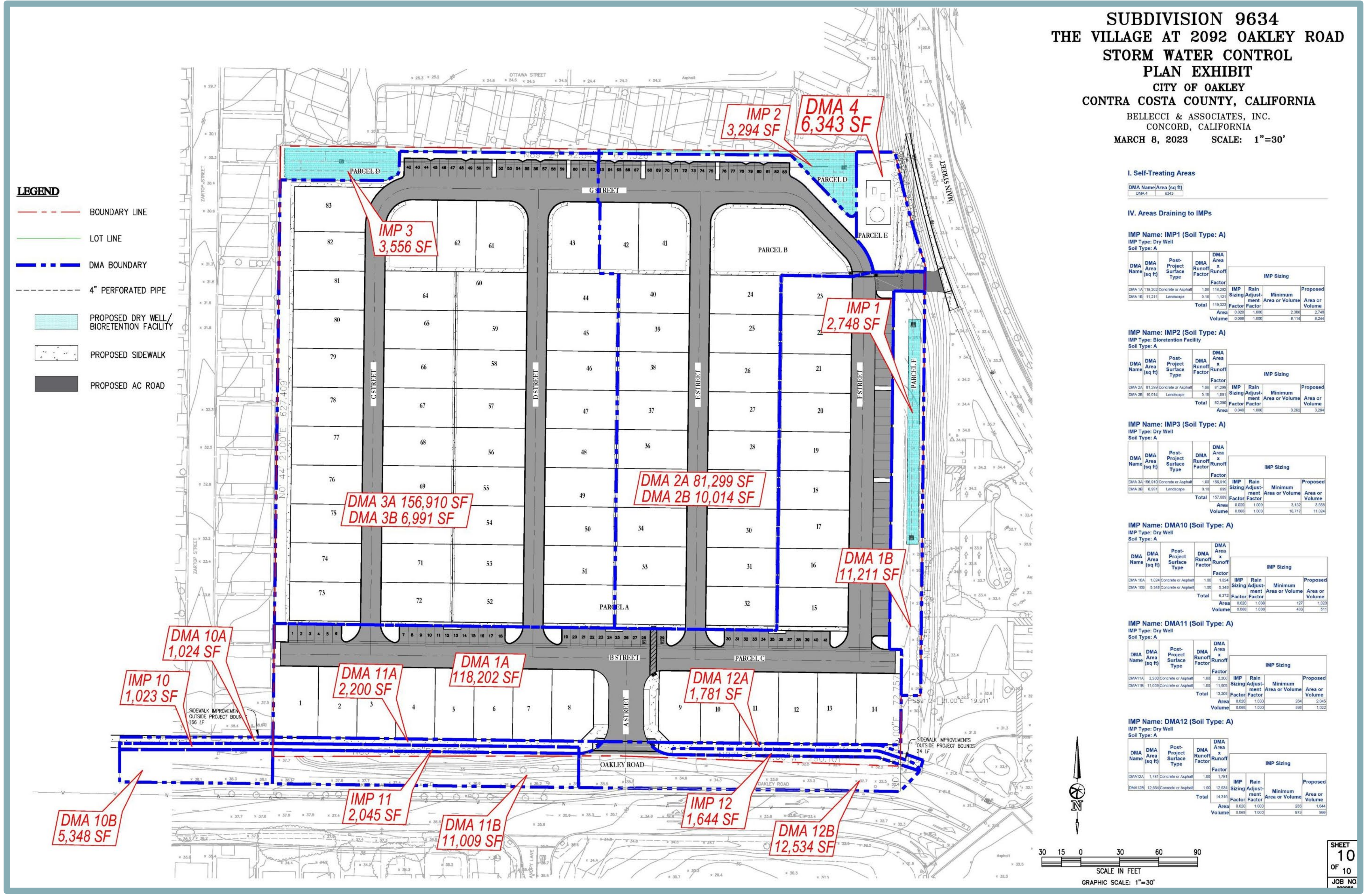


Figure 8
Preliminary Stormwater Control Plan



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
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 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 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 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
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

	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
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
DMA11A	2,200	Concrete or Asphalt	1.00	2,200
DMA11B	11,009	Concrete or Asphalt	1.00	11,009
			Total	13,209

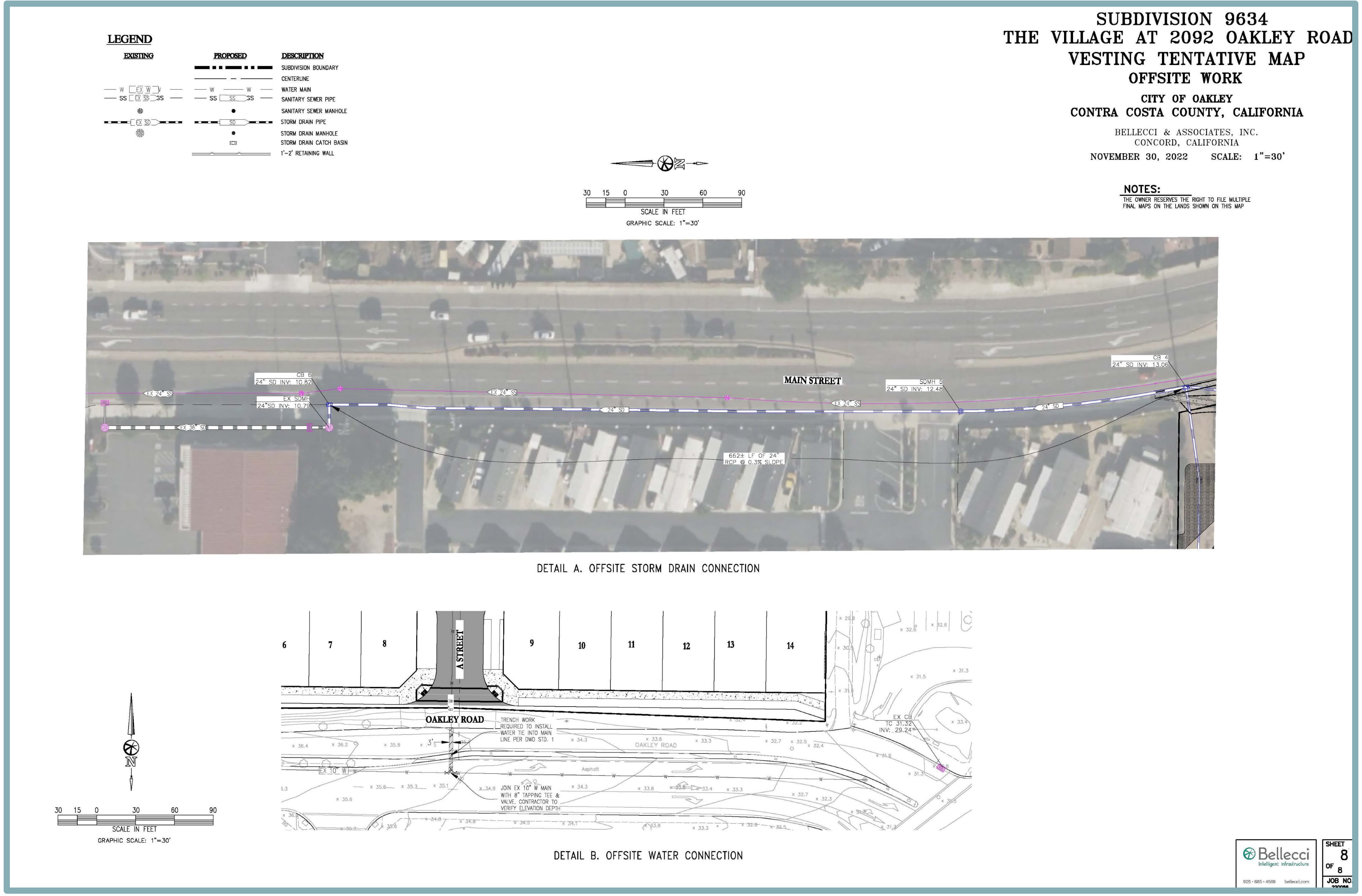
	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
Area	0.020	1.000	264	2,045
Volume	0.068	1.000	898	1,022

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
DMA12A	1,781	Concrete or Asphalt	1.00	1,781
DMA12B	12,534	Concrete or Asphalt	1.00	12,534
			Total	14,315

	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
Area	0.020	1.000	286	1,644
Volume	0.068	1.000	973	986

Figure 9
Offsite Utility Plan



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.

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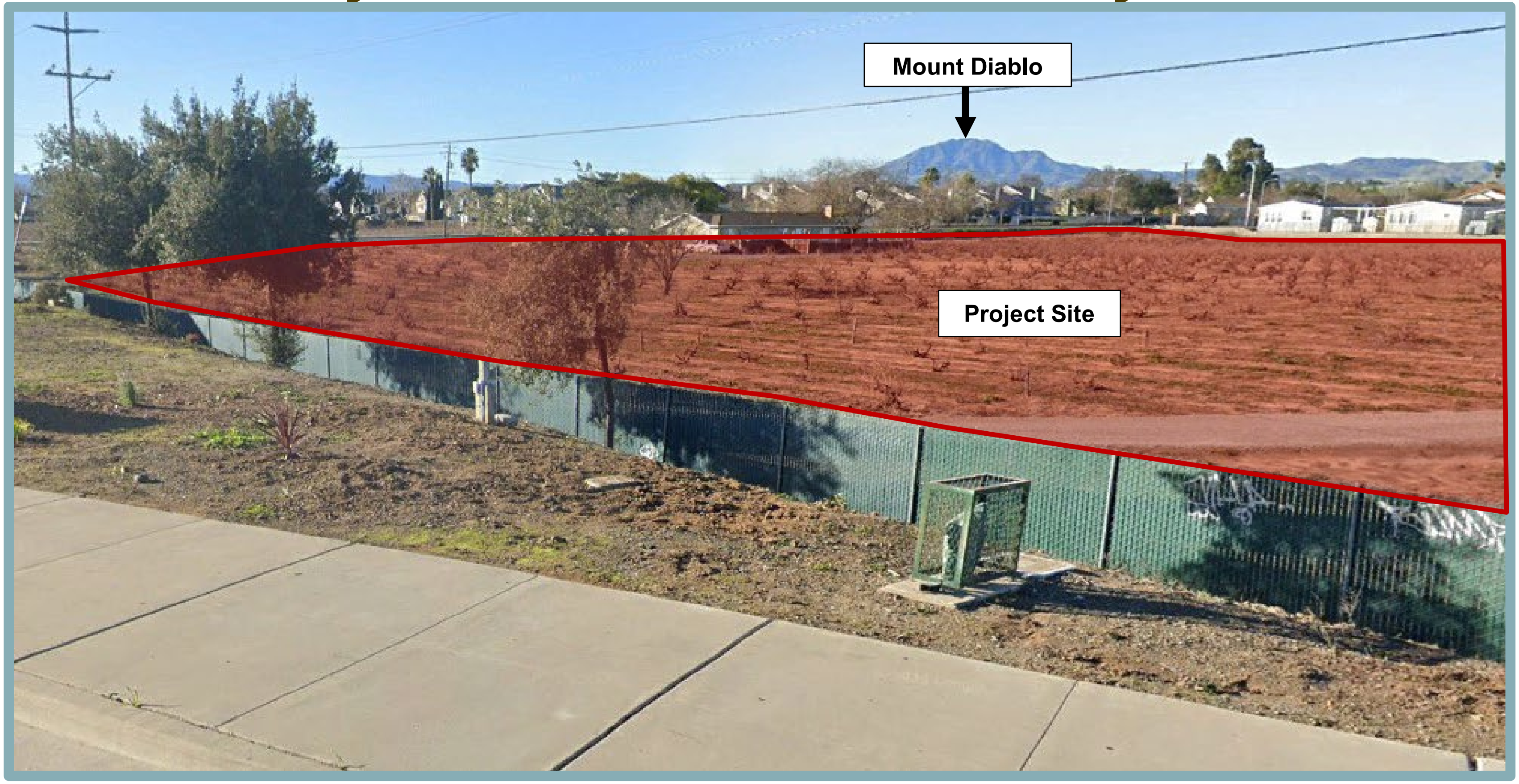
[1] City of Oakley. *City of Oakley General Plan, Focused General Plan Update* [pg. 6-24]. Adopted January 11, 2022.

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

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[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

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[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.

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[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.

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[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

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[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,

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[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

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[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

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[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

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[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.

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[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.

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[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,

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[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

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[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.

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[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

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[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.

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[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.

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[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.

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[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

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[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

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[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.

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[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

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[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.

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[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,

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[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]

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[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.

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[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.

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[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

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[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.*

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[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.

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[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

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[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

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[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

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[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.

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[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.

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[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 risk to public safety. Therefore, project traffic related to construction activities 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.

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[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.

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[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.

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[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.

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[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.

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[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

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	CO2e

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	—

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				Total	Exhaust	Fugitive Dust	Total	Exhaust	Fugitive Dust					
Project Phases (Pounds)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	PM10 (lbs/day)	PM10 (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	PM2.5 (lbs/day)	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				Total	Exhaust	Fugitive Dust	Total	Exhaust	Fugitive Dust					
Project Phases (Tons for all except CO2e. Metric tonnes for CO2e)	ROG (tons/phase)	CO (tons/phase)	NOx (tons/phase)	PM10 (tons/phase)	PM10 (tons/phase)	PM10 (tons/phase)	PM2.5 (tons/phase)	PM2.5 (tons/phase)	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

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[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.

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[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 <u>including</u> 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 <u>total parcel acreage</u> (development project) or <u>project footprint acreage</u> (rural infrastructure or utility project).

<u>Table 1: Land Cover Types and Impacts</u>

			Proposed for HCP/NCCP Dedication on the Parcel (Requires Conservancy Approval)	
Land Cover Type	**Permanent Impacts**	**Temporary Impacts**	*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		

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[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]
☐ Waste Discharge Requirements
☐ CWA Section 401 Water Quality Certification
☐ 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.

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[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**.

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[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

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[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.

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[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).

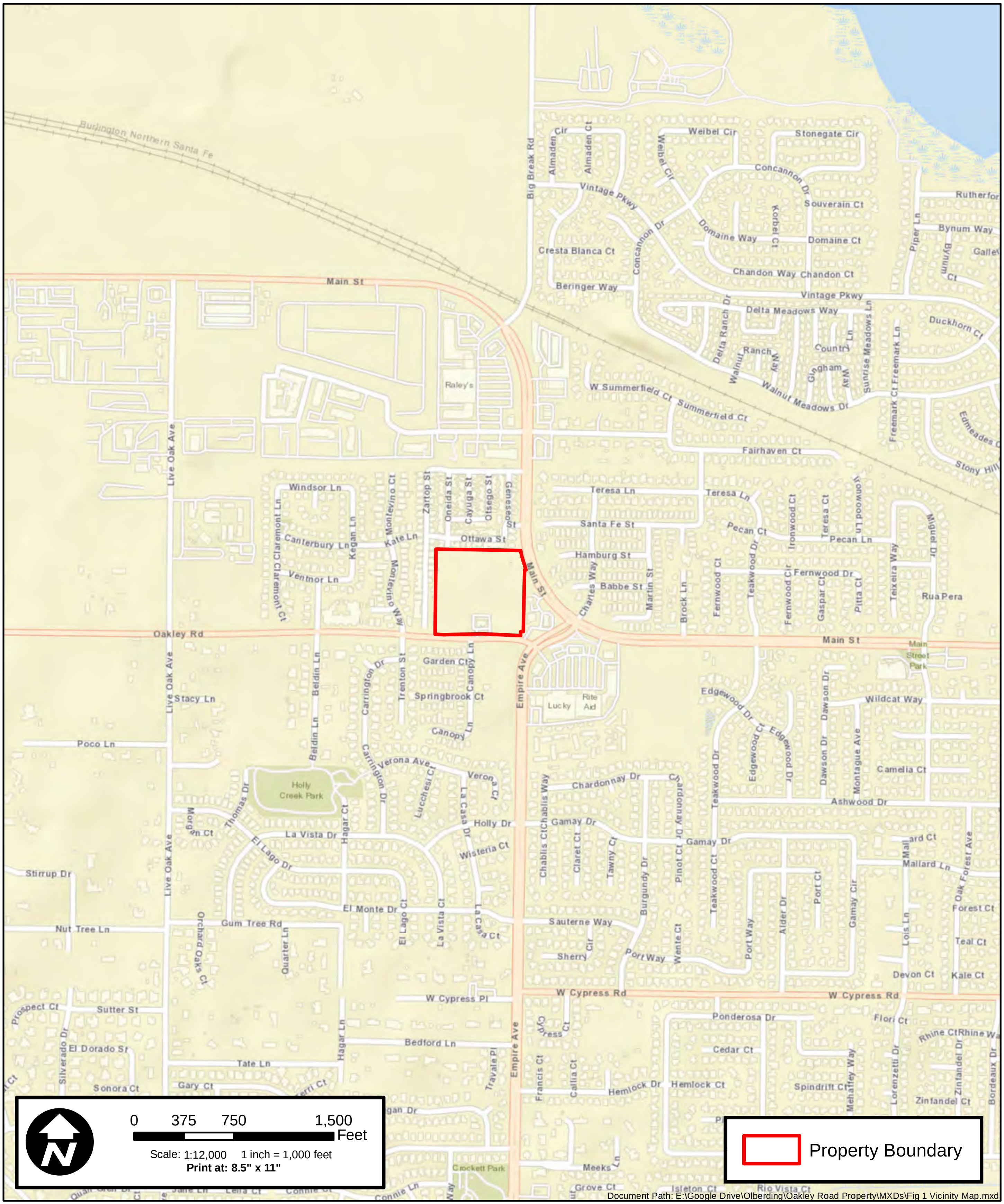
The applicant is proposing to remove the existing on-site structures and subdivide the site into 83 single-family residential lots, ranging from 2,920 square feet (sf) to 3,790 sf. The two-story single-family residences will range from 2,277 sf to 2,656 sf and each unit will include four bedrooms and 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
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WALL AND FENCE DETAILS	L-2.3
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PLAN 1 SPANISH EXTERIOR ELEVATIONS	A02
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SITE ACCESS EXHIBIT	A33

399.203
The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

Figure 2 - Site Plans

COVER SHEET
CS

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

30 15 0 30 60 90
SCALE IN FEET
GRAPHIC SCALE: 1"=30'

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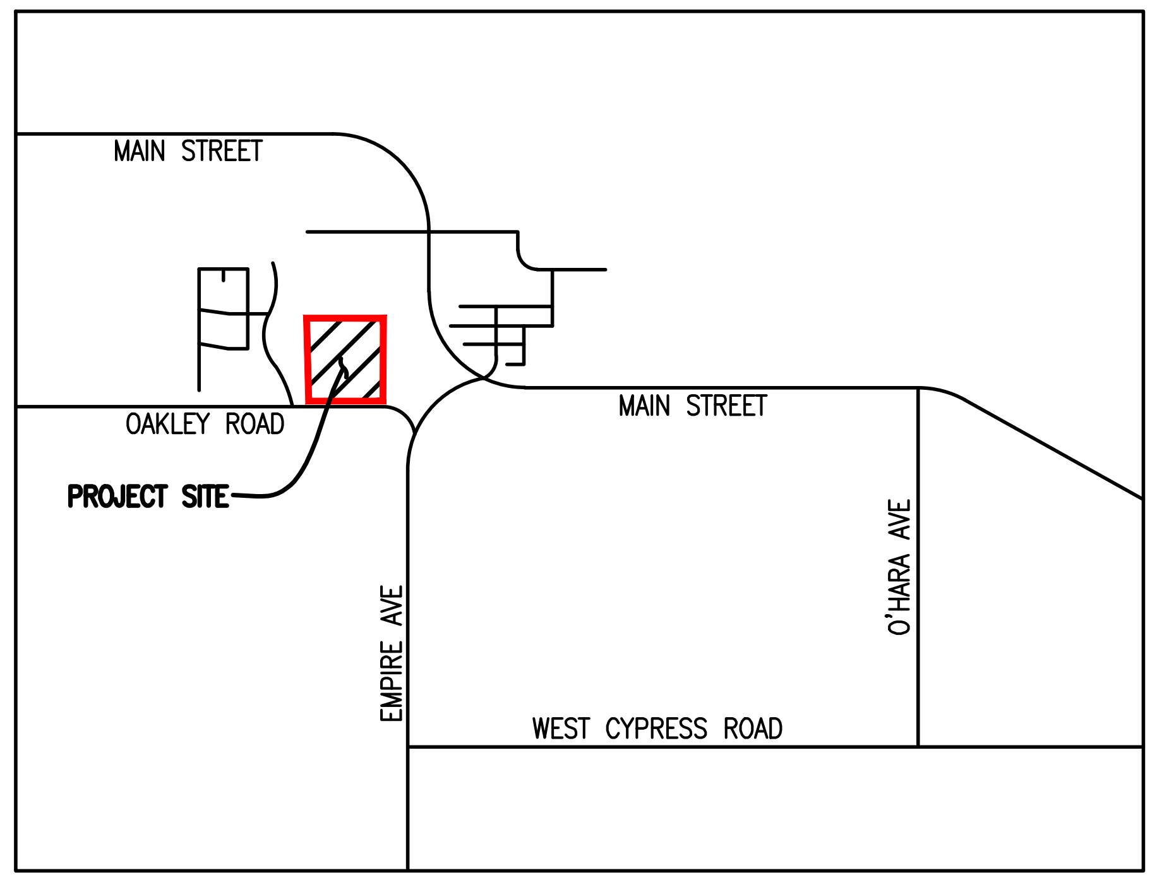
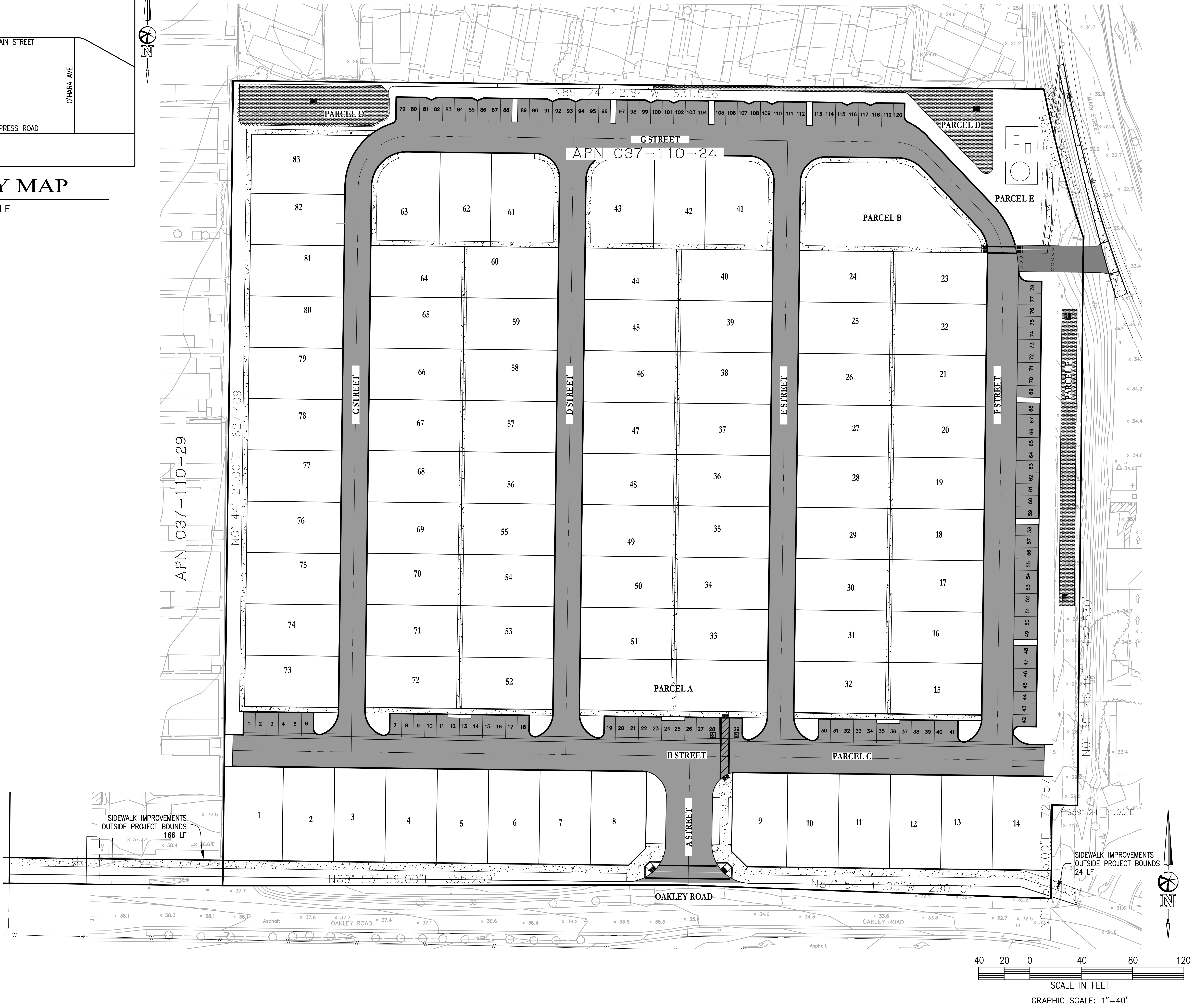
SHEET 1 OF 1
JOB NO. 220056



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'

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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–	DIABLO WATER DISTRICT
SANITARY SEWER–	IRONHOUSE SANITARY DISTRICT
STORM DRAIN–	CITY OF OAKLEY
GAS & ELECTRIC–	PACIFIC GAS & ELECTRIC
FIRE–	EAST CONTRA COSTA FIRE PROTECTION DISTRICT
TELEPHONE–	AT&T
CABLE TV–	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

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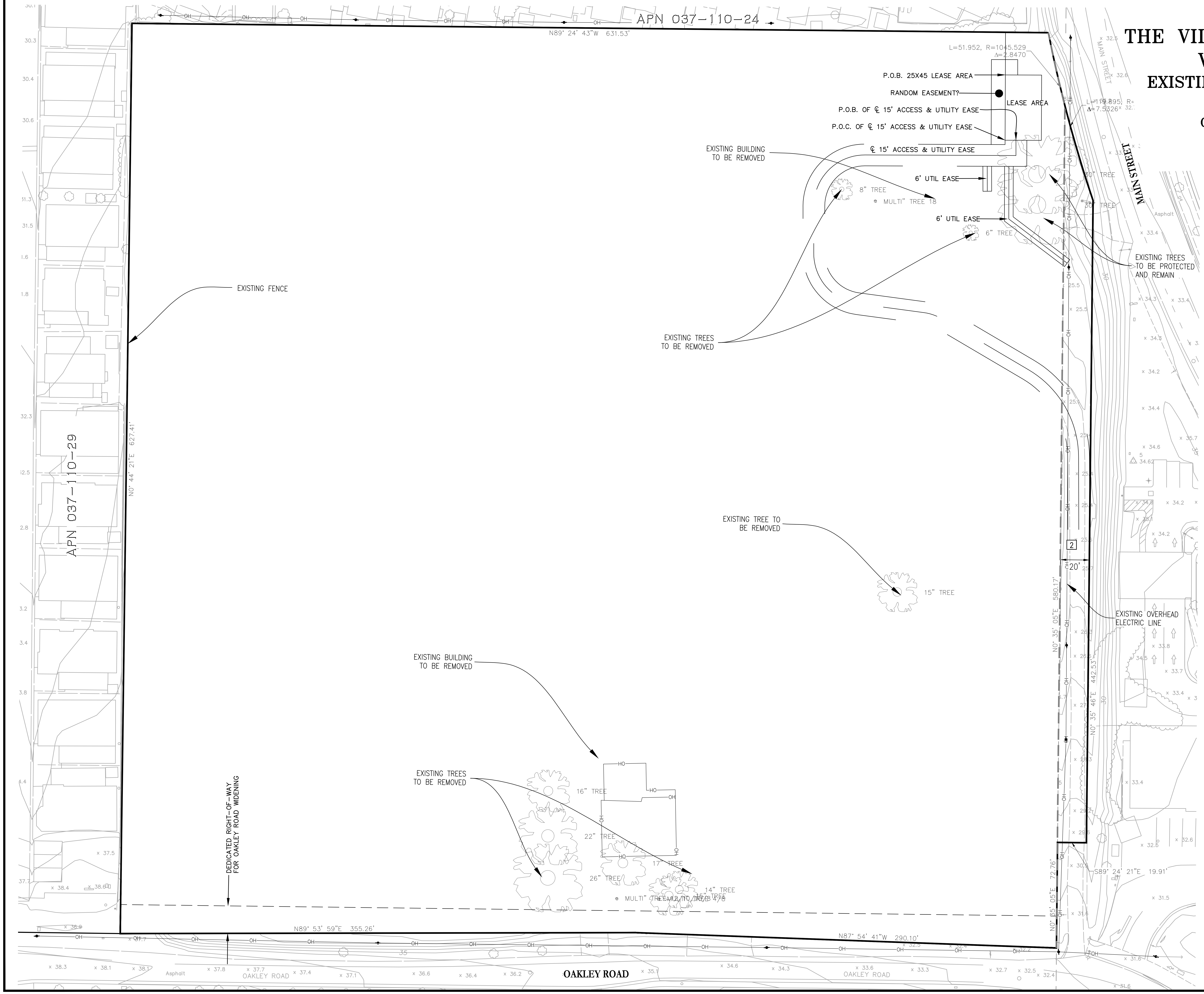
SHEET 1 OF 10

JOB NO. 220056



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

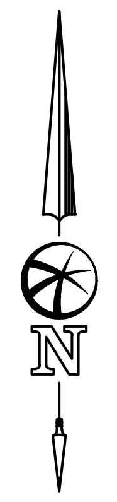
MARCH 8, 2023 SCALE: 1"=30'

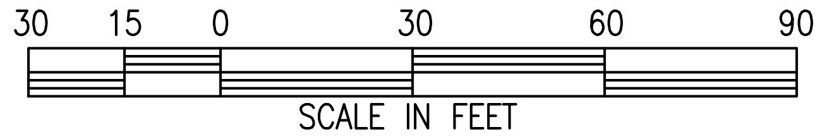
NOTES:

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





SCALE IN FEET
GRAPHIC SCALE: 1"=30'

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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

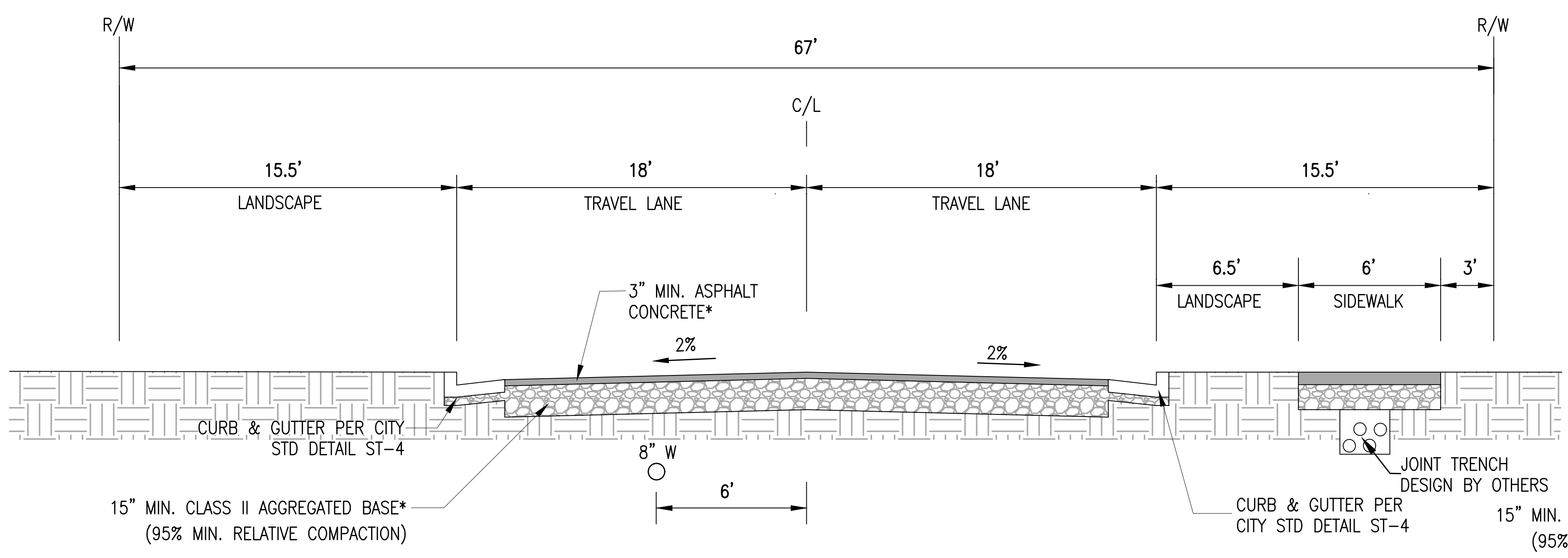
BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA
MARCH 8, 2022

NOTES:
THE OWNER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS ON THE LANDS SHOWN ON THIS MAP

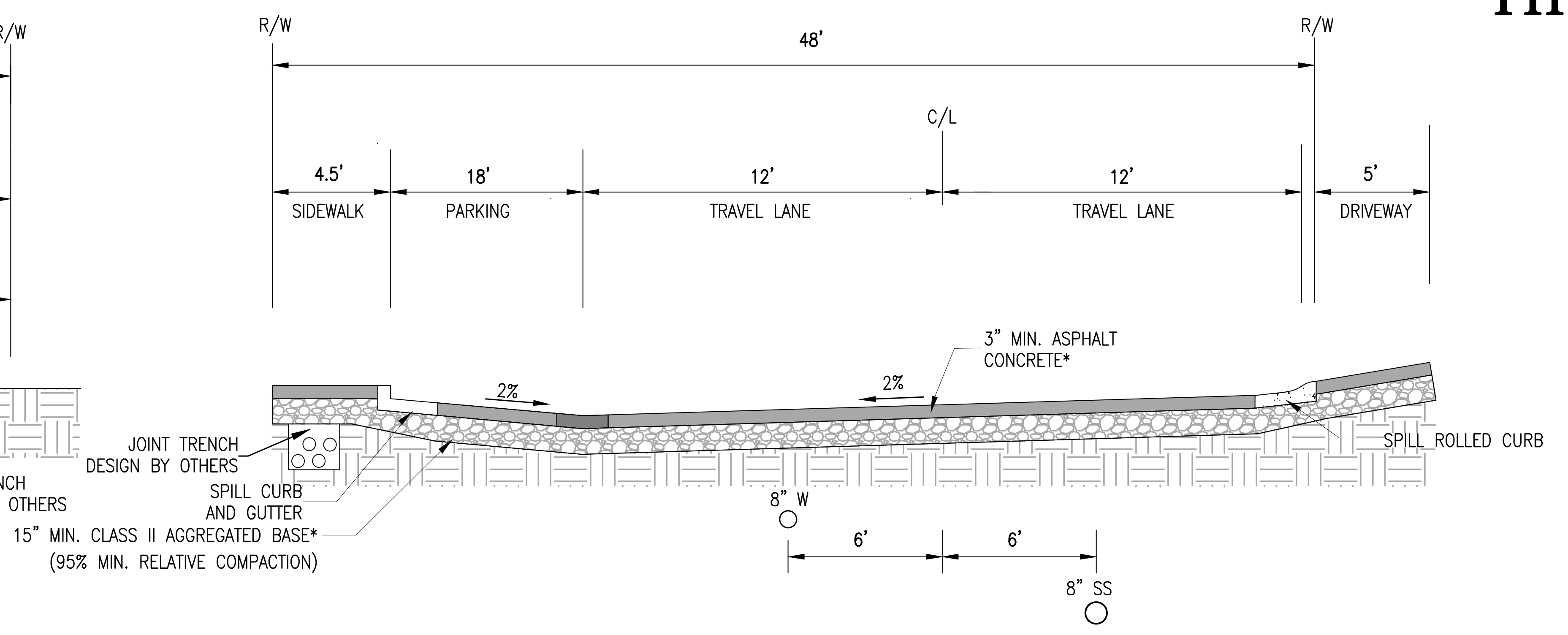
NOTES:

* = AC AND AB SECTIONS TO BE BASED ON ROADWAY AND R VALUES

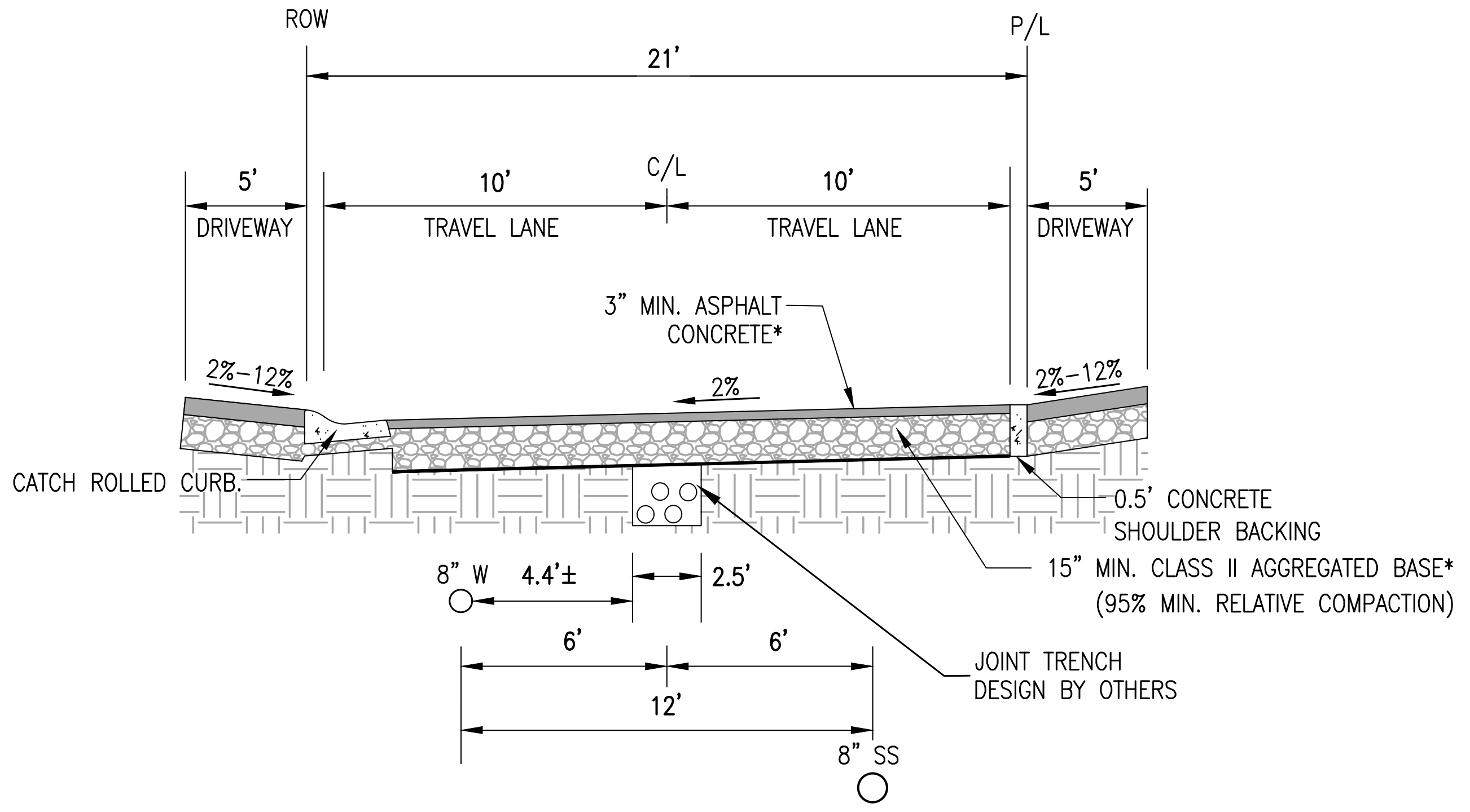
1. RIP RAP OR SPLASH BLOCK TO BE USED ALONG WATER PATH OF TRAVEL



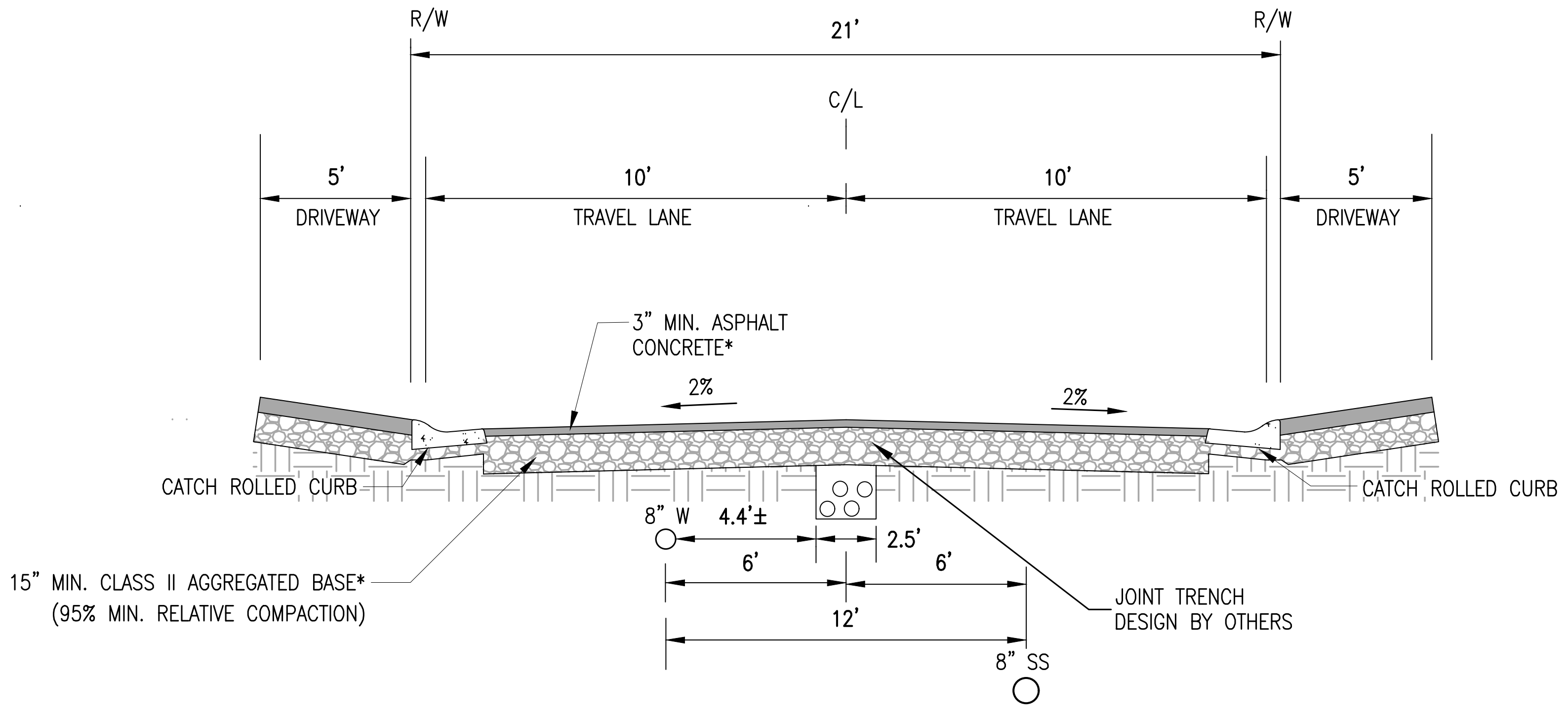
A STREET (PRIVATE)
NOT TO SCALE



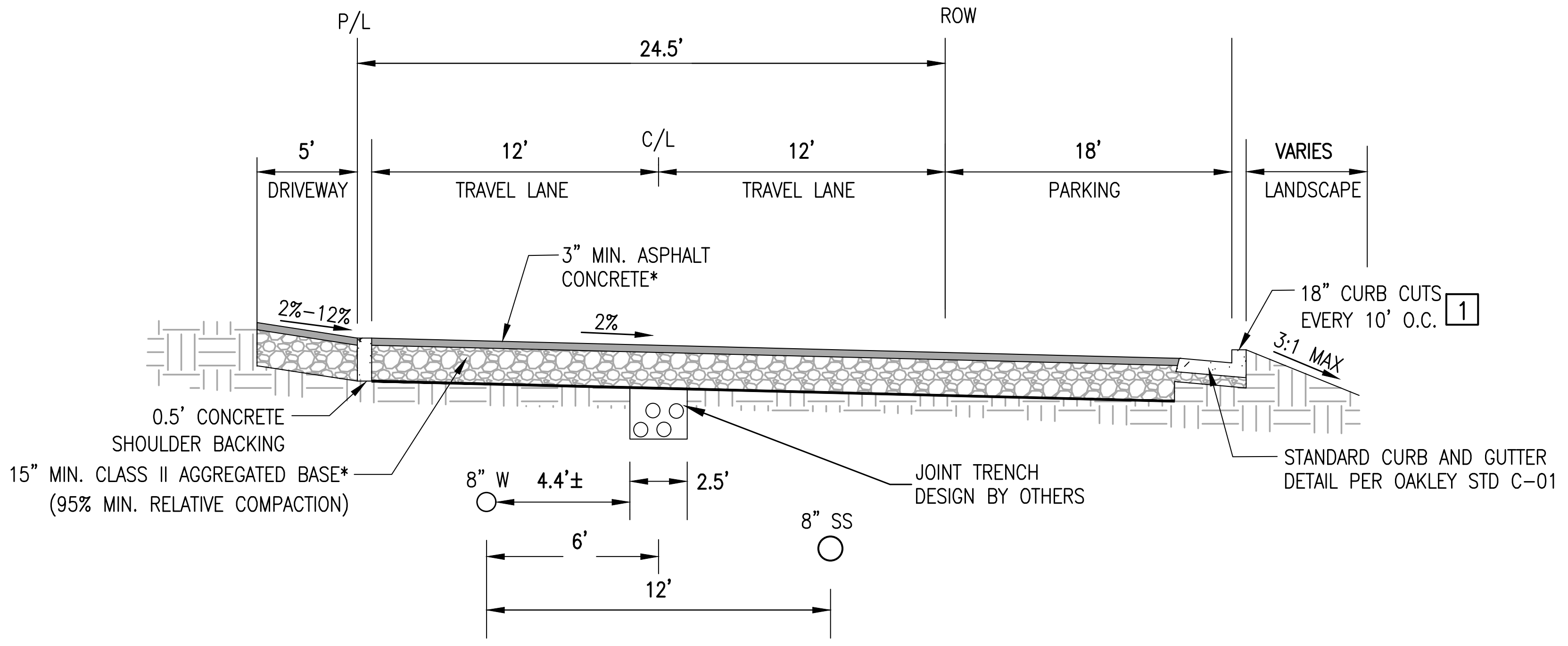
B STREET (PRIVATE)
NOT TO SCALE



C STREET (PRIVATE)
NOT TO SCALE



D & E STREET (PRIVATE)
NOT TO SCALE



F STREET (PRIVATE)
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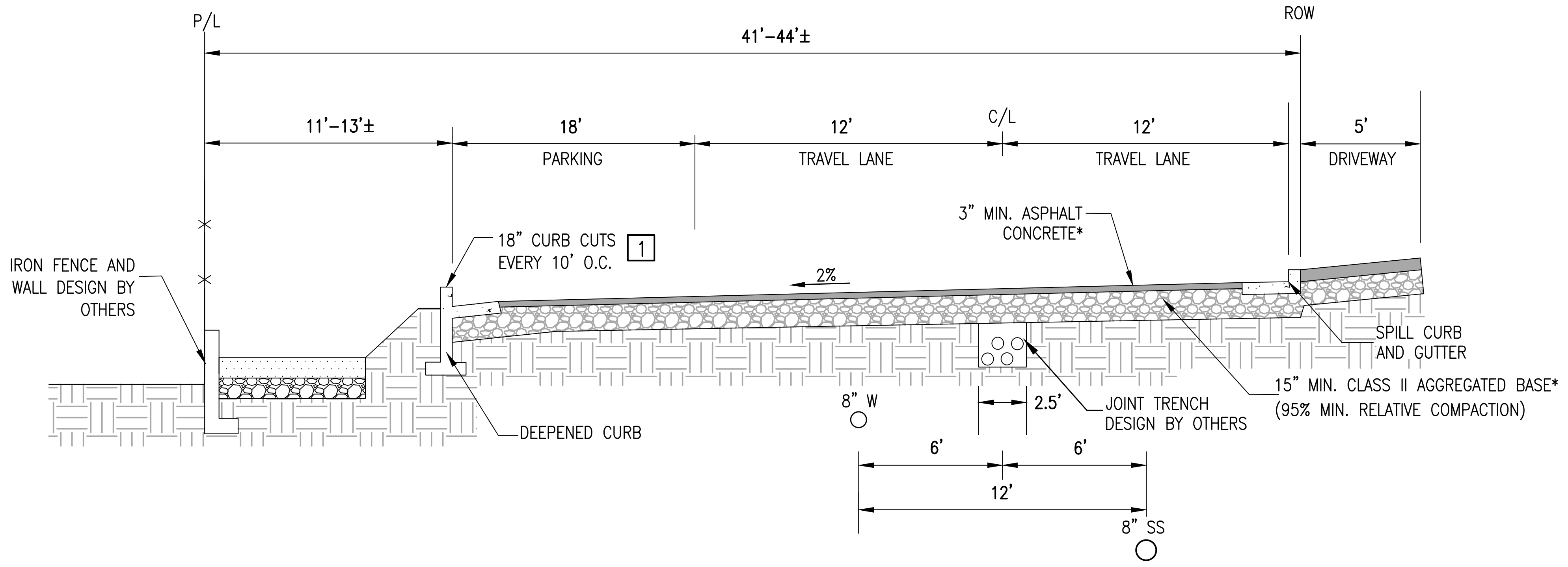

G STREET (PRIVATE)
NOT TO SCALE

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SHEET 3 OF 10
JOB NO. 220056

SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
TYPICAL STREET SECTIONS

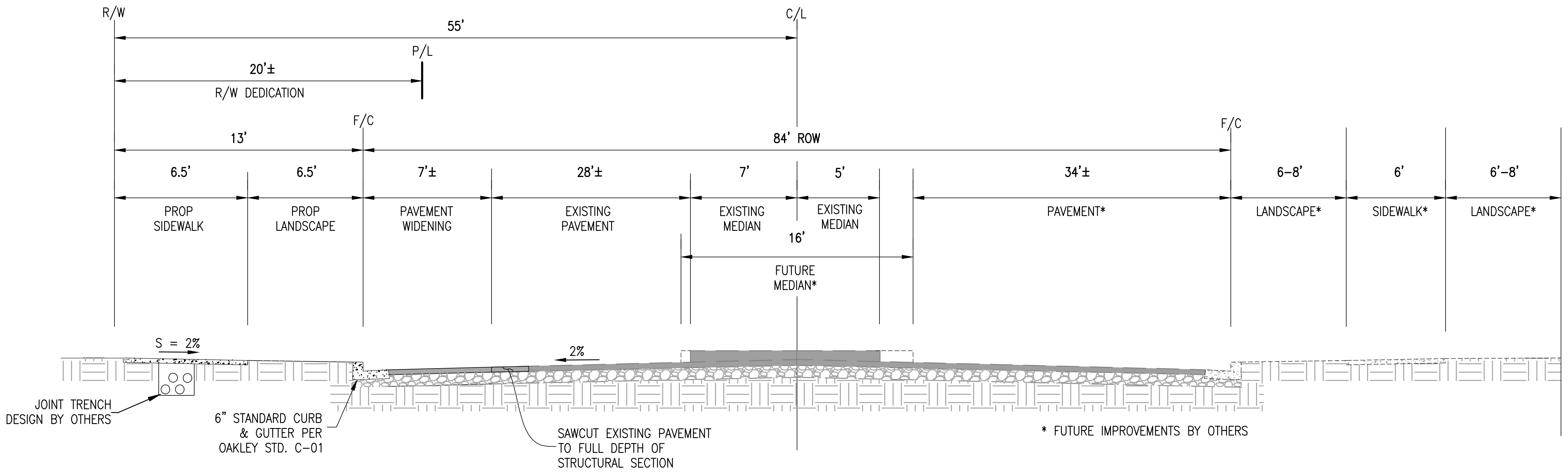
CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA
MARCH 8, 2022

NOTES:
THE OWNER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS ON THE LANDS SHOWN ON THIS MAP

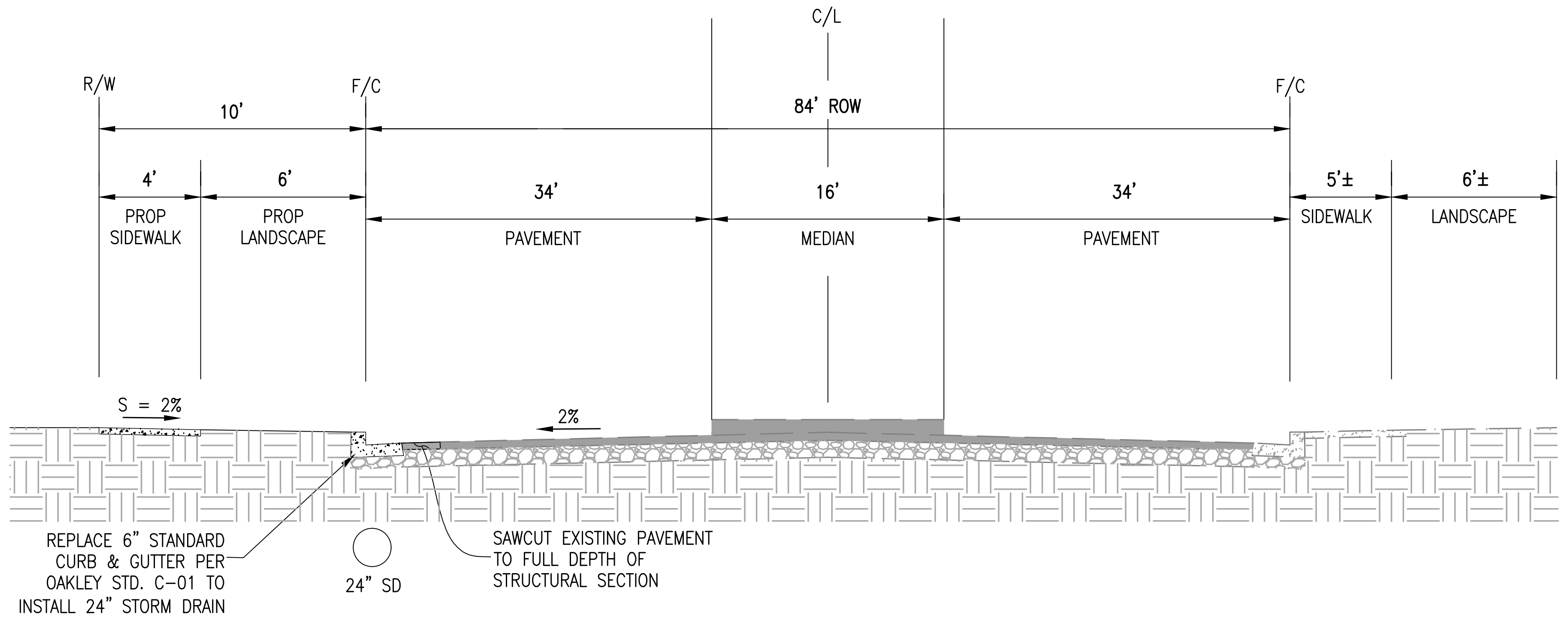
LEGEND

——	IMPROVEMENTS BY PROJECT
– – –	EXISTING CONDITIONS
- - - -	FUTIRE IMPROVEMENTS BY OTHERS



OAKLEY ROAD (PUBLIC)

NOT TO SCALE



MAIN STREET (PUBLIC)

NOT TO SCALE

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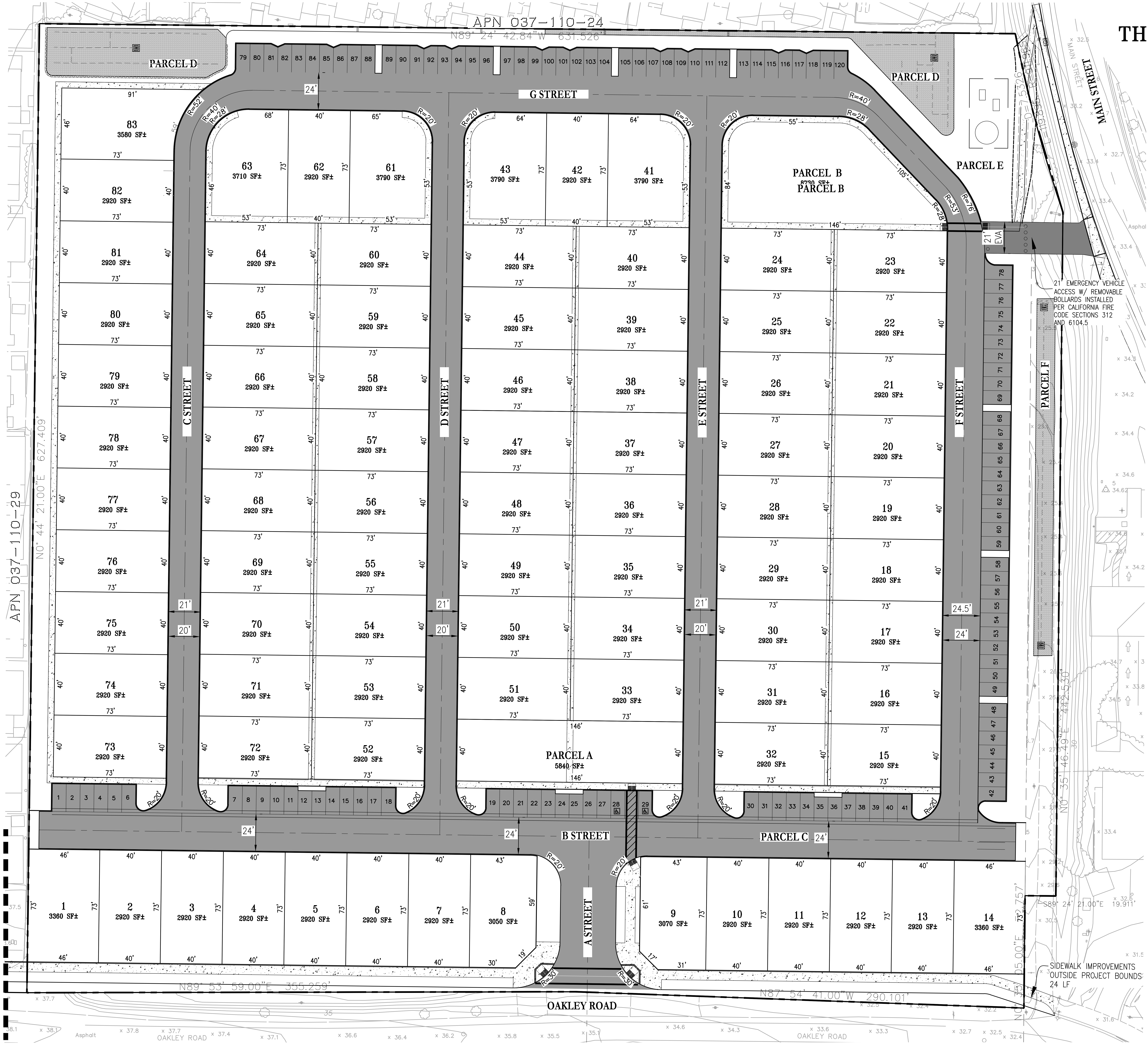
SHEET 4 OF 10

JOB NO. 220056



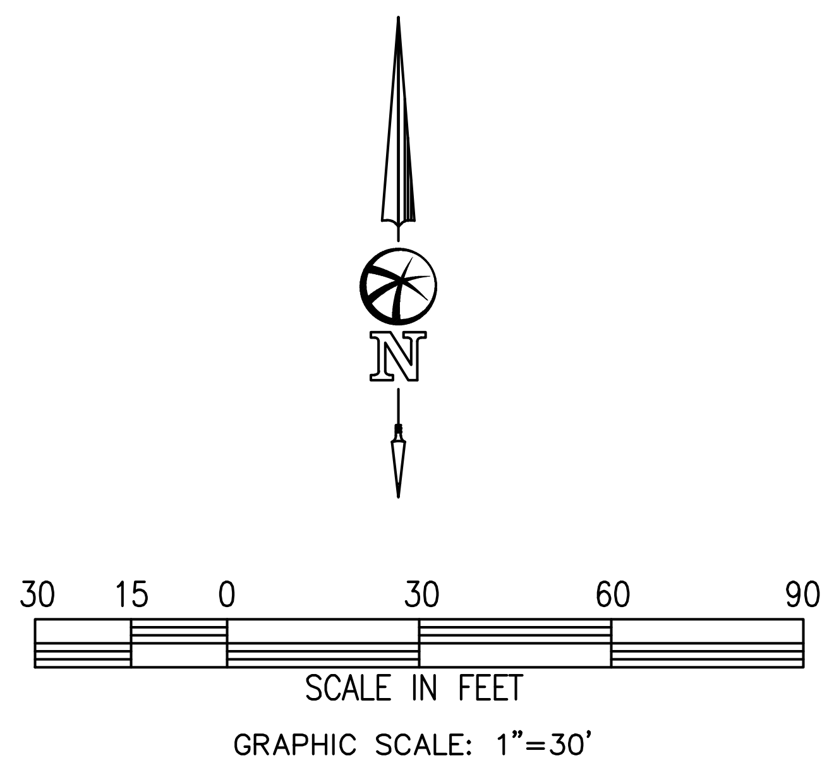
SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
SITE PLAN

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA
MARCH 8 2022 SCALE: 1"=30'

NOTES:

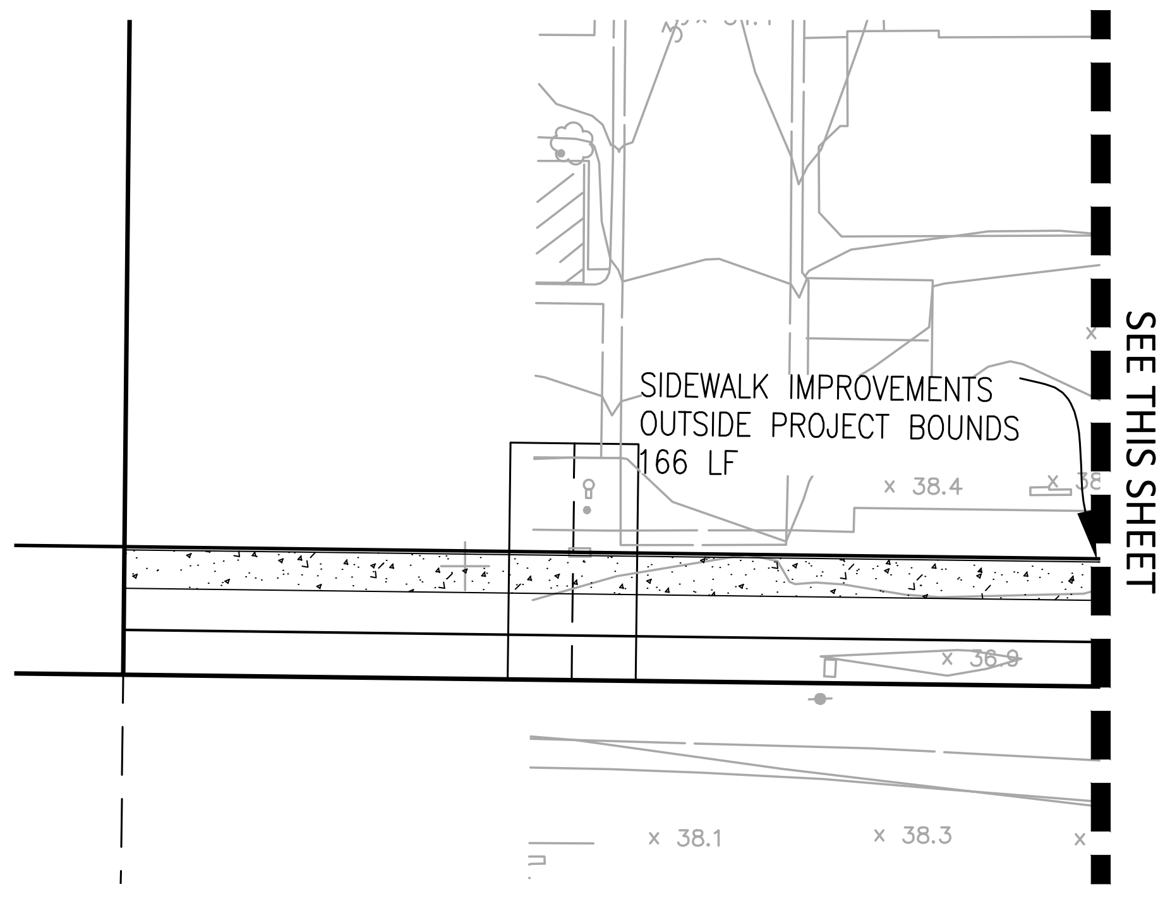
THE OWNER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS ON THE LANDS SHOWN ON THIS MAP



GRAPHIC SCALE: 1"=30'

LEGEND

PROPOSED	DESCRIPTION
▬ ▬ ▬	SUBDIVISION BOUNDARY
───	LOT LINE
1	LOT NUMBER
3,000 SF±	LOT AREA IN SQUARE FEET



SIDEWALK IMPROVEMETS

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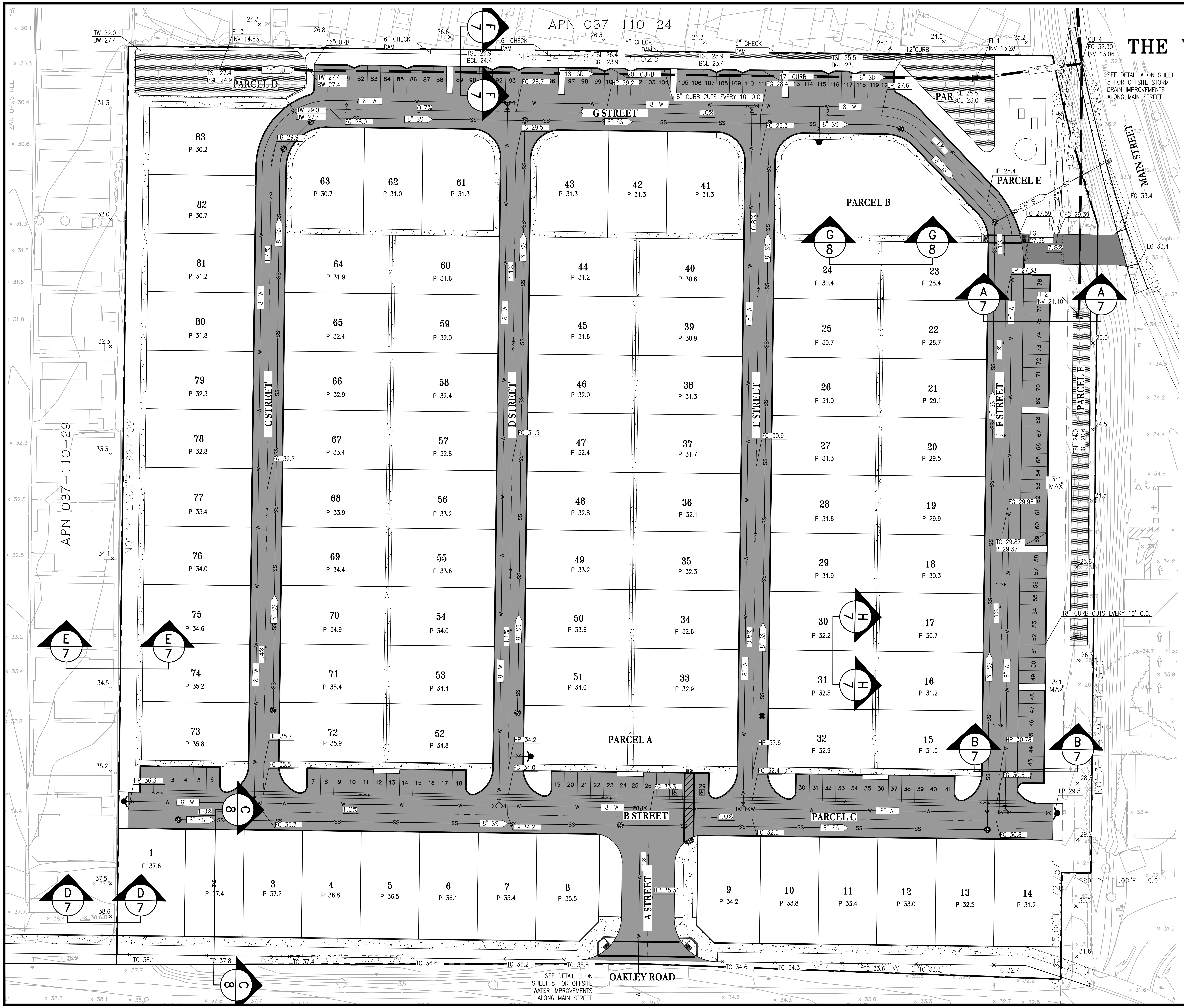
SHEET 5 OF 10

JOB NO. 220056



SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
GRADING & UTILITY PLAN

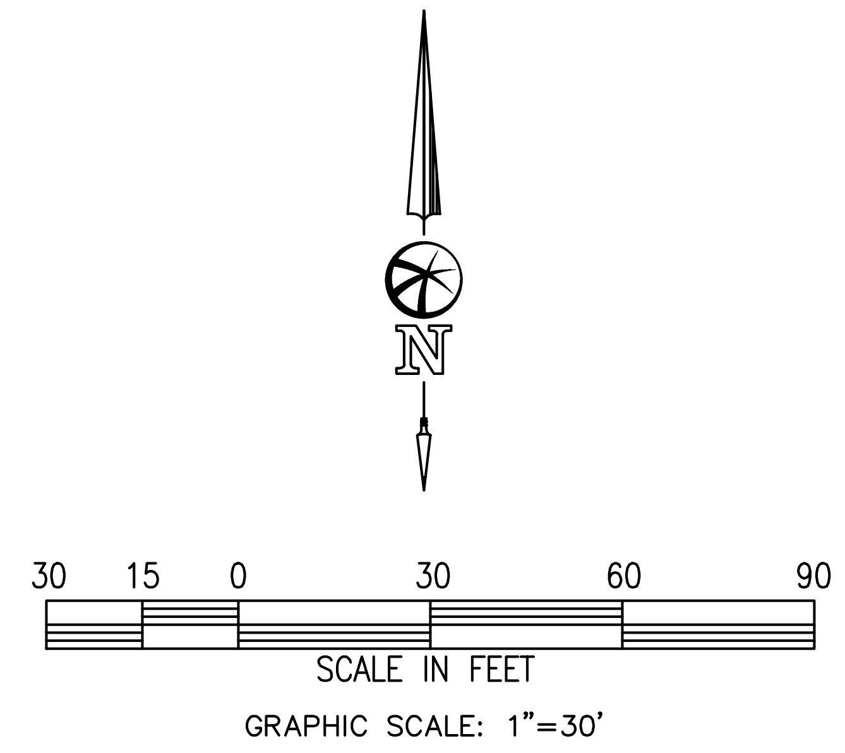
CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

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



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] 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

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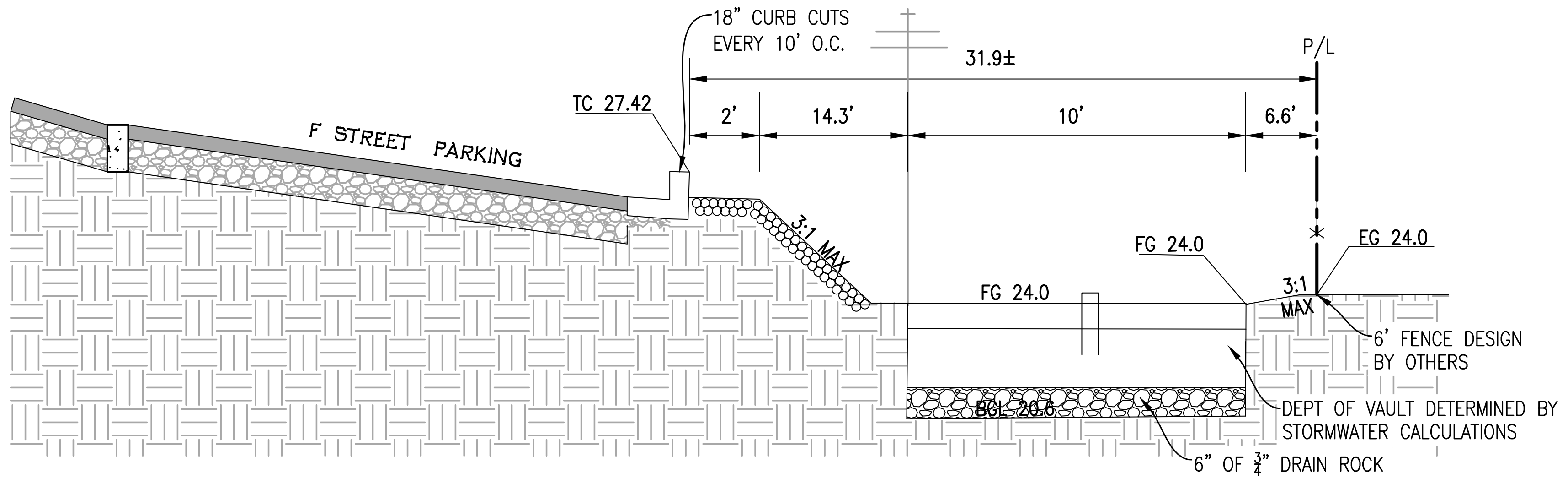
SHEET 6 OF 10
JOB NO. 220056

SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
GRADING SECTIONS

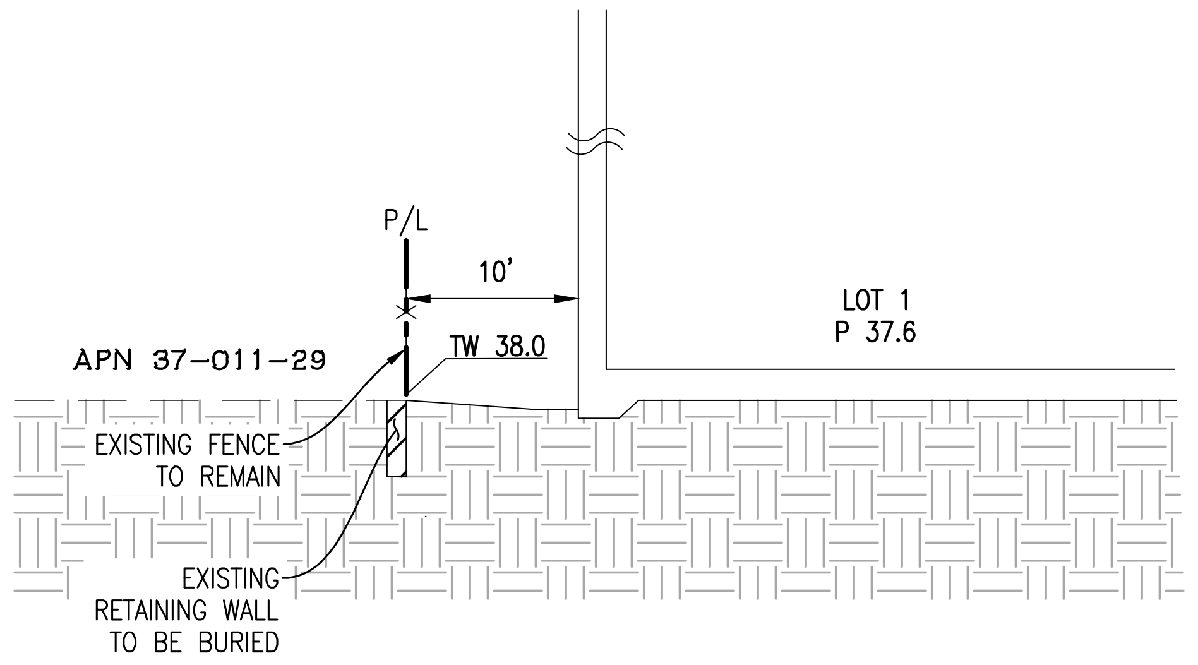
CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA

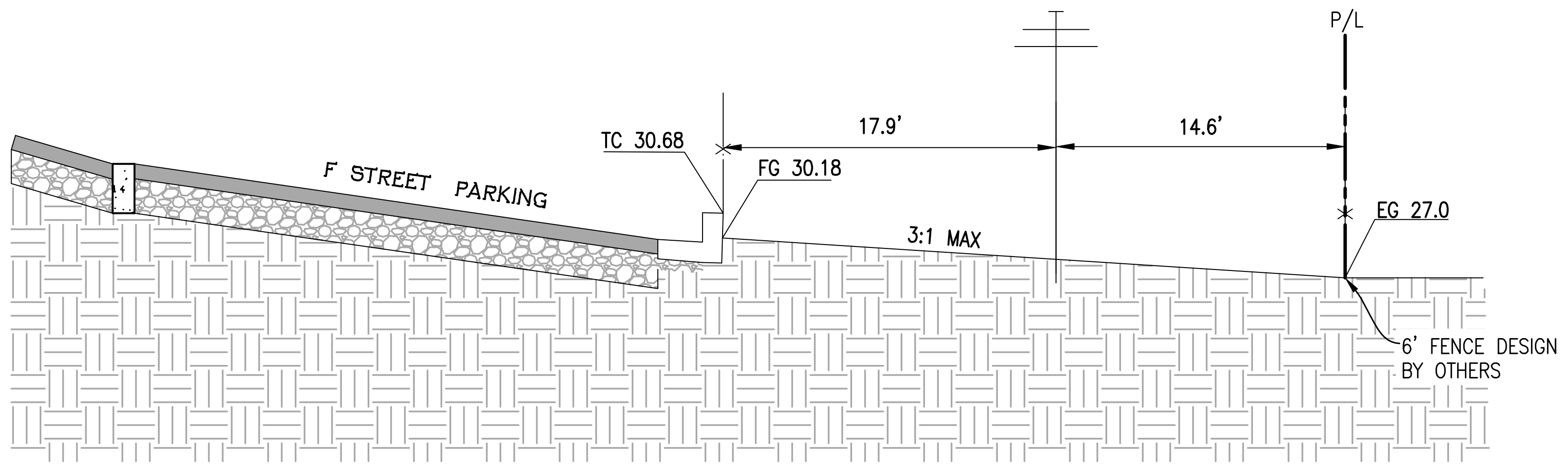
MARCH 8, 2022



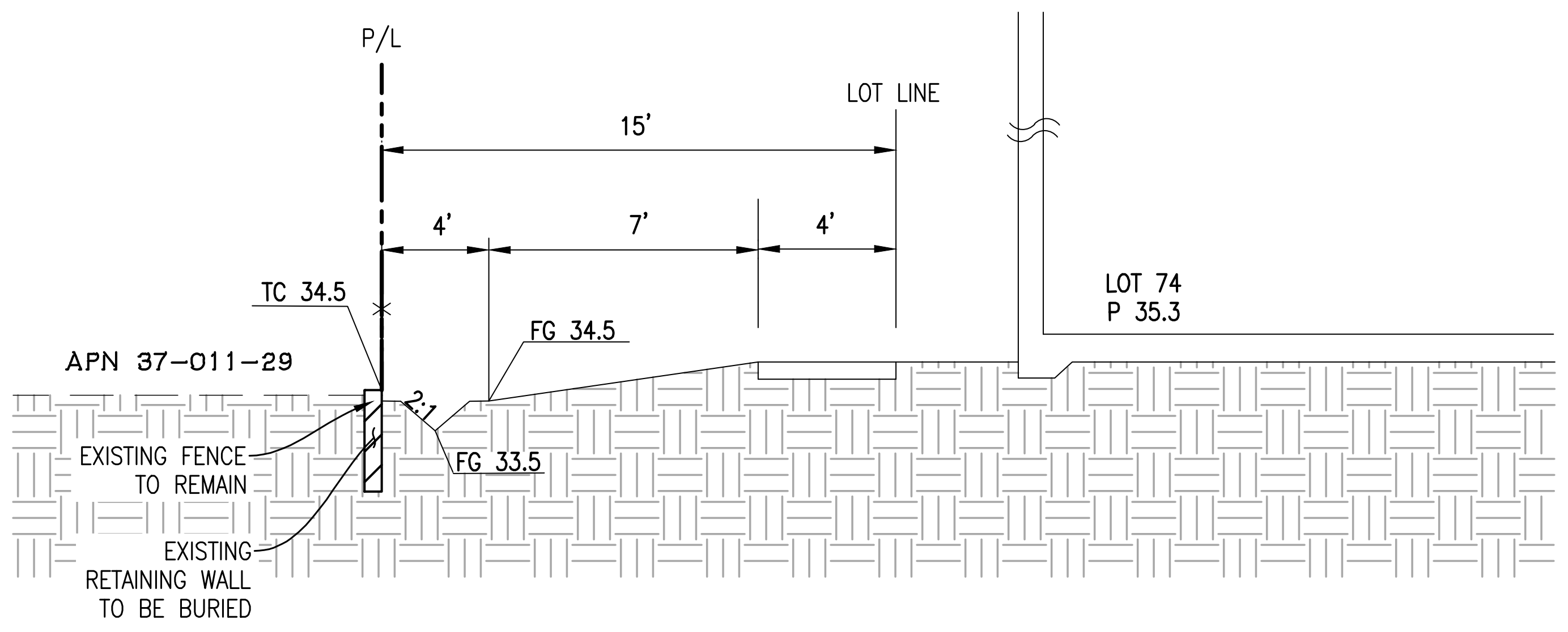
SECTION A–A
N.T.S.



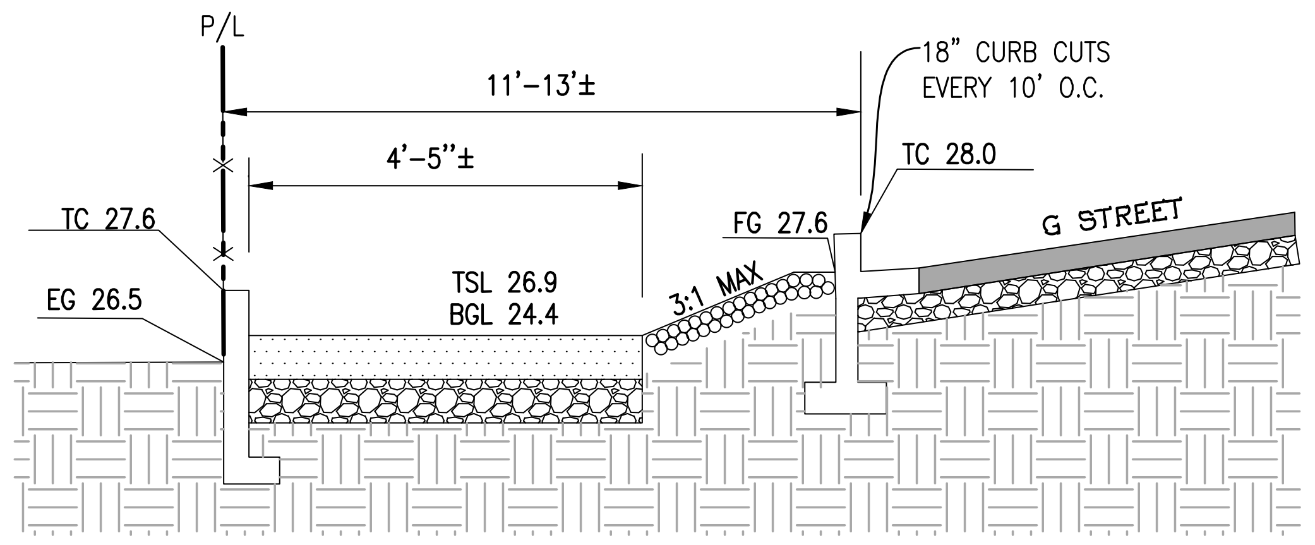
SECTION D–D
N.T.S.



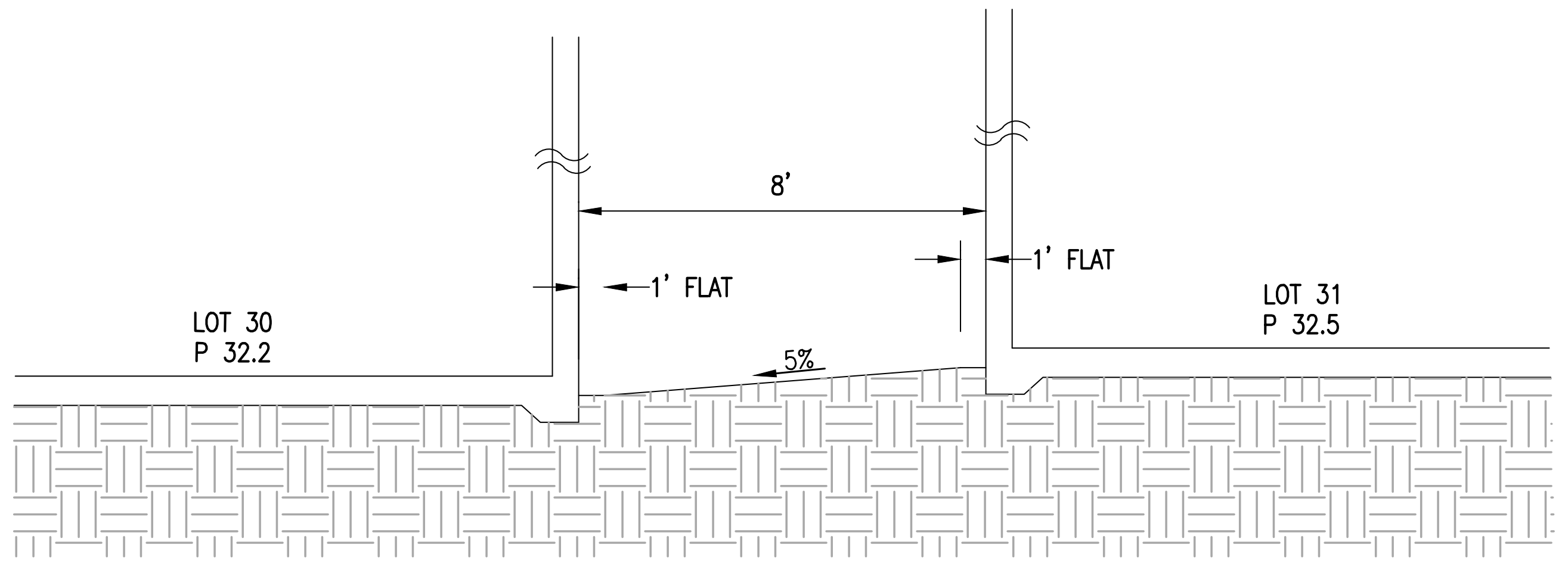
SECTION B–B
N.T.S.



SECTION E–E
N.T.S.



SECTION F–F
N.T.S.



SECTION H–H
N.T.S.

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SHEET 7 OF 10

JOB NO.
220056

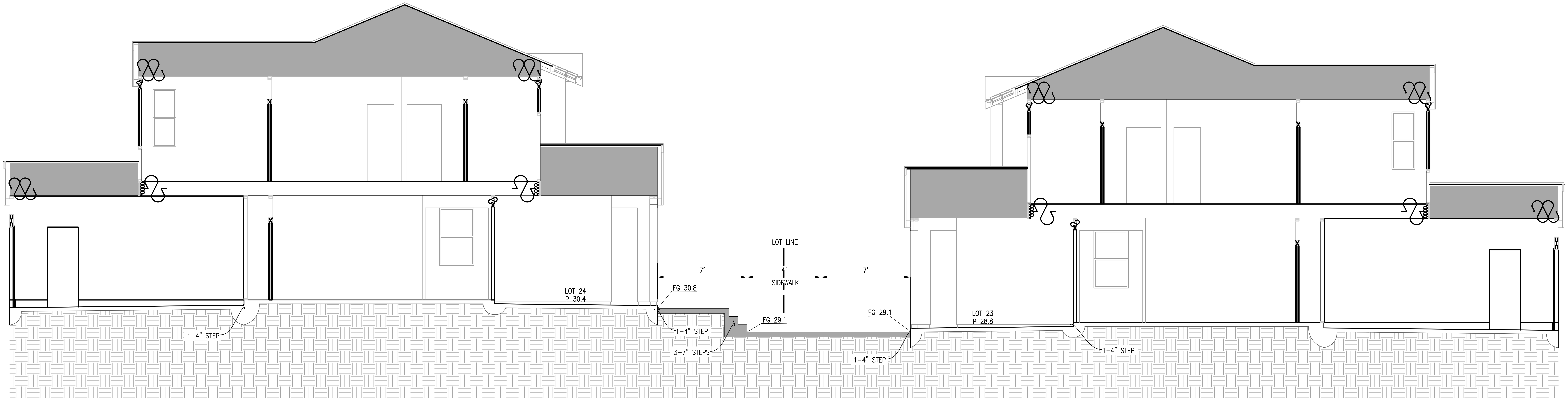
SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
VESTING TENTATIVE MAP
GRADING SECTIONS

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.

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Intelligent Infrastructure
925 • 685 • 4569 bellecci.com

SHEET
8
OF 10

JOB NO.
220056

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

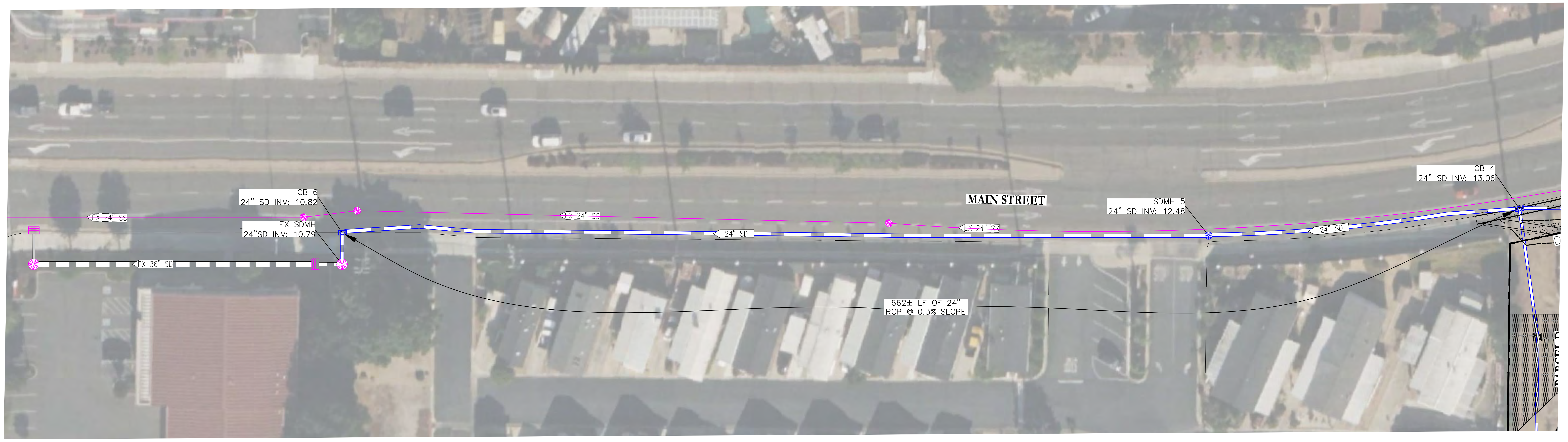
MARCH 8, 2023 SCALE: 1"=30'

NOTES:
THE OWNER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS ON THE LANDS SHOWN ON THIS MAP

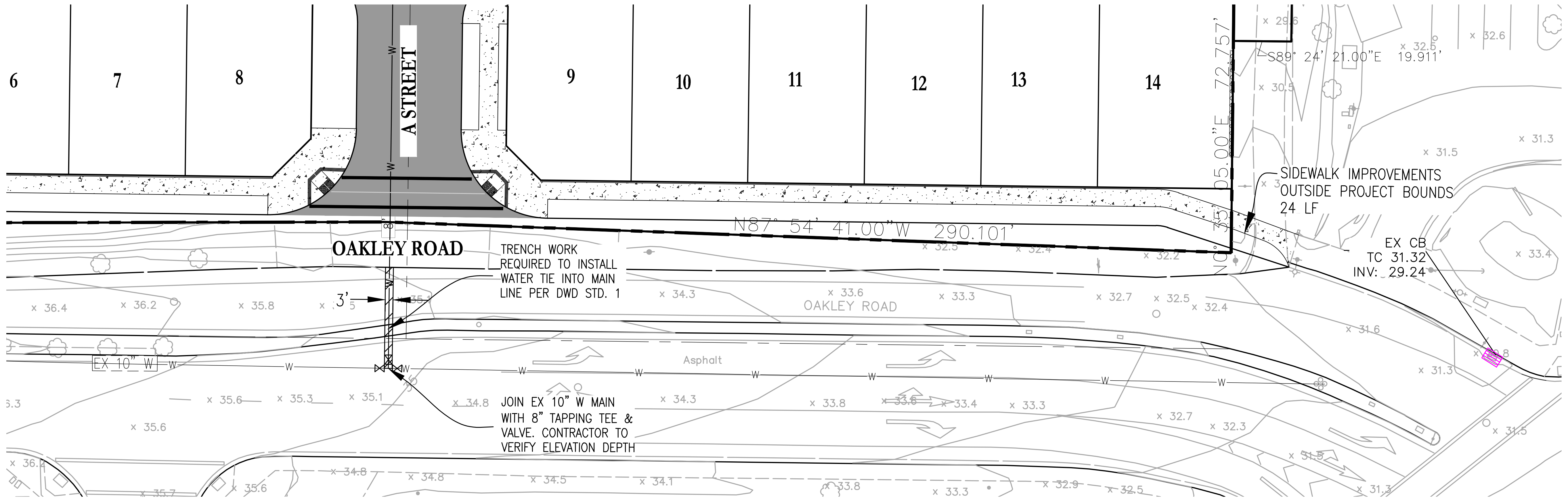
LEGEND

EXISTING	PROPOSED	DESCRIPTION
	▬ ▪ ▪ ▬ ▪ ▪ ▬	SUBDIVISION BOUNDARY
	——— – ———	CENTERLINE
— W EX W W —	— W — W —	WATER MAIN
— SS EX SS SS —	— SS SS 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



DETAIL B. OFFSITE WATER CONNECTION

30 15 0 30 60 90
SCALE IN FEET
GRAPHIC SCALE: 1"=30'

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Intelligent Infrastructure
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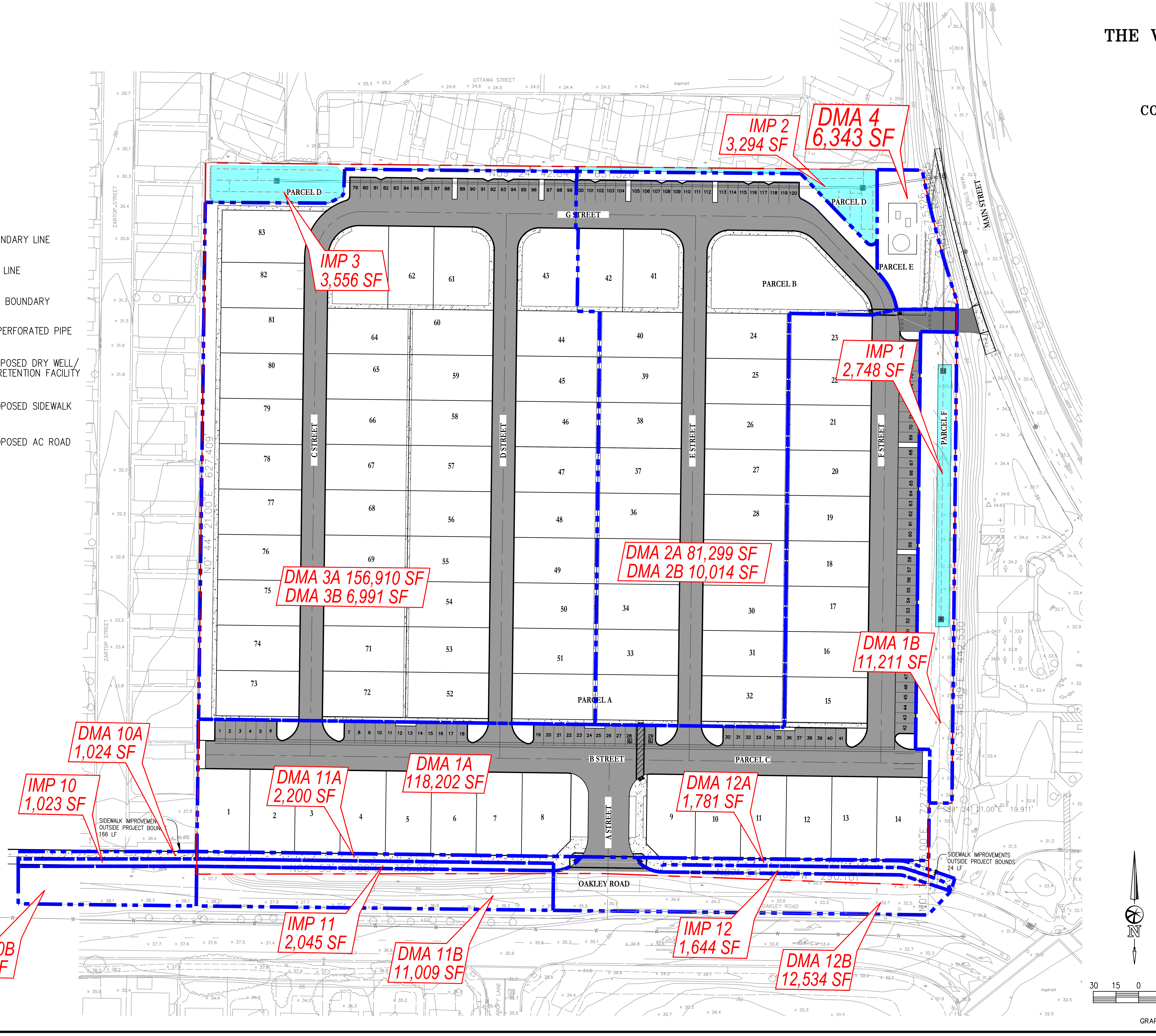
SHEET 9 OF 10
JOB NO. 220056

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
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

30 15 0 30 60 90

SCALE IN FEET

GRAPHIC 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
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
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

IMP Sizing	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
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
DMA11A	2,200	Concrete or Asphalt	1.00	2,200
DMA11B	11,009	Concrete or Asphalt	1.00	11,009
			Total	13,209

IMP Sizing	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
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
DMA12A	1,781	Concrete or Asphalt	1.00	1,781
DMA12B	12,534	Concrete or Asphalt	1.00	12,534
			Total	14,315

IMP Sizing	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
Area	0.020	1.000	286	1,644
Volume	0.068	1.000	973	986

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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

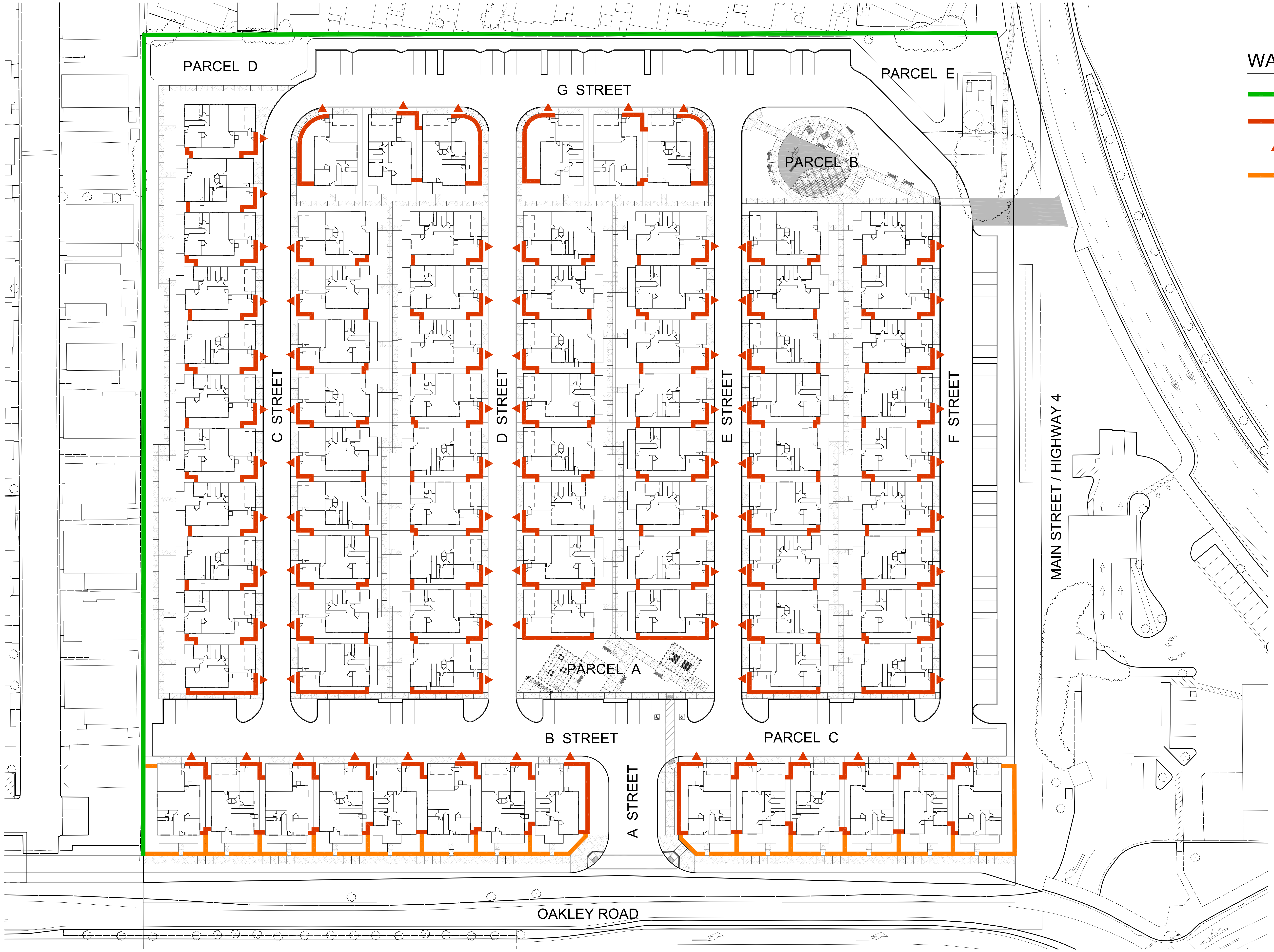
Preliminary Landscape Plan

L-1.2

THE VILLAGE AT 2092 OAKLEY ROAD Oakley, California

MARCH 8, 2023

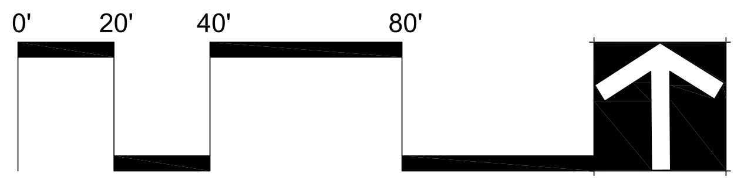
R 3 STUDIOS



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"



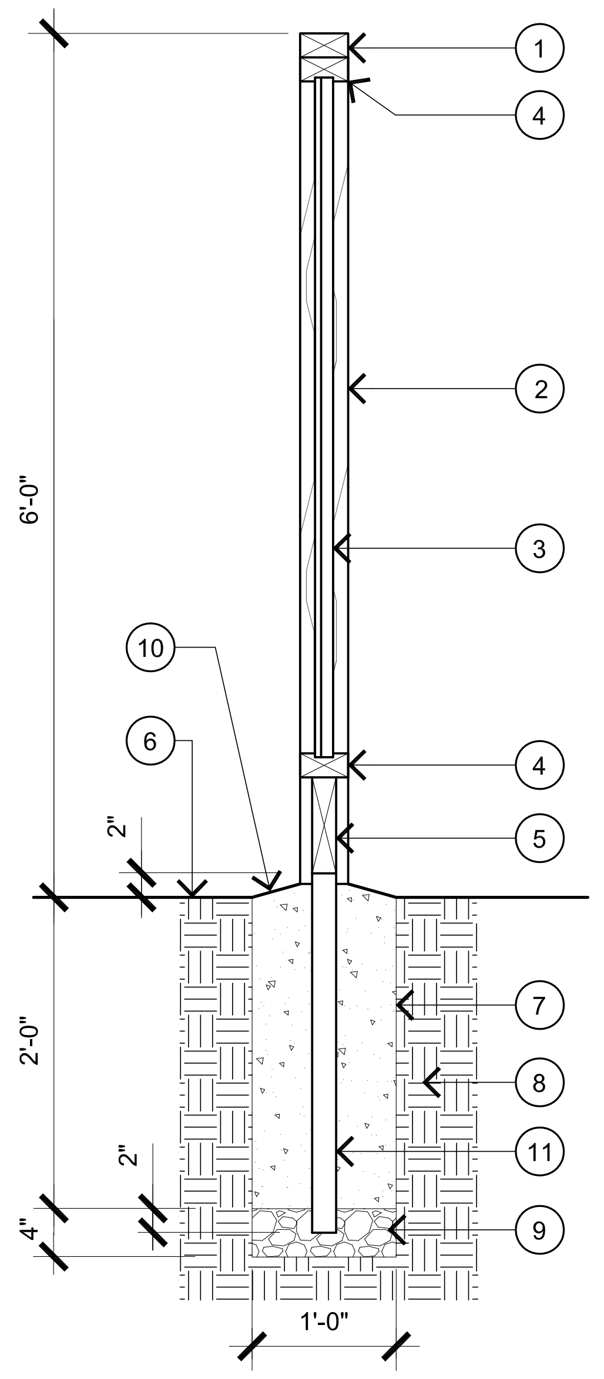
Wall and Fence Plan

L-2.1

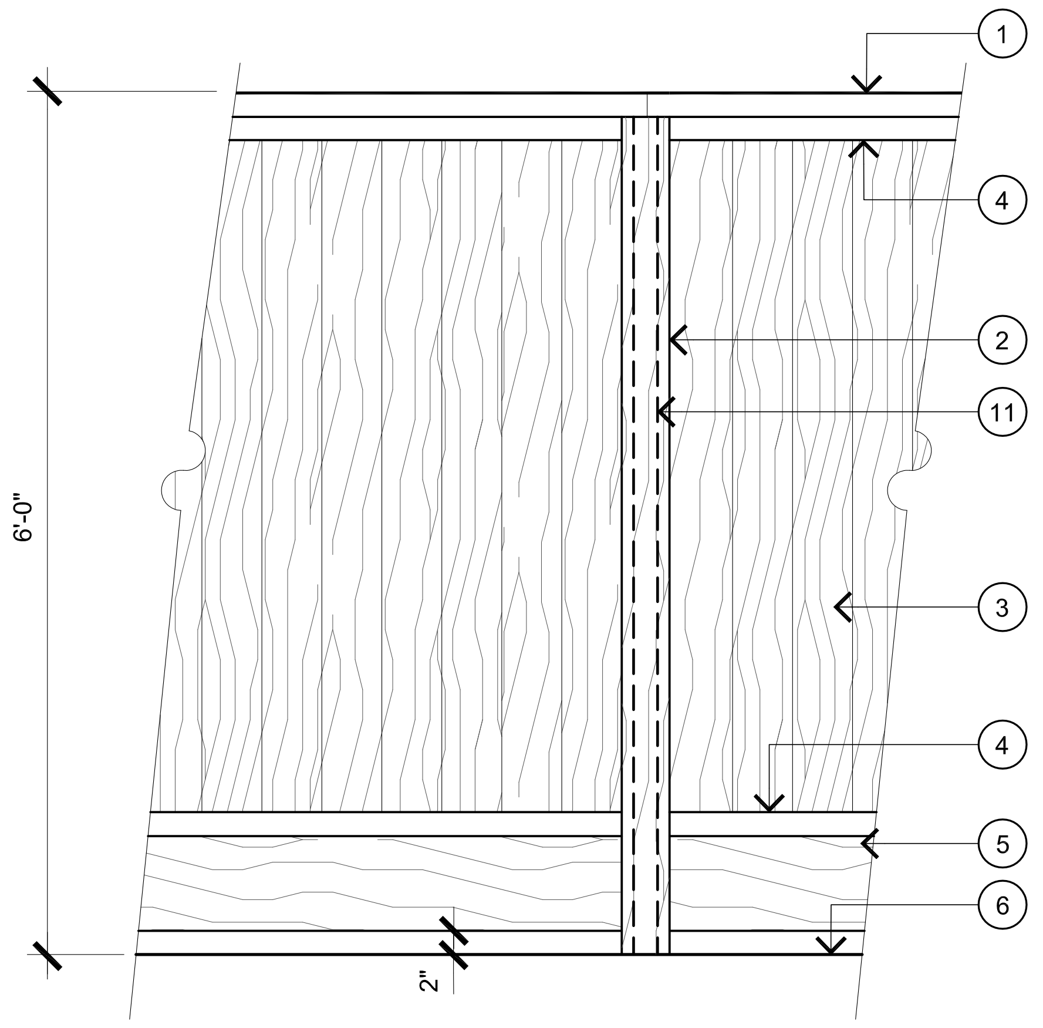
THE VILLAGE AT 2092 OAKLEY ROAD Oakley, California

MARCH 8, 2023

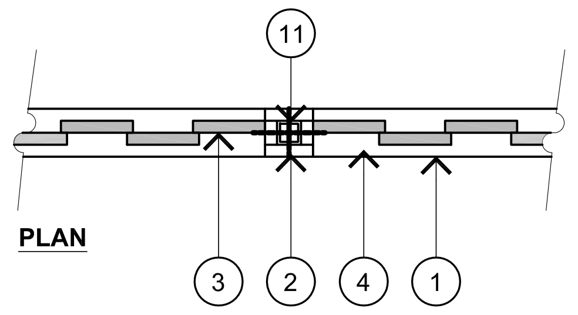
R3 STUDIOS



SECTION



ELEVATION



PLAN

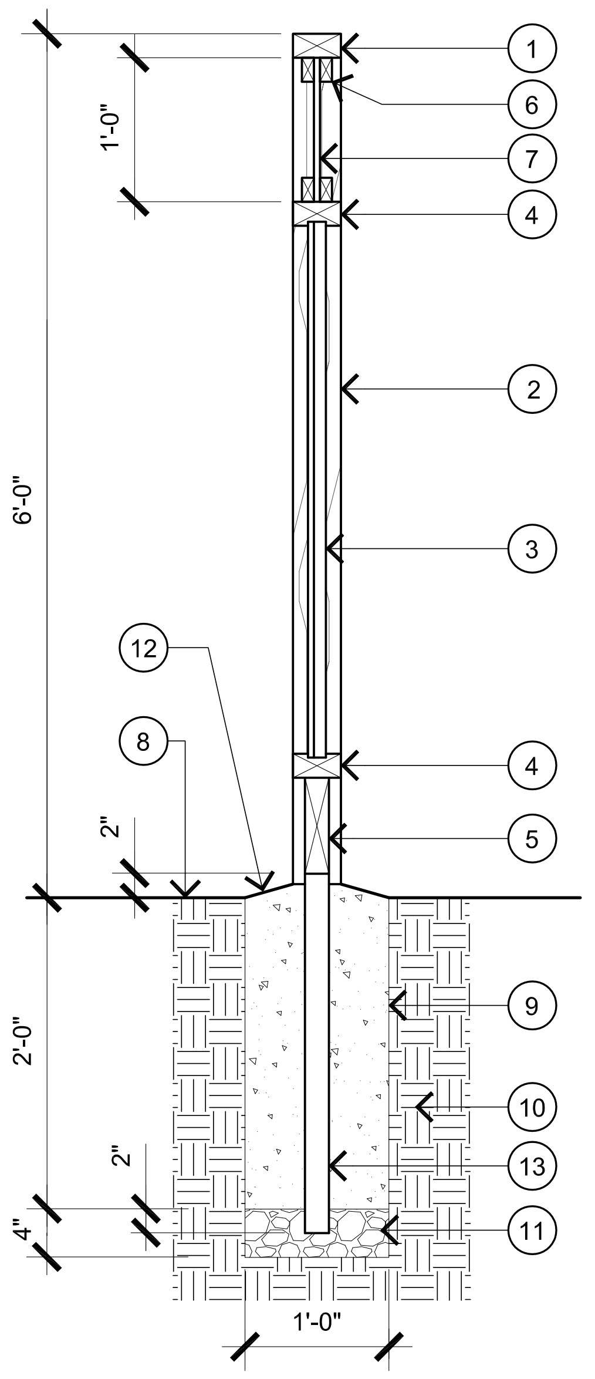
① 2"X4" TOP CAP
② 1" X 4" CLADDING AND 1" X 4" (RIPPED TO 2") CLADDING EDGE
③ 1"X6" FENCE BOARDS, BOARD ON BOARD
④ 2"X4" TOP AND BOTTOM RAILS RABBET CUT TO RECEIVE FENCE BOARDS
⑤ 2"X8" KICKER BOARD
⑥ FINISH GRADE, GRADE TO SLOPE AWAY FROM FENCE
⑦ CONCRETE FOOTING
⑧ COMPACTED SUBGRADE OR ENGINEERED FILL 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



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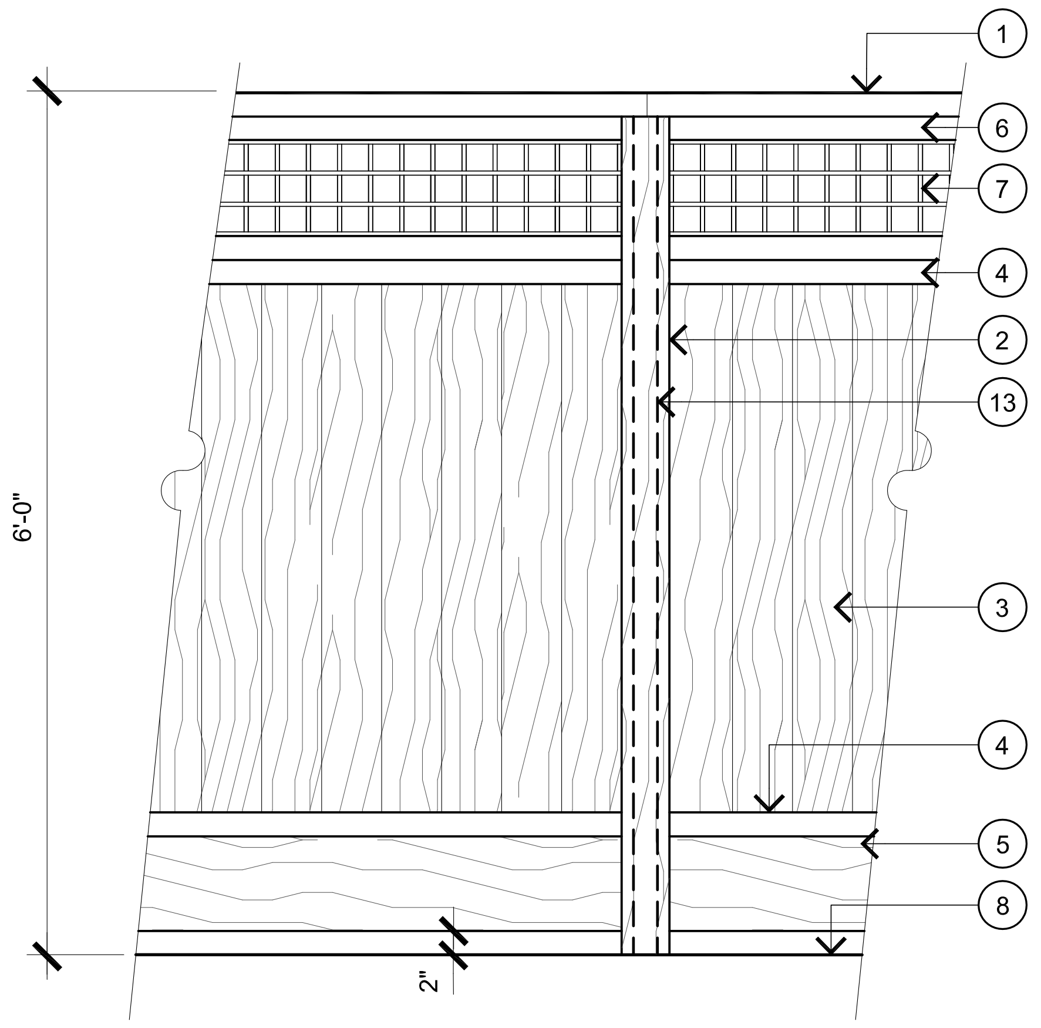

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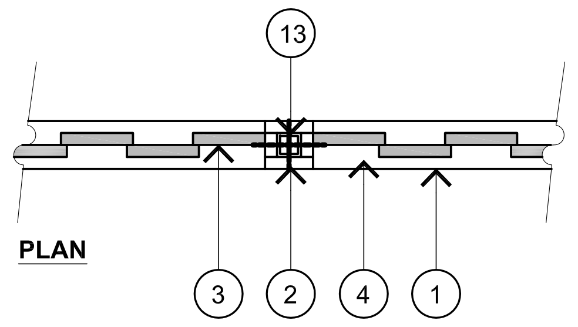

PLAN

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② 1" X 4" CLADDING AND 1" X 4" (RIPPED TO 2") CLADDING EDGE
③ 1"X6" FENCE BOARDS, BOARD ON BOARD
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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.

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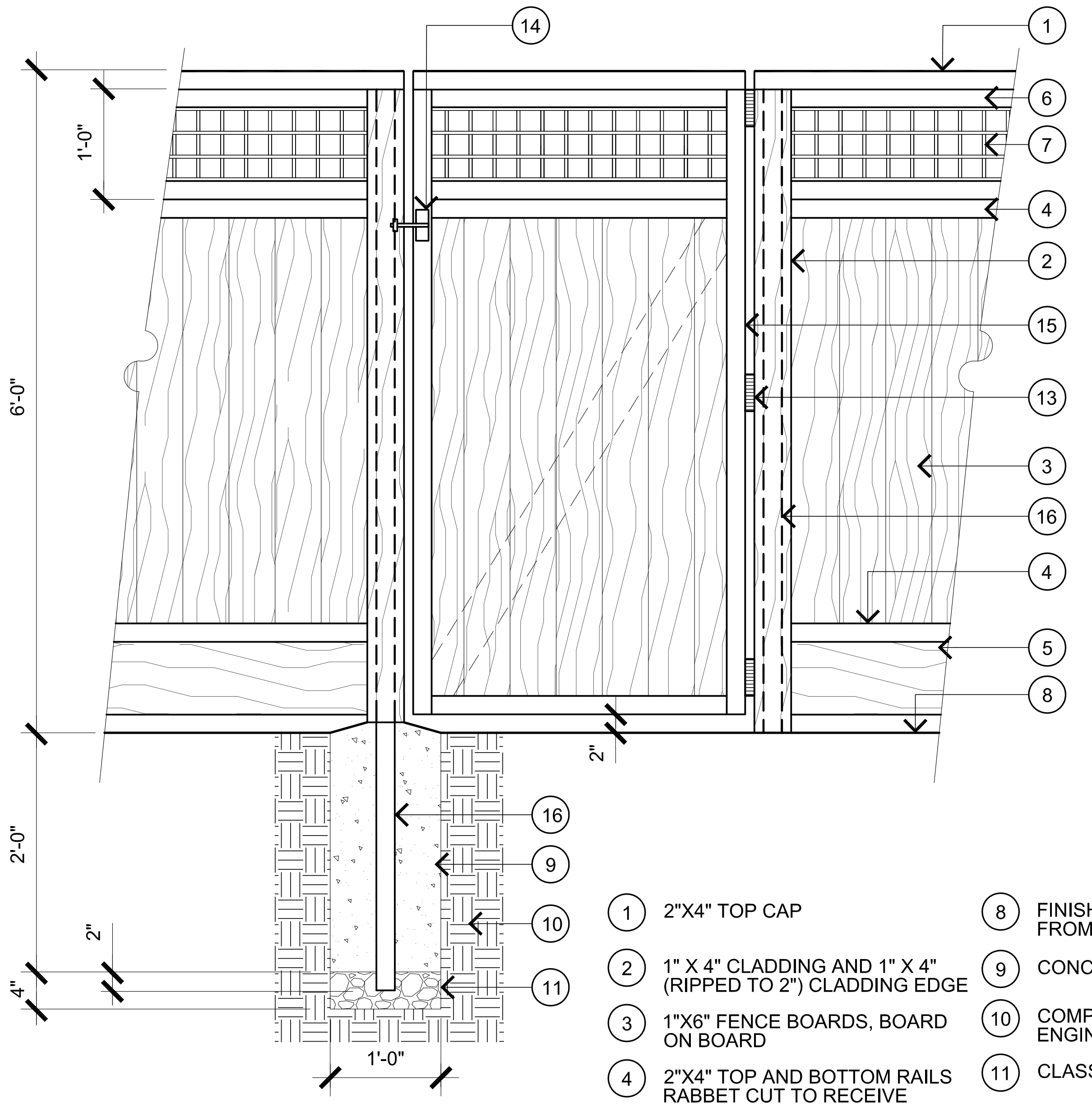
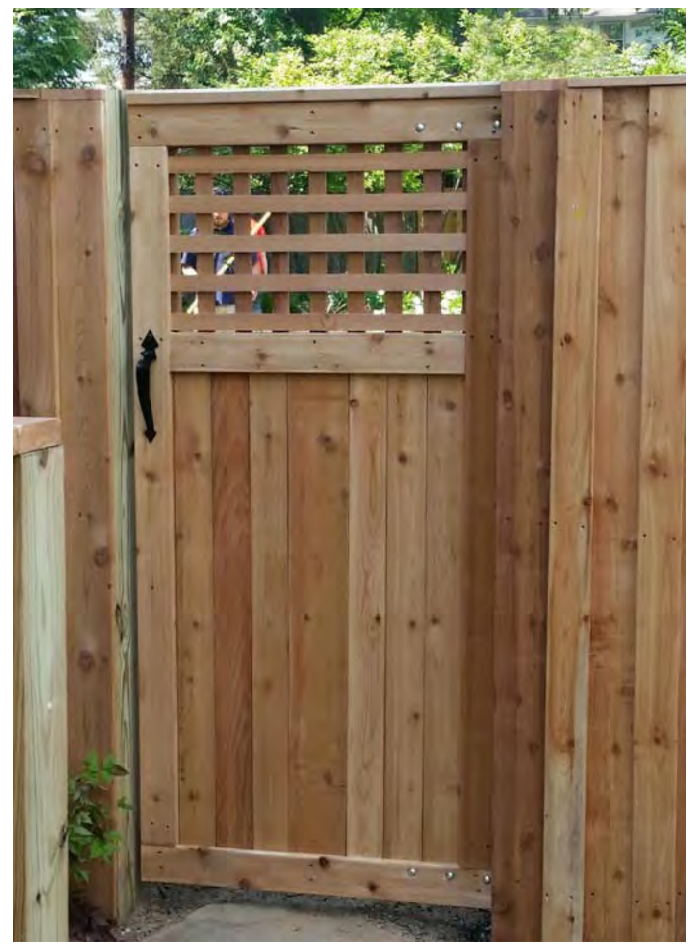
- ALL SCREWS SHALL BE HOT DIPPED GALVANIZED.

SCALE : 3/4"=1'-0"

② WOOD FENCE WITH LATTICE



SECTION/ELEVATION



① 2"X4" TOP CAP
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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

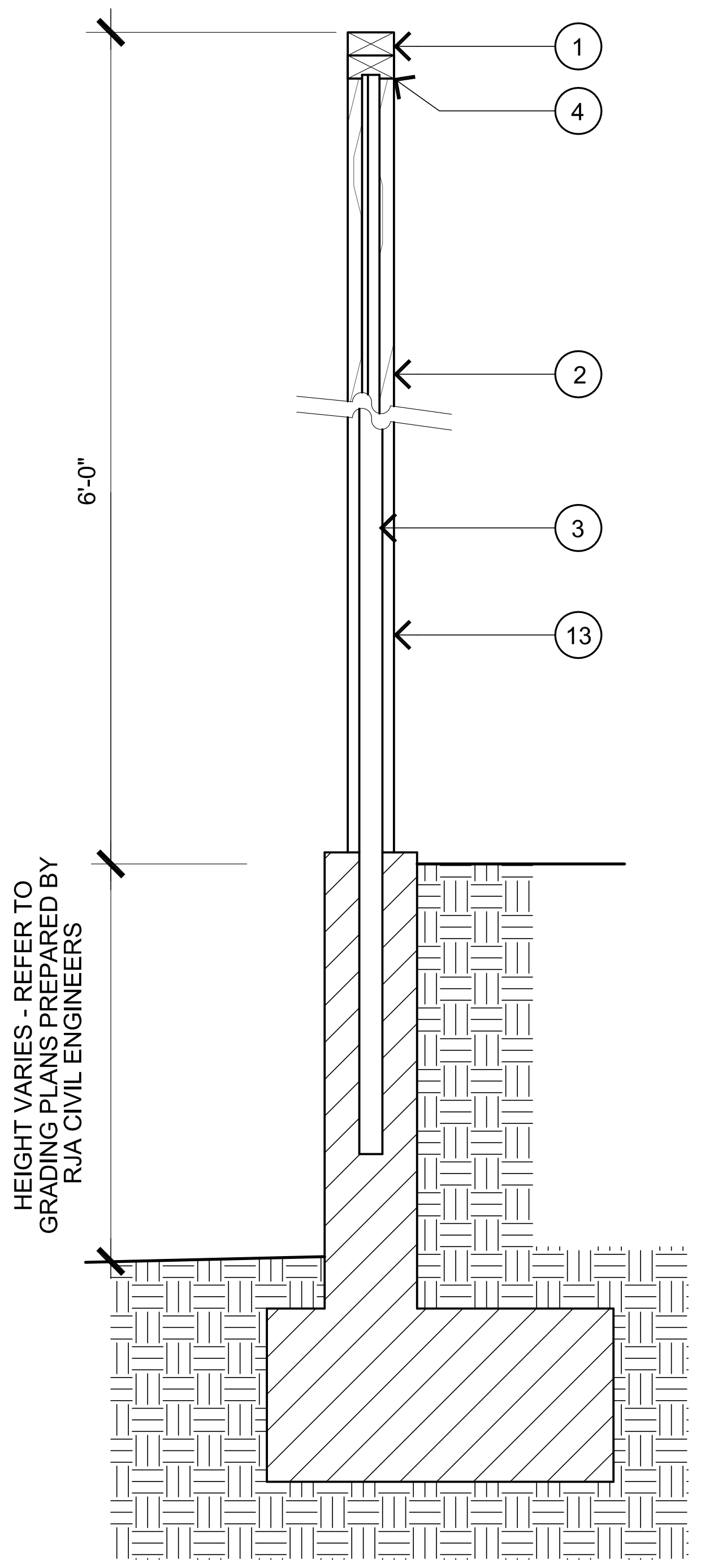
Wall and Fence Details

L-2.2

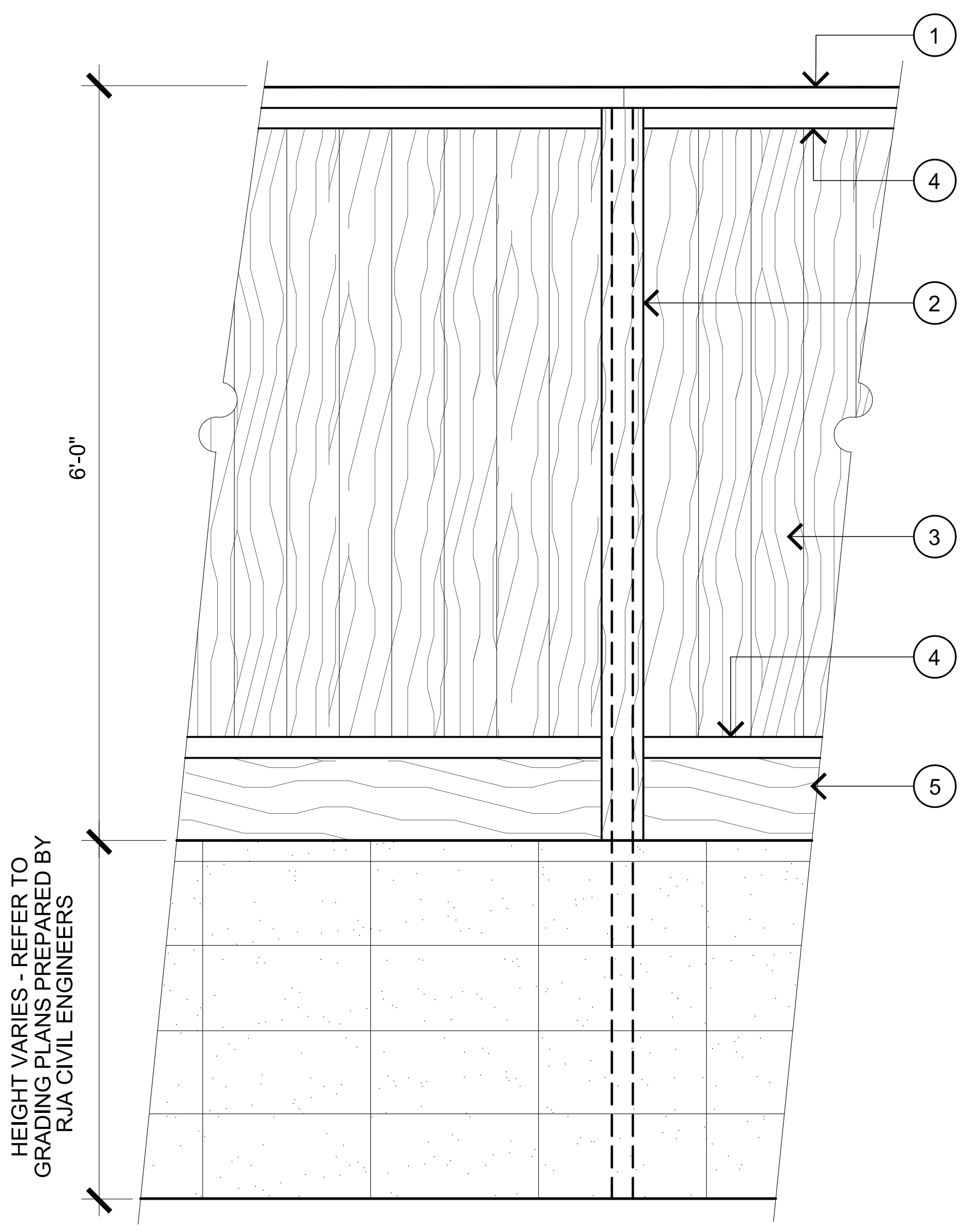
THE VILLAGE AT 2092 OAKLEY ROAD Oakley, California

MARCH 8, 2023

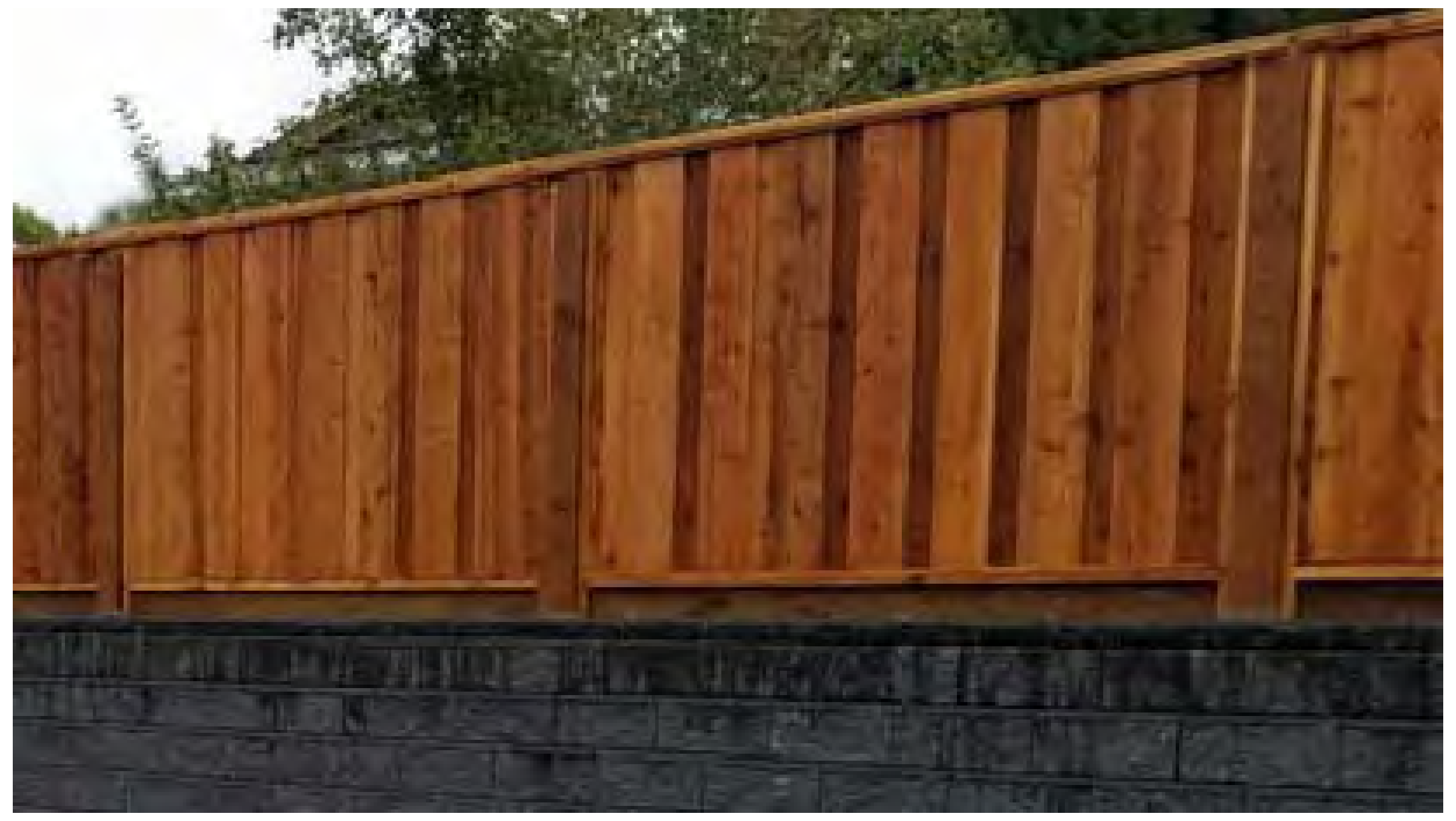
R3 STUDIOS

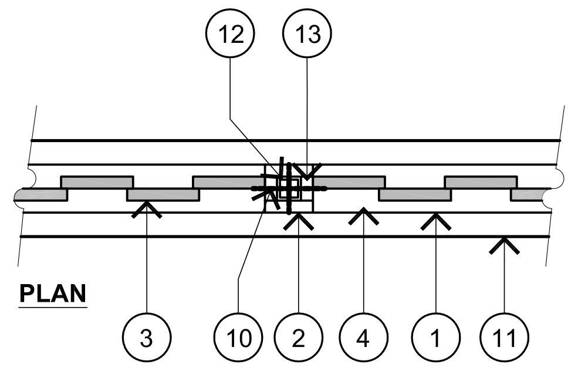


SECTION



ELEVATION





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"

Wall and Fence Details

SMALL EVERGREEN TREE: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

HOMEOWNER PRIVATE YARD (TYPICAL)

SMALL FLOWERING ACCENT TREE: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

DROUGHT-TOLERANT EVERGREEN HEDGE WITH FLOWERING GROUNDCOVER: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

FLOWERING ACCENT TREE: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

CONCRETE DRIVEWAY: REFER TO PLANS PREPARED BY BELLECCI CIVIL ENGINEERS

FLOWERING DROUGHT-TOLERANT SHRUBS AND GROUNCOVER: 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

WATER TREATMENT PLANT MATERIAL: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

4'-0" WIDE CONCRETE WALKWAY: REFER TO DETAIL 1 SHEET L-10

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"

KEY MAP NTS

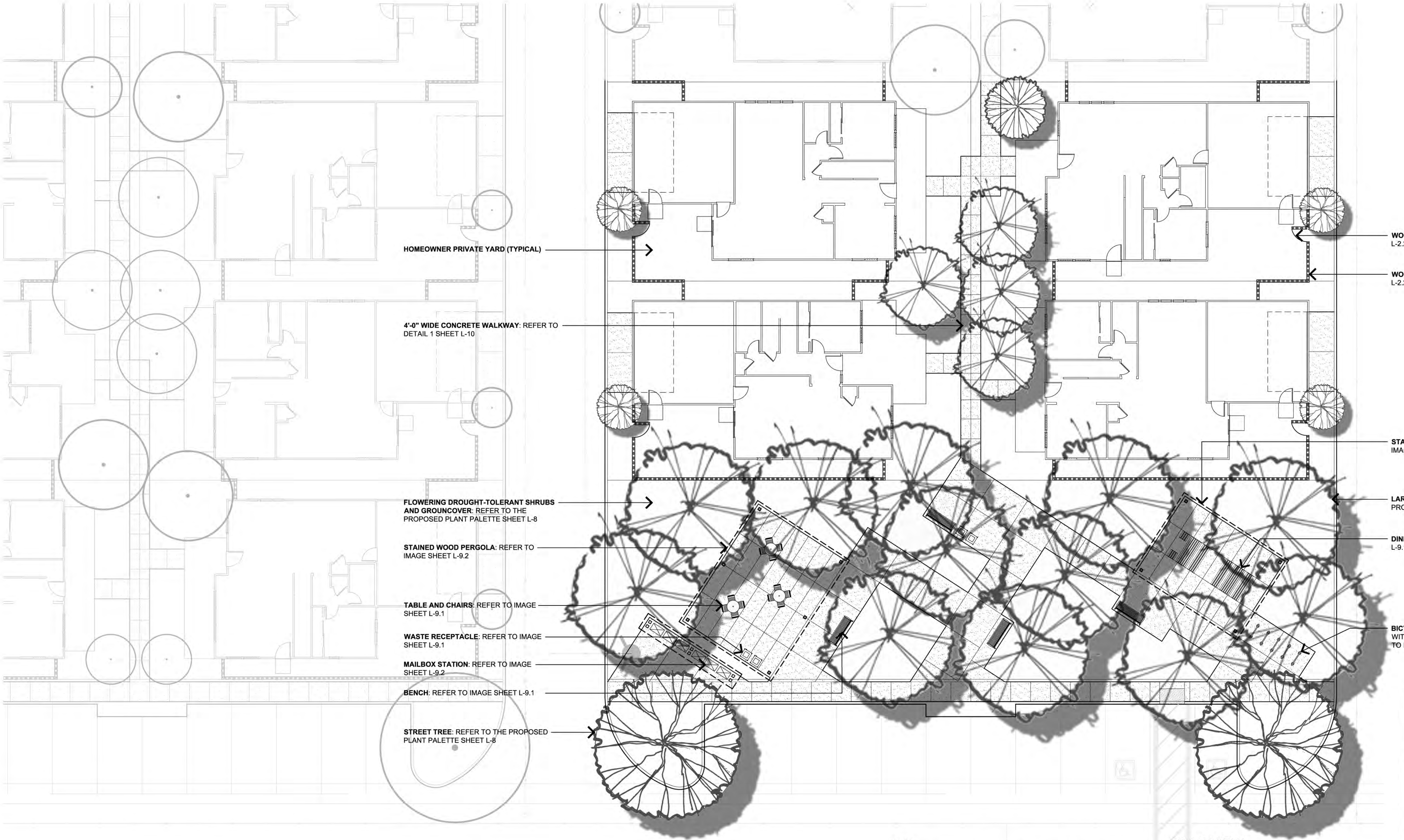
Typical House Cluster Enlargement

L-3

THE VILLAGE AT 2092 OAKLEY ROAD Oakley, California

MARCH 8, 2023

R3 STUDIOS



NOTE:

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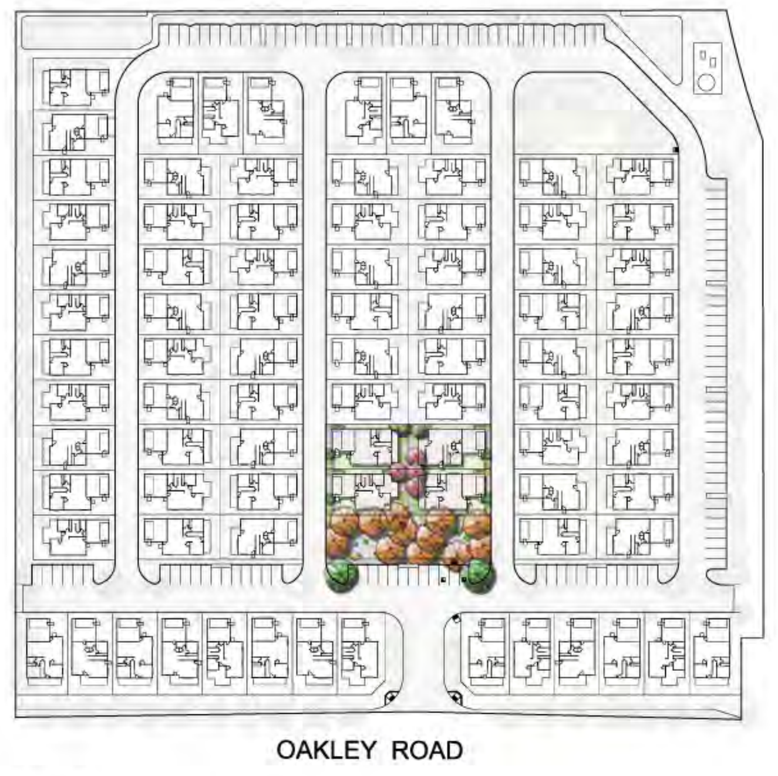
PLAN VIEW
Scale: 1"=10'-0"



KEY MAP NTS

House Cluster and Open Space Enlargement

L-4

THE VILLAGE AT 2092 OAKLEY ROAD Oakley, California

MARCH 8, 2023

R3 STUDIOS

DROUGHT-TOLERANT SHRUBS AND GROUNCOVER ON SLOPES: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

TREES UNDER POWER LINES: MAXIMUM HEIGHT OF 25'-0", REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

STREET TREE: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

DROUGHT-TOLERANT SHRUBS AND GROUNCOVER ON SLOPES: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

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.

Typical Tree Planting at Parking Area Concept

L-5

THE VILLAGE AT 2092 OAKLEY ROAD Oakley, California

MARCH 8, 2023

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"

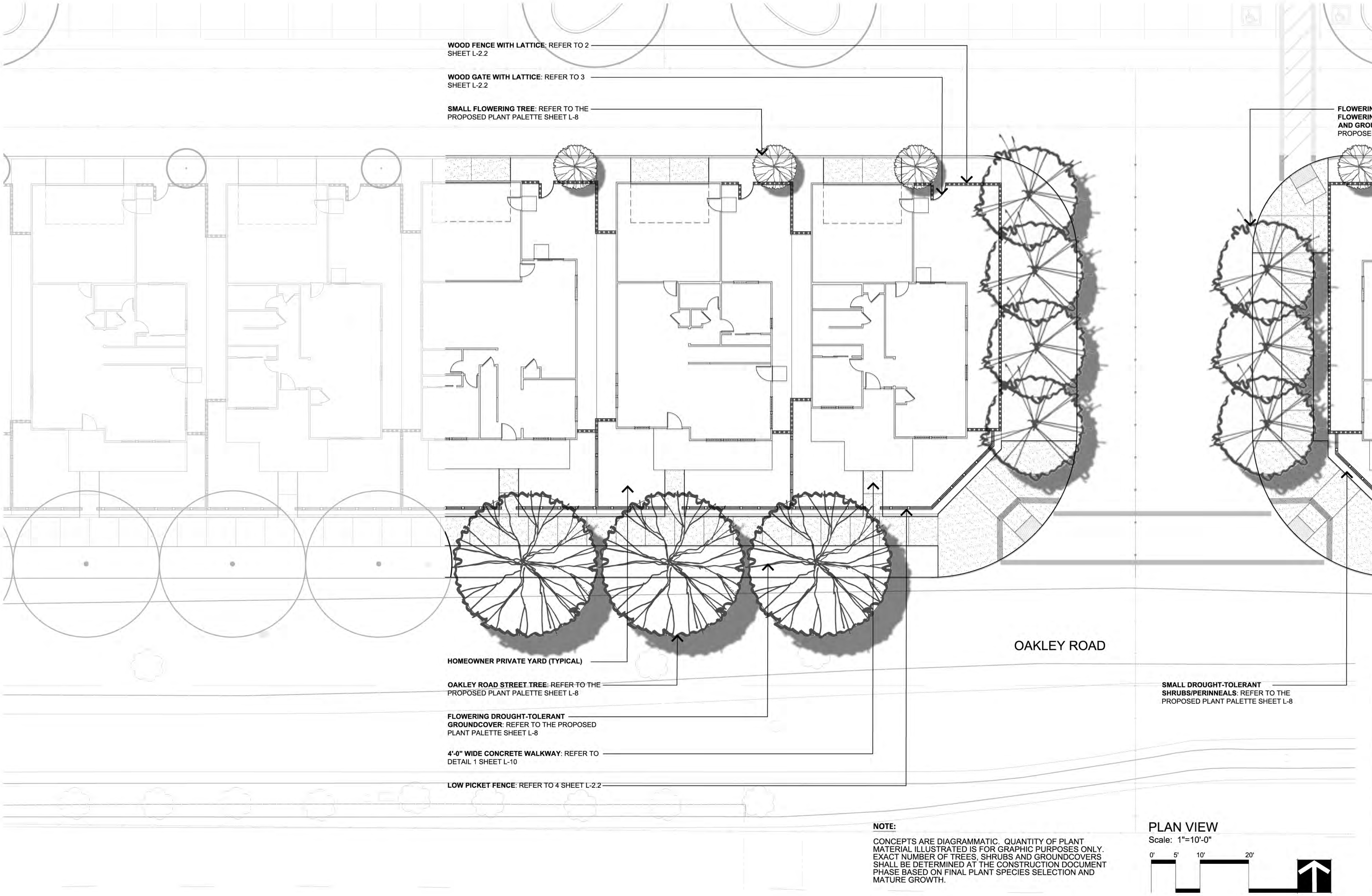
Open Space Enlargement

L-6

THE VILLAGE AT 2092 OAKLEY ROAD Oakley, California

MARCH 8, 2023

R3 STUDIOS



WOOD FENCE WITH LATTICE: REFER TO 2 SHEET L-2.2

WOOD GATE WITH LATTICE: REFER TO 3 SHEET L-2.2

SMALL FLOWERING TREE: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

FLOWERING ACCENT TREES WITH FLOWERING DROUGHT-TOLERANT SHRUBS AND GROUNDCOVER: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

HOMEOWNER PRIVATE YARD (TYPICAL)

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

4'-0" WIDE CONCRETE WALKWAY: REFER TO DETAIL 1 SHEET L-10

LOW PICKET FENCE: REFER TO 4 SHEET L-2.2

SMALL DROUGHT-TOLERANT SHRUBS/PERINNEALS: REFER TO THE PROPOSED PLANT PALETTE SHEET L-8

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"

KEY MAP NTS

Project Entry Enlargement

L-7

THE VILLAGE AT 2092 OAKLEY ROAD Oakley, California

MARCH 8, 2023

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)

BOTANICAL NAME	COMMON NAME	MINIMUM CONTAINER SIZE	SPACING	PLANTING ZONE	WULCOLS
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.

Proposed Plant Palette

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

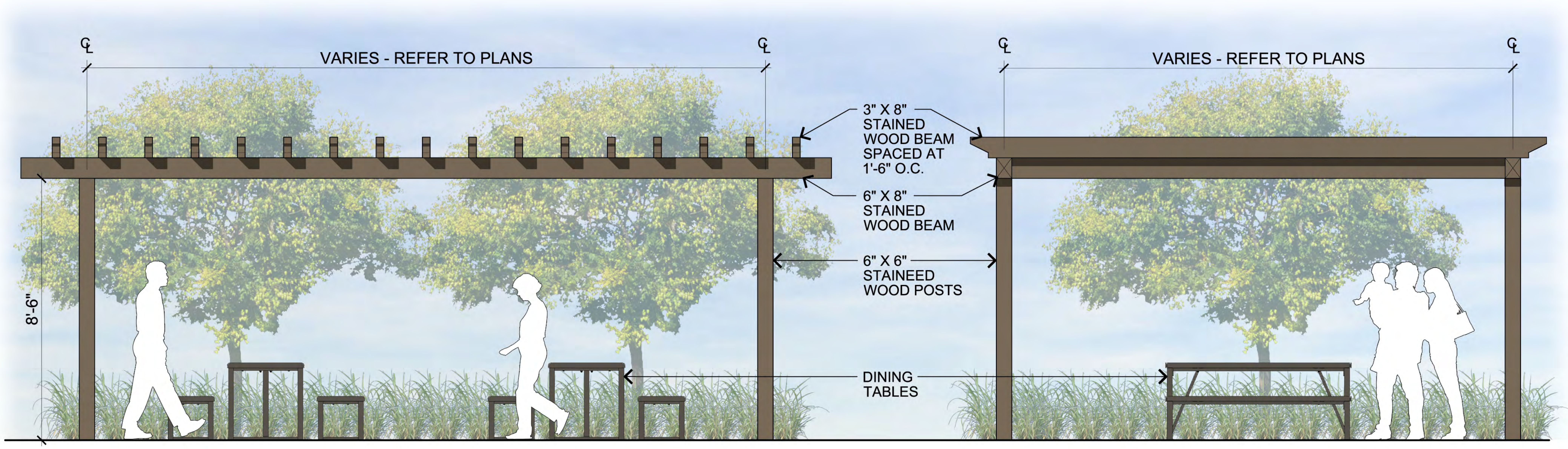
Site Amenities

L-9.1

THE VILLAGE AT 2092 OAKLEY ROAD Oakley, California

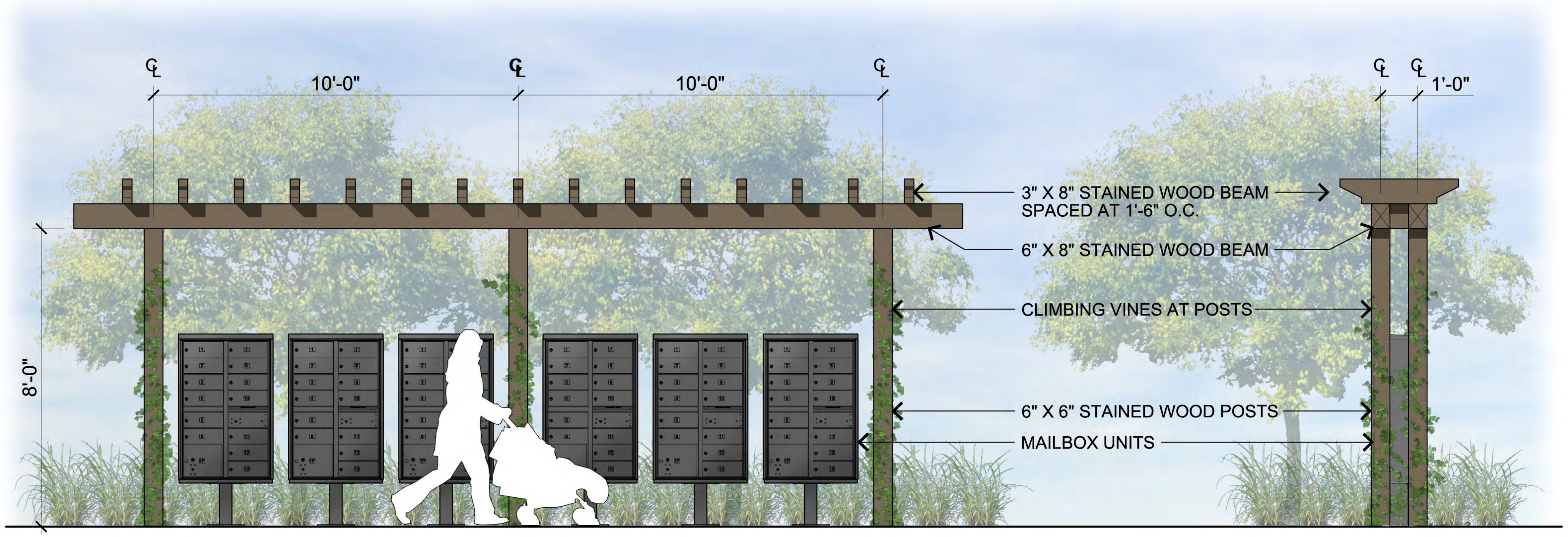
MARCH 8, 2023

R3 STUDIOS



STAINED WOOD PERGOLA

SCALE: 1/2" - 1'-0"



MAILBOX STATION

SCALE: 1/2" - 1'-0"

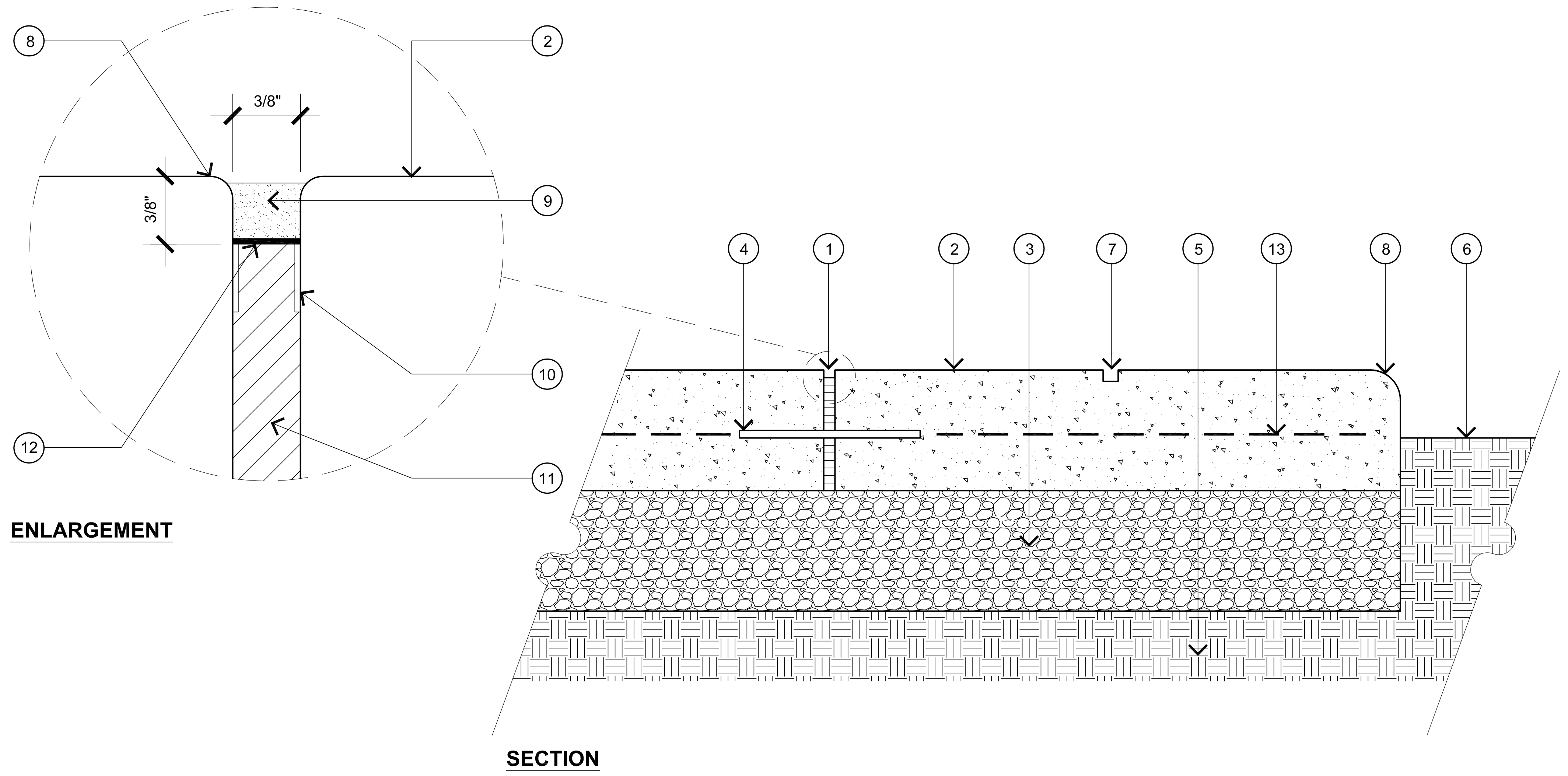
Site Amenities

L-9.2

THE VILLAGE AT 2092 OAKLEY ROAD Oakley, California

MARCH 8, 2023

R3 STUDIOS



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

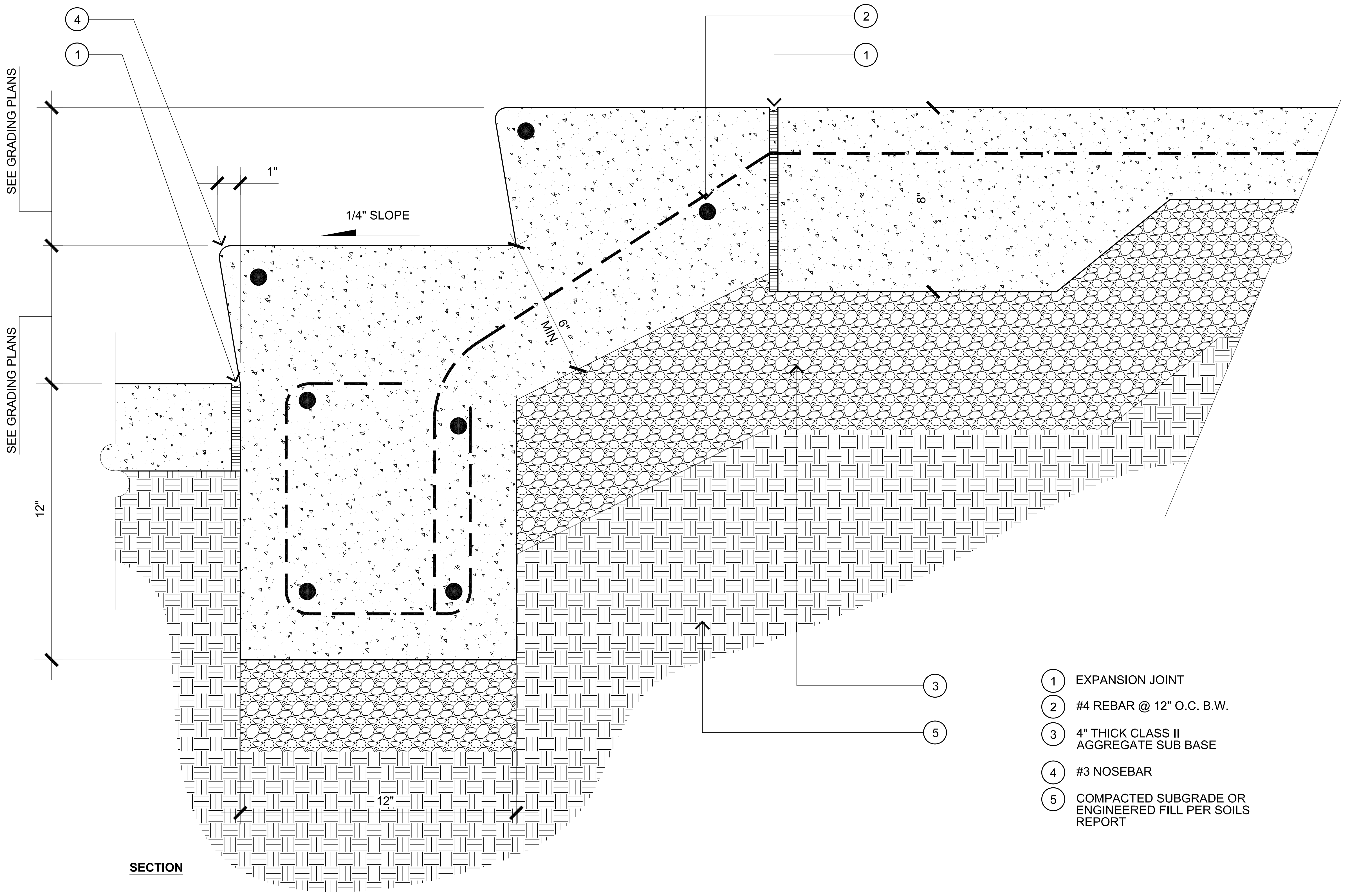
⑫ BOND BREAKER TAPE

⑬ #3 REBAR @ 18" O.C. BOTH WAYS

NOTE:
CONCRETE MIX SHALL BE LOW SHRINK.

① CONCRETE PAVING

SCALE : 3"=1'-0"



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)

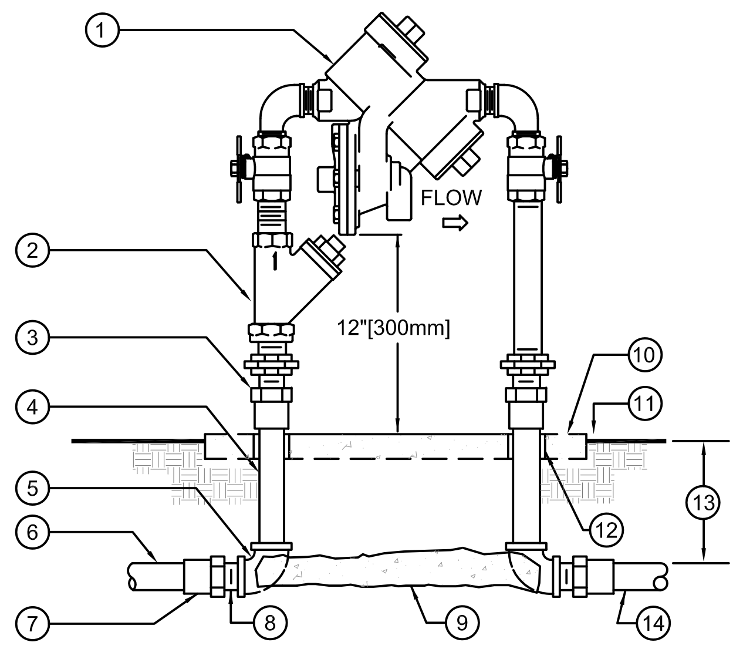
SCALE : 3"=1'-0"

Construction Details

L-10

THE VILLAGE AT 2092 OAKLEY ROAD Oakley, California

MARCH 8, 2023

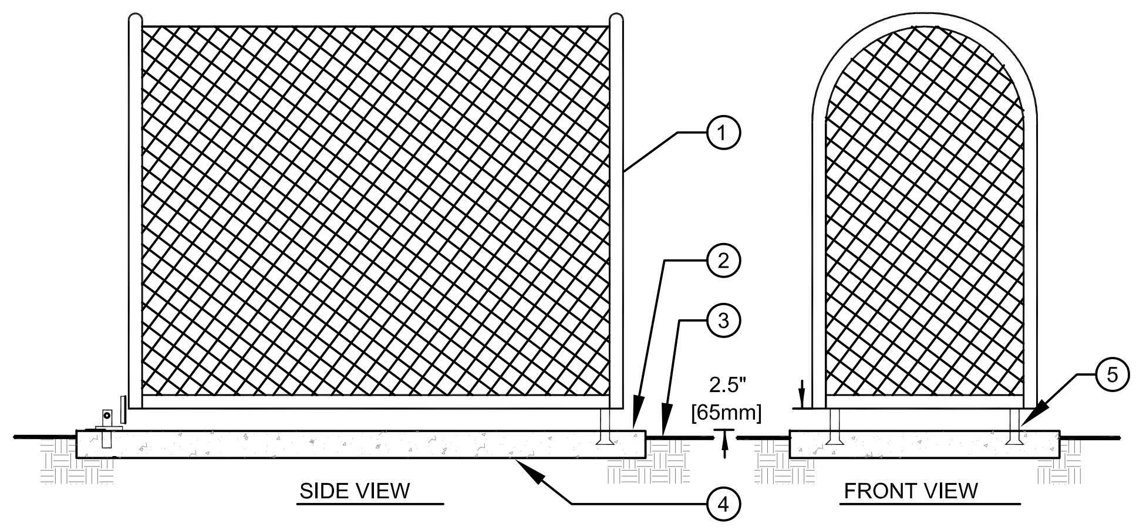


① REDUCED PRESSURE BACKFLOW ASSEMBLY.
② YB "Y" STRAINER SYSTEM (AS REQUIRED).
③ WROUGHT COPPER MALE ADAPTER-2 TOTAL (SOLDER x THREAD CONNECTION).
④ COPPER TYPE "K" PIPE (LENGTH AS REQUIRED).
⑤ WROUGHT COPPER 90° ELBOW-2 TOTAL (SOLDER x THREAD CONNECTION).
⑥ PVC MAIN LINE TO POINT OF CONNECTION.
⑦ BUSH 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

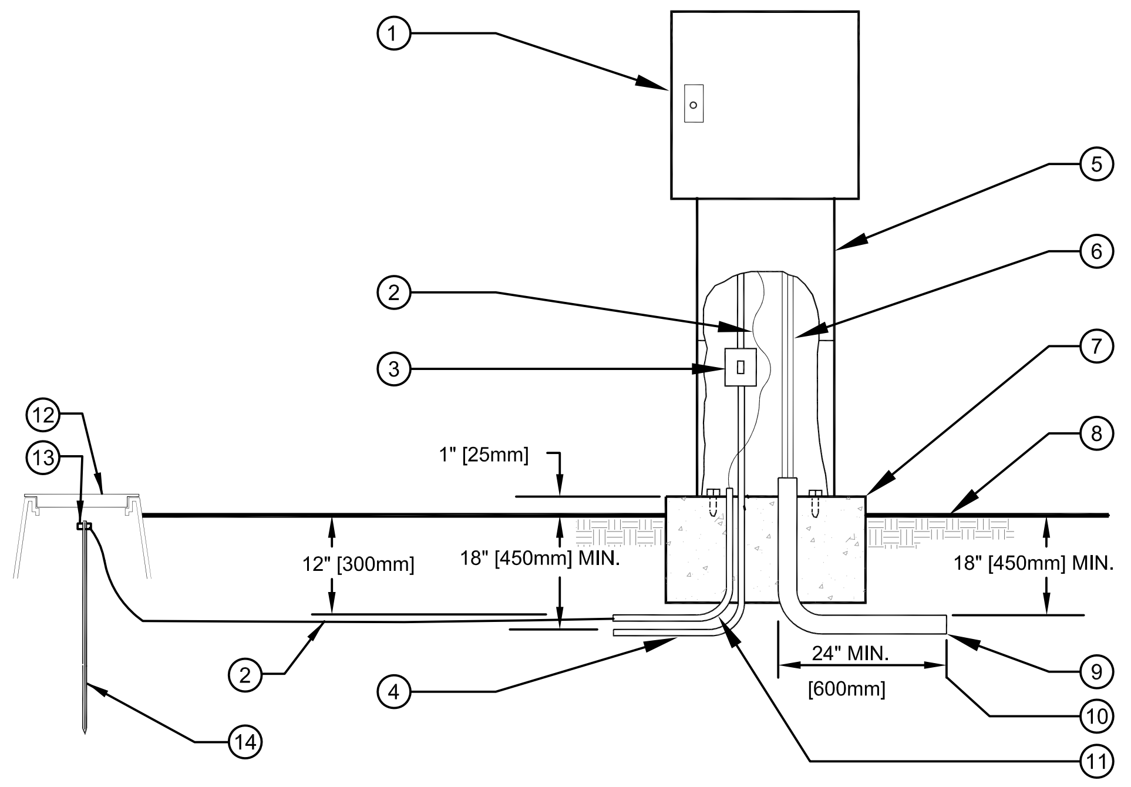
SCALE: NONE



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

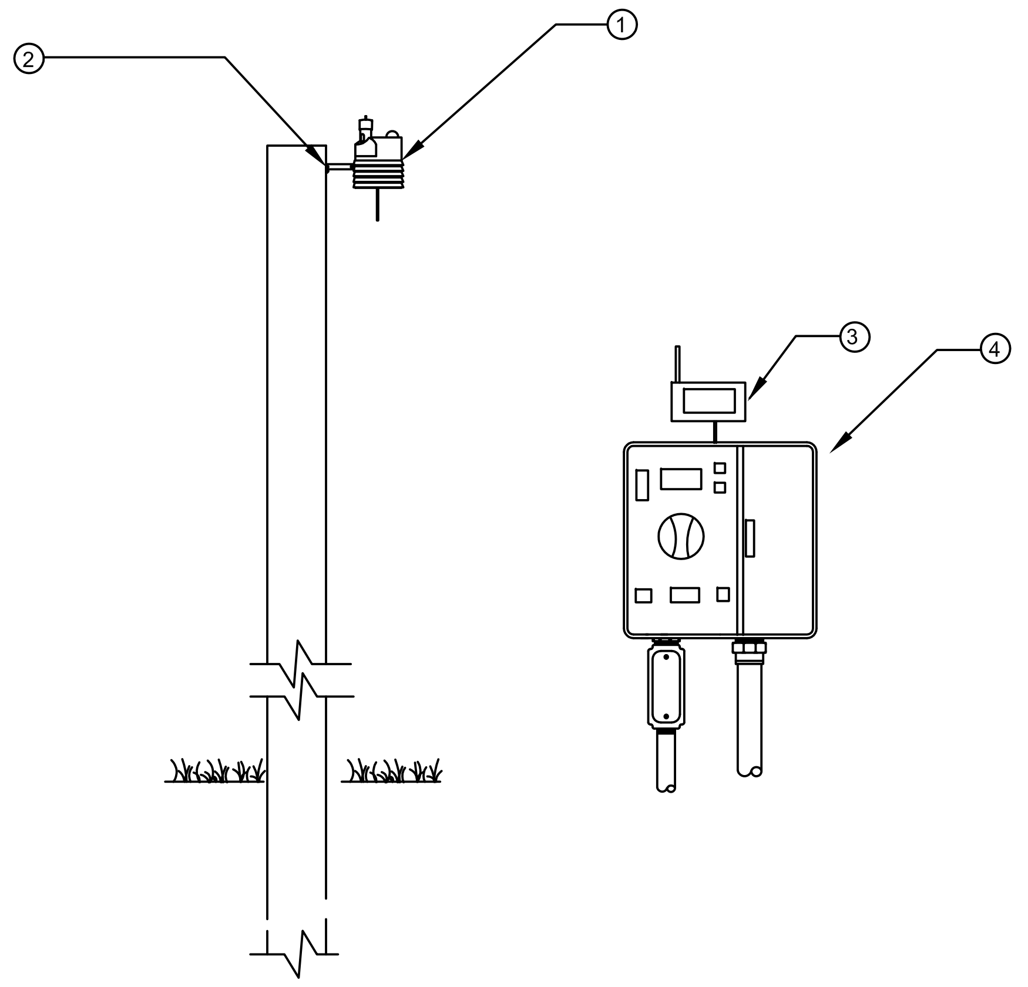
SCALE: NONE



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

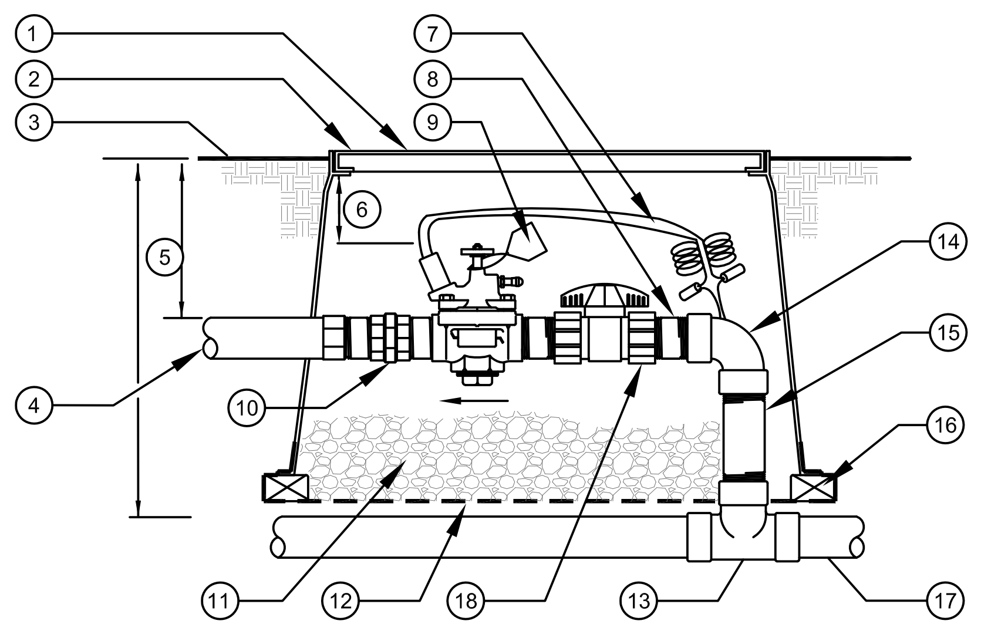


NOTE: MAXIMUM LINE OF SIGHT FROM SENSOR TO RECEIVER IS 1000 FT. DISTANCE IS LESS IF OBSTRUCTIONS EXIST. SENSOR MUST BE INSTALLED IN "CLEAR SPACE" WHERE IT IS EXPOSED TO UNOBSTRUCTED RAINFALL AND IS CLEAR OF IRRIGATION SPRAY.

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

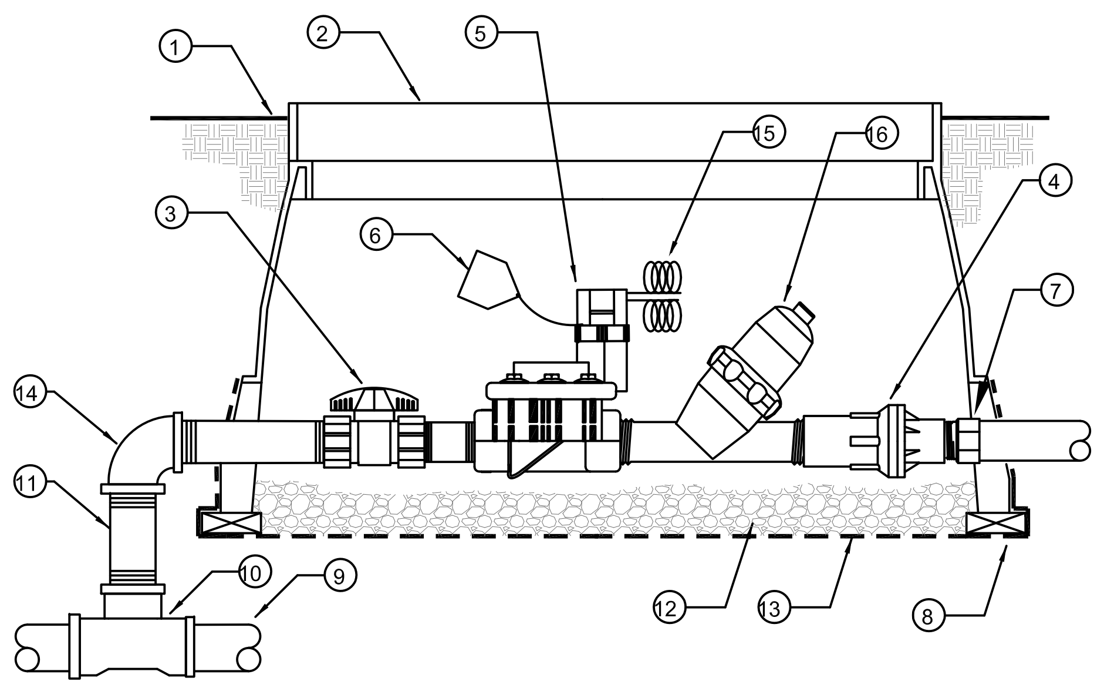
SCALE: NONE



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

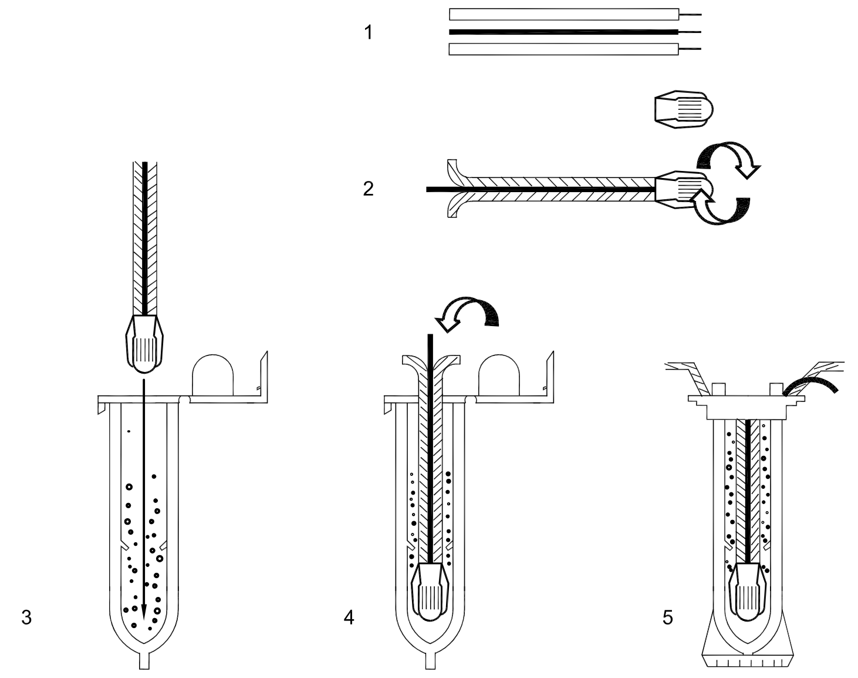
SCALE: NONE



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)

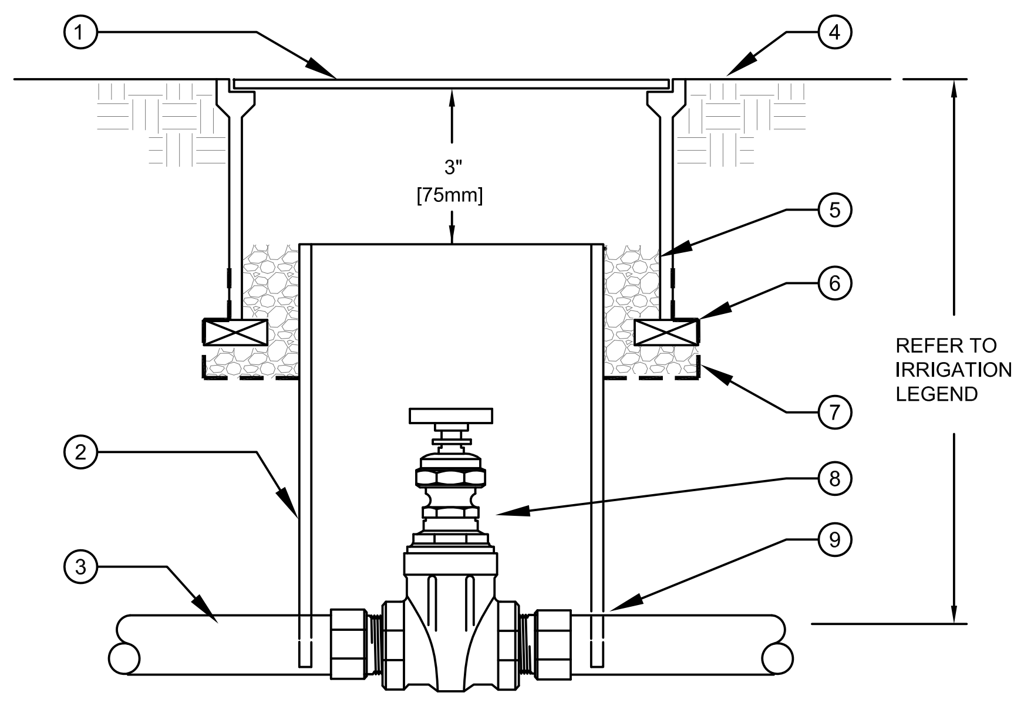
SCALE: NONE



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

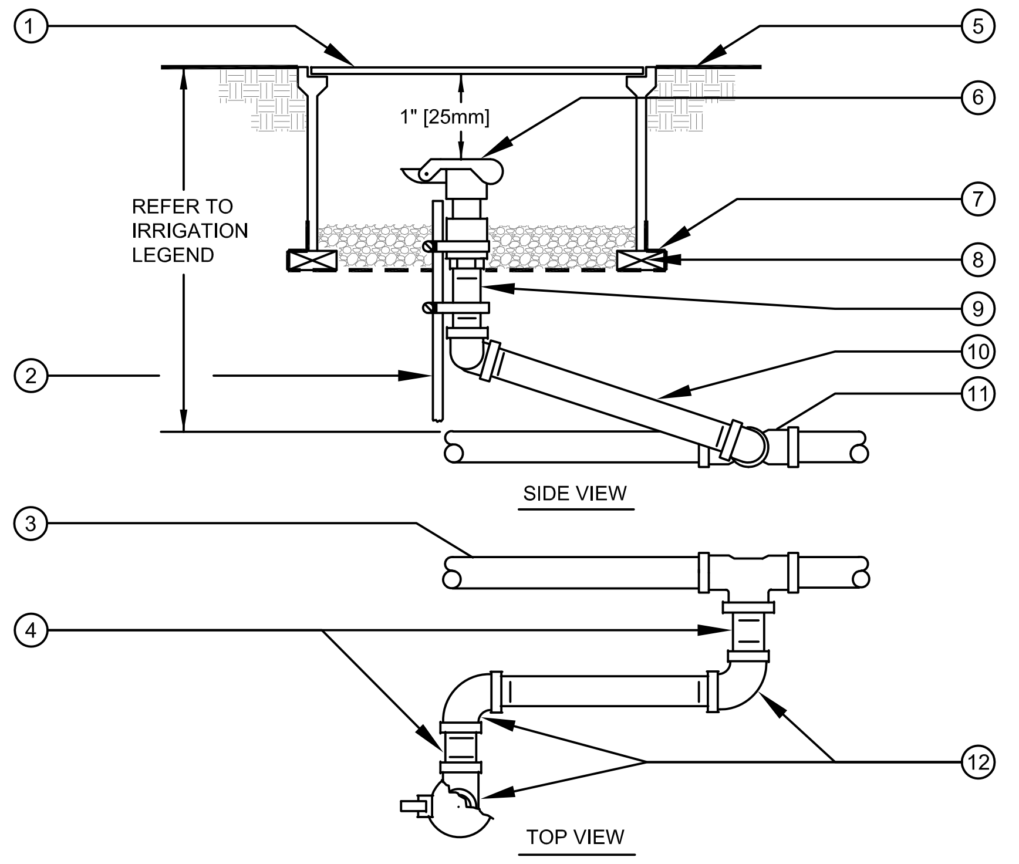
SCALE: NONE



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

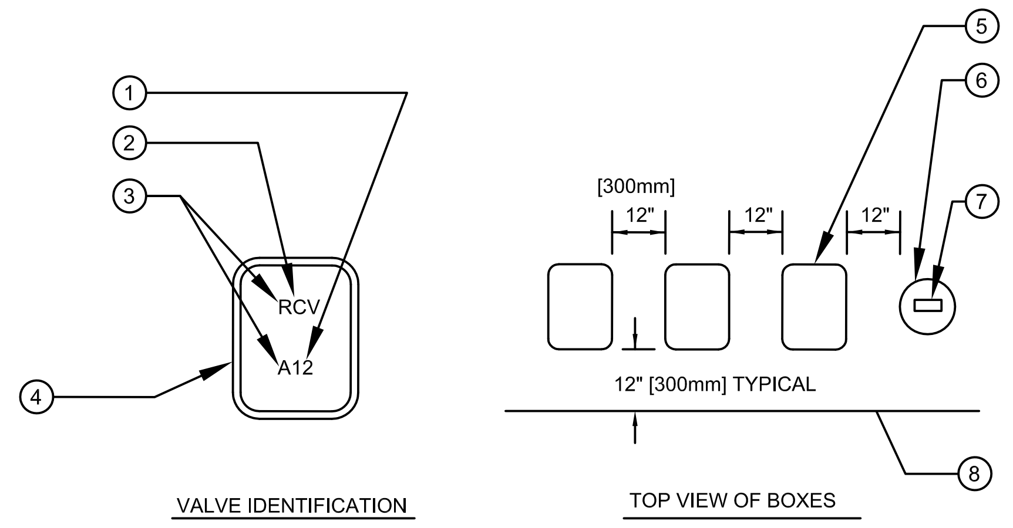


① 10" ROUND PLASTIC VALVE BOX WITH BOLT DOWN LID.
② 1 1/4" x 1 1/4" x 3/16" [30mm x 30mm x 5mm] ANGLE IRON 30" [760mm] LONG W/2 STAINLESS STEEL STRAPS (ONE AROUND QCV).
③ PVC MAIN LINE.
④ 3" [75mm] LONG SCHEDULE 80 PVC THREADED NIPPLE.
⑤ FINISH GRADE.
⑥ QUICK COUPLING VALVE.
⑦ 19 GAUGE 1/2" [13mm] SQUARE 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.

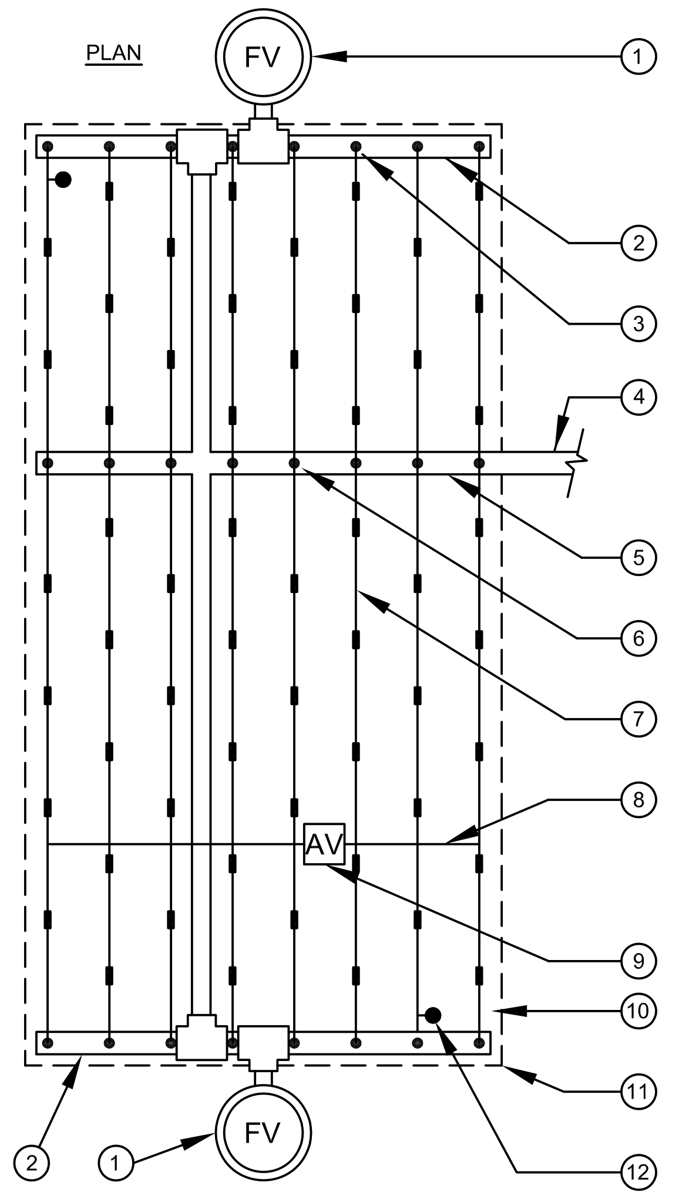
INSTRUCTIONS:
1. CENTER VALVE BOX OVER REMOTE CONTROL VALVE TO FACILITATE SERVICING VALVE.
2. SET BOXES 1" [25mm] ABOVE FINISH GRADE OR MULCH COVER IN GROUND COVER/SHRUB AREA AND FLUSH WITH FINISH GRADE IN TURF AREA.
3. SET RCV AND VALVE BOX ASSEMBLY IN GROUND COVER/SHRUB AREA WHERE POSSIBLE. INSTALL 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

Irrigation Details

L-11.1

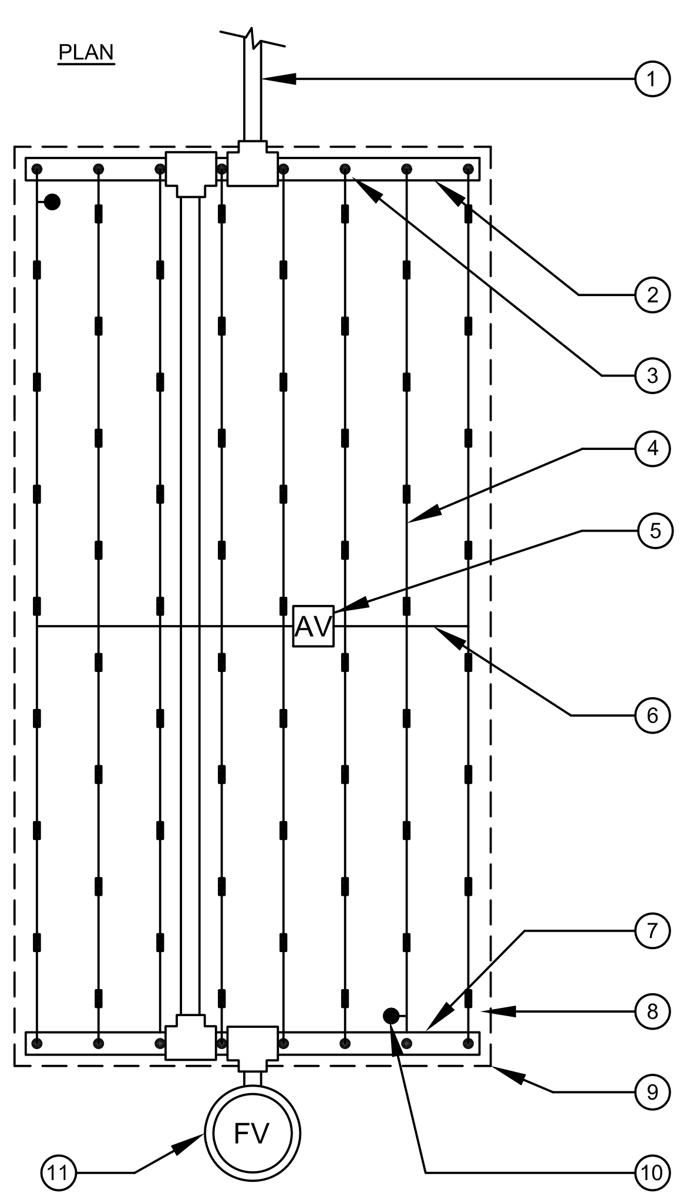


1. AUTOMATIC FLUSH VALVE PLUMBED TO FLUSH MANIFOLD AT LOW POINT
2. PVC FLUSH MANIFOLD. MINIMUM SIZE TO BE 1" UNLESS OTHERWISE NOTED.
3. MANIFOLD-TO-ELBOW CONNECTION (TYP).
4. PVC LATERAL LINE FROM VALVE. MINIMUM SIZE TO BE 1" UNLESS OTHERWISE NOTED.
5. PVC SUPPLY MANIFOLD.
6. MANIFOLD-TO-TEE CONNECTION.
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

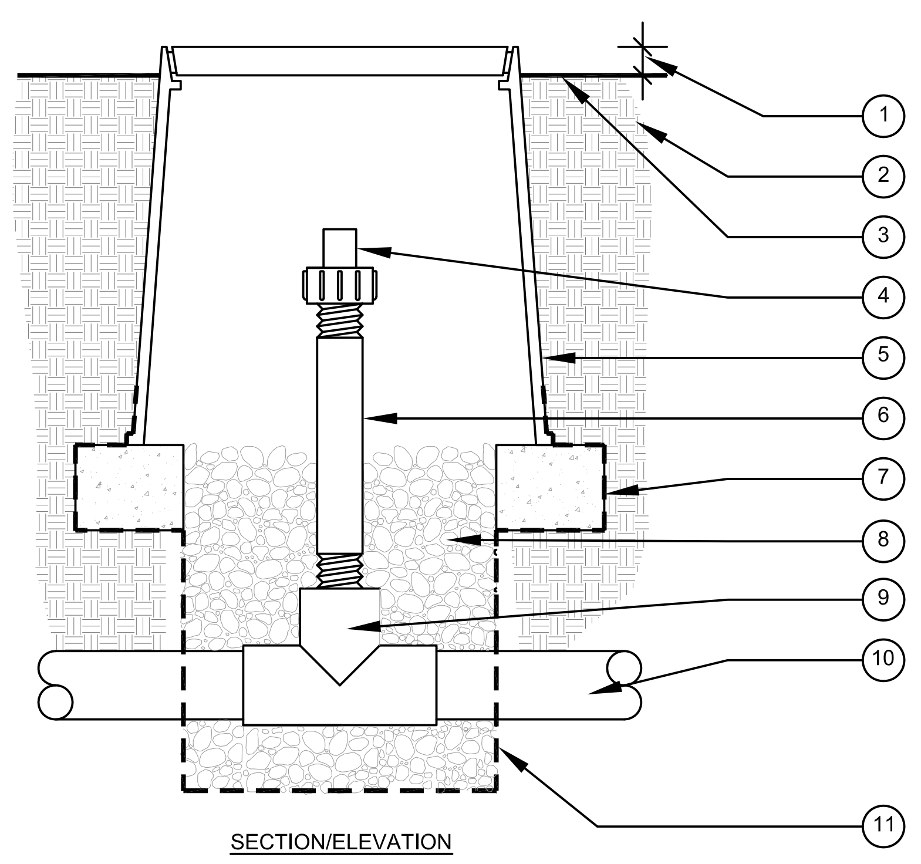


1. PVC LATERAL LINE FROM VALVE. MINIMUM SIZE TO BE 1" UNLESS OTHERWISE NOTED.
2. PVC FLUSH MANIFOLD. MINIMUM SIZE TO BE 1" UNLESS OTHERWISE NOTED.
3. MANIFOLD-TO-ELBOW CONNECTION (TYP).
4. DRIPLINE LATERAL.
5. AIR/VACUUM RELIEF VALVE PLUMBED TO BLANK 5/8" [16mm] TUBING AT EACH HIGH POINT.
6. AIR/VACUUM 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



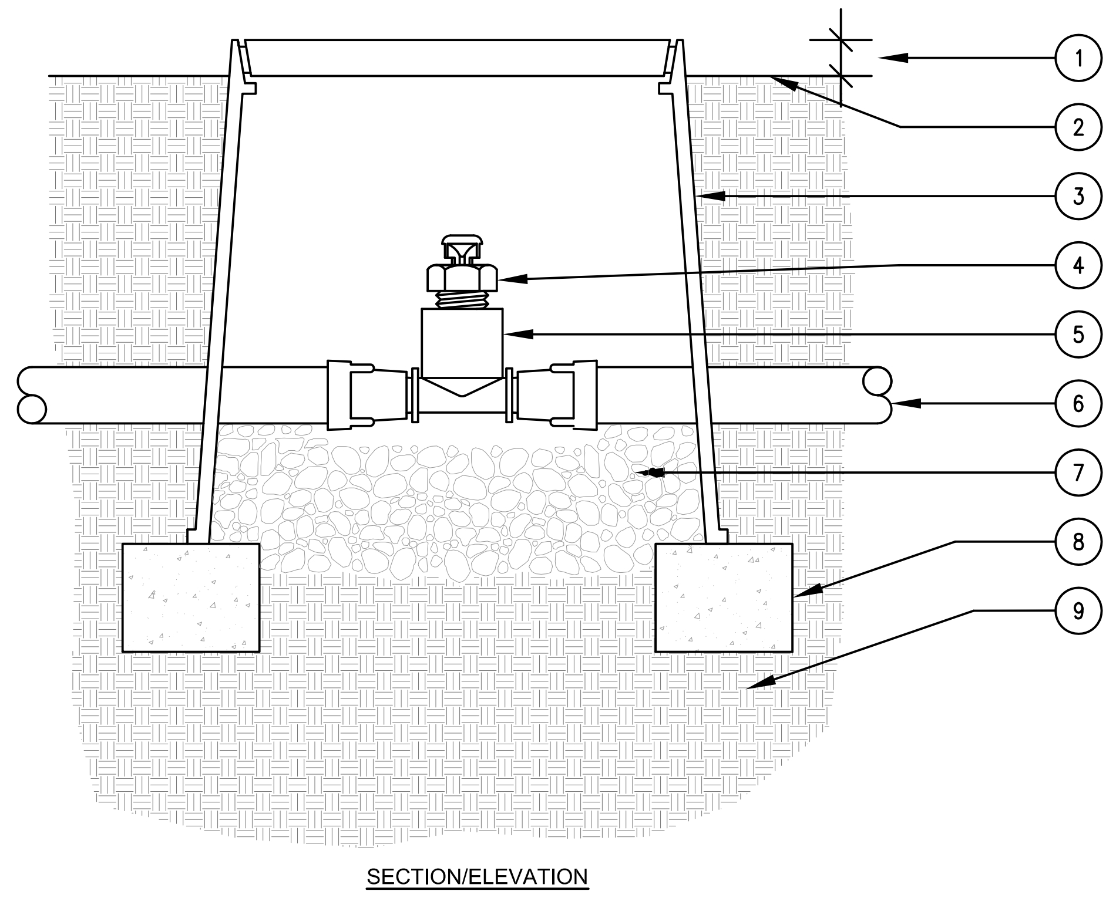
SECTION/ELEVATION

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



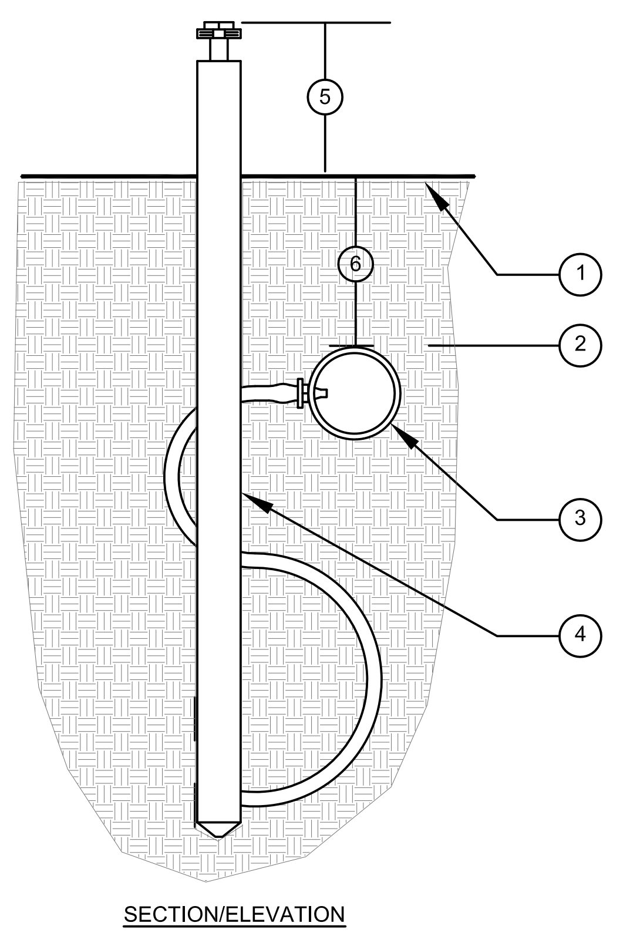
SECTION/ELEVATION

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

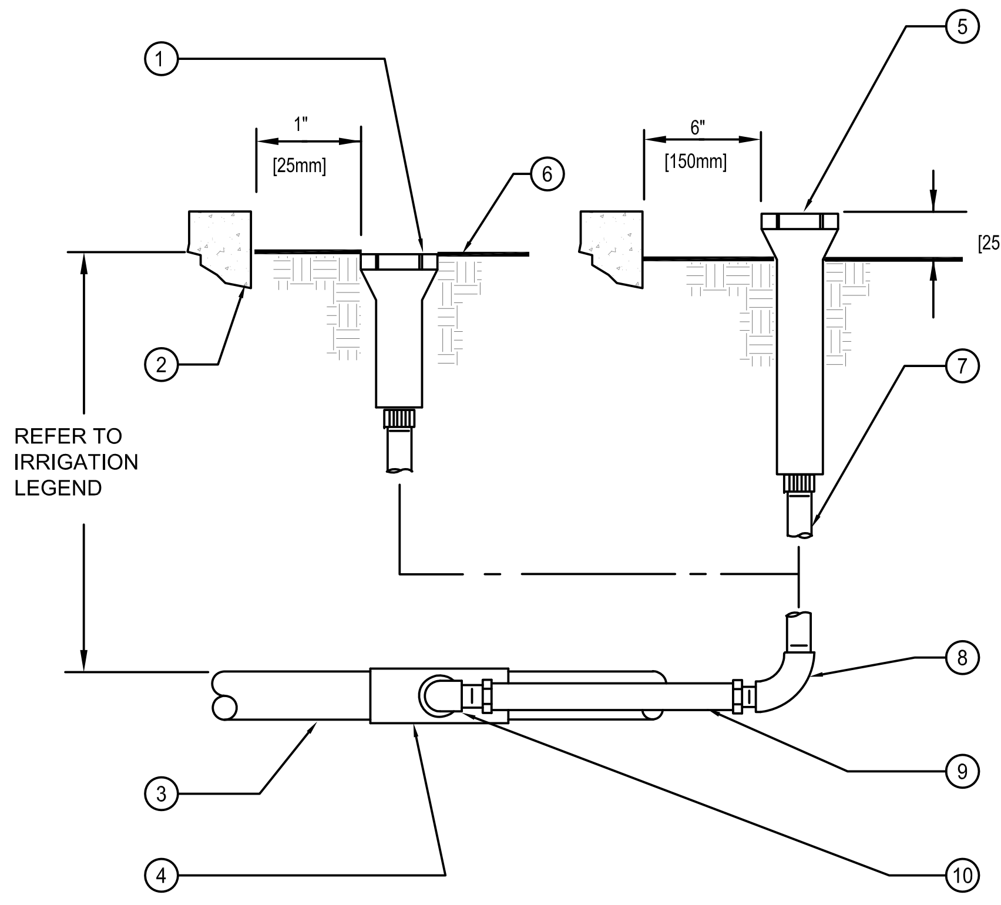


SECTION/ELEVATION

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

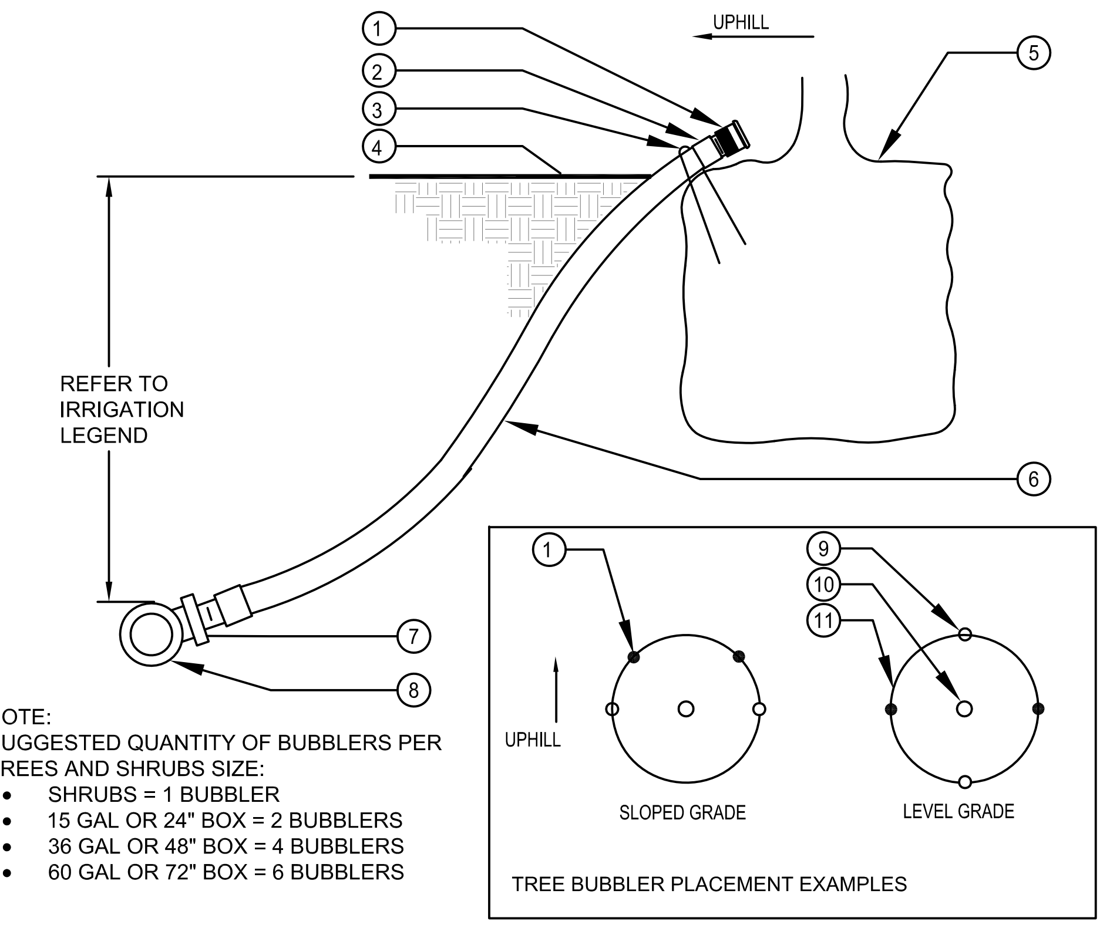
SCALE: NONE



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



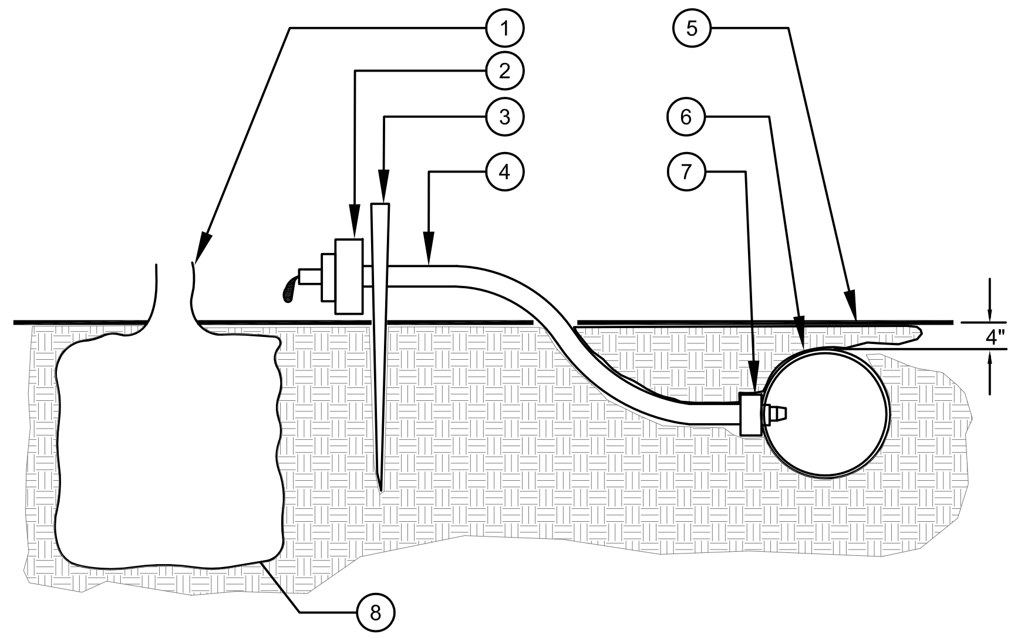
TREE BUBBLER PLACEMENT EXAMPLES

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 <u>TOP</u> 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

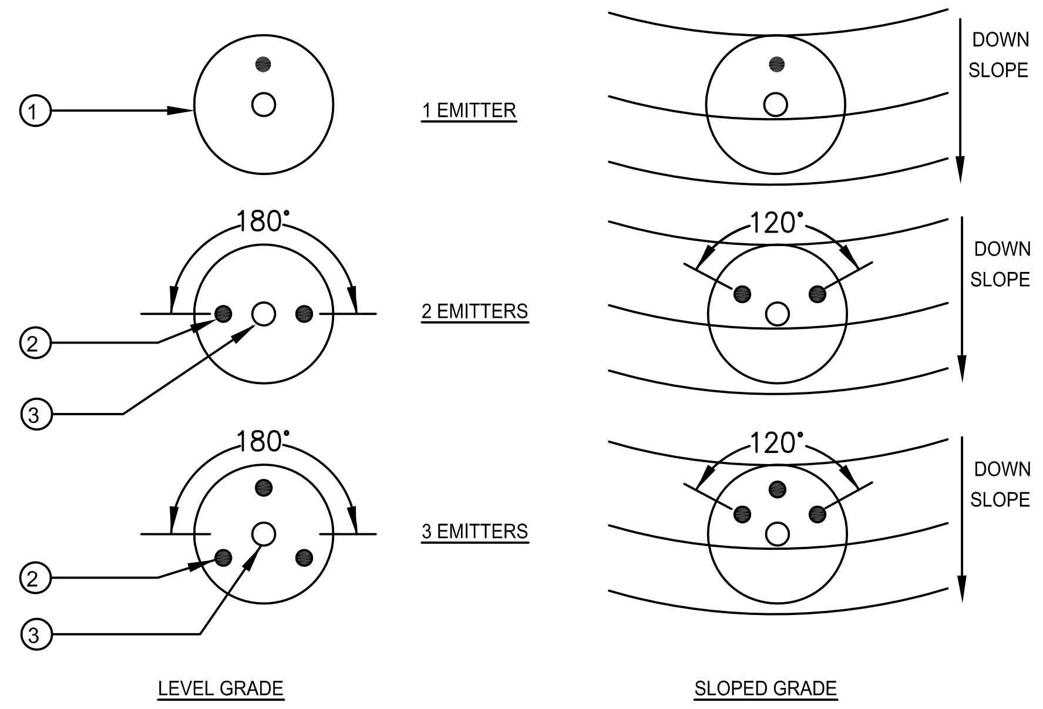


NOTE:
TO INSERT BARBED CONNECTOR INTO POLYETHYLENE TUBING, USE INSERTION TOOL. WHERE POLYETHYENE TUBING CAN BE PLACED ADJACENT TO SHRUB ROOTBALL, A BARBED EMITTER MAY BE INSTALLED DIRECTLY INTO POLYETHYENE TUBING AND DISTRIBUTION TUBING ELIMINATED. POINT OF WATER EMISSION FROM BARBED EMITTER MUST DRIP 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

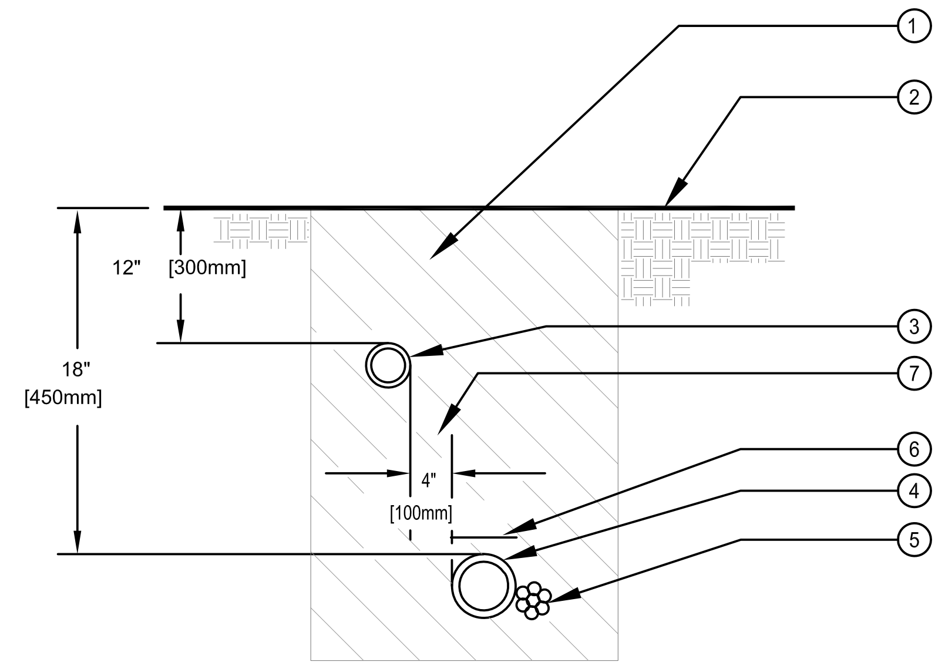
PLANT SIZE	EMITTER SPECIFACATION	FLOW (GPH)/PER EMITTER OR OUTLET	QUANTITY OF EMITTERS PER SHRUB/TREE
1 GALLON SHRUBS	USE SLV-PS-CV-1	1 GPH	2
5 GALLON SHRUBS	USE SLV-PS-CV-2	2 GPH	2
15 GALLON	USE SLV-PS-CV-2	2 GPH	3

MAXIMUM AMOUNT OF FLOW PER DRIP TUBING RUN IS <u>240</u> 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

Irrigation Details

L-11.2

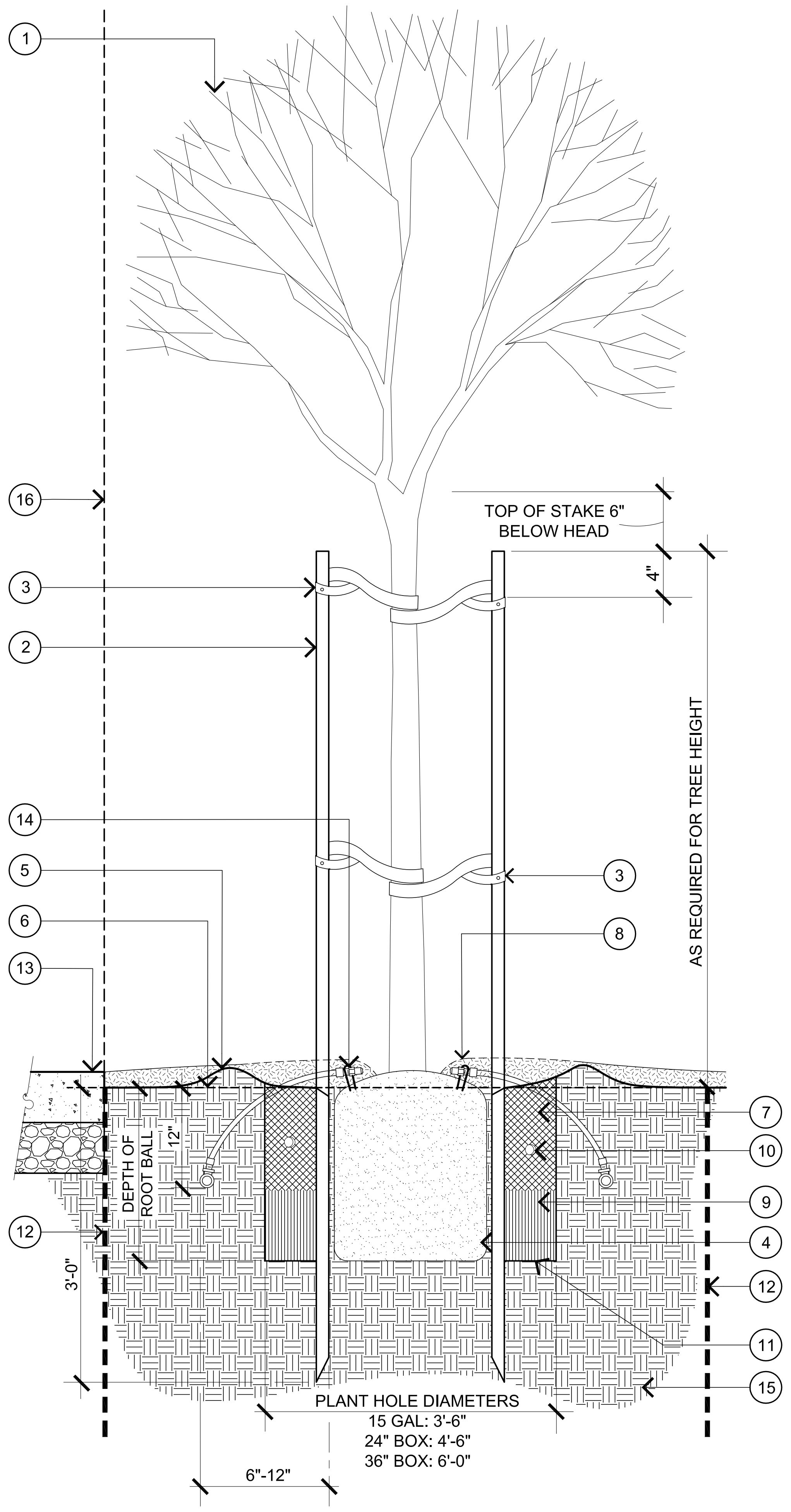
THE VILLAGE AT 2092 OAKLEY ROAD Oakley, California

MARCH 8, 2023

R3 STUDIOS

1 TREE STAKING

N.T.S.



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

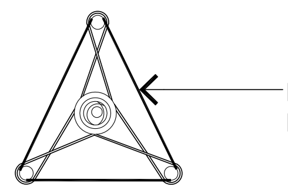
⑭ 1/4 GPM IRRIGATION BUBBLER, OFFSET FROM TREE TUCKED TO ROOTBALL

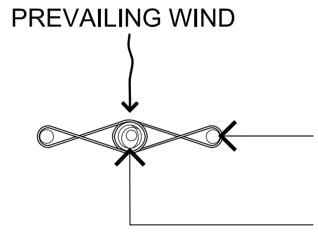
⑮ COMPACTED SUBGRADE OR ENGINEERED FILL PER SOILS REPORT

⑯ BUILDING OR WALL

NOTES:

ALL PLANTING AREAS TO BE TREATED WITH PRE-EMERGENT.





2 GROUNDCOVER PLANTING

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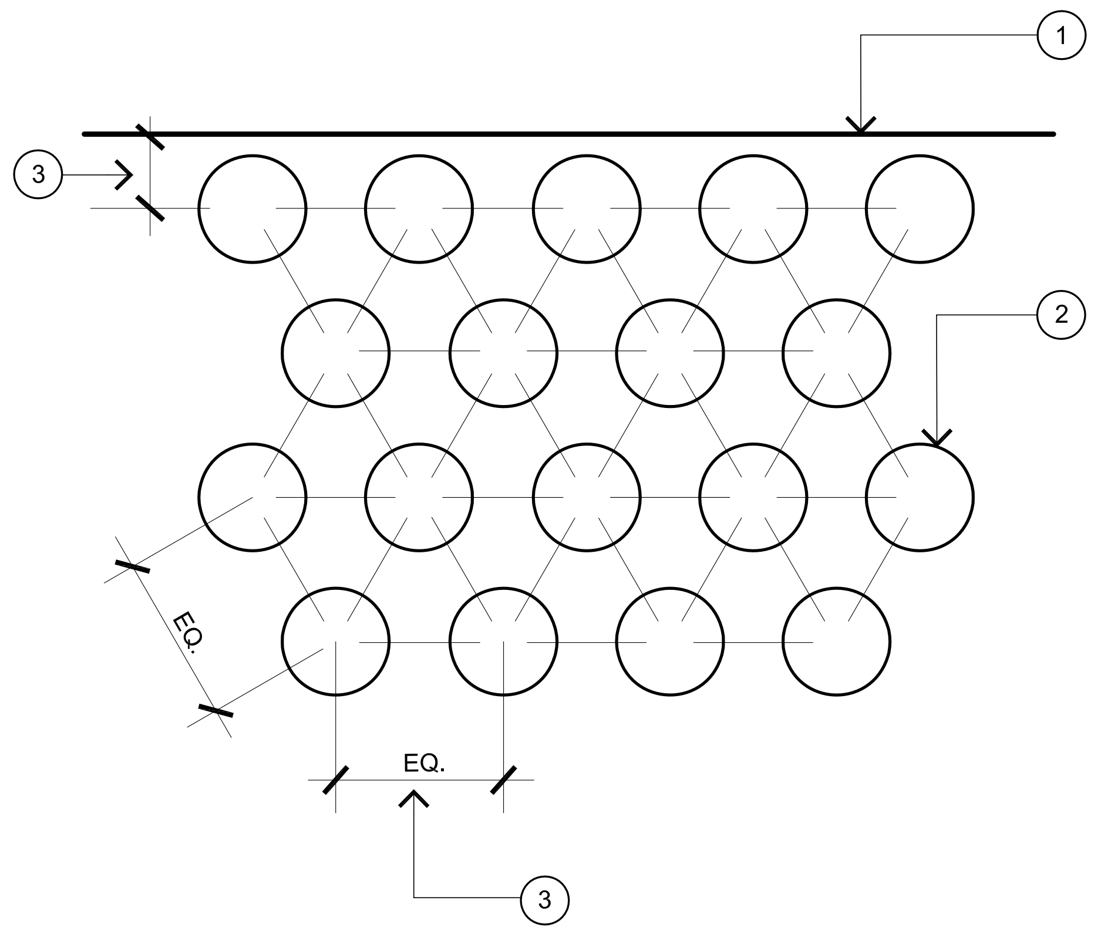


① EDGE OF PAVING, HEADER, FACE OF BUILDING, WALL, ETC.

② GROUNDCOVER OR SHRUB: REFER TO PLANTING PLAN FOR LOCATION AND PLANTING LEGEND FOR SPECIES

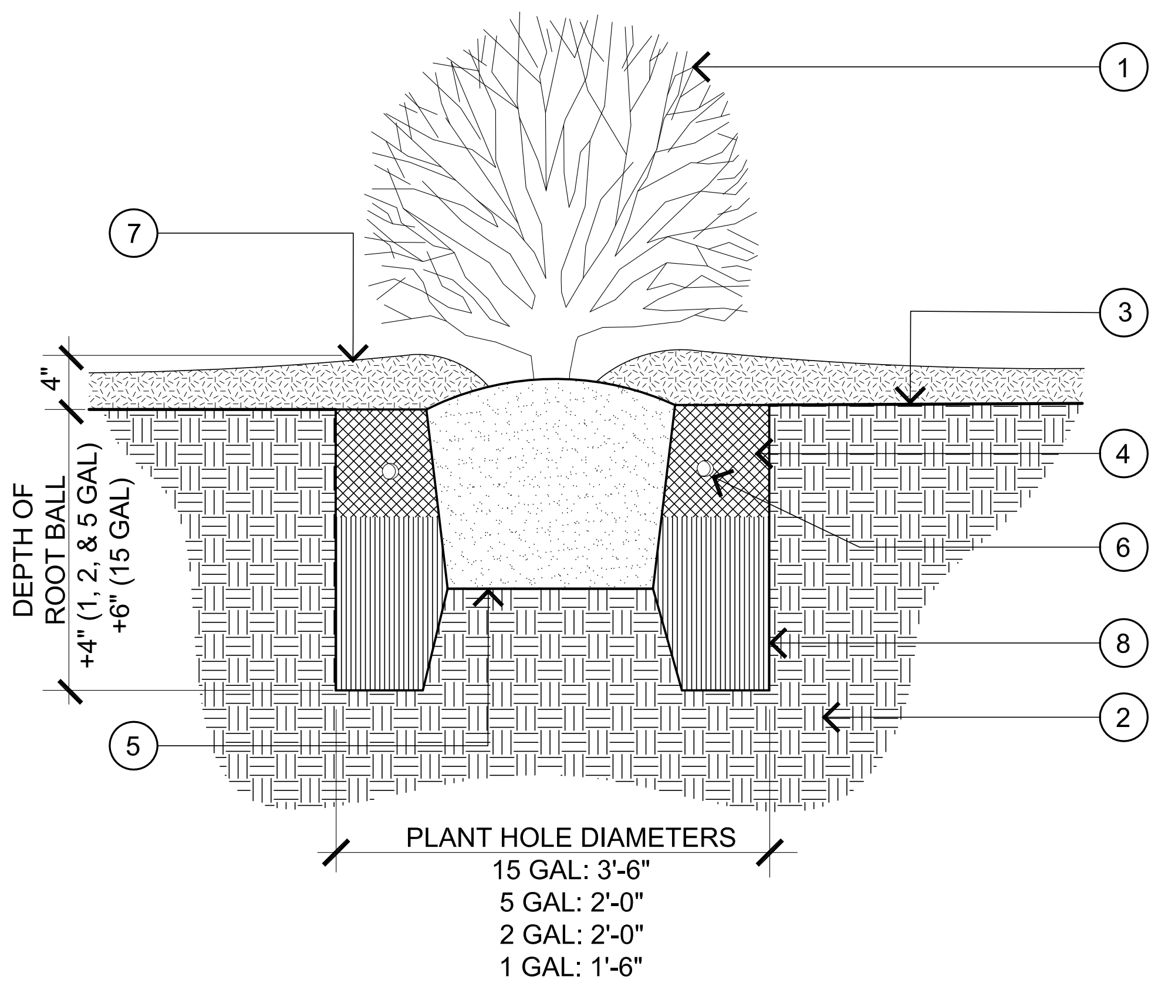
③ GROUNDCOVER AND SHRUB SPACING PER PLANTING PLAN AND LEGEND

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

3 SHRUB 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

Planting Details

L-12

THE VILLAGE AT 2092 OAKLEY ROAD Oakley, California

MARCH 8, 2023

3 STUDIOS

399.203

The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

CONCEPTUAL OAKLEY ROAD PERSPECTIVE
A00

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The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

CONCEPTUAL STREETSCENE

A0.1

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PASEO VIEW

ENTRY OPEN SPACE

CONCEPTUAL PERSPECTIVES

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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

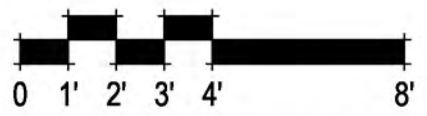
FARMHOUSE ELEVATION

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



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PLAN 1 FRONT ELEVATIONS
A01

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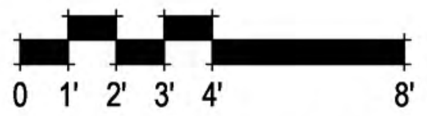
SPANISH REAR ELEVATION

SPANISH RIGHT ELEVATION

SPANISH LEFT ELEVATION

SPANISH FRONT ELEVATION



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PLAN 1 SPANISH EXTERIOR ELEVATIONS
A02

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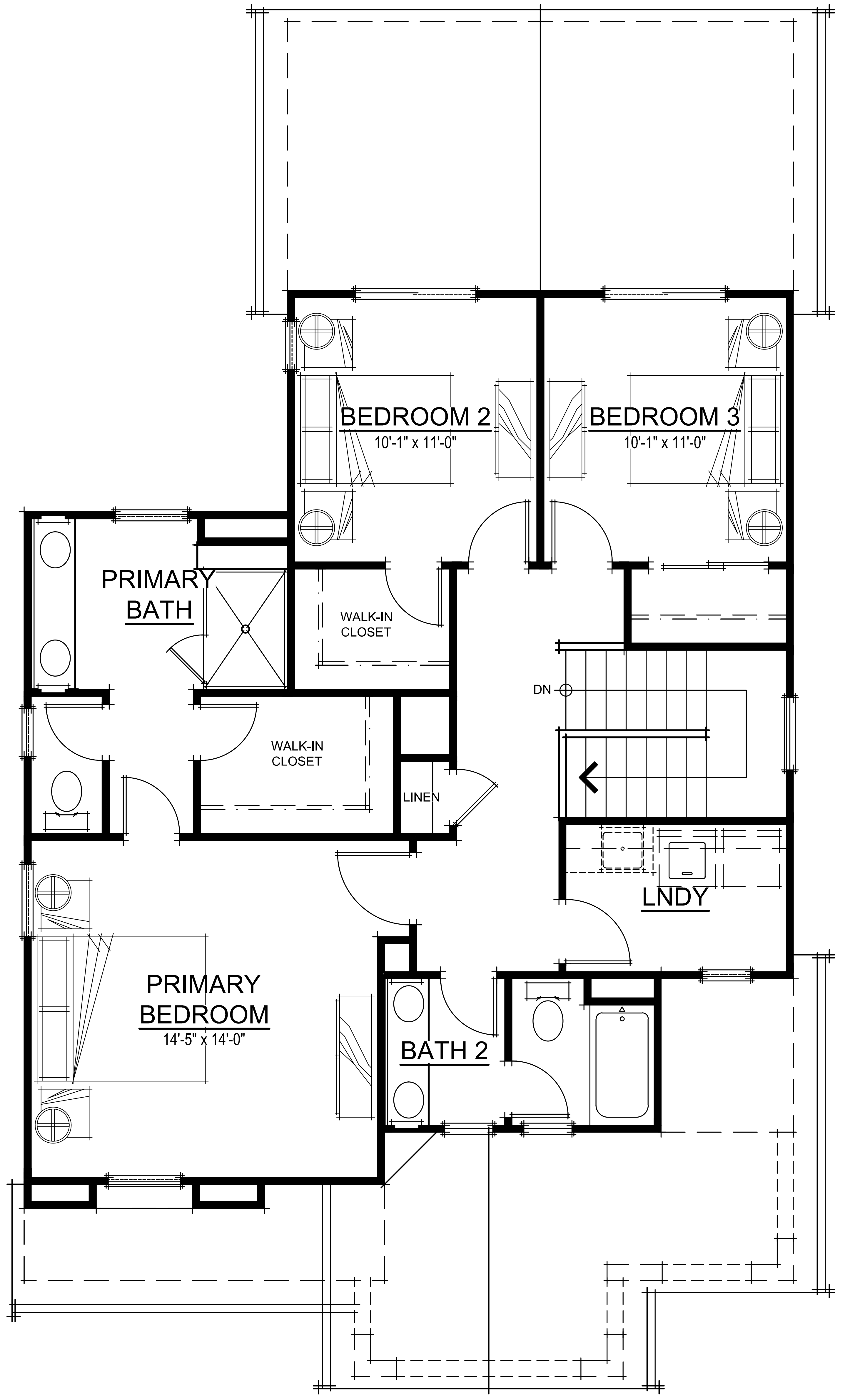
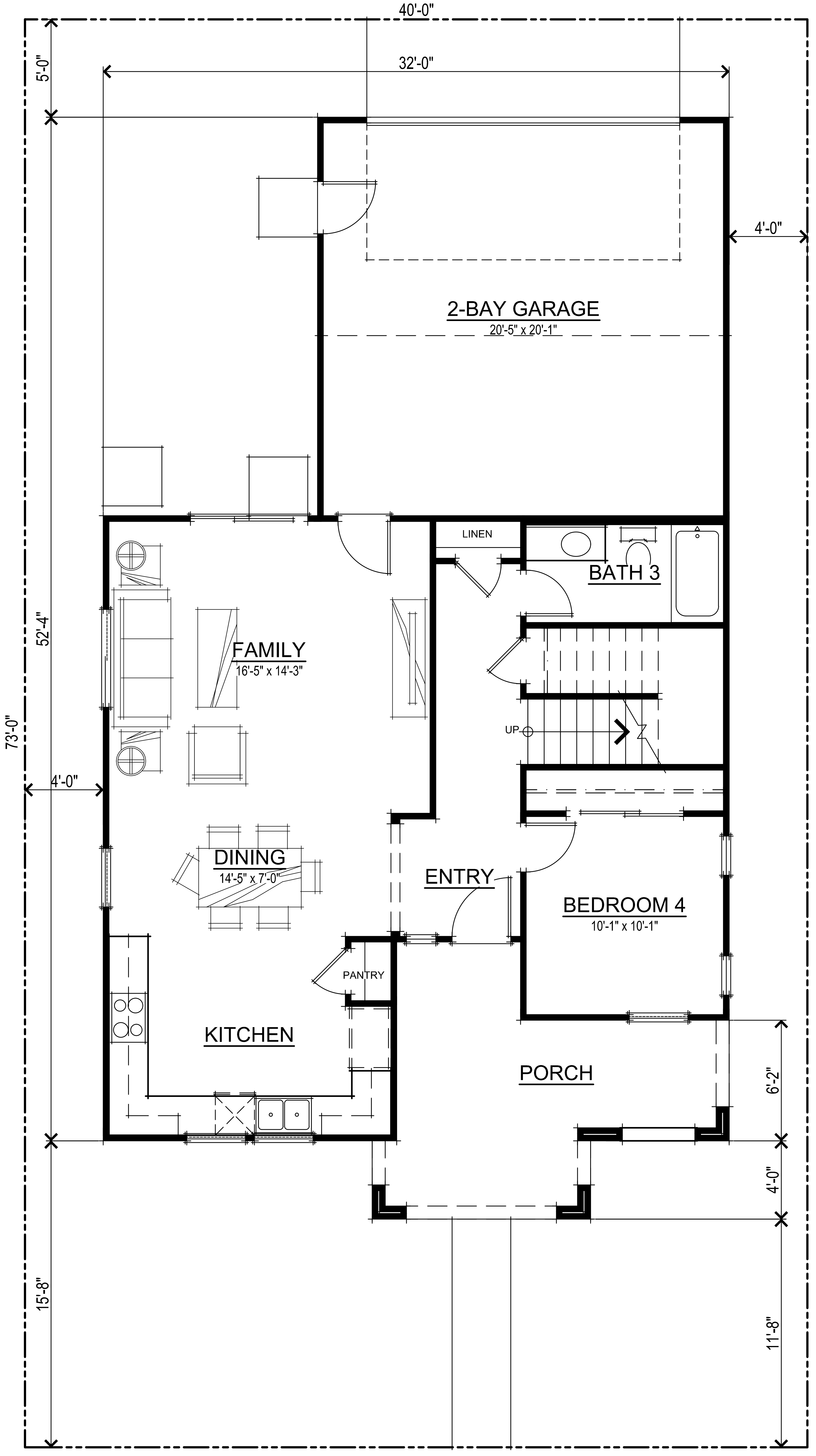
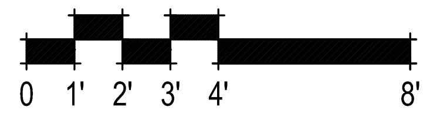


SECOND FLOOR PLAN



FIRST FLOOR PLAN



SQUARE FOOTAGES	
FIRST FLOOR	892 SQ. FT.
SECOND FLOOR	956 SQ. FT.
TOTAL LIVING	1848 SQ. FT.
2-BAY GARAGE	429 SQ. FT.

PLAN 1 SPANISH FLOOR PLANS
A03

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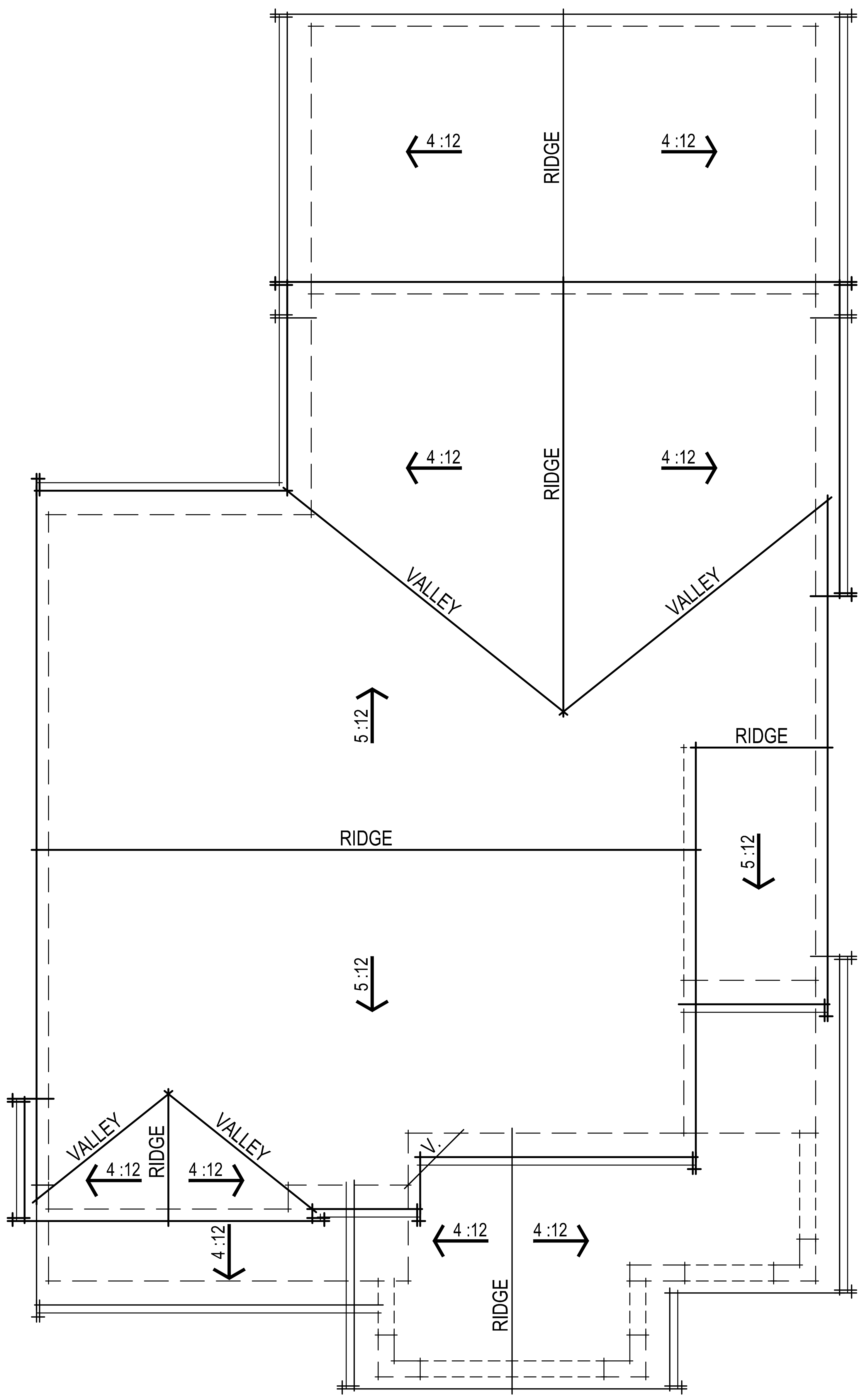

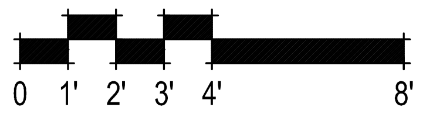

SPANISH ROOF PLAN

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March 8, 2023

PLAN 1 SPANISH ROOF PLAN
A04

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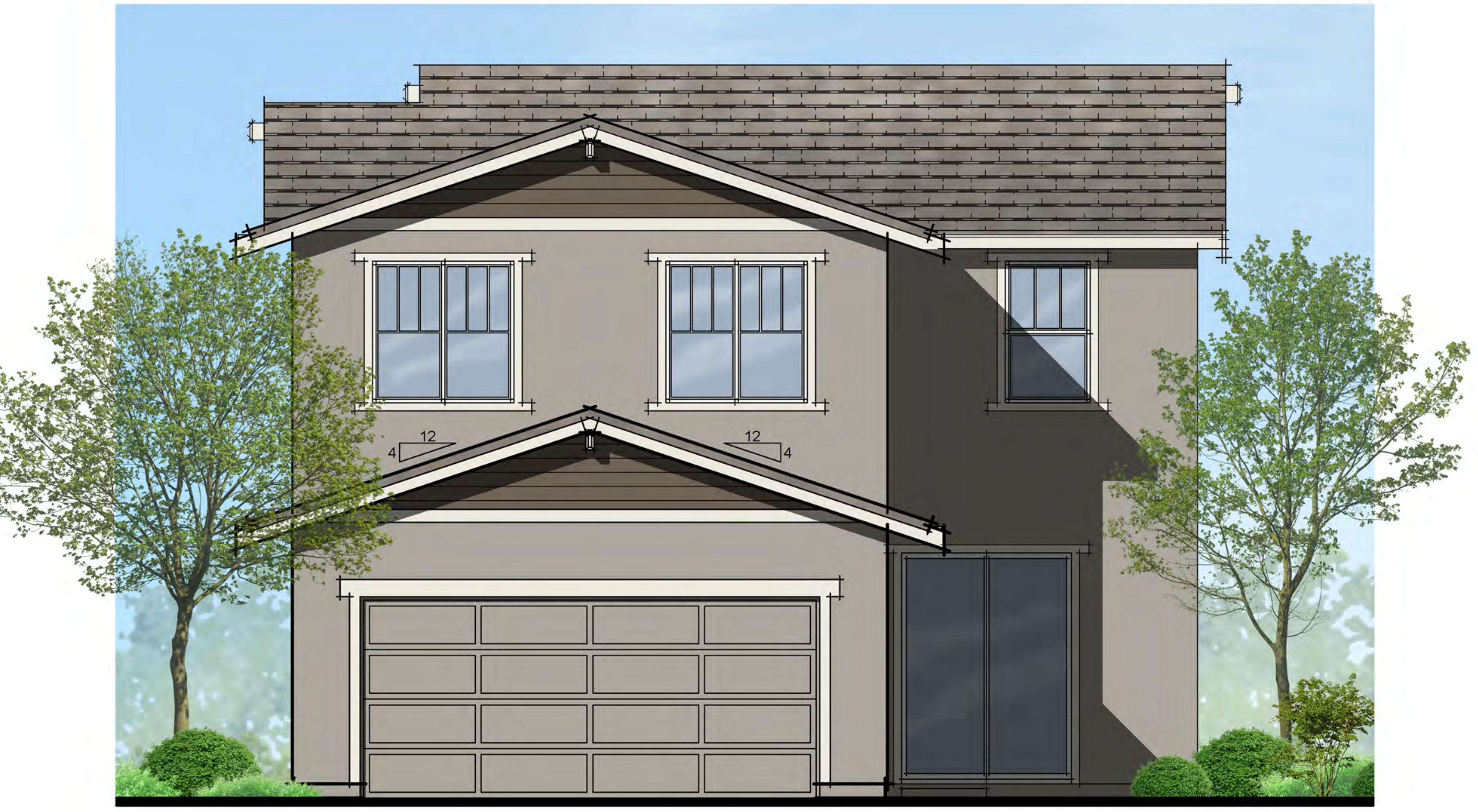
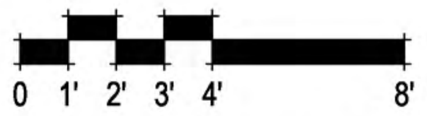


BUNGALOW REAR ELEVATION

BUNGALOW RIGHT ELEVATION

BUNGALOW LEFT ELEVATION

BUNGALOW FRONT ELEVATION



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March 8, 2023

PLAN 1 BUNGALOW EXTERIOR ELEVATIONS
A05

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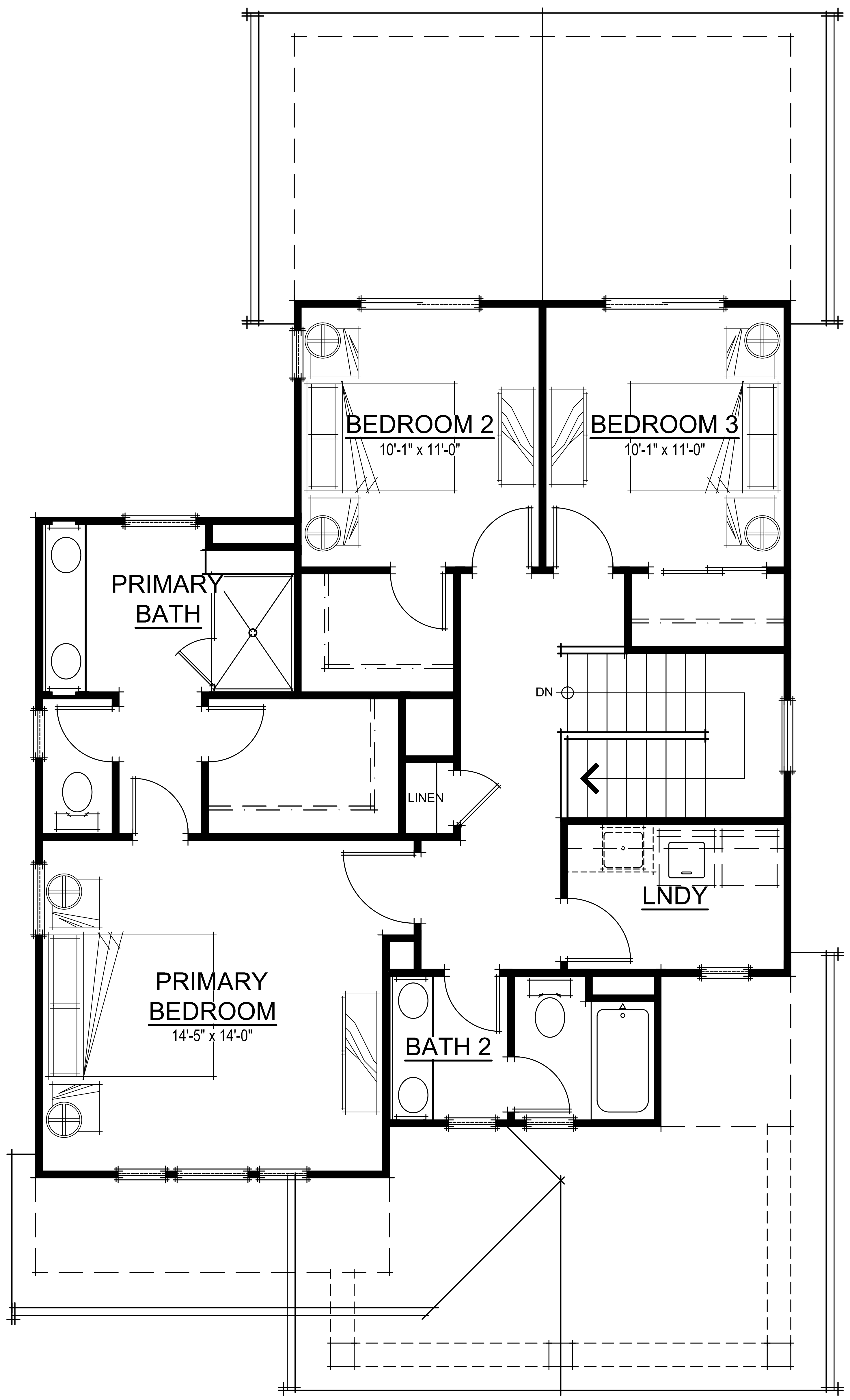
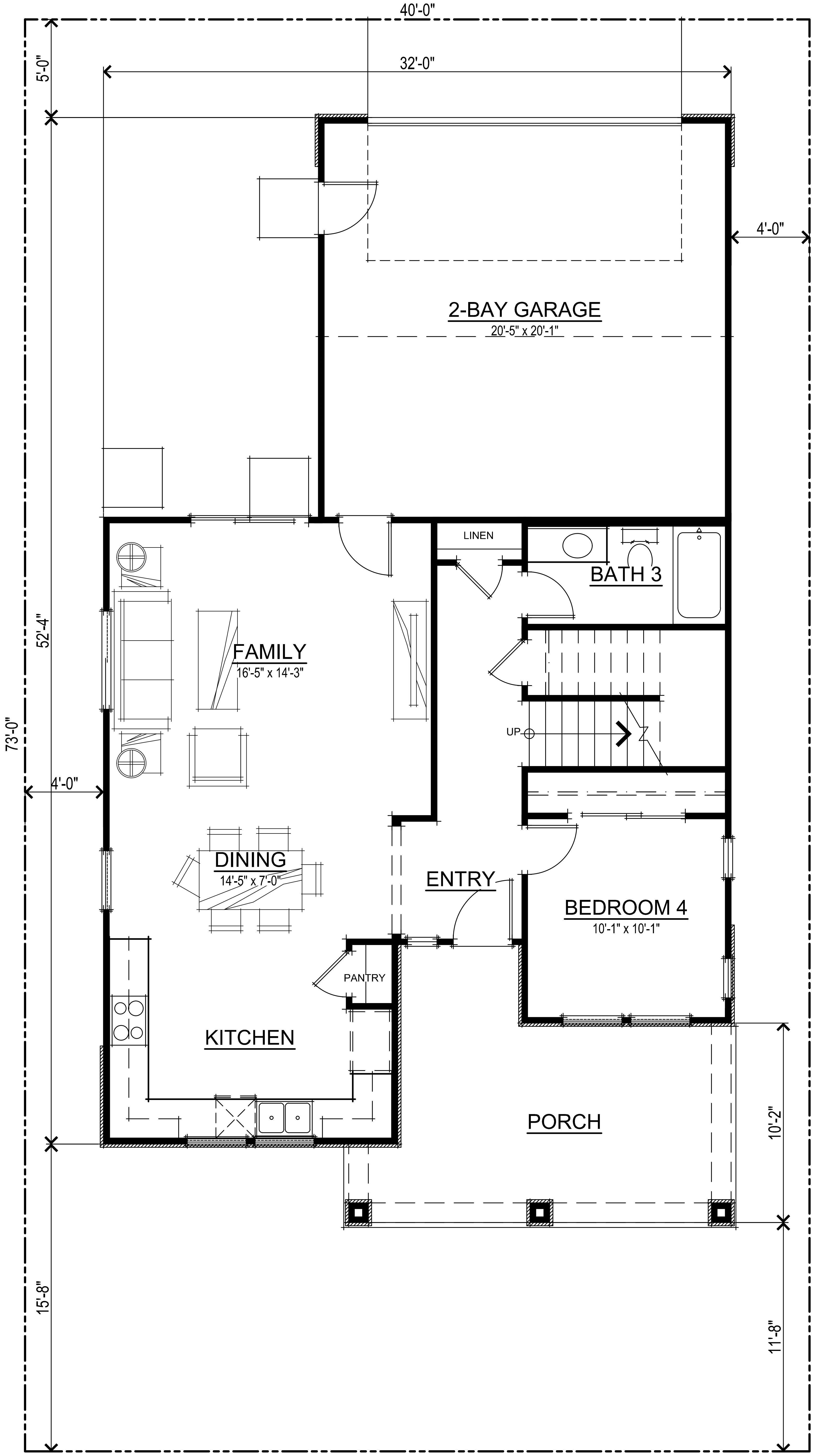
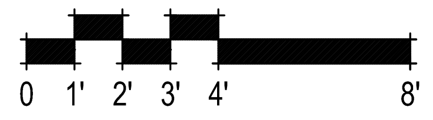


SECOND FLOOR PLAN



FIRST FLOOR PLAN



SQUARE FOOTAGES	
FIRST FLOOR	892 SQ. FT.
SECOND FLOOR	956 SQ. FT.
TOTAL LIVING	1848 SQ. FT.
2-BAY GARAGE	429 SQ. FT.

PLAN 1 BUNGALOW FLOOR PLANS
A06

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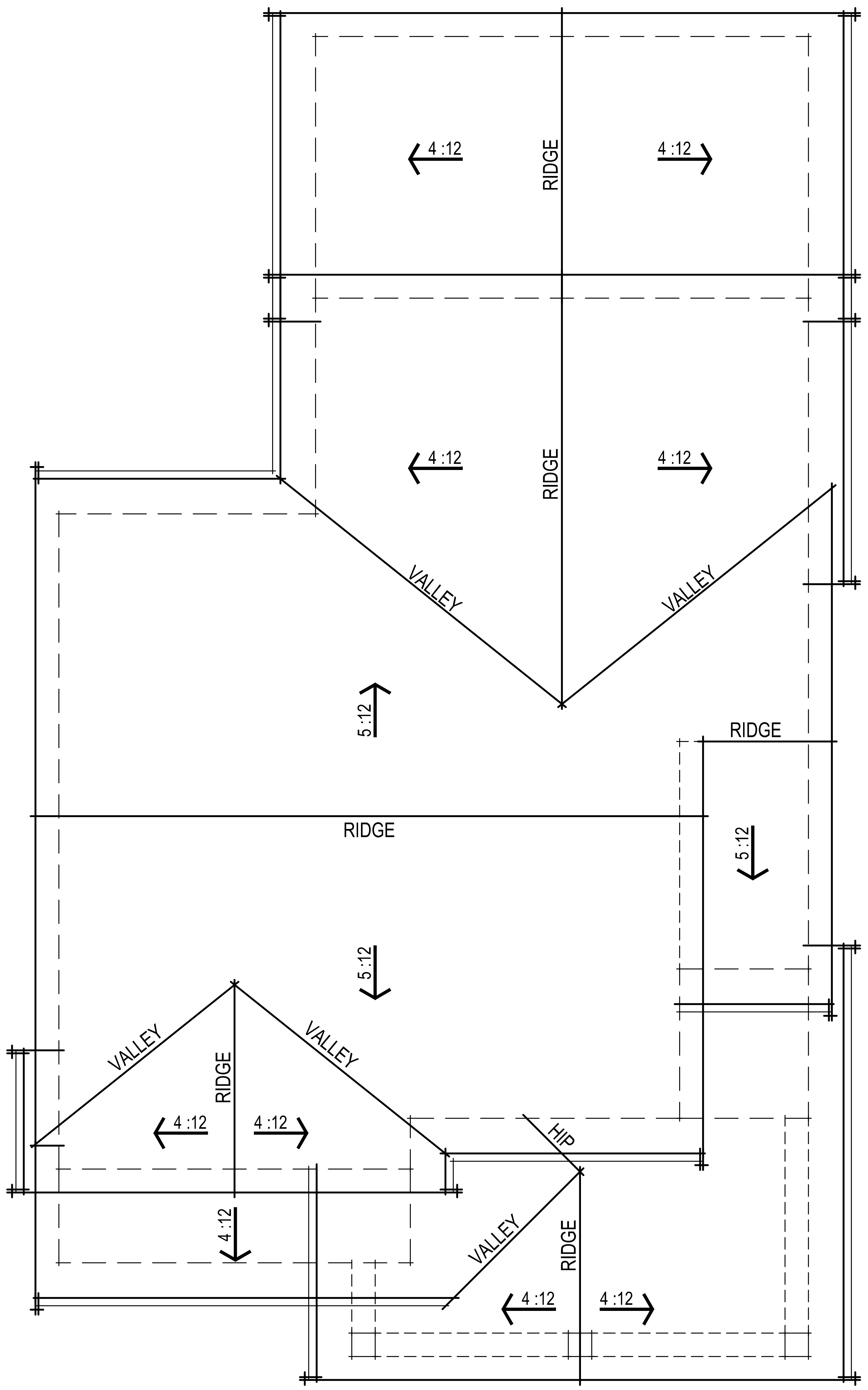

BUNGALOW ROOF PLAN

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March 8, 2023

PLAN 1 BUNGALOW ROOF PLAN
A07

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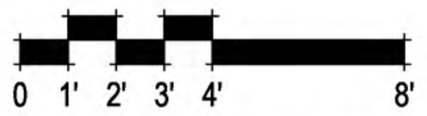
FARMHOUSE REAR ELEVATION

FARMHOUSE RIGHT ELEVATION

FARMHOUSE LEFT ELEVATION

FARMHOUSE FRONT ELEVATION



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PLAN 1 FARMHOUSE EXTERIOR ELEVATIONS
A08

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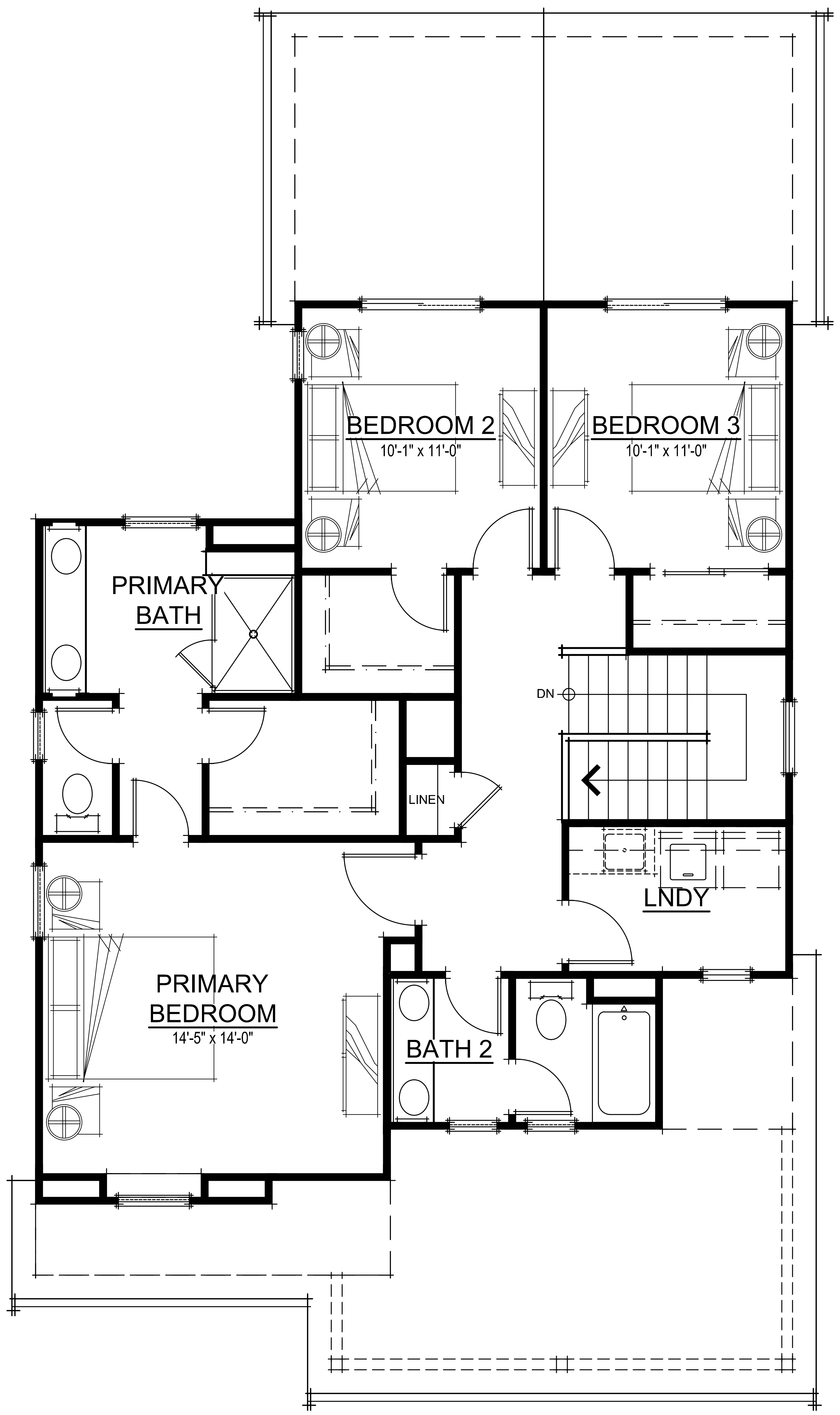
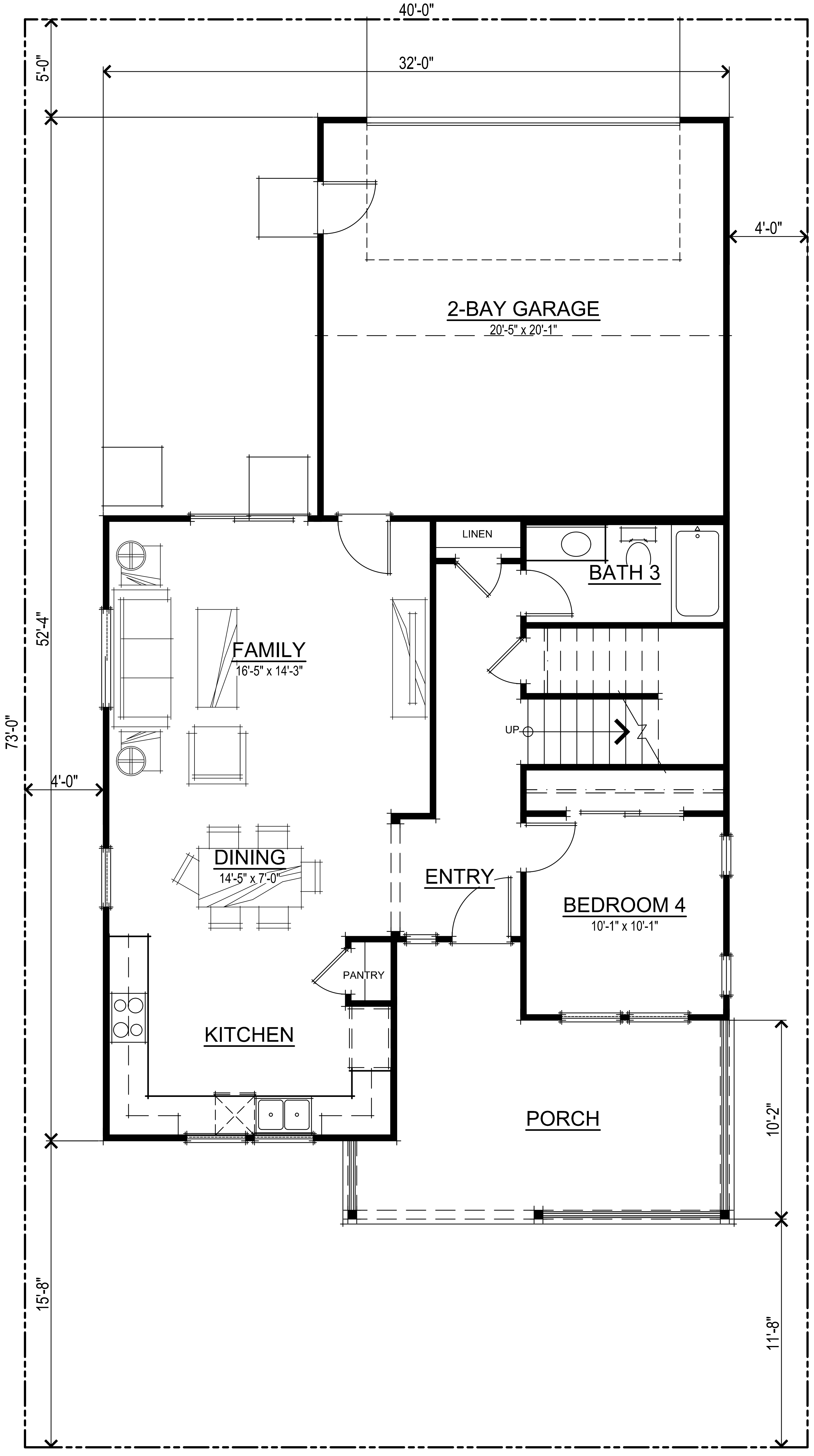


SECOND FLOOR PLAN



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.

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PLAN 1 FARMHOUSE FLOOR PLANS
A09

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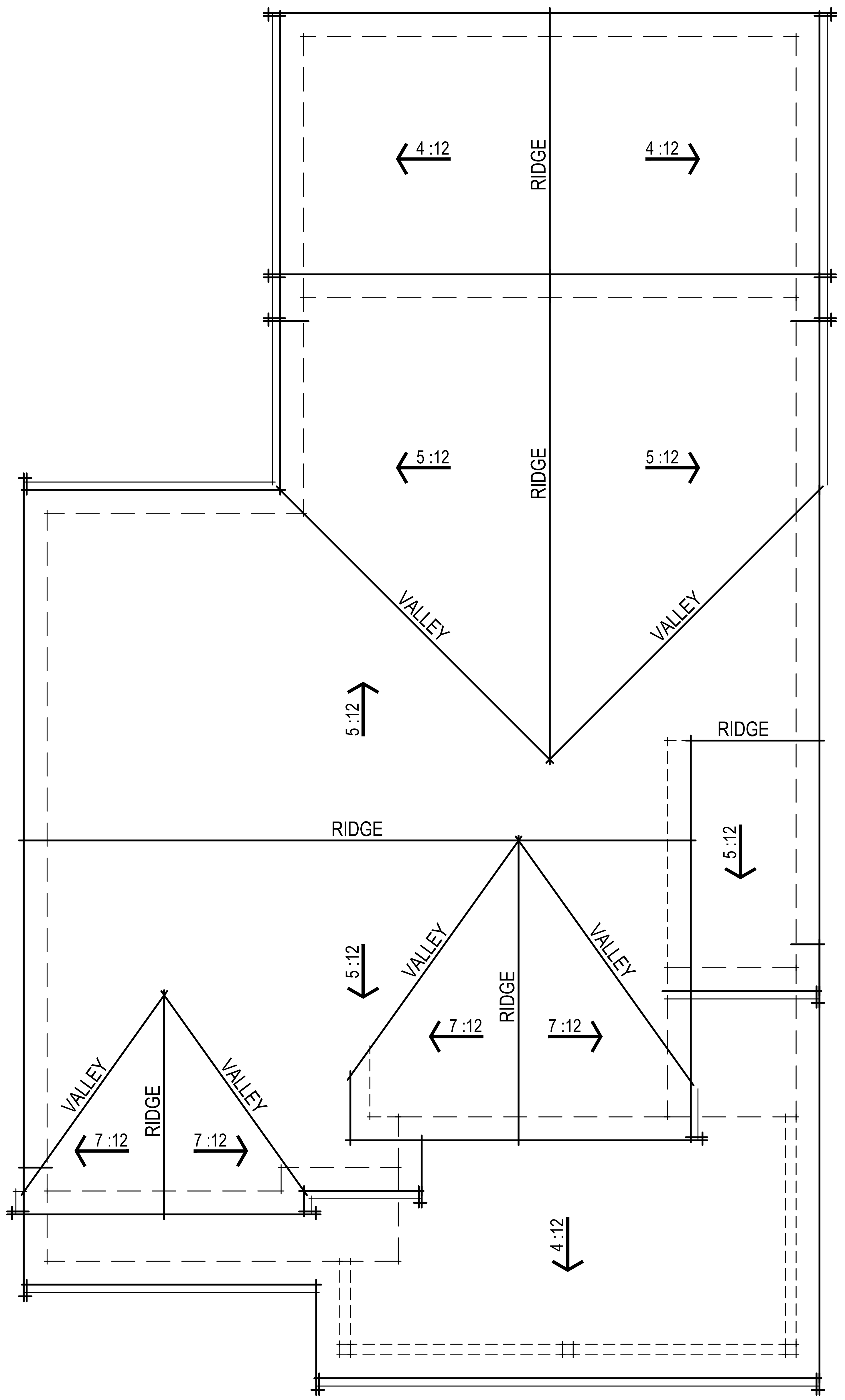

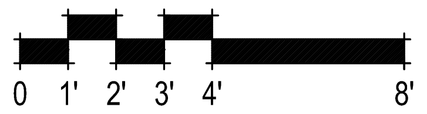

FARMHOUSE ROOF PLAN

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PLAN 1 FARMHOUSE ROOF PLAN
A10

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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

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0 1' 2' 3' 4' 8'

PLAN 2 FRONT ELEVATIONS
A11

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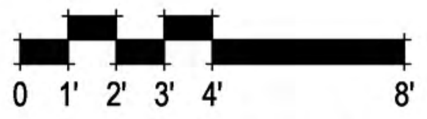
SPANISH REAR ELEVATION

SPANISH RIGHT ELEVATION

SPANISH LEFT ELEVATION

SPANISH FRONT ELEVATION



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PLAN 2 SPANISH EXTERIOR ELEVATIONS
A12

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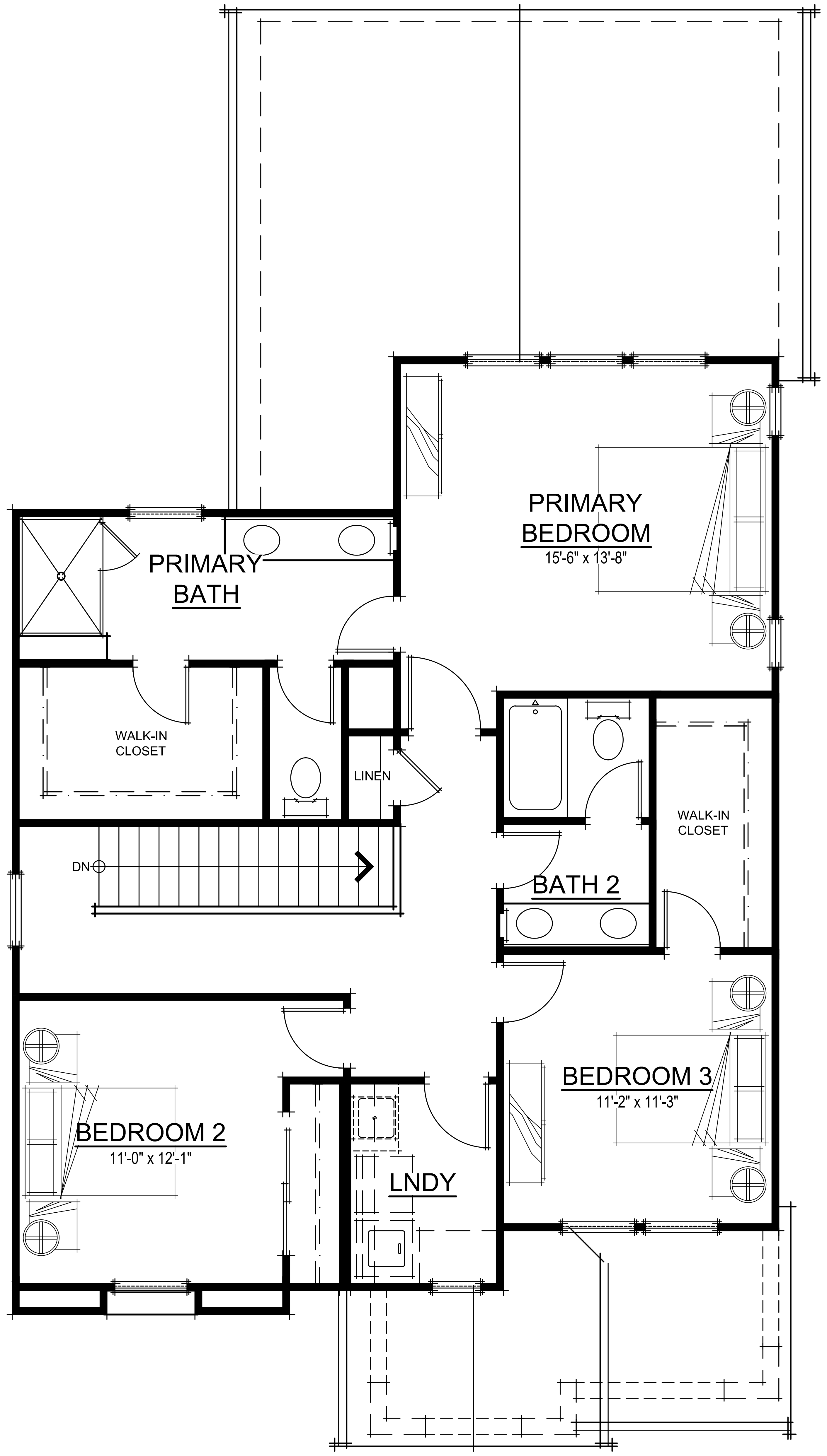
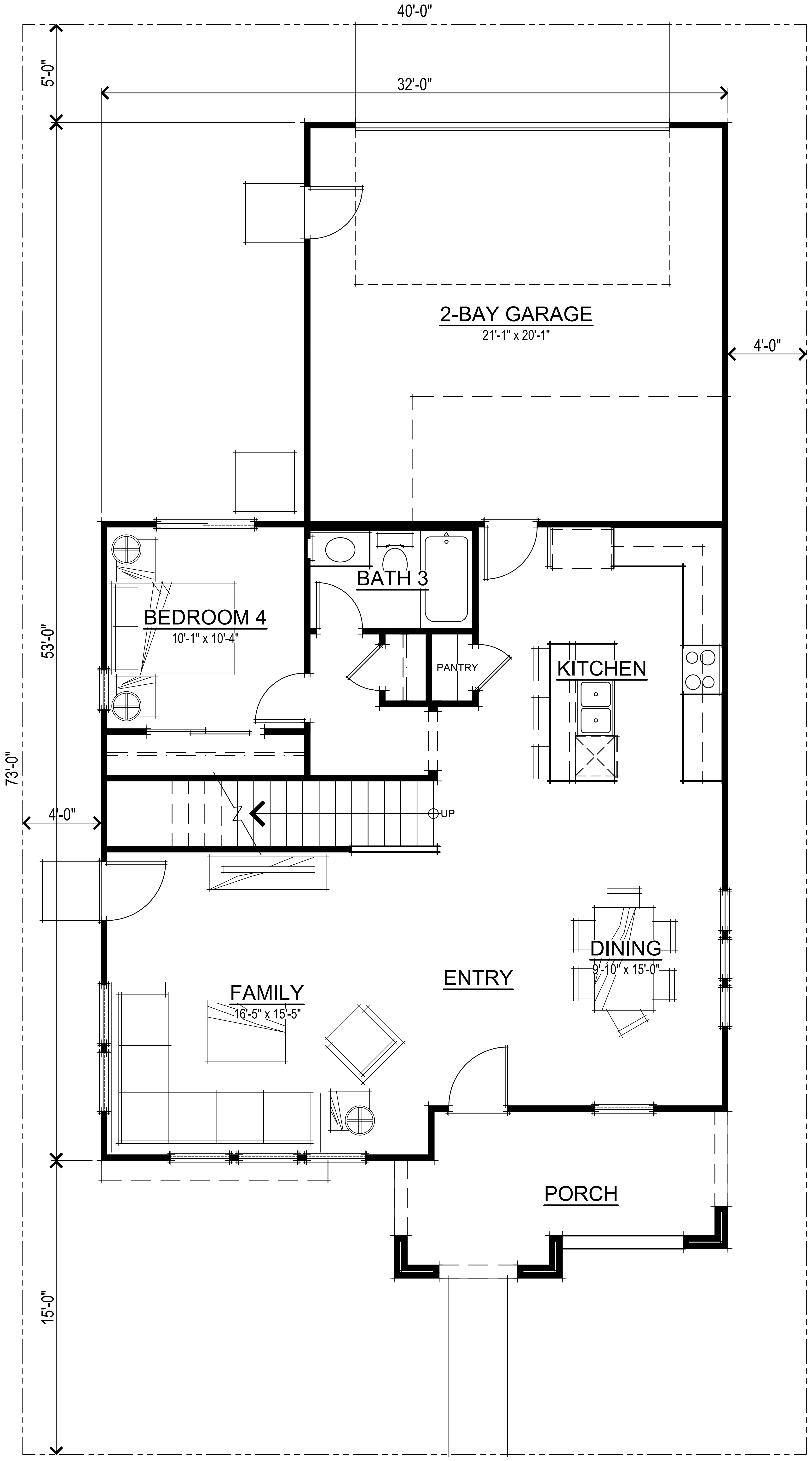


SECOND FLOOR PLAN



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'

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March 8, 2023

PLAN 2 SPANISH FLOOR PLANS
A13

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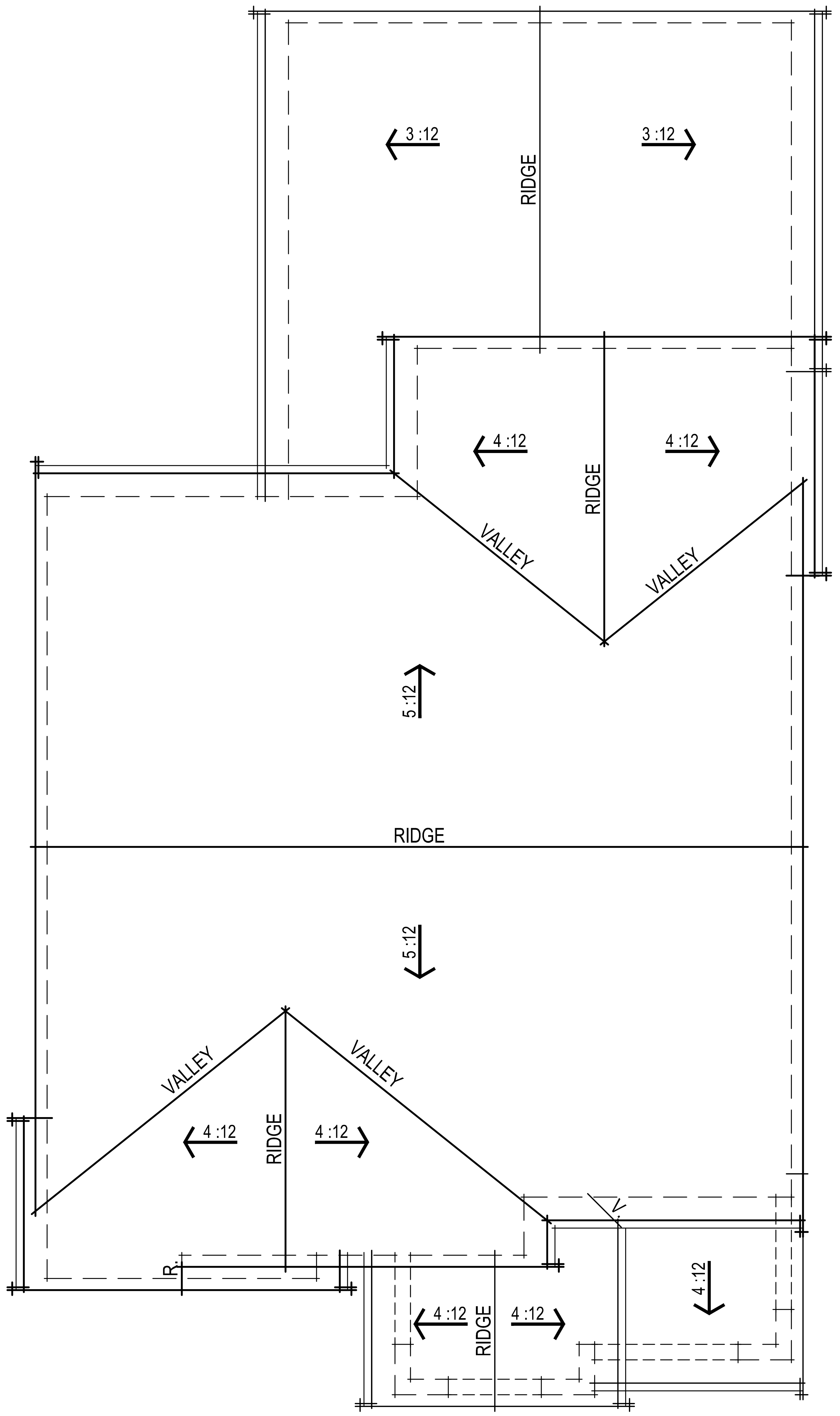

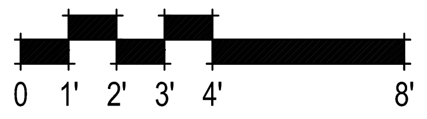

SPANISH ROOF PLAN

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March 8, 2023

PLAN 2 SPANISH ROOF PLAN
A14

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BUNGALOW REAR ELEVATION

BUNGALOW RIGHT ELEVATION

BUNGALOW LEFT ELEVATION

BUNGALOW FRONT ELEVATION

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March 8, 2023

0 1' 2' 3' 4' 8'

PLAN 2 BUNGALOW EXTERIOR ELEVATIONS
A15

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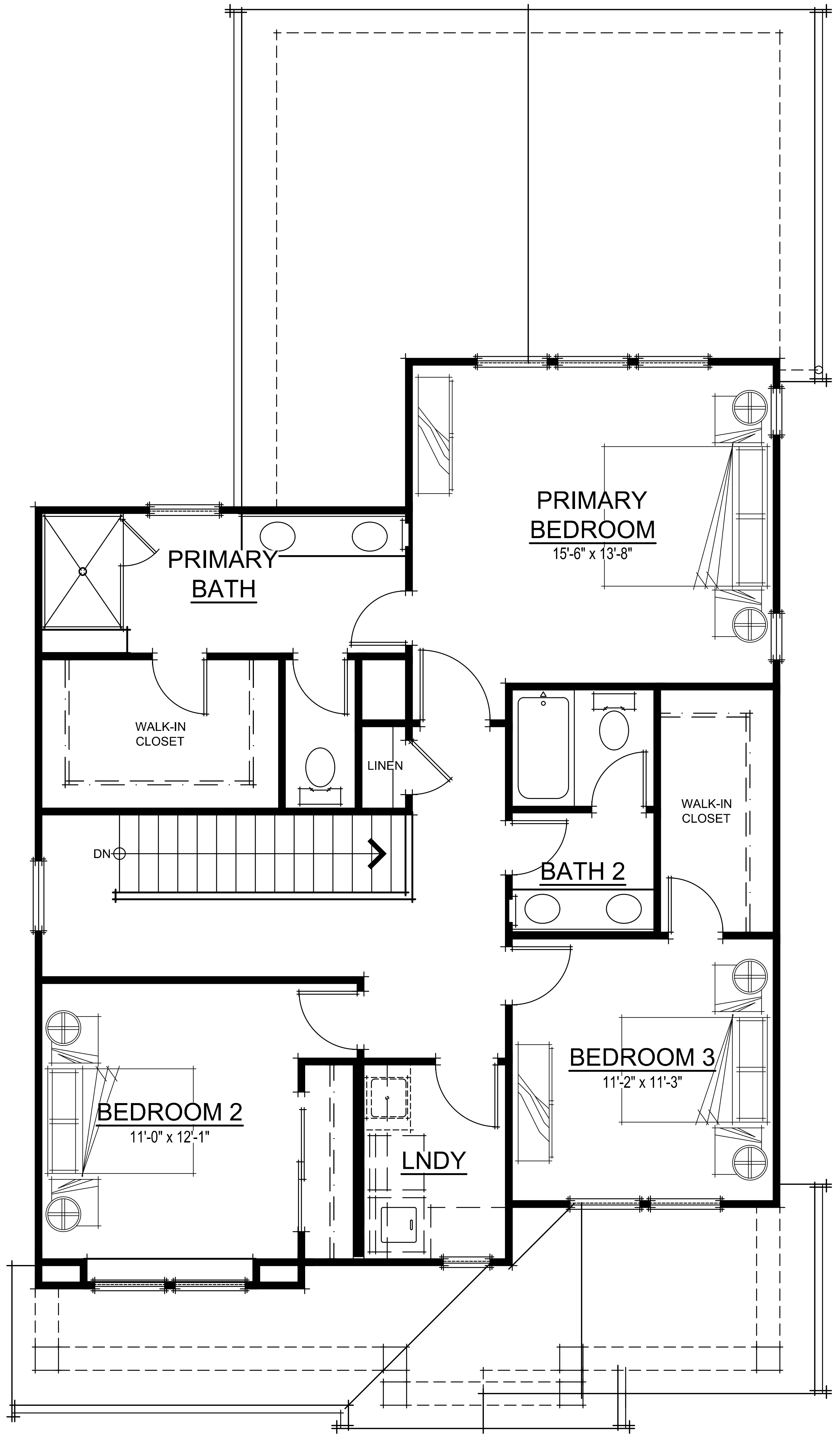
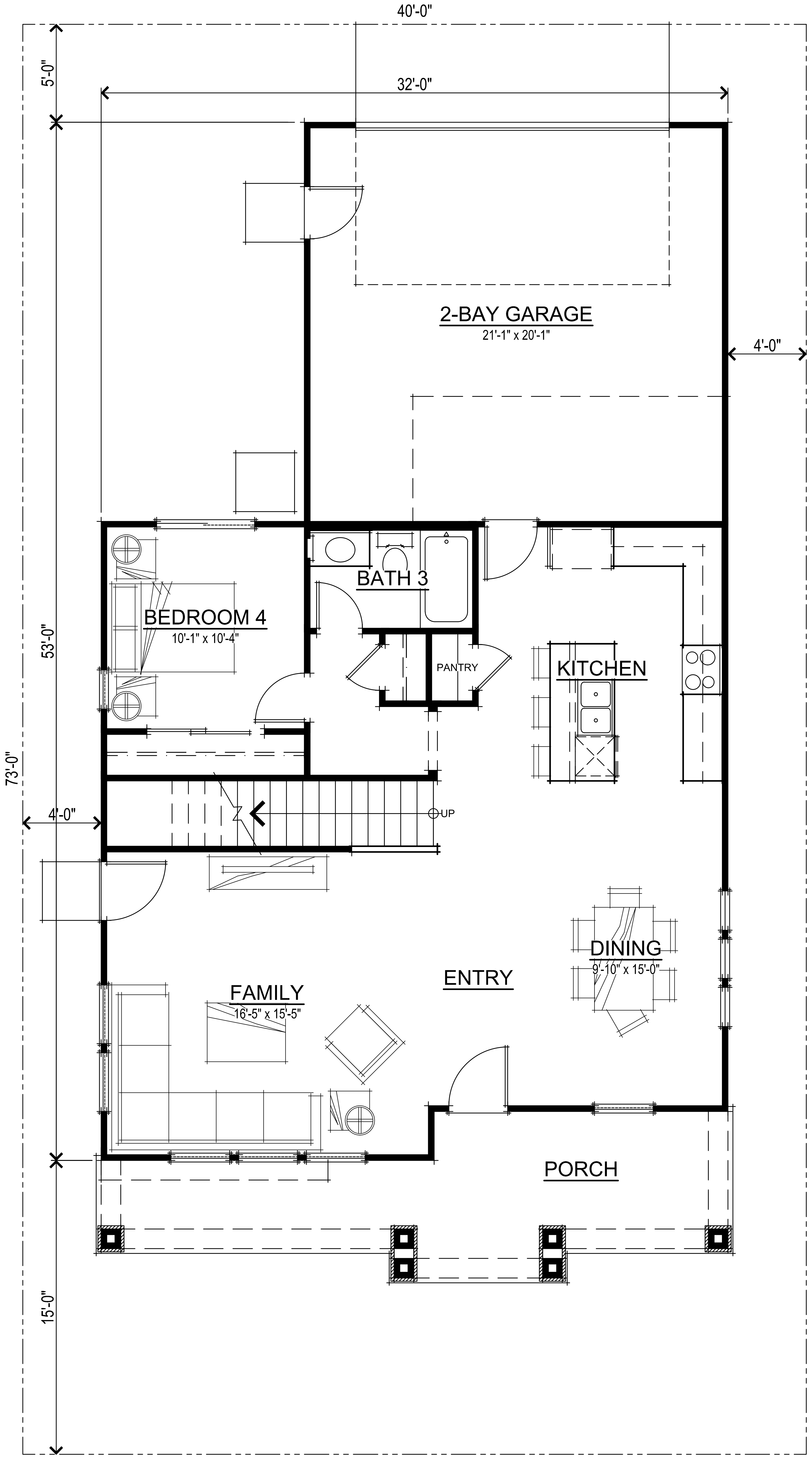


SECOND FLOOR PLAN



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.

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PLAN 2 BUNGALOW FLOOR PLANS
A16

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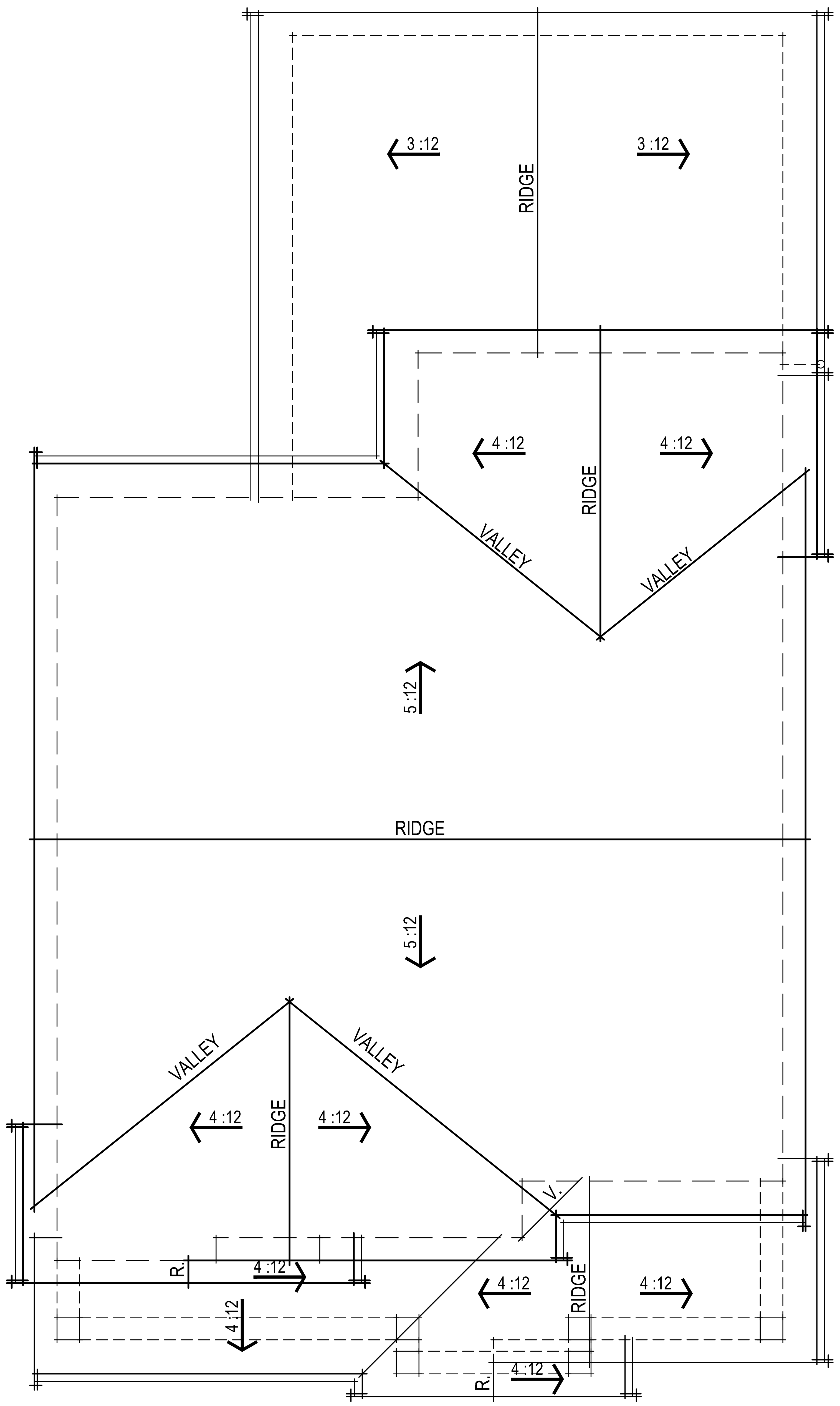
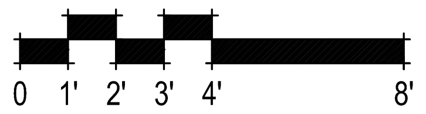


BUNGALOW ROOF PLAN



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PLAN 2 BUNGALOW ROOF PLAN
A17

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FARMHOUSE REAR ELEVATION

FARMHOUSE RIGHT ELEVATION

FARMHOUSE LEFT ELEVATION

FARMHOUSE FRONT ELEVATION

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March 8, 2023

0 1' 2' 3' 4' 8'

PLAN 2 FARMHOUSE EXTERIOR ELEVATIONS
A18

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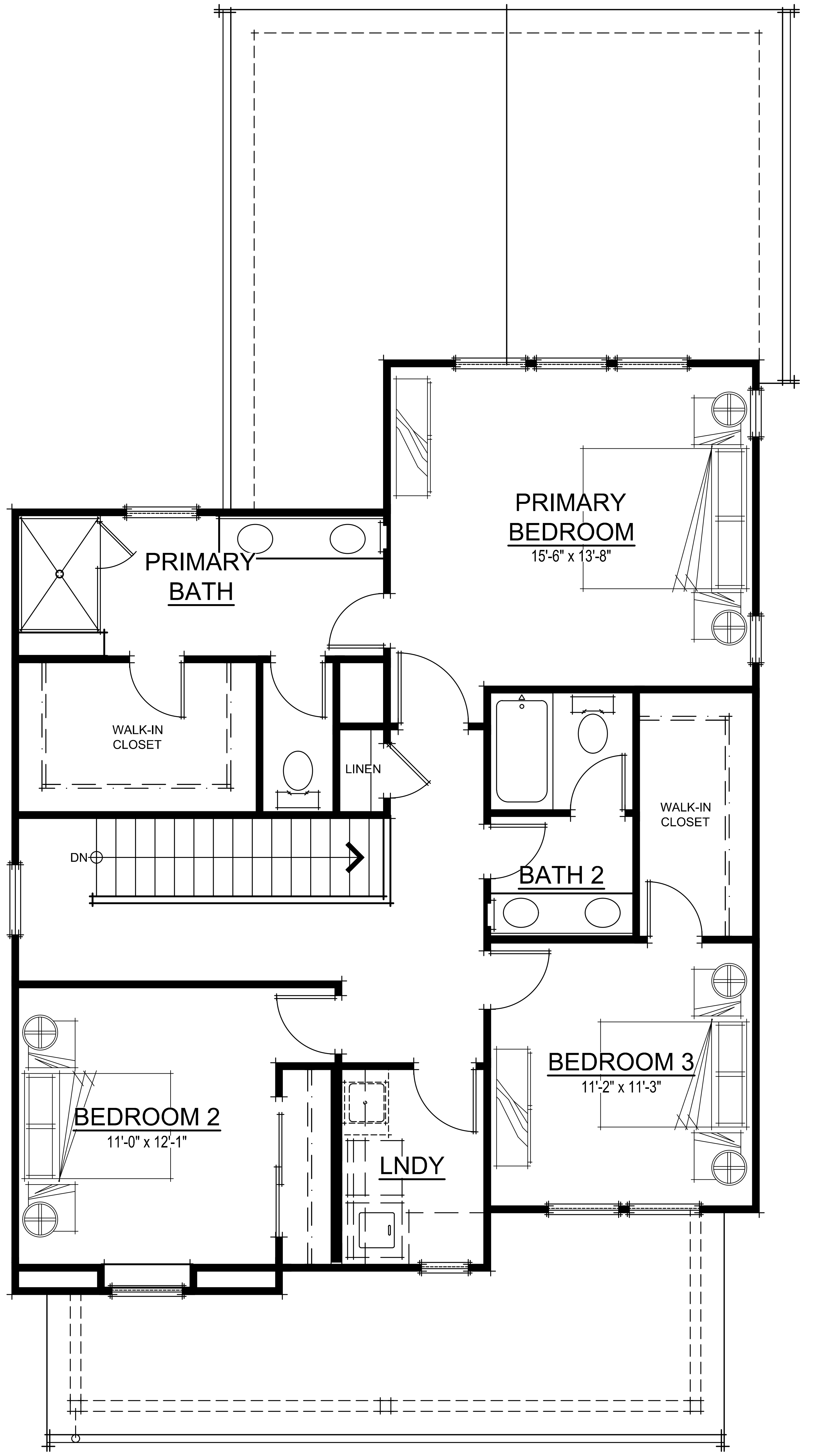
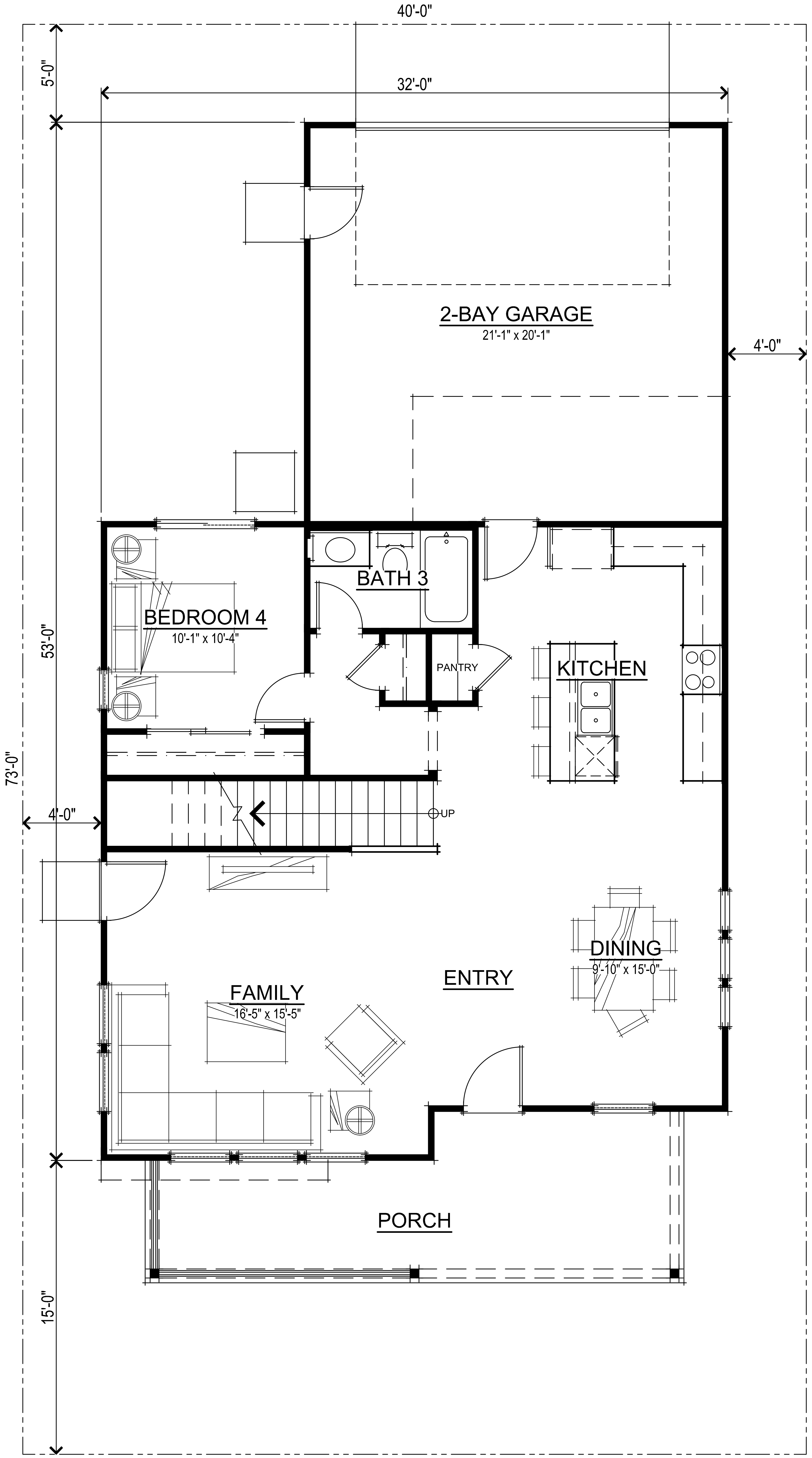


SECOND FLOOR PLAN



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'

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PLAN 2 FARMHOUSE FLOOR PLANS
A19

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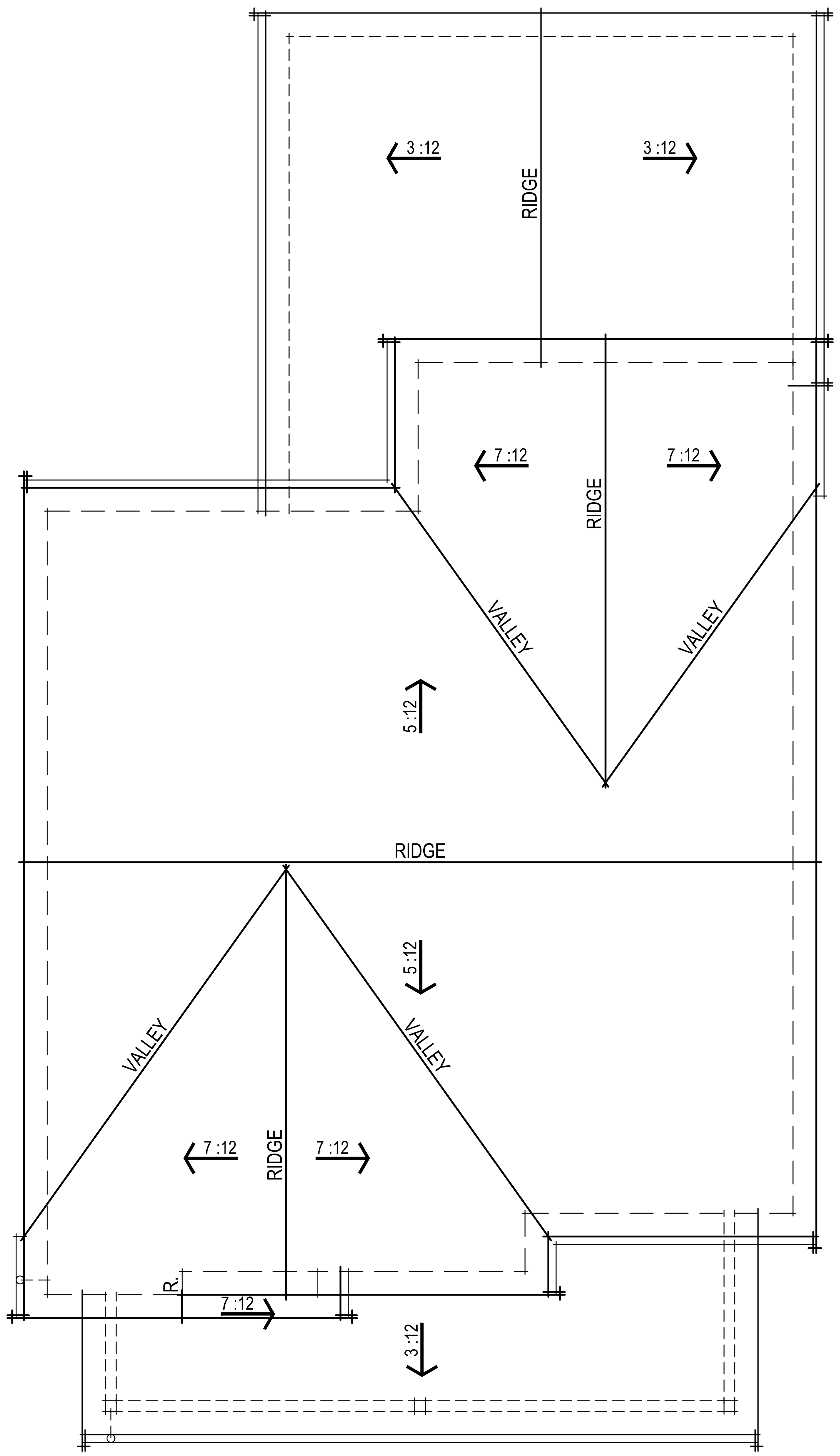

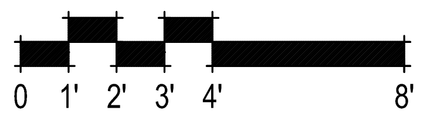

FARMHOUSE ROOF PLAN

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PLAN 2 FARMHOUSE ROOF PLAN
A20

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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

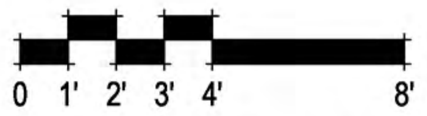
FARMHOUSE ELEVATION

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



PLAN 3 FRONT ELEVATIONS
A21

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SPANISH REAR ELEVATION

SPANISH RIGHT ELEVATION

SPANISH LEFT ELEVATION

SPANISH FRONT ELEVATION

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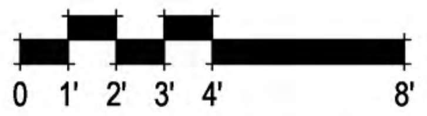
Oakley, CA
March 8, 2023



PLAN 3 SPANISH EXTERIOR ELEVATIONS
A22

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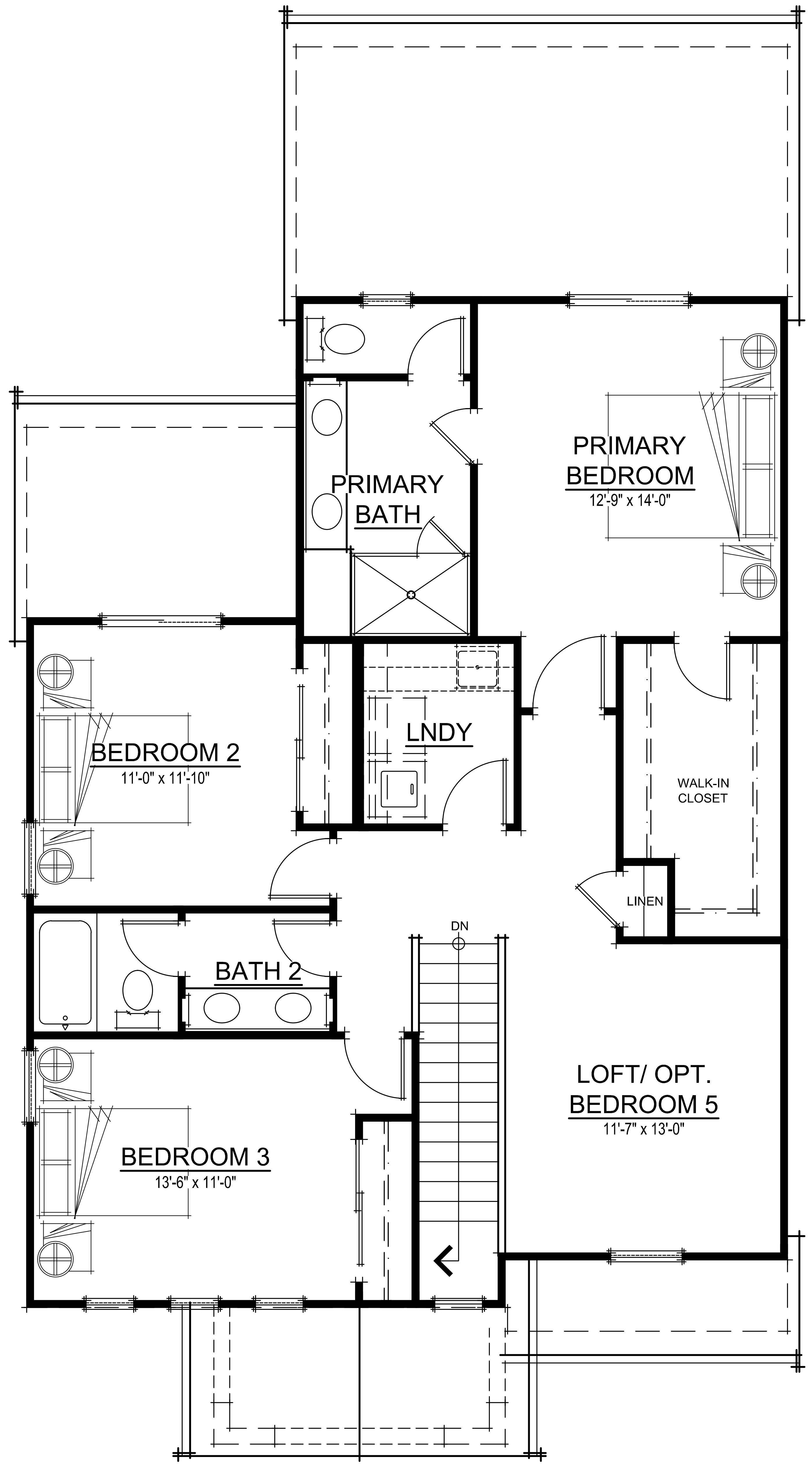
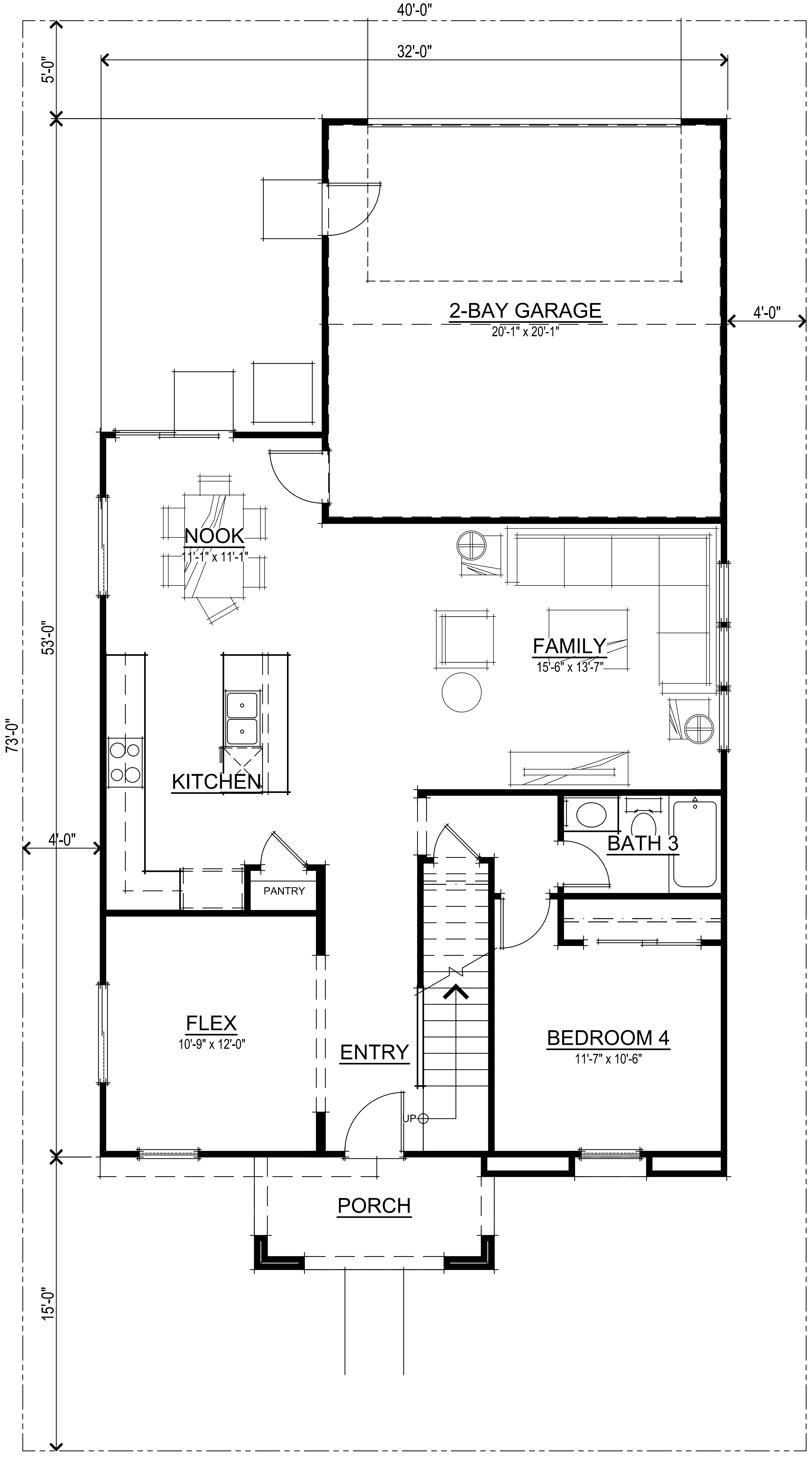


SECOND FLOOR PLAN

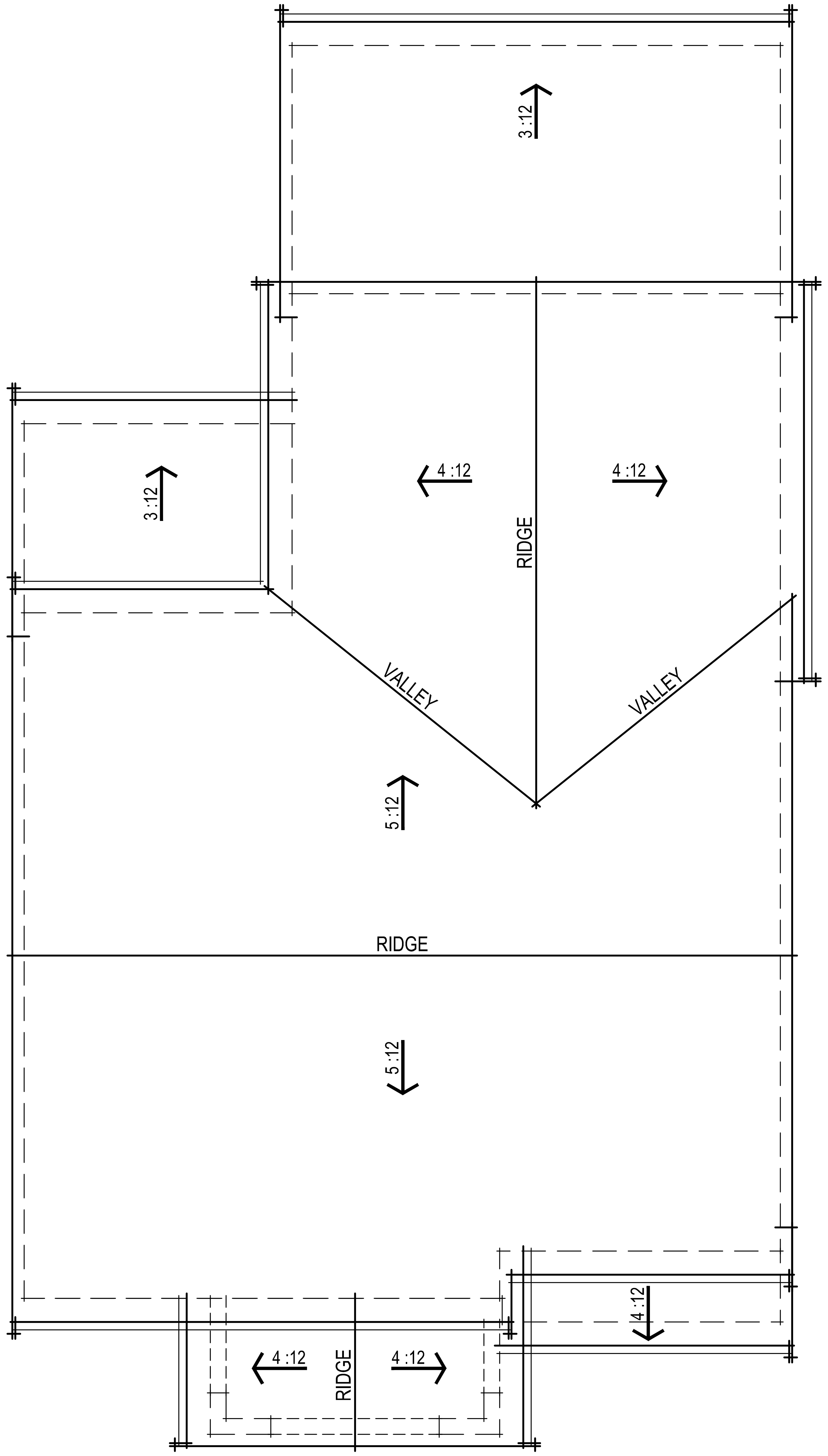


FIRST FLOOR PLAN

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'

PLAN 3 SPANISH FLOOR PLANS



SPANISH ROOF PLAN

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March 8, 2023

PLAN 3 SPANISH ROOF PLAN
A24

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BUNGALOW REAR ELEVATION

BUNGALOW RIGHT ELEVATION

BUNGALOW LEFT ELEVATION

BUNGALOW FRONT ELEVATION

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Oakley, CA
March 8, 2023

0 1' 2' 3' 4' 8'

PLAN 3 BUNGALOW EXTERIOR ELEVATIONS
A25

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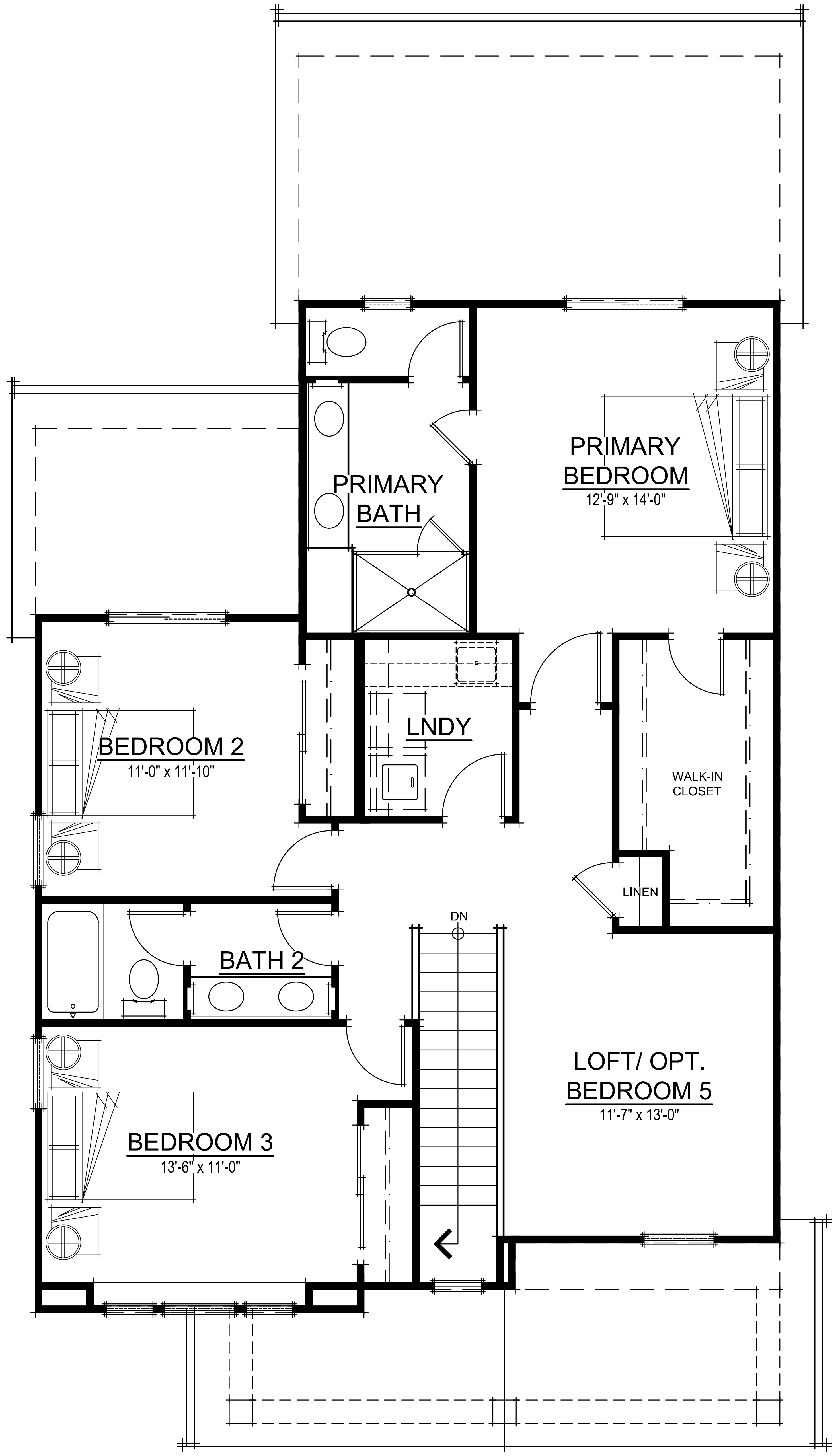
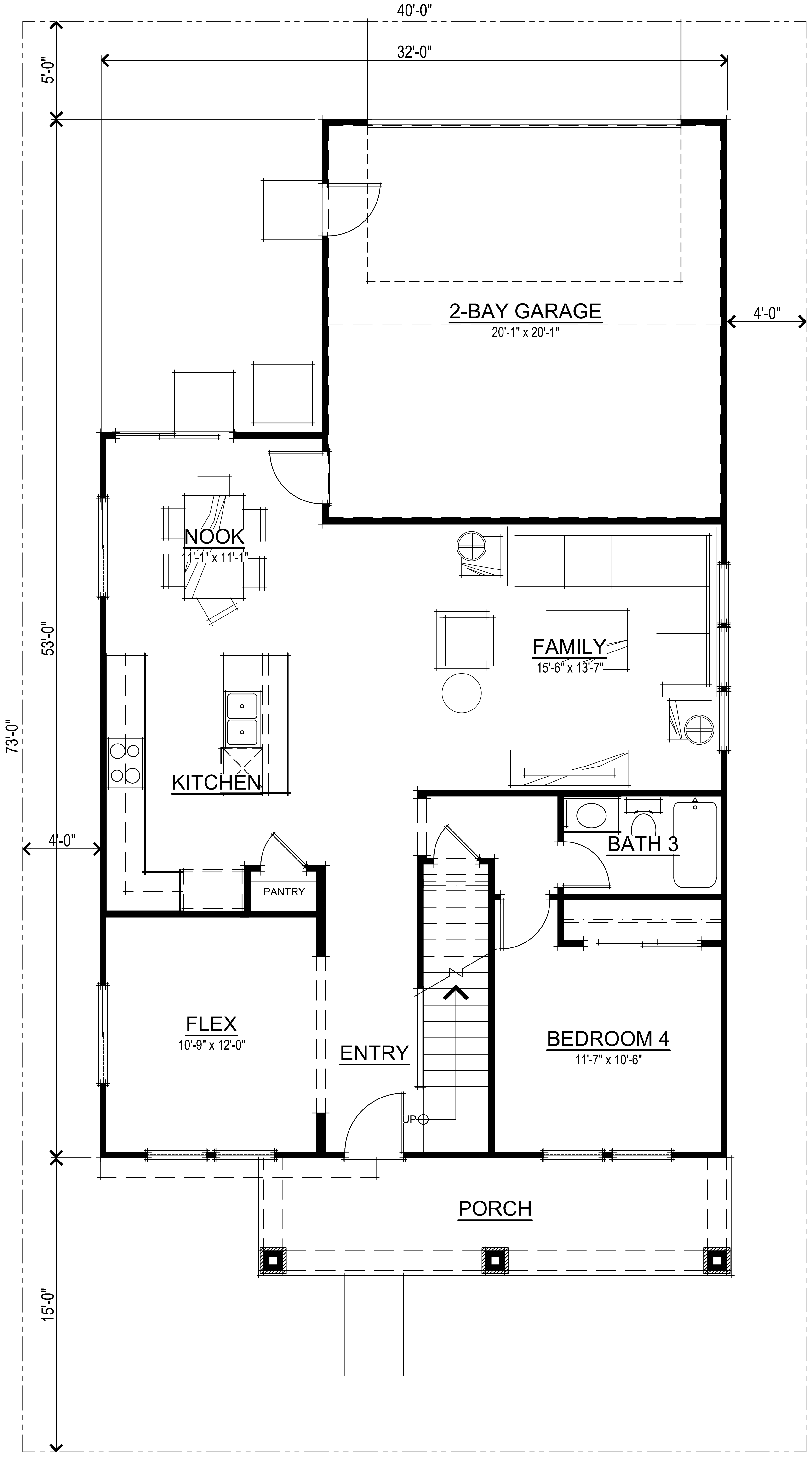


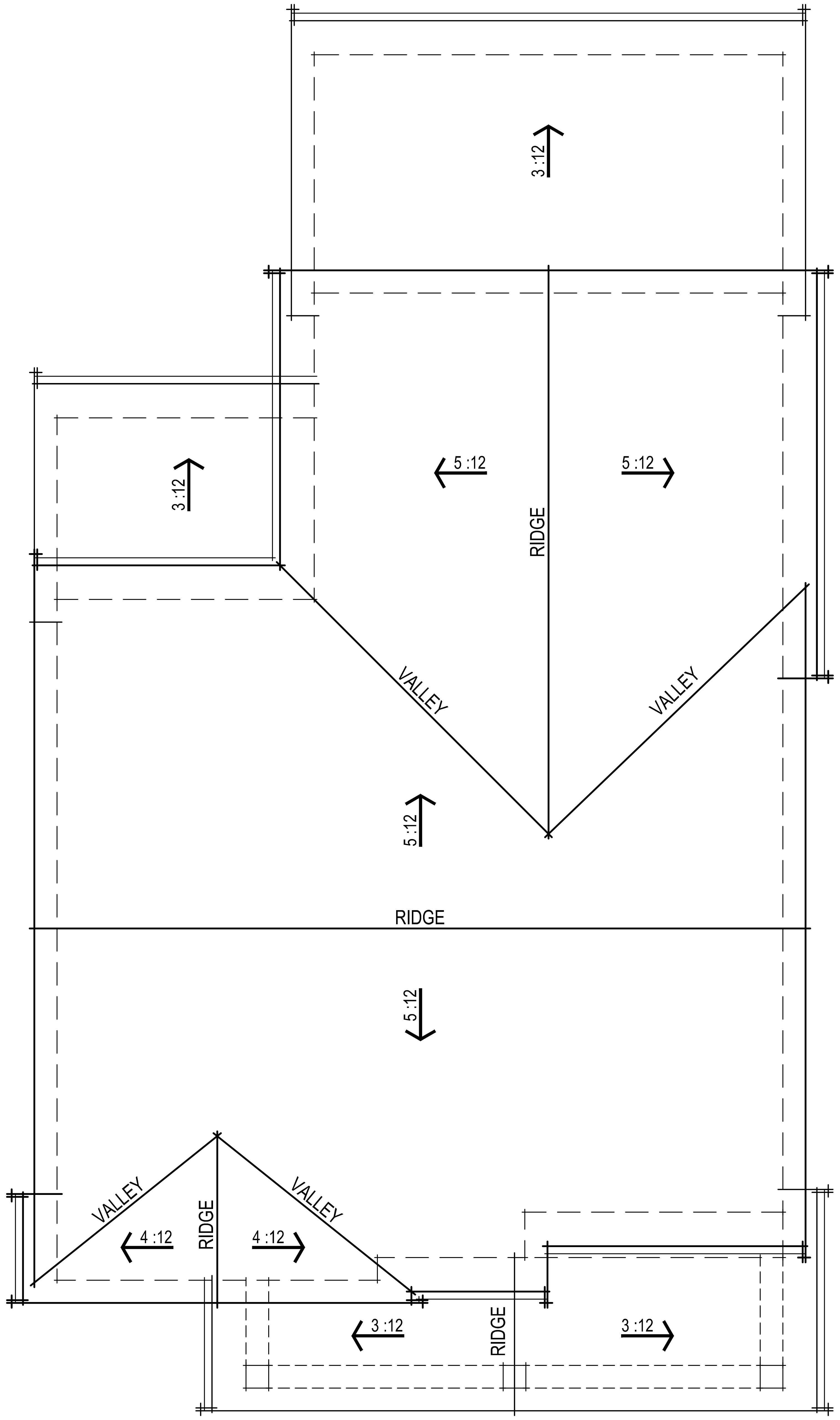
SECOND FLOOR PLAN

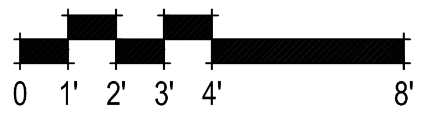


FIRST FLOOR PLAN

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.

PLAN 3 BUNGALOW FLOOR PLANS





BUNGALOW ROOF PLAN

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PLAN 3 BUNGALOW ROOF PLAN
A27

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FARMHOUSE REAR ELEVATION

FARMHOUSE RIGHT ELEVATION

FARMHOUSE LEFT ELEVATION

FARMHOUSE FRONT ELEVATION

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March 8, 2023

0 1' 2' 3' 4' 8'

PLAN 3 FARMHOUSE EXTERIOR ELEVATIONS
A28

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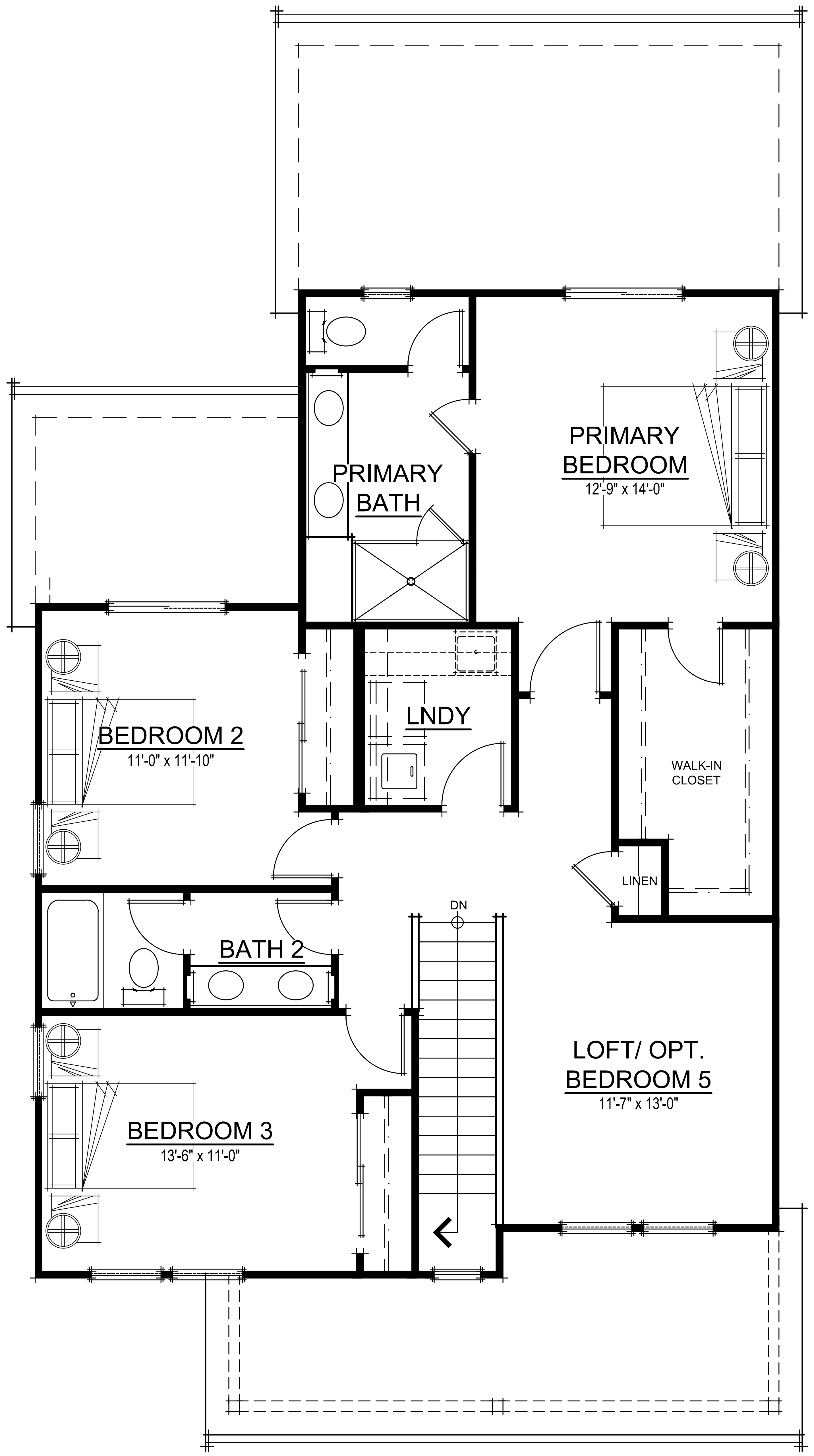
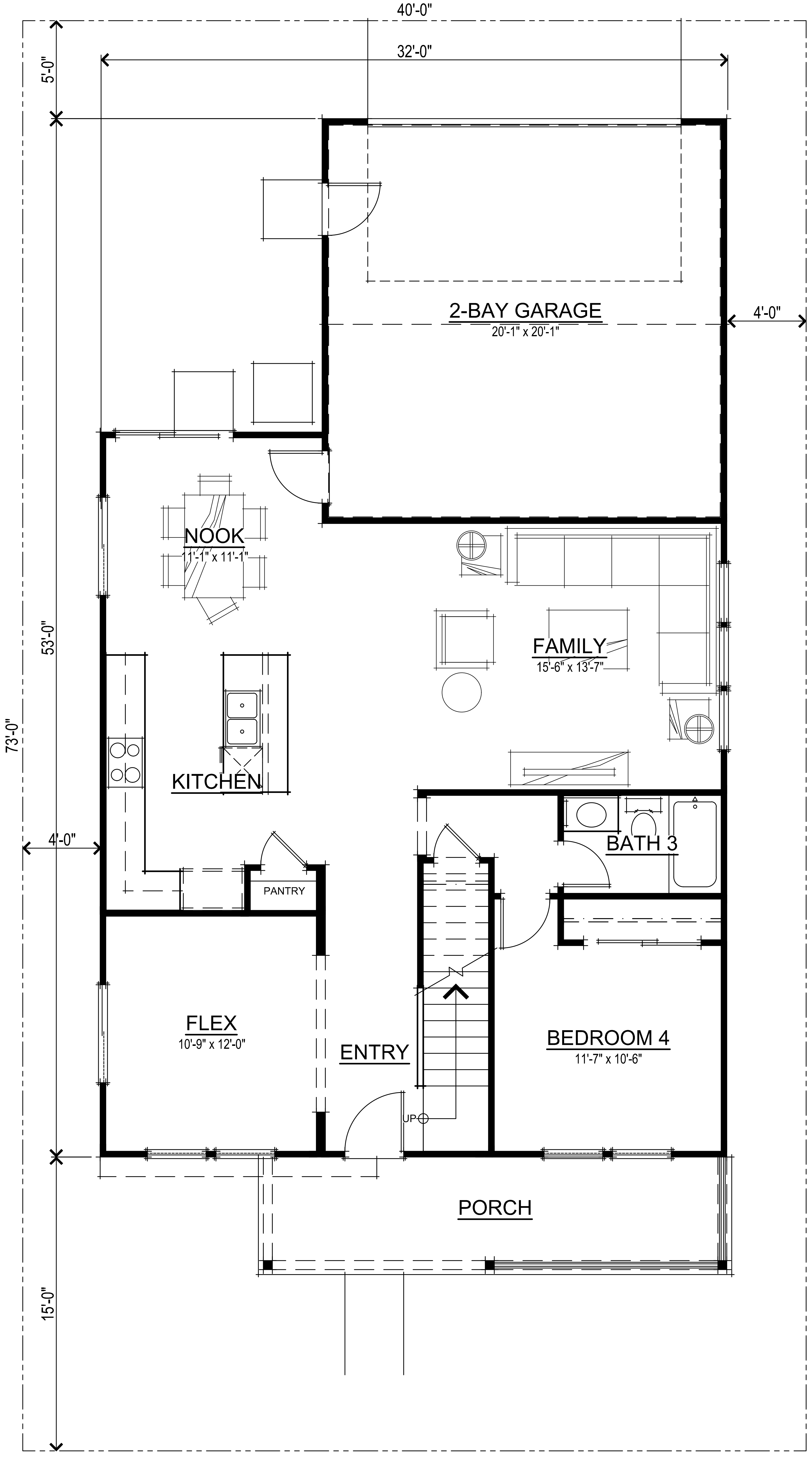


SECOND FLOOR PLAN



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'

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PLAN 3 FARMHOUSE FLOOR PLANS
A29

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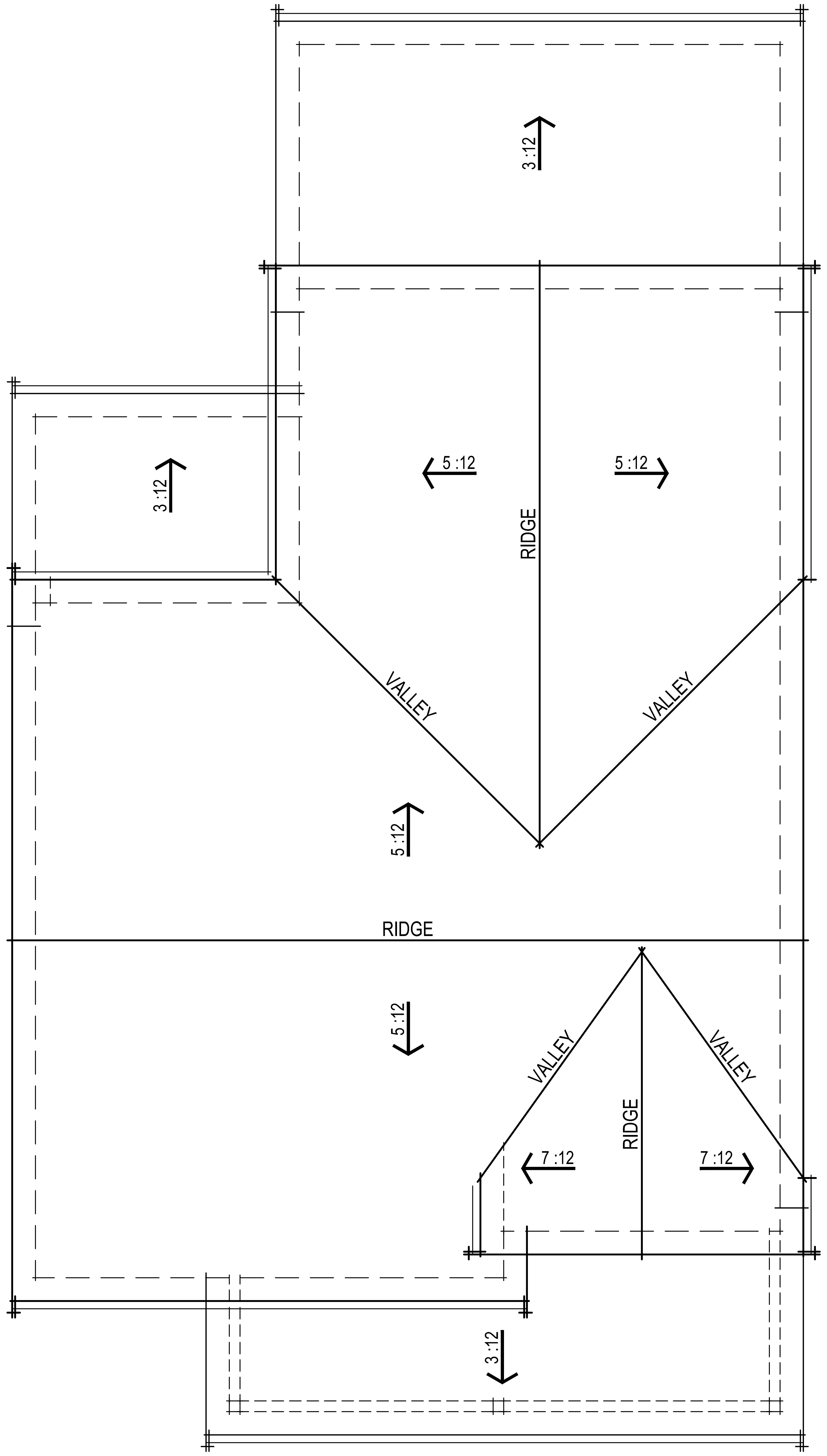

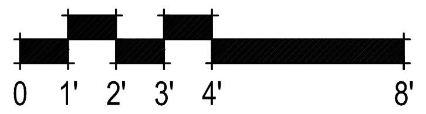

FARMHOUSE ROOF PLAN

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PLAN 3 FARMHOUSE ROOF PLAN
A30

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BUNGALOW LEFT ELEVATION

SPANISH LEFT ELEVATION

0 1' 2' 3' 4' 8'

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SAMPLE ENHANCED ELEVATIONS
A31

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FARMHOUSE LEFT ELEVATION

SPANISH LEFT ELEVATION

0 1' 2' 3' 4' 8'

SAMPLE ENHANCED ELEVATIONS

A32

399.203

The Village at 2092 Oakley Road

Oakley, CA

March 8, 2023

SDG Architects, Inc.
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Brentwood, CA 94513
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399.203
The Village at 2092 Oakley Road
Oakley, CA
March 8, 2023

SITE ACCESS EXHIBIT
A33

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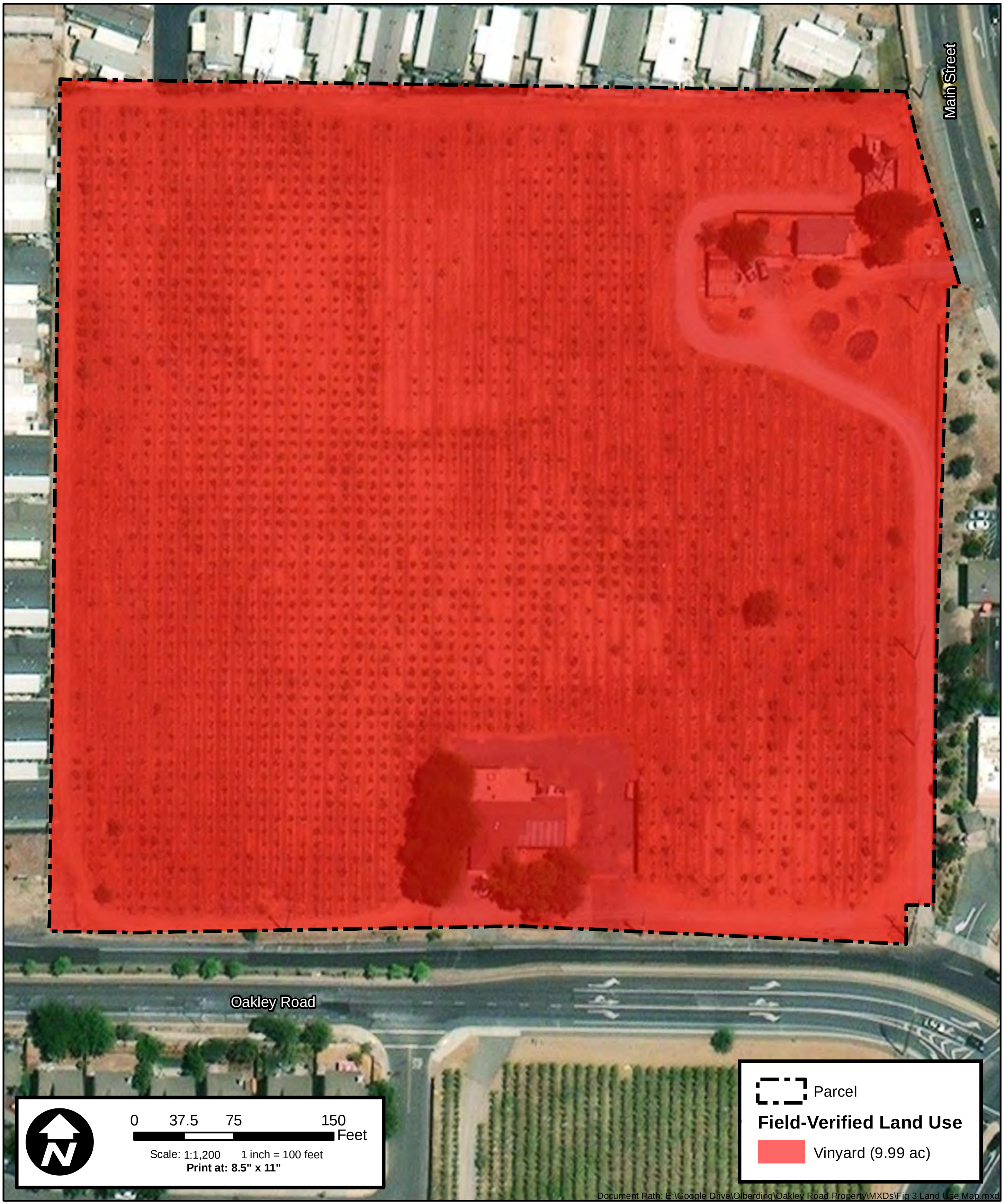

Document Path: E:\Google Drive\Olberding\Oakley Road Property\MXDs\Fig 3 Land Use Map.mxd

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.

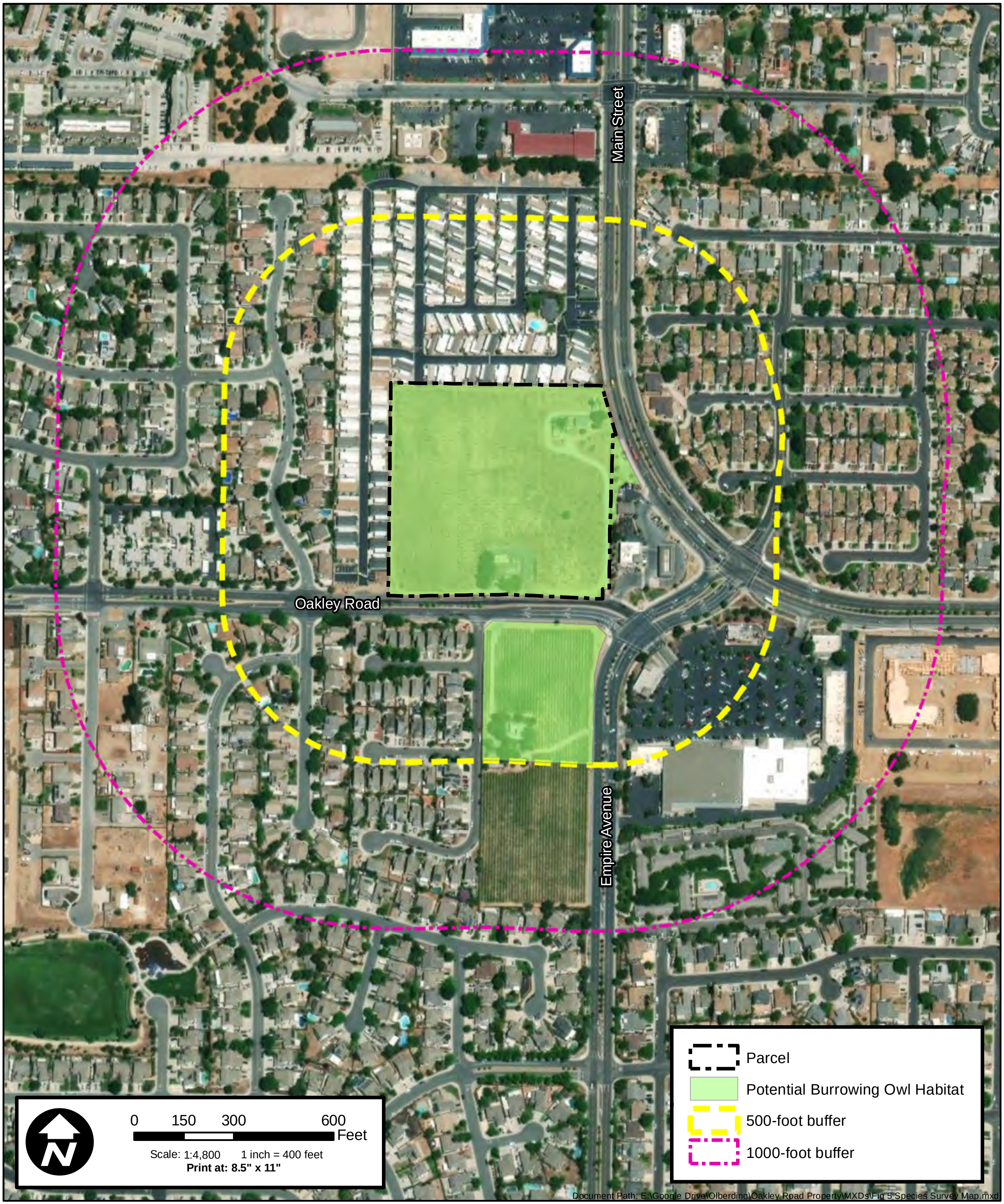

Figure 5: Planning Survey Species Habitat Map
2092 Oakley Road Property
Oakley, California

OLBERDING
-ENVIRONMENTAL-

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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

See appropriate ordinance or HCP/NCCP Figure 9-1 to determine Fee Zone

	PERMANENT IMPACTS (ACRES)		**2023 FEE/ACRE** *subject to change* [1]		
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

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]

	PERMANENT IMPACTS (ACRES)		**2023 FEE/ACRE** *subject to change* [1]		
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**

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[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)

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**

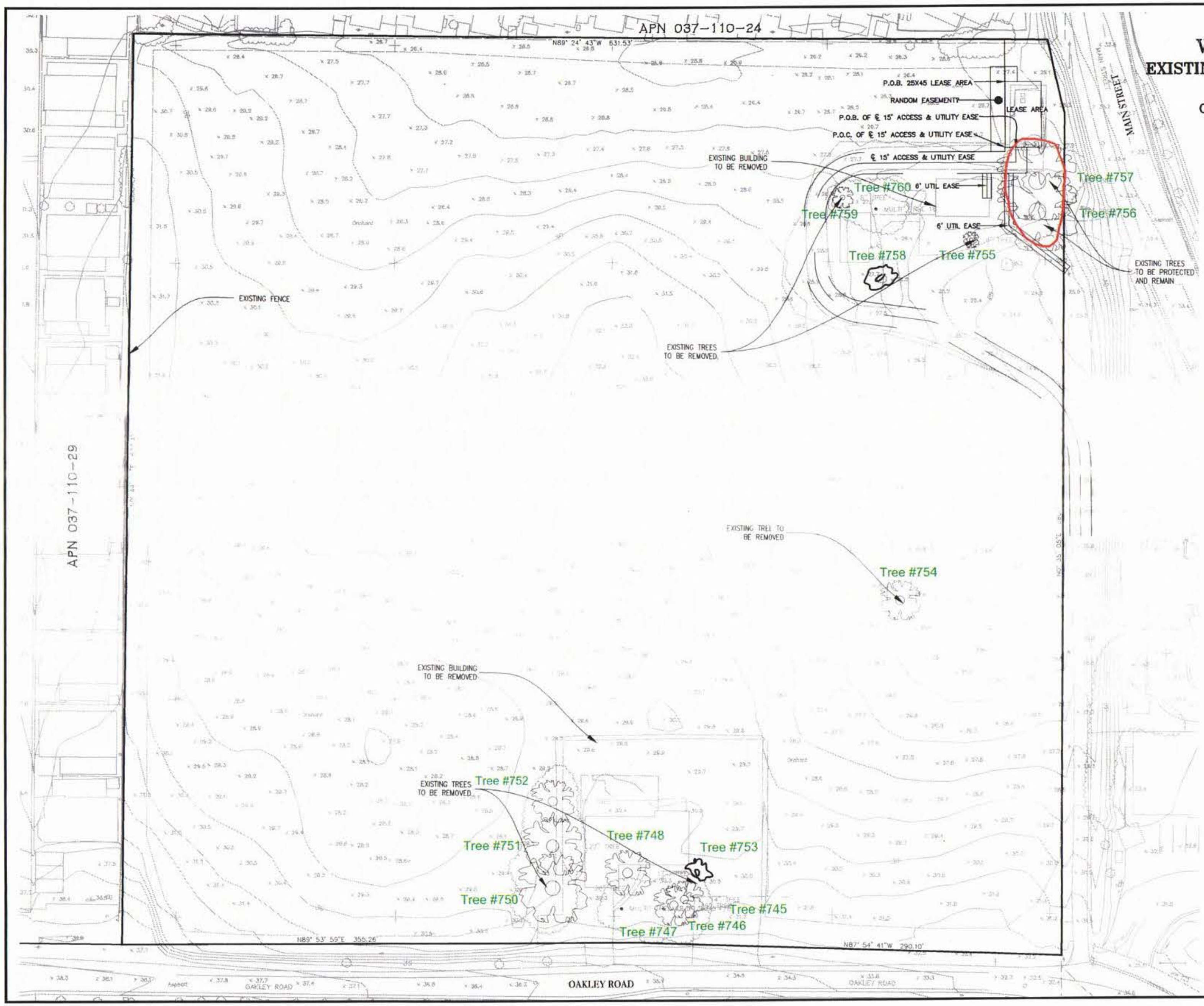
If you have any questions you can reach me at my office (925) 687-3631.

Respectfully Submitted,

Jarred Juarez

Jarred Juarez
Certified Arborist
WE-13341A

JJ:prj



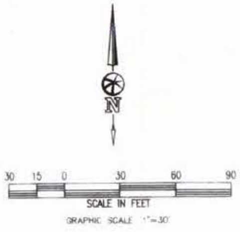
2092 OAKLEY ROAD
VESTING TENTATIVE MAP
EXISTING CONDITIONS AND CONSTRAINTS

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"



Bellecci
intelligent infrastructure

SHEET 2 OF 6
JOB NO. 220066

Appendix E
Historic Evaluation

Tom Origer & Associates
Archaeology / Historical Research

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:
NRHP Status Code:

Other Listings:
Review Code: **Reviewer:** **Date:**
Resource Name or #: 2092 Oakley Road
Page 1 **of** 16

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.

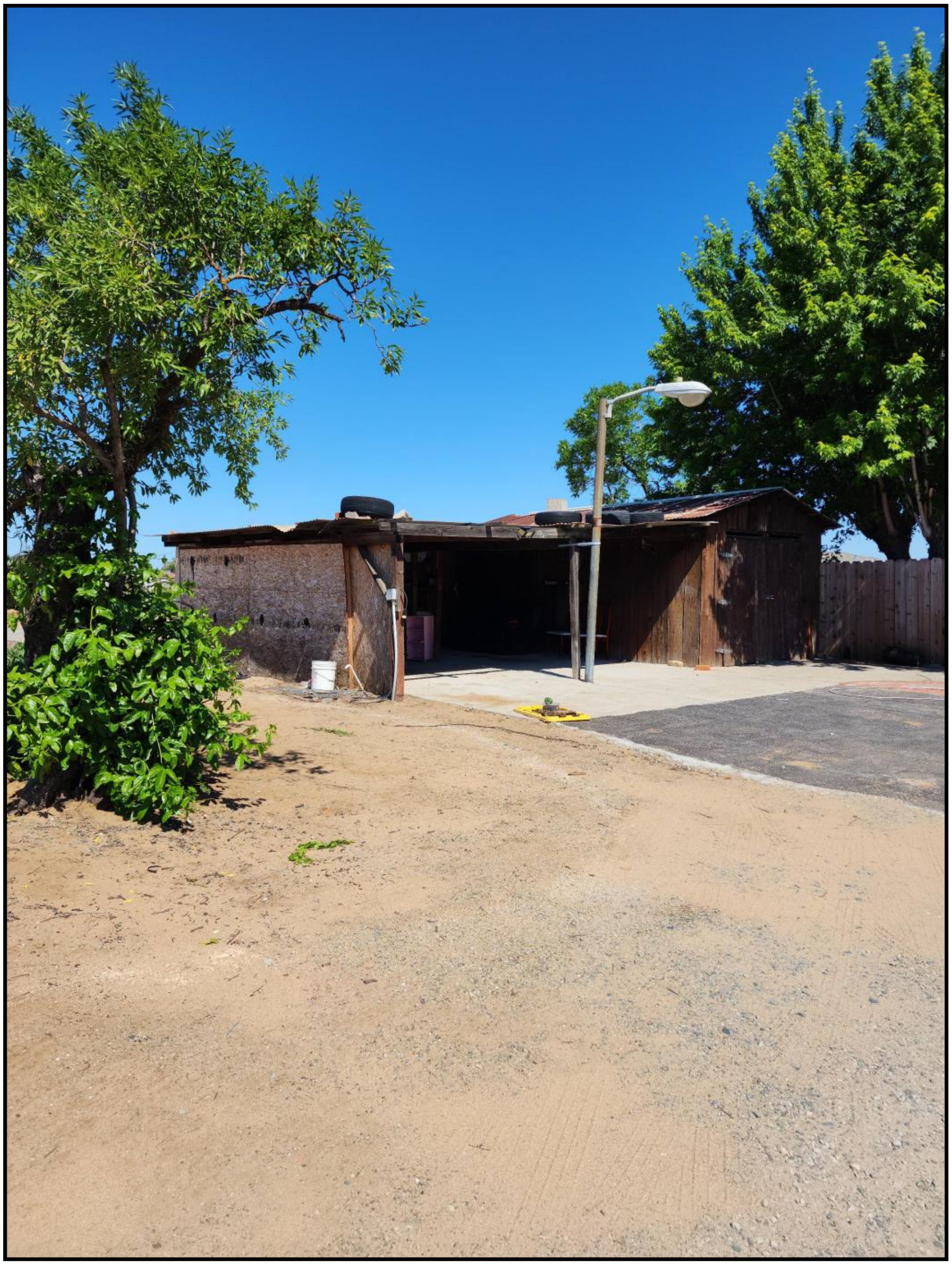
There is another house on the property constructed in 1967 that is not considered potentially important, as well as a cell tower that resembles a water tower.

View of house facing northwest.

CONTINUATION SHEET

Primary #:
HRI #:
Trinomial:

Recorded by: Eileen Barrow, Tom Origer & Associates
Resource Name or #: 2092 Oakley Road
Date: September 2023



View of shed and carport facing northwest.

BUILDING, STRUCTURE, AND OBJECT RECORD

Primary #:
HRI #:
NRHP Status Code:
Resource Name or #: 2092 Oakley Road

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)

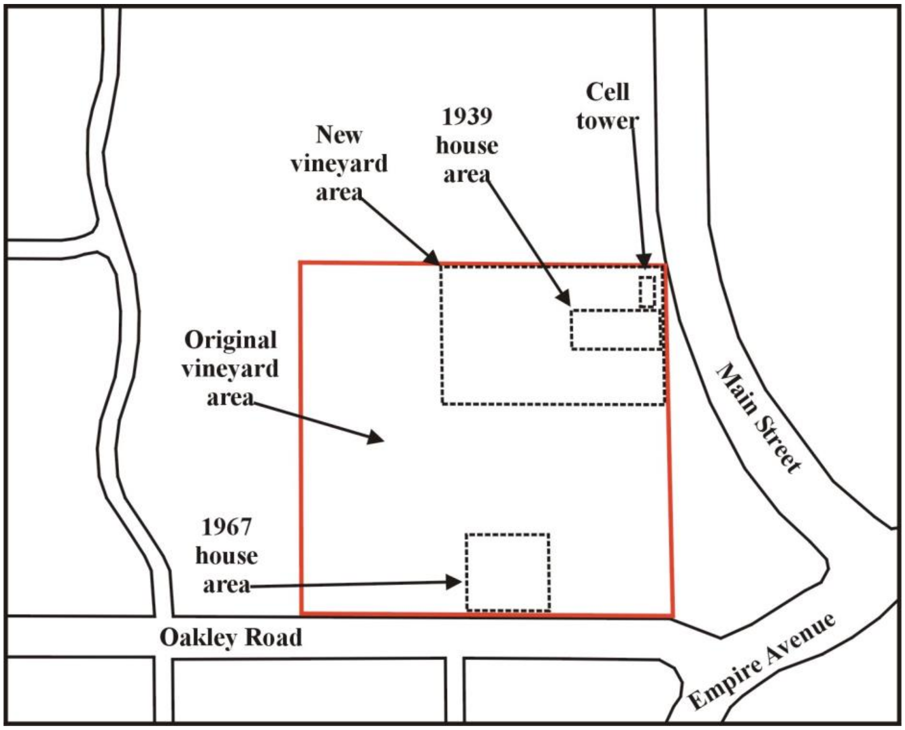
B11. Additional Resource Attributes:

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.

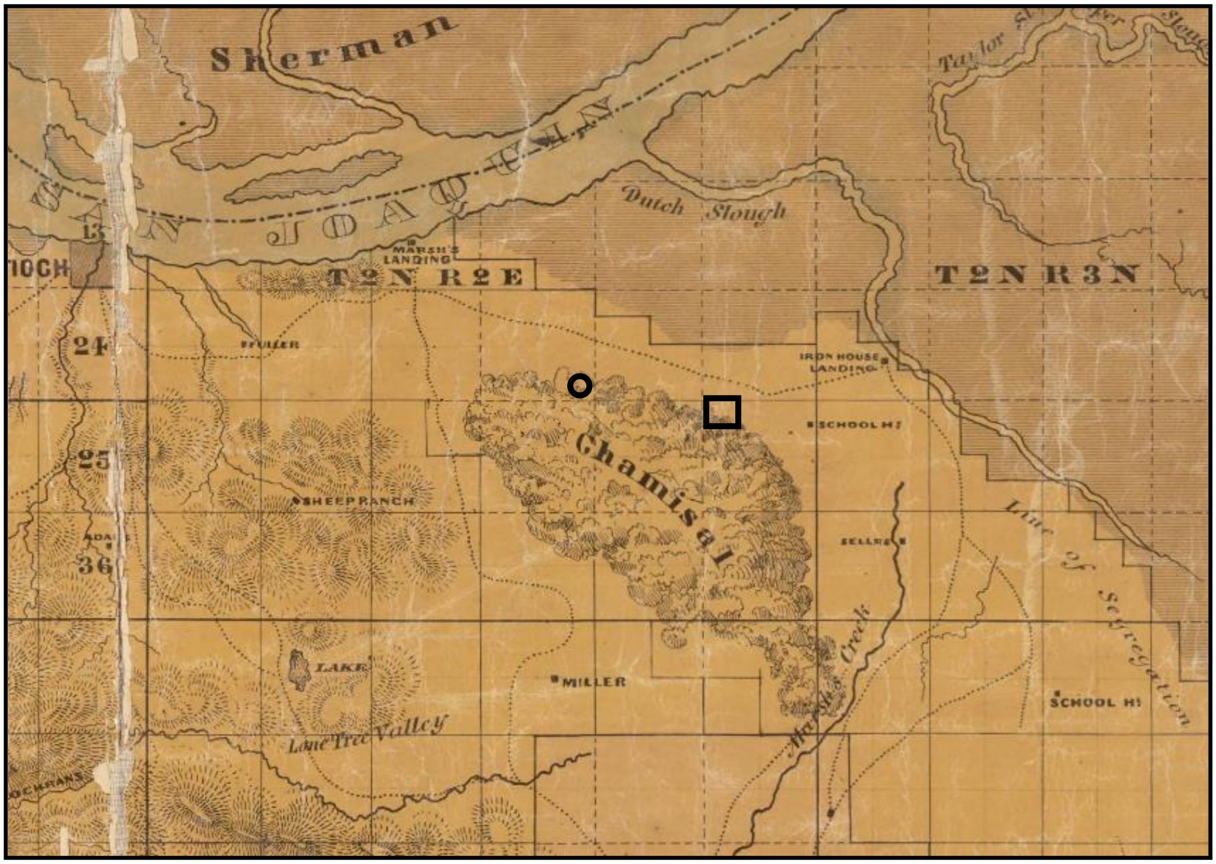


Figure 1. Map of eastern Contra Costa County, 1871 (Contra Costa County Board of Supervisors 1871)

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).

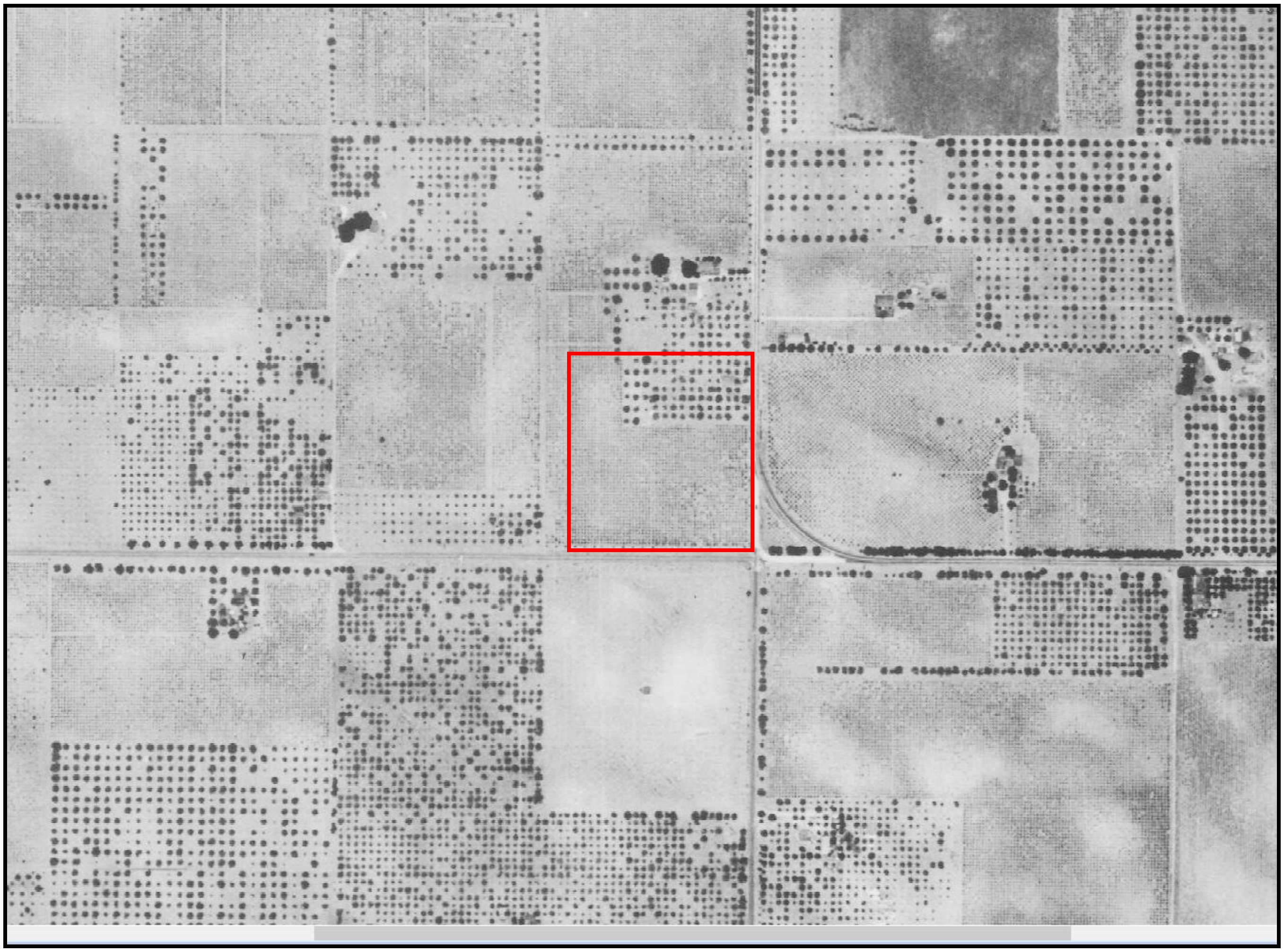


Figure 3. View of the subject property (UCSB 1939).

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.

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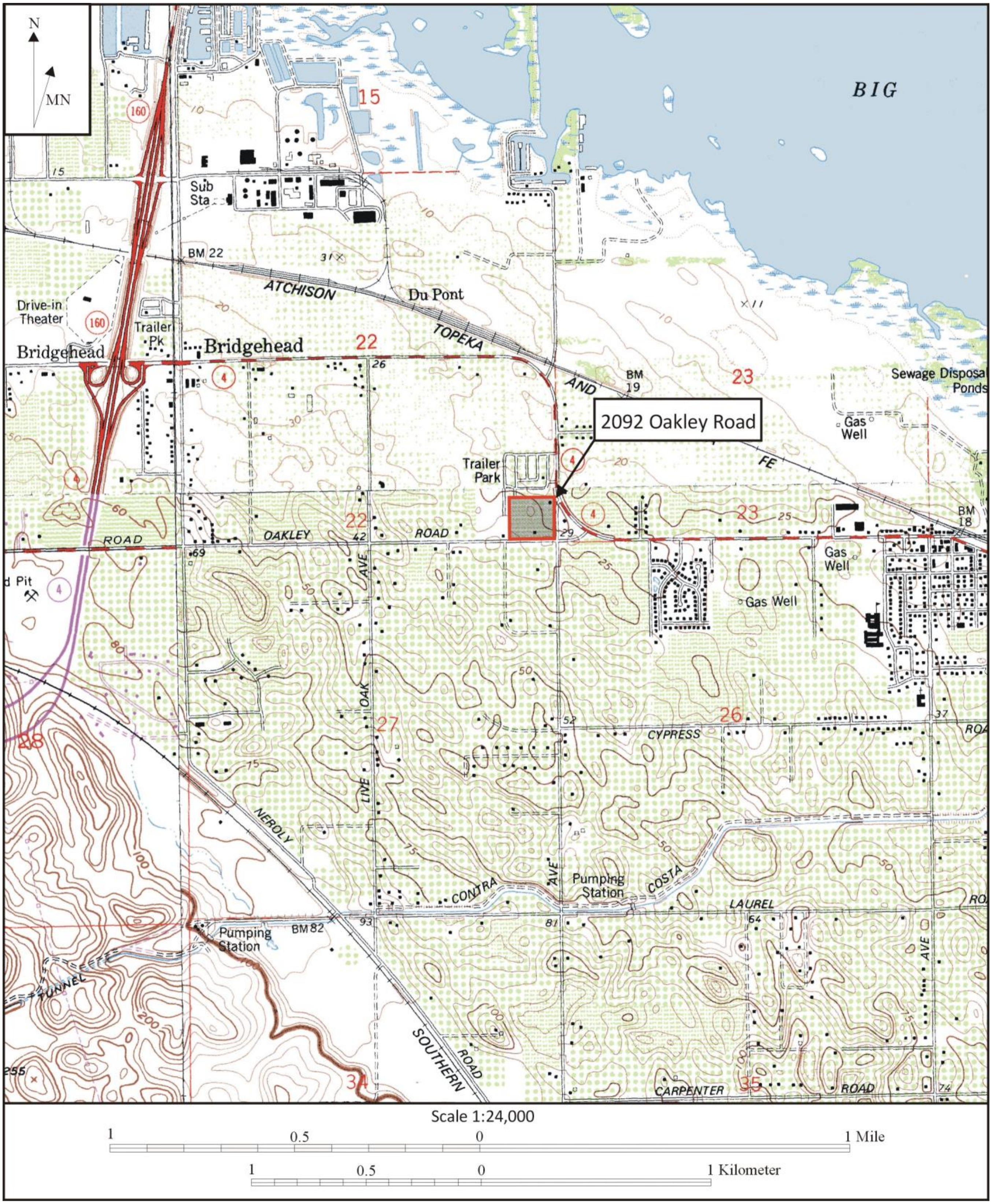
LOCATION MAP

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 ☐ GEOLOGY ☐ ENVIRONMENTAL

BAEZ GEOTECHNICAL GROUP

GEOTECHNICAL INVESTIGATION
PASEO RESIDENTIAL SUBDIVISION
2092 OAKLEY ROAD
OAKLEY, CALIFORNIA

for
John D'Ambrosio Family Trust
November 9, 2022

BGG Project No. G289.01

5236 REDWOOD ROAD, HUGHSON, CA 95326 | P.O. BOX 296, OAKDALE, CA 95361 | 355 EARHART WAY, LIVERMORE, CA 94551 | (209) 602-6569

☐ GEOTECHNICAL ☐ GEOLOGY ☐ ENVIRONMENTAL
BAEZ GEOTECHNICAL GROUP

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 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

REGISTERED PROFESSIONAL ENGINEER
WILLIAM R. STEVENS
No. 2339
GEOTECHNICAL
STATE OF CALIFORNIA

Stefanie Parman-Ribeiro	William R. Stevens
Project Engineer	Principal Engineer
	GE 2339

Attachments:

Plate 1 – Vicinity Map
Plate 2 – Site Plan

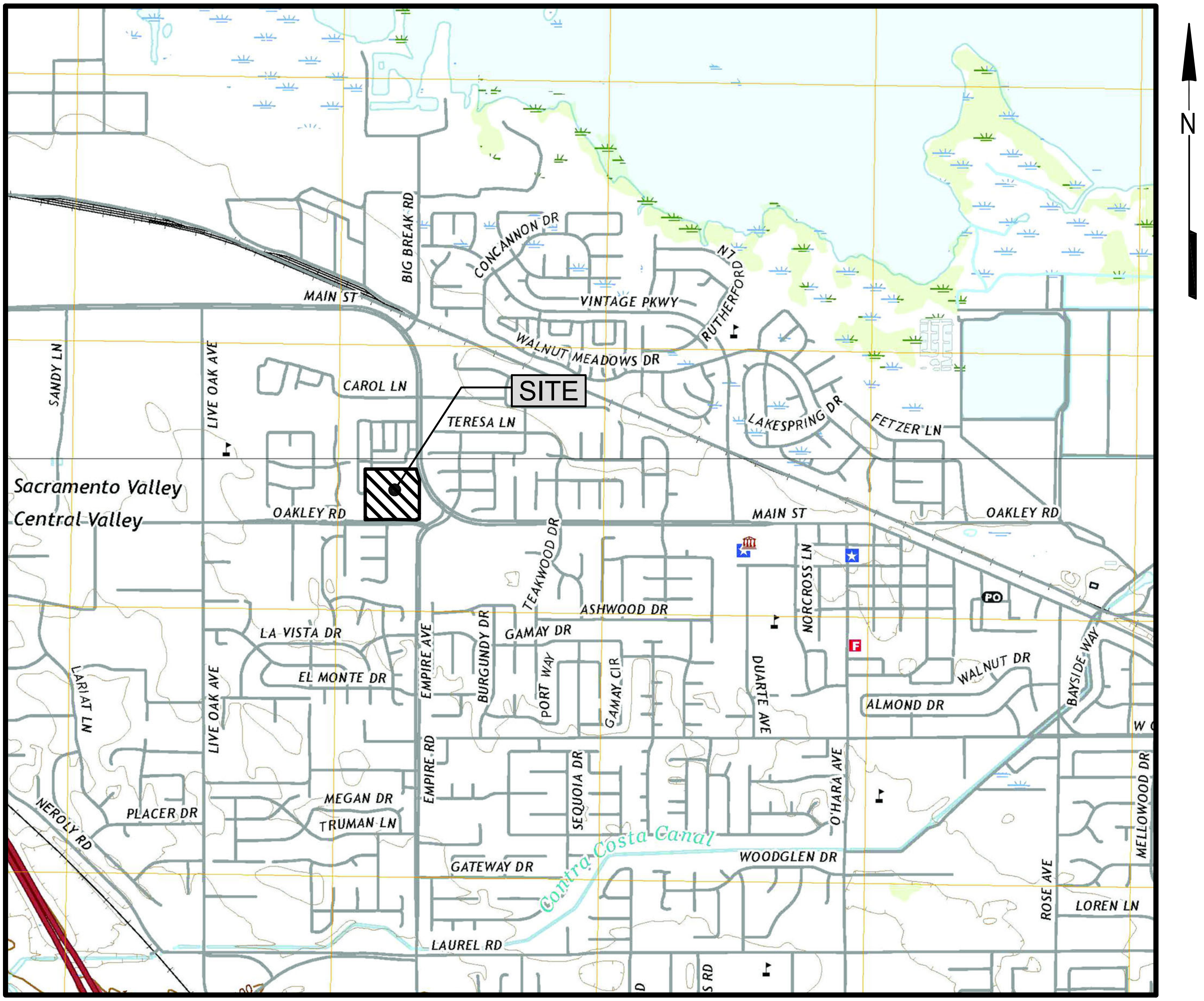
Appendix A – Boring Logs
Appendix B – CPT Graphs
Appendix C – Laboratory Test Results
Appendix D – Corrosion Test Results
Appendix E – Liquefaction Analyses – Groundwater 20-feet Deep
Appendix F – Liquefaction Analyses – Groundwater 25-feet Deep

E://BGG/G289-2092 Oakley Road/GI G289 Paseo Oakley.docx

DRAWN BY: SPR

DATE: 10/25/2022

BGG NUMBER: G289.01



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.

0 2000

1 INCH = 2000 FEET

VICINITY MAP

PASEO SUBDIVISION

2092 OAKLEY ROAD
OAKLEY, CALIFORNIA
FOR
JOHN D'AMBROSIO FAMILY TRUST

BAEZ GEOTECHNICAL GROUP

PLATE 1

DRAWN BY: SPR

DATE: 10/26/2022

BGG NUMBER: G289.01

BAEZ GEOTECHNICAL GROUP

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

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

PAGE 1 OF 1

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
		32	0						
SM	SILTY SAND, tan to medium brown, dry, loose, fine- to medium-grained sand			▨					
	below 1 foot, moist, medium dense (Sample consolidated 0.1% upon loading to 1,000 psf and an additional 0.5% after saturation) (Sample consolidated 0.1% upon loading to 2,500 psf and an additional 0.8% after saturation)			⧗	10		4.2 3.6		
				▨					
		27	5	⧗	10				
SM	SILTY SAND, tan and medium brown with gray, moist, dense, fine- to medium-grained sand								
		22	10	⧗	35				
CL	SILTY CLAY, tan and light brown with light and dark gray, slightly moist, hard	17	15	◪	53				91
	Bottom of Boring at 15 feet below the ground surface (bgs). Groundwater was not encountered.	12	20						

BORING NUMBER: B2

PAGE 1 OF 1

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: 30 feet MSL
DRILLING CONTRACTOR: West Coast Exploration
GROUNDWATER ELEVATION: Not encountered
DRILLING METHOD: Solid Flight Auger
SAMPLER TYPE:
⧗ Modified California Sampler
◢ Standard Penetration Test
LOGGED BY: KJR
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	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			◢	24				15
		15	15						
	Bottom of Boring at 15 feet bgs. Groundwater was not encountered.								
		10	20						

BORING NUMBER: B3/P1

PAGE 1 OF 1

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
LOGGED BY: KJR
NOTES: Elevation obtained from Google Earth

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
		32	0						
SM	SILTY SAND, tan to medium brown, dry, loose, fine- to medium-grained sand 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) below 3 feet, fine- to coarse-grained sand			▨ ⧗ ▨	15		3.7 3.7		
		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

PAGE 1 OF 1

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: 29 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
		29	0						
SM	SILTY SAND, tan to medium brown, dry, loose, fine- to medium-grained sand								
	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 LOCATION: 2092 Oakley Road, Oakley
PROJECT NUMBER: G289.01
CLIENT: Mercantile Systems, Inc.
DATE DRILLED: 09/30/2022
GROUND ELEVATION: 30 feet MSL
DRILLING CONTRACTOR: West Coast Exploration
GROUNDWATER ELEVATION: Not encountered
DRILLING METHOD: Solid Flight Auger
SAMPLER TYPE:
⧗ Modified California Sampler
◪ Standard Penetration Test
LOGGED BY: KJR
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
		30	0						
SM	SILTY SAND, tan to medium brown, dry, loose, fine- to medium-grained sand below 1 foot, moist and medium dense								
	Bottom of Boring at 4 feet bgs. Groundwater was not encountered.	25	5						
		20	10						
		15	15						
		10	20						

APPENDIX B

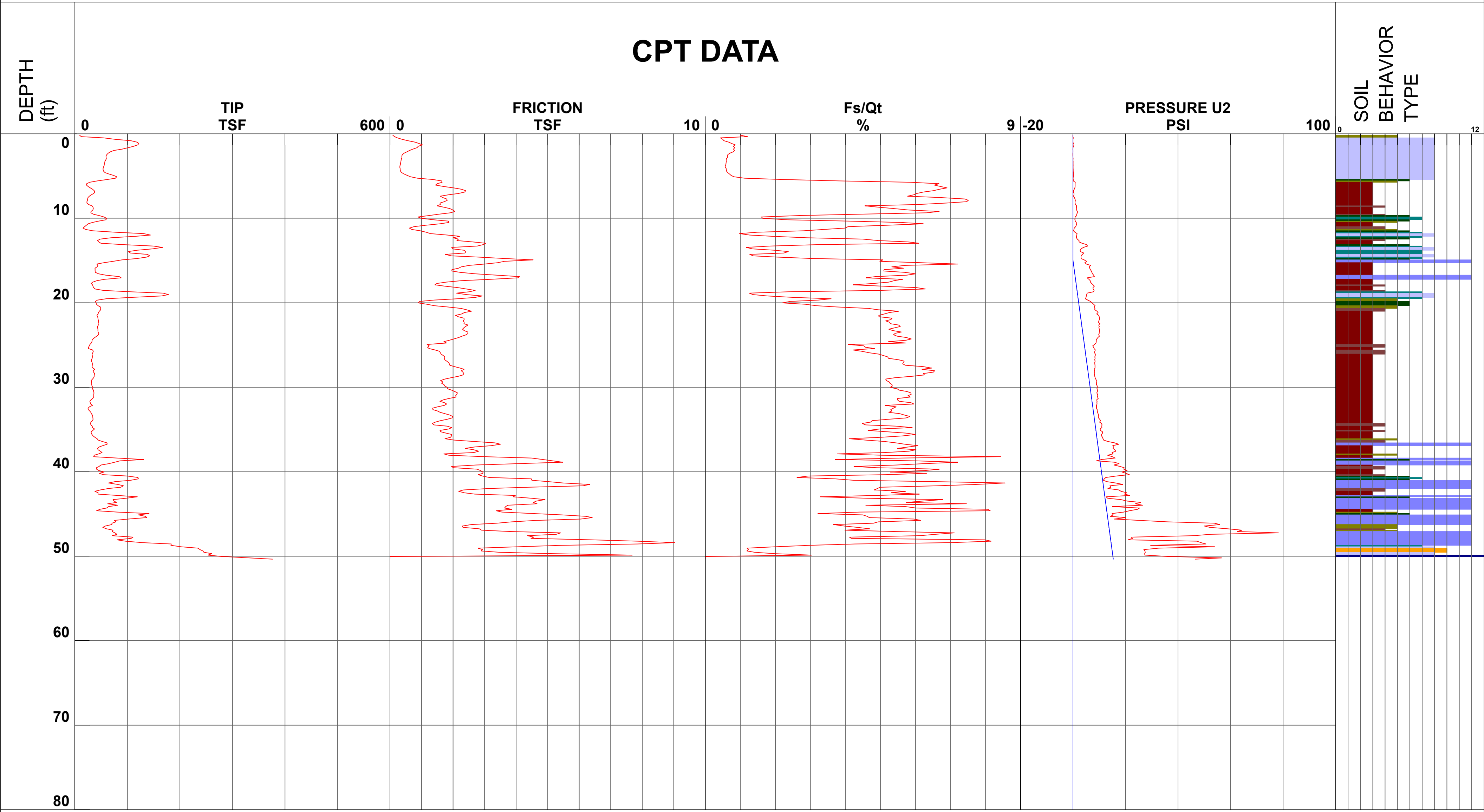
Middle Earth Earth Geo Testing, Inc.
Cone Penetrometer Test (CPT) Graphs

Baez Geotechnical

Middle Earth Geo Testing Inc.

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



■ 1 - sensitive fine grained	■ 4 - silty clay to clay	■ 7 - silty sand to sandy silt	■ 10 - gravelly sand to sand
■ 2 - organic material	■ 5 - clayey silt to silty clay	■ 8 - sand to silty sand	■ 11 - very stiff fine grained (*)
■ 3 - clay	■ 6 - sandy silt to clayey silt	■ 9 - sand	■ 12 - sand to clayey sand (*)

Cone Size 15cm squared

S*Soil behavior type and SPT based on data from UBC-1983

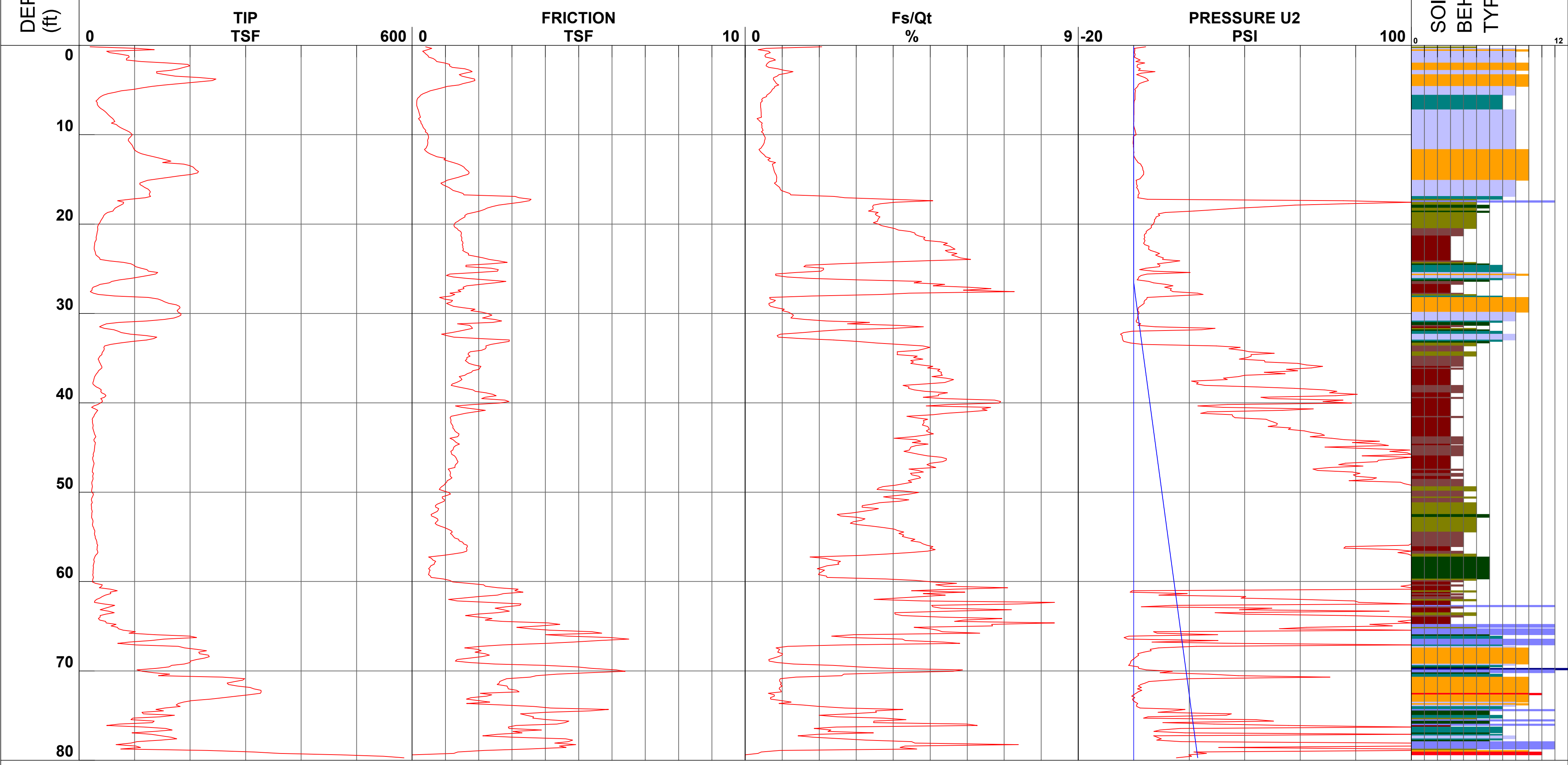
Baez Geotechnical

Middle Earth
Geo Testing Inc.

Project Oakley Paseos
Job Number G289.01
Hole Number CPT-02
EST GW Depth During Test 26.60 ft
Operator AJ-BH
Cone Number DDG1589
Date and Time 9/30/2022 8:45:23 AM
Filename SDF(230).cpt
GPS
Maximum Depth 79.72 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 (*)

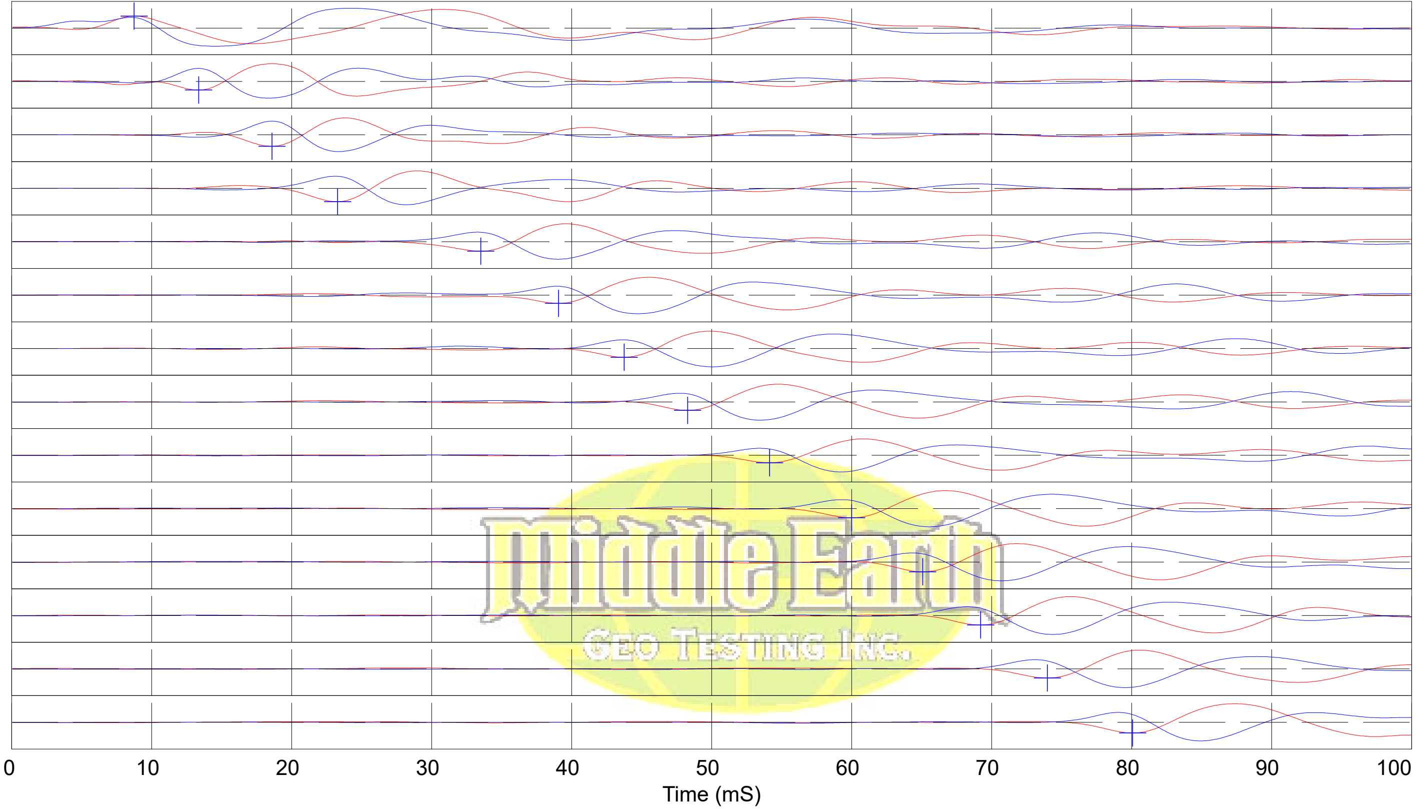
Cone Size 15cm squared

S*Soil behavior type and SPT based on data from UBC-1983

CPT-02

Baez Geotechnical

Oakley Paseos



Depth 4.99ft	Ref*	Arrival 8.75mS	Velocity*
Depth 10.01ft	Ref 4.99ft	Arrival 13.36mS	Velocity 847.95ft/S
Depth 15.03ft	Ref 10.01ft	Arrival 18.59mS	Velocity 866.65ft/S
Depth 20.01ft	Ref 15.03ft	Arrival 23.28mS	Velocity 1008.52ft/S
Depth 30.02ft	Ref 20.01ft	Arrival 33.51mS	Velocity 951.29ft/S
Depth 35.01ft	Ref 30.02ft	Arrival 39.06mS	Velocity 884.89ft/S
Depth 40.03ft	Ref 35.01ft	Arrival 43.75mS	Velocity 1058.16ft/S
Depth 45.01ft	Ref 40.03ft	Arrival 48.28mS	Velocity 1090.38ft/S
Depth 50.03ft	Ref 45.01ft	Arrival 54.14mS	Velocity 850.35ft/S
Depth 55.02ft	Ref 50.03ft	Arrival 60.00mS	Velocity 845.94ft/S
Depth 60.04ft	Ref 55.02ft	Arrival 65.07mS	Velocity 983.50ft/S
Depth 65.03ft	Ref 60.04ft	Arrival 69.21mS	Velocity 1199.24ft/S
Depth 70.05ft	Ref 65.03ft	Arrival 73.98mS	Velocity 1049.47ft/S
Depth 79.72ft	Ref 70.05ft	Arrival 80.07mS	Velocity 1583.55ft/S

Hammer to Rod String Distance (ft): 5.83
* = Not Determined

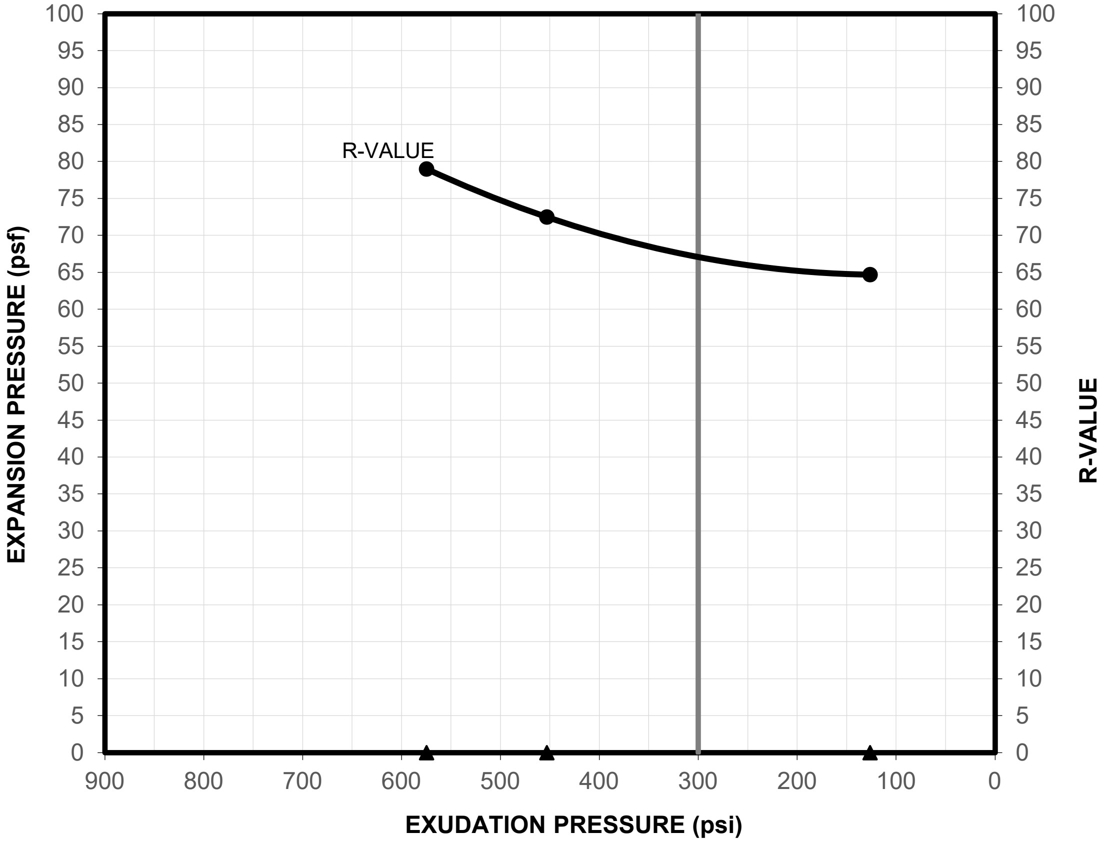
COMMENT:

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

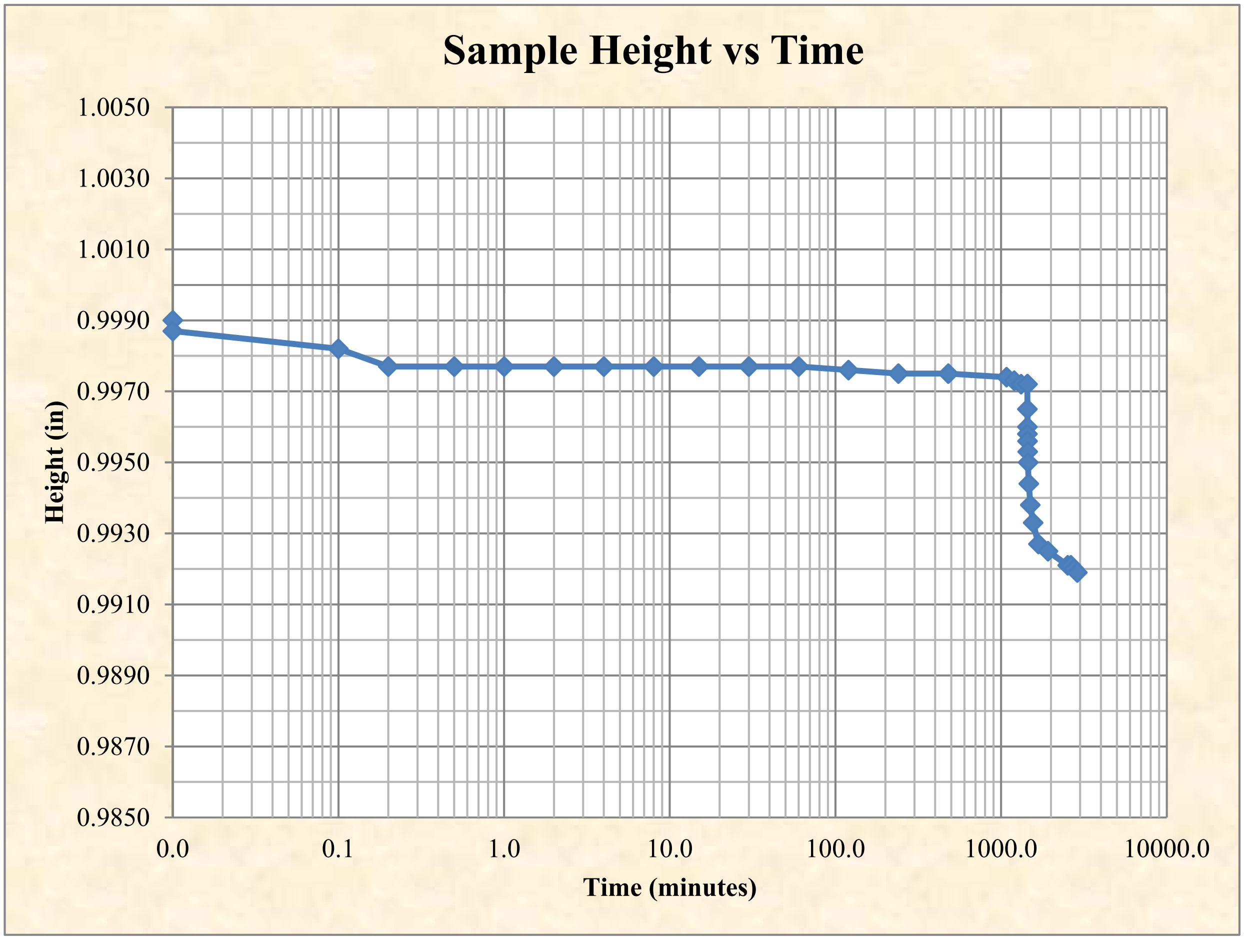
SPECIMENS	1	2	3
EXUDATION PRESSURE (psi)	575	453	126
EXPANSION PRESSURE (psf)	0	0	0
R-VALUE	79	72	65
MOISTURE CONTENT (%)	9.0	10.7	12.8
DRY DENSITY (pcf)	110.3	112.2	110.7
EXPANSION PRESSURE (psf) AT EXUDATION PRESSURE OF 300 psi		0	
R-VALUE AT EXUDATION PRESSURE OF 300 psi		**TEST RESULT** **67**	

[1] Material description per ASTM D2488

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**
PROJECT NUMBER: **14368.000.174 PHLAB**
CLIENT: **Baez Geotechnical Group, Inc.**
PHASE NUMBER: **LAB**

REPORT DATE: **10/06/22**

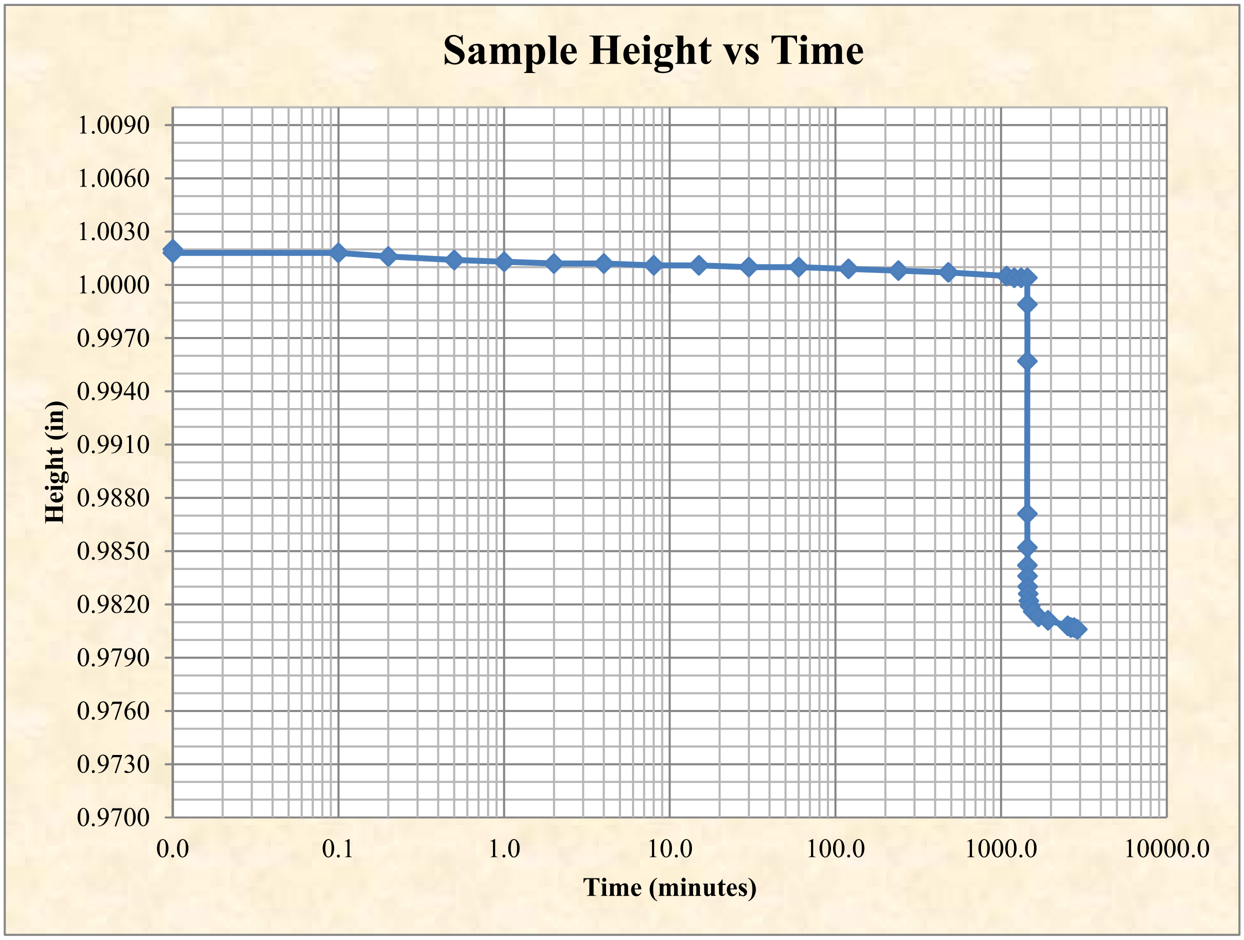
ENGEO
Expect Excellence

Tested by: K. Lecce

Reviewed by: M. Tong

ONE DIMENSIONAL SWELL/COLLAPSE POTENTIAL - METHOD 'C' Modified

ASTM D4546



SAMPLE ID:	**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**

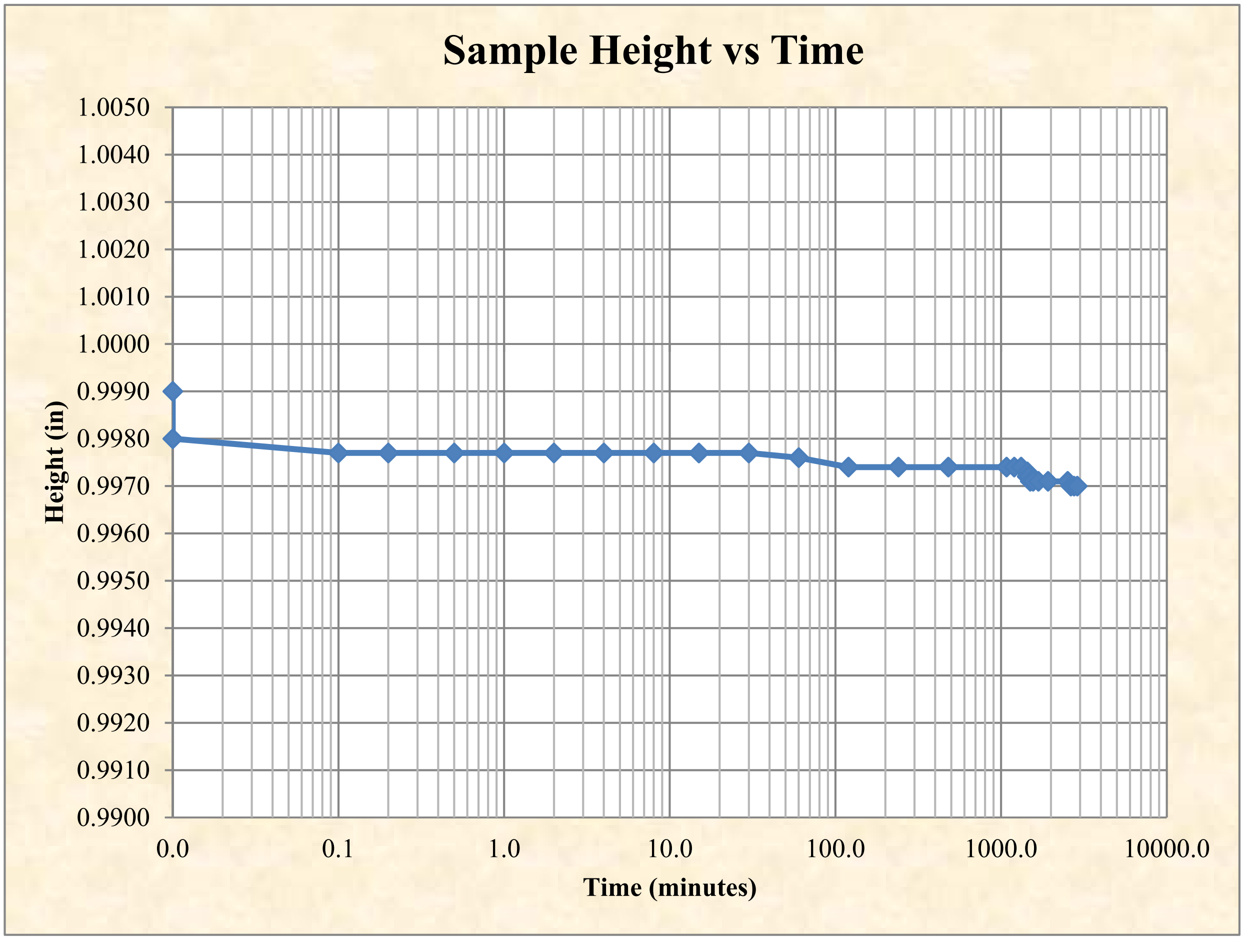
ENGEO
Expect Excellence

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**
PROJECT NUMBER: **14368.000.174 PHLAB**
CLIENT: **Baez Geotechnical Group, Inc.**
PHASE NUMBER: **LAB**

REPORT DATE: **10/13/22**

ENGEO
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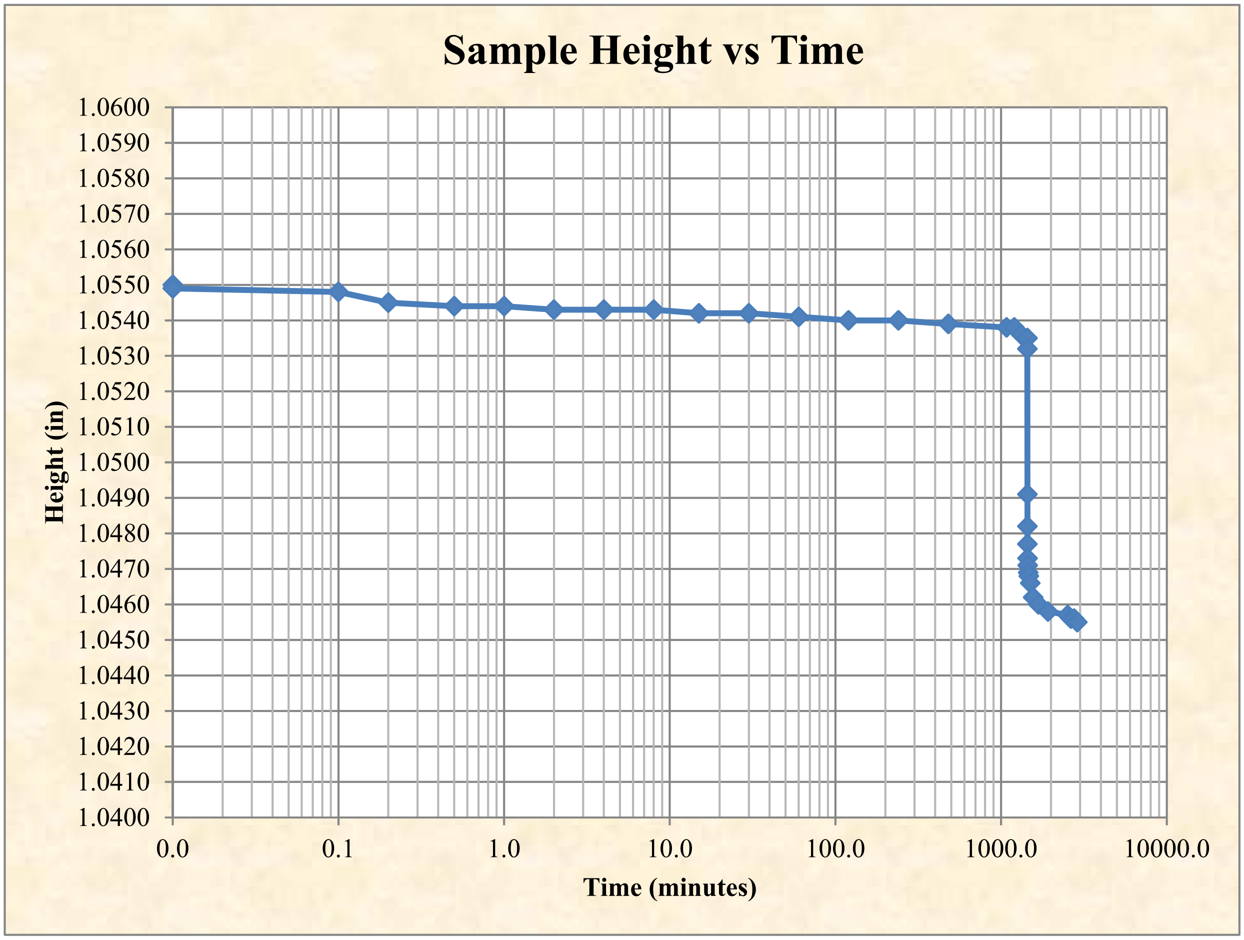
Tested by: K. Lecce

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
PROJECT NUMBER: 14368.000.174 PHLAB
CLIENT: Baez Geotechnical Group, Inc.
PHASE NUMBER: LAB

REPORT DATE: 10/13/22

ENGEO
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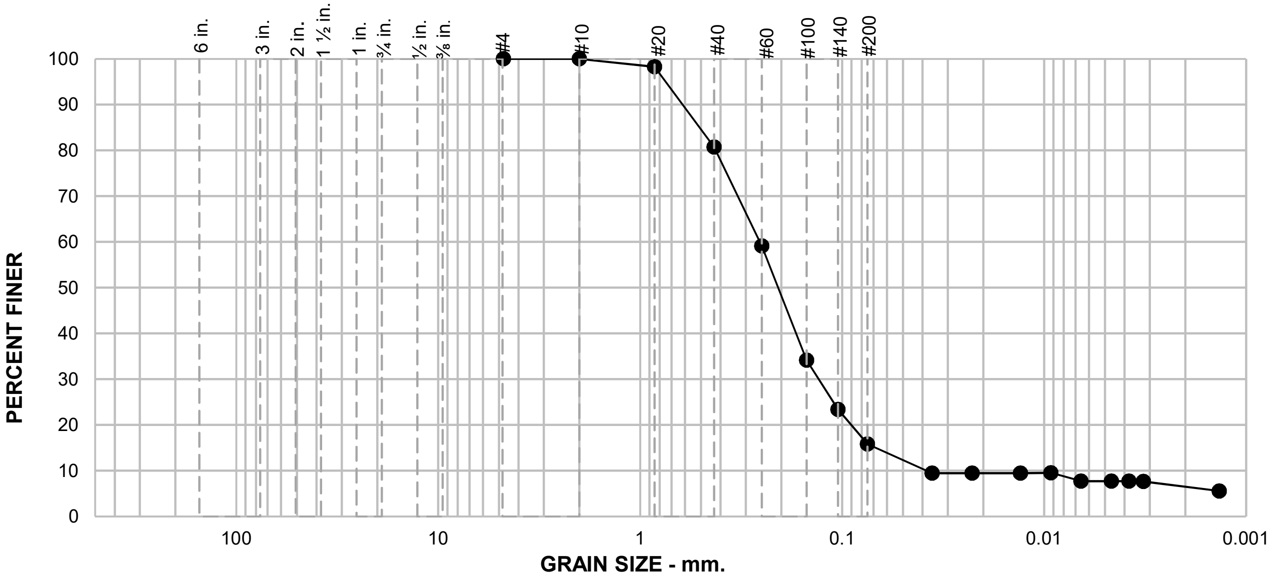
Tested by: K. Lecce

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

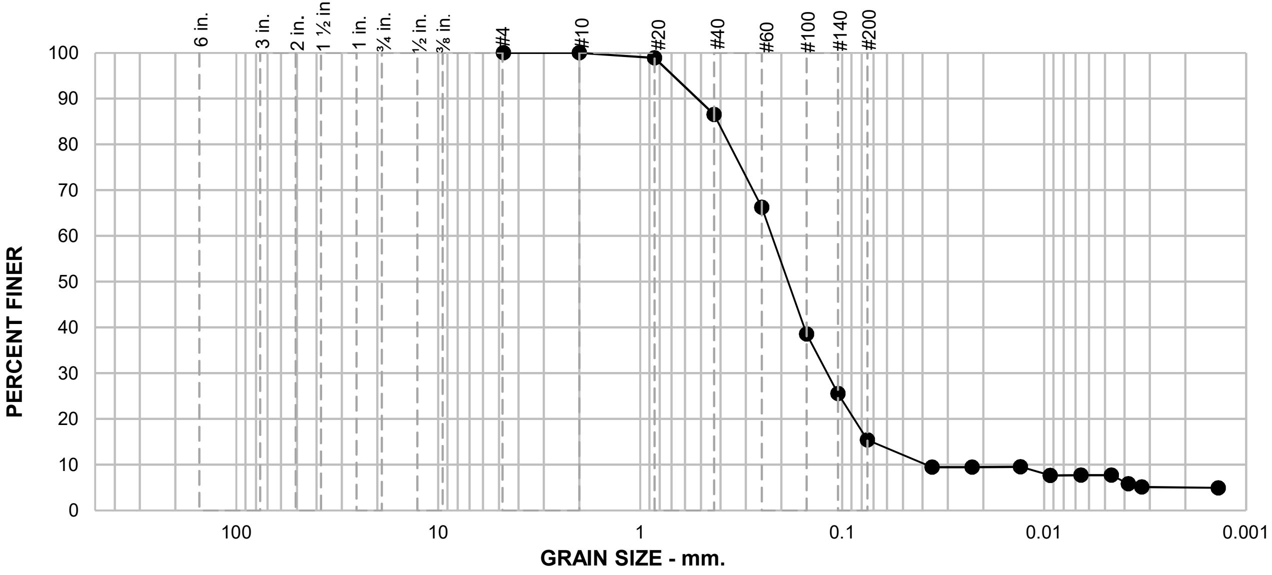
Silt/clay division of 0.002mm used
USCS: ASTM D2487

* (no specification provided)

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		

* (no specification provided)

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

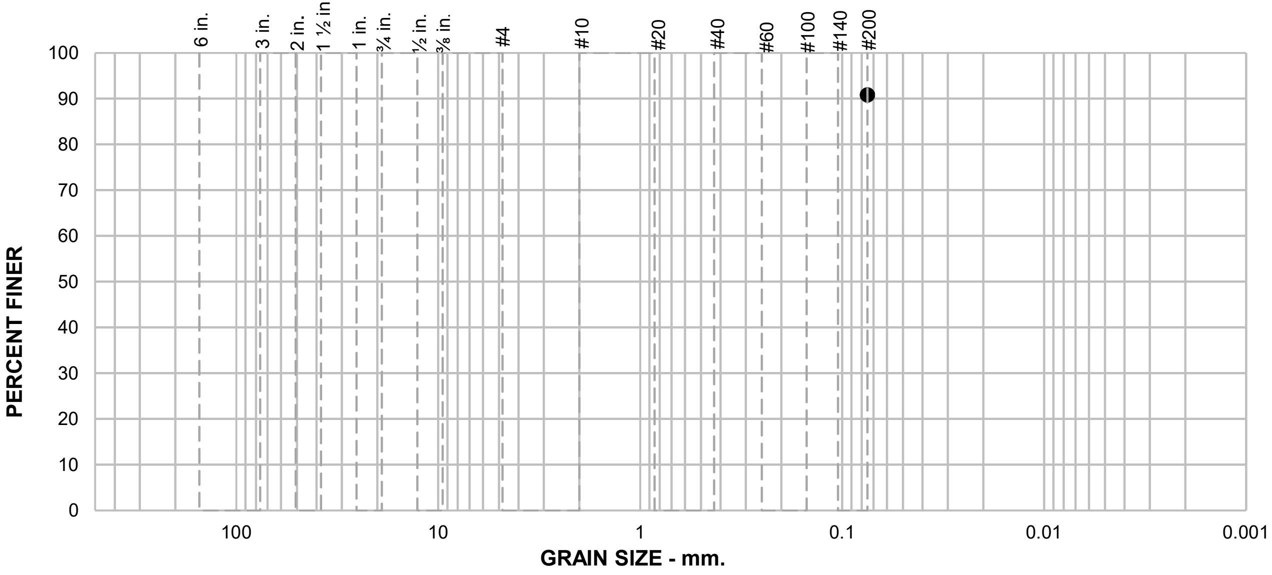
Silt/clay division of 0.002mm used
USCS: ASTM D2487

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		

* (no specification provided)

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

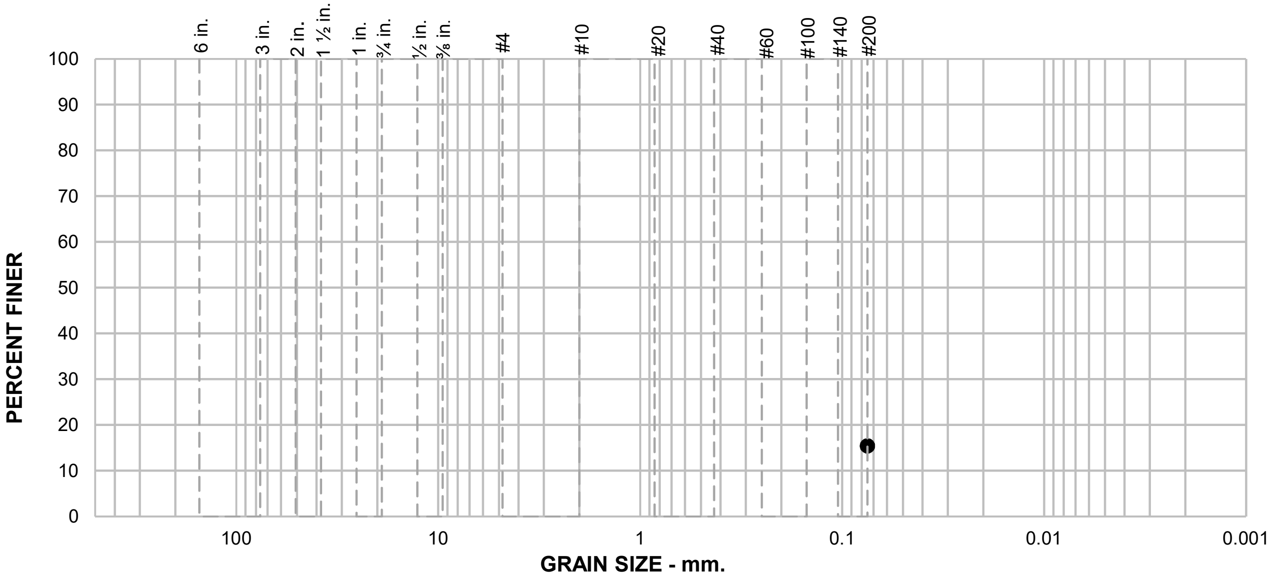
Soak time = 180 min
Dry sample weight = 296.4 g
Largest particle size < No. 4 Sieve

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		

* (no specification provided)

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

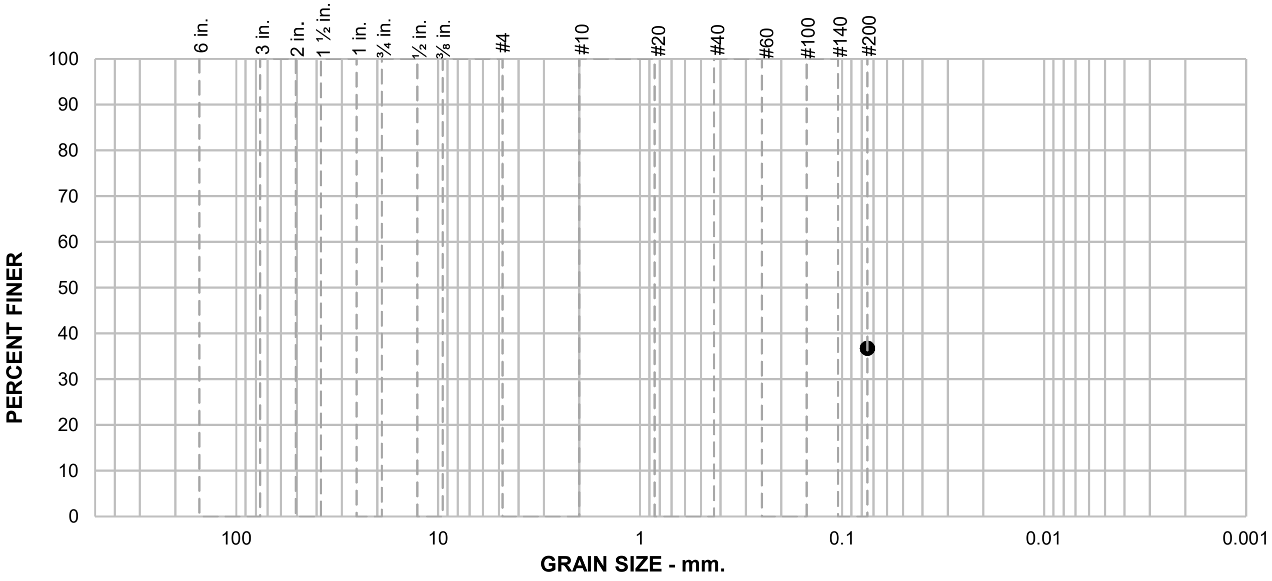
Soak time = 180 min
Dry sample weight = 331.55 g
Largest particle size < No. 4 Sieve

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		

* (no specification provided)

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

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.

Aileen 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

* Results Reported on "As Received" Basis

N.D. - None Detected

Sherri Moore

Sherri Moore
Chemist

<u>Quality Control Summary</u> - All laboratory quality control parameters were found to be within established limits

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 13042 **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.	Qty.	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: Alen 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

APPENDIX E

CLiq Liquefaction Analyses Reports
for Groundwater at 20-feet Deep

Baez Geotechnical Group
Geotechnical Engineers
BGG
http://www.baezgeotechnicalgroup.com

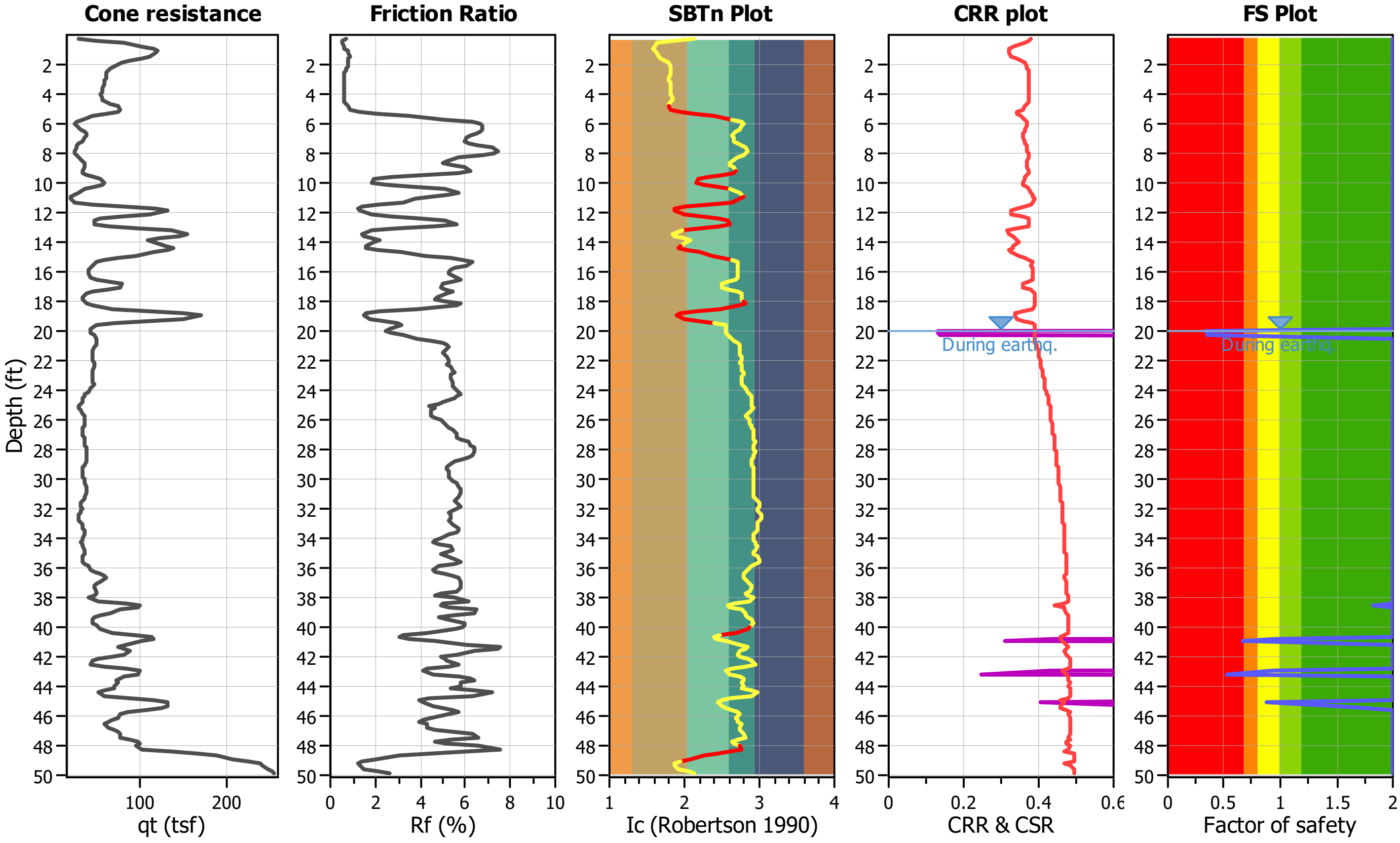
LIQUEFACTION ANALYSIS REPORT

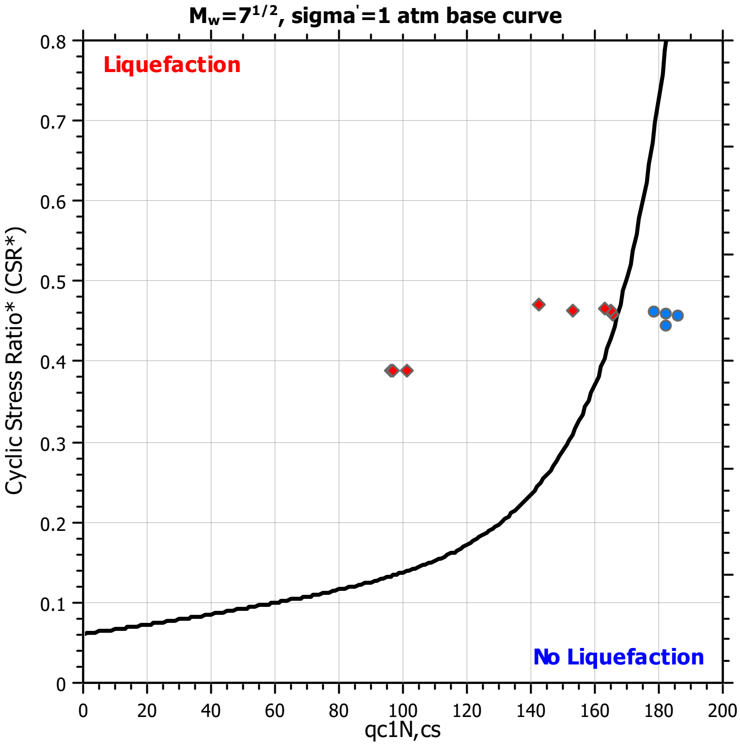
Project title : G289.01 Paseo **Location : Oakley Road, Oakley**

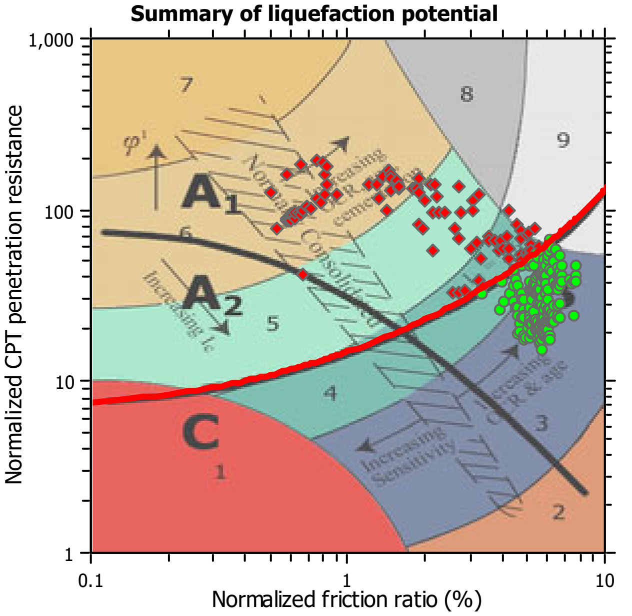
CPT file : CPT-01

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		

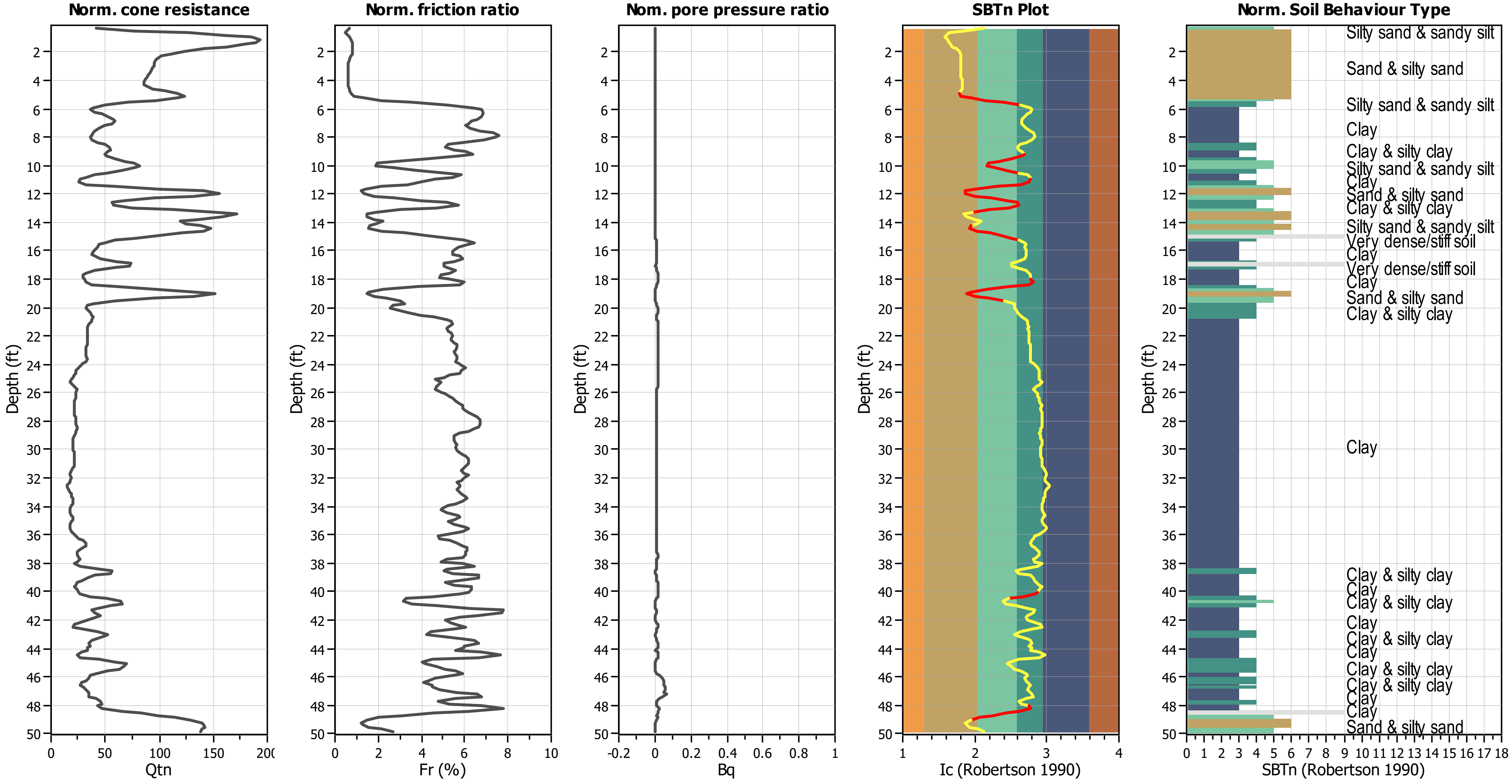






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normalized)



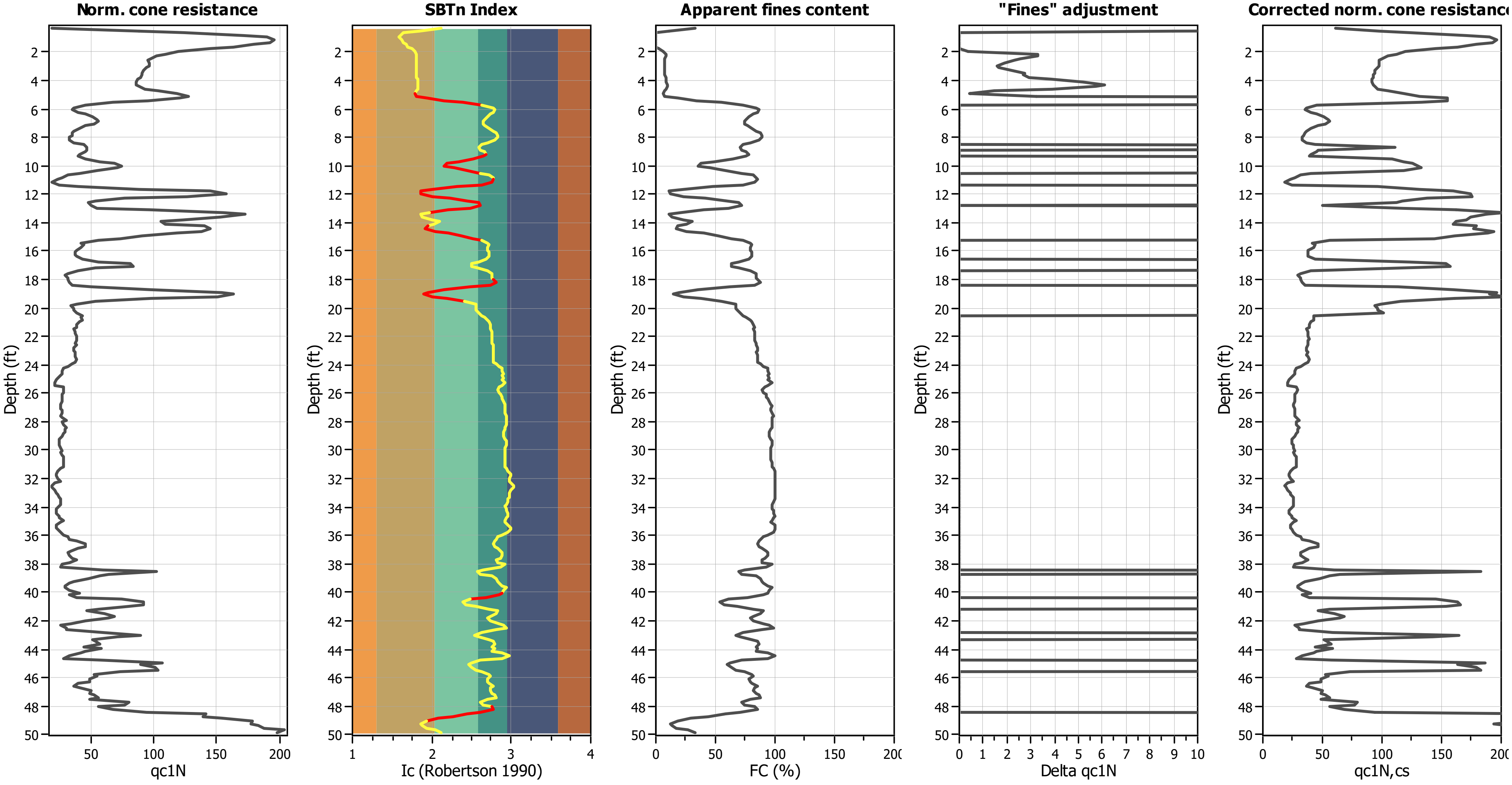
Input parameters and analysis data

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

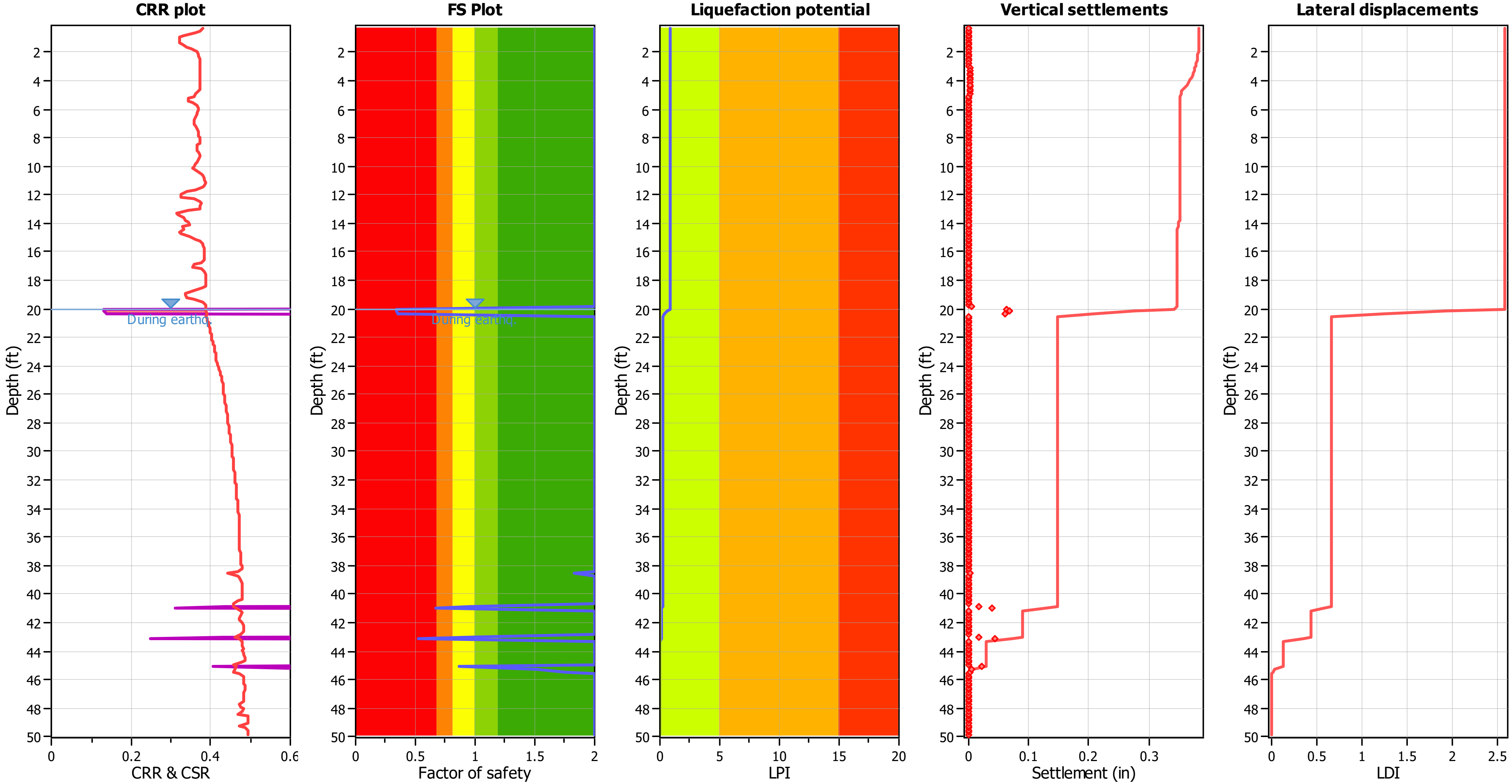
Liquefaction analysis overall plots (intermediate results)



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

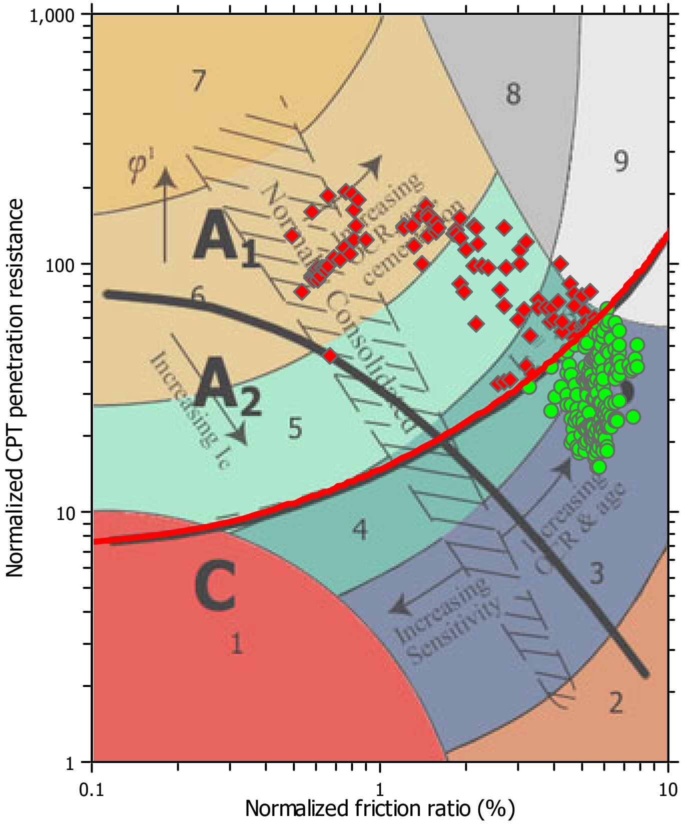
F.S. color scheme

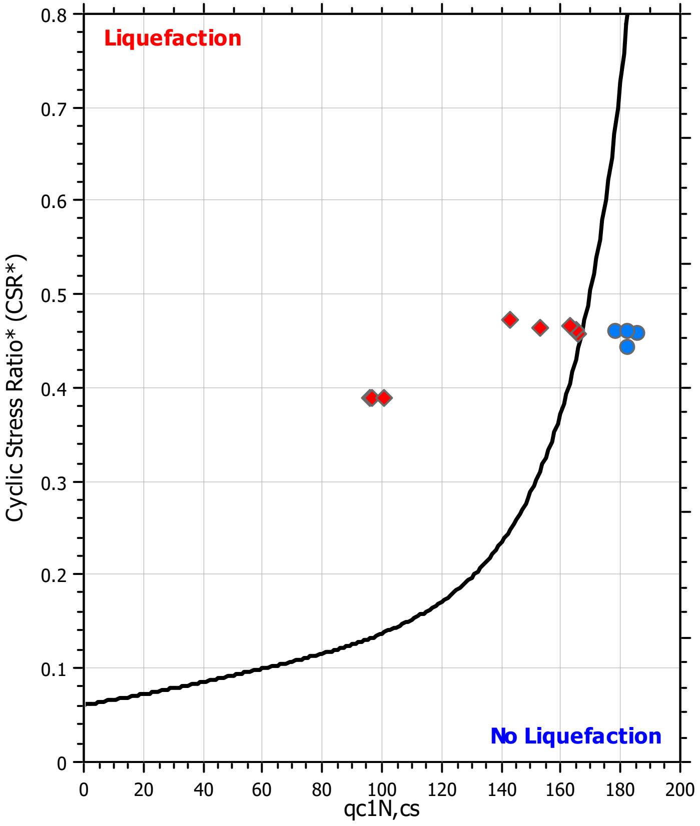
- 🟥 Almost certain it will liquefy
- 🟧 Very likely to liquefy
- 🟨 Liquefaction and no liq. are equally likely
- 🟩 Unlike to liquefy
- 🟩 Almost certain it will not liquefy

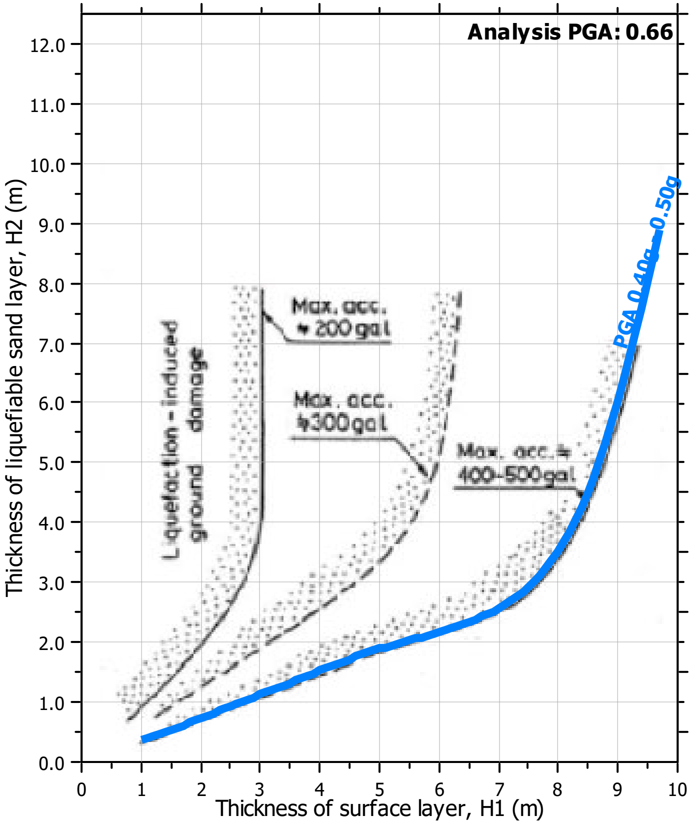
LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟩 Low risk

Liquefaction analysis summary plots



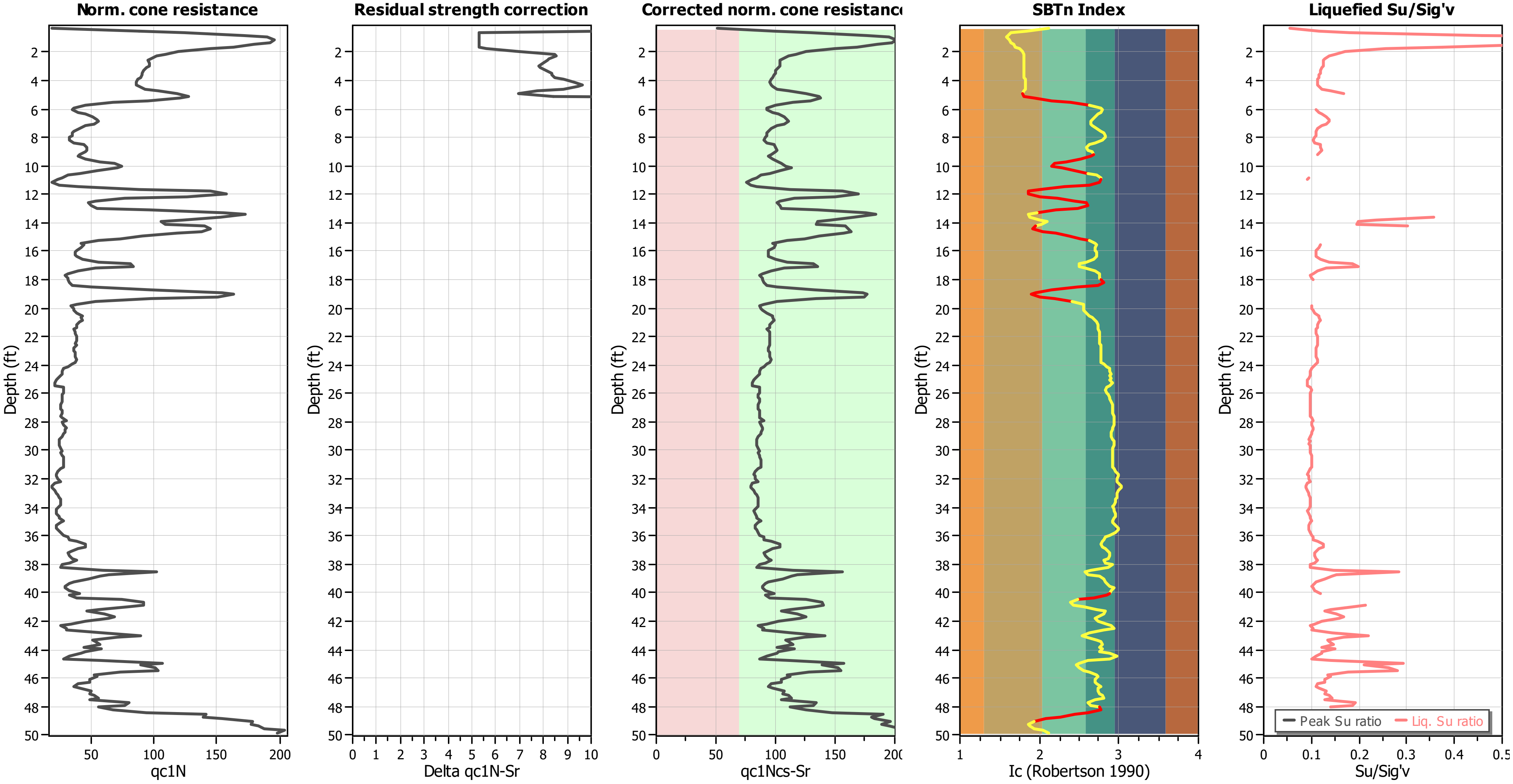




Input parameters and analysis data

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))



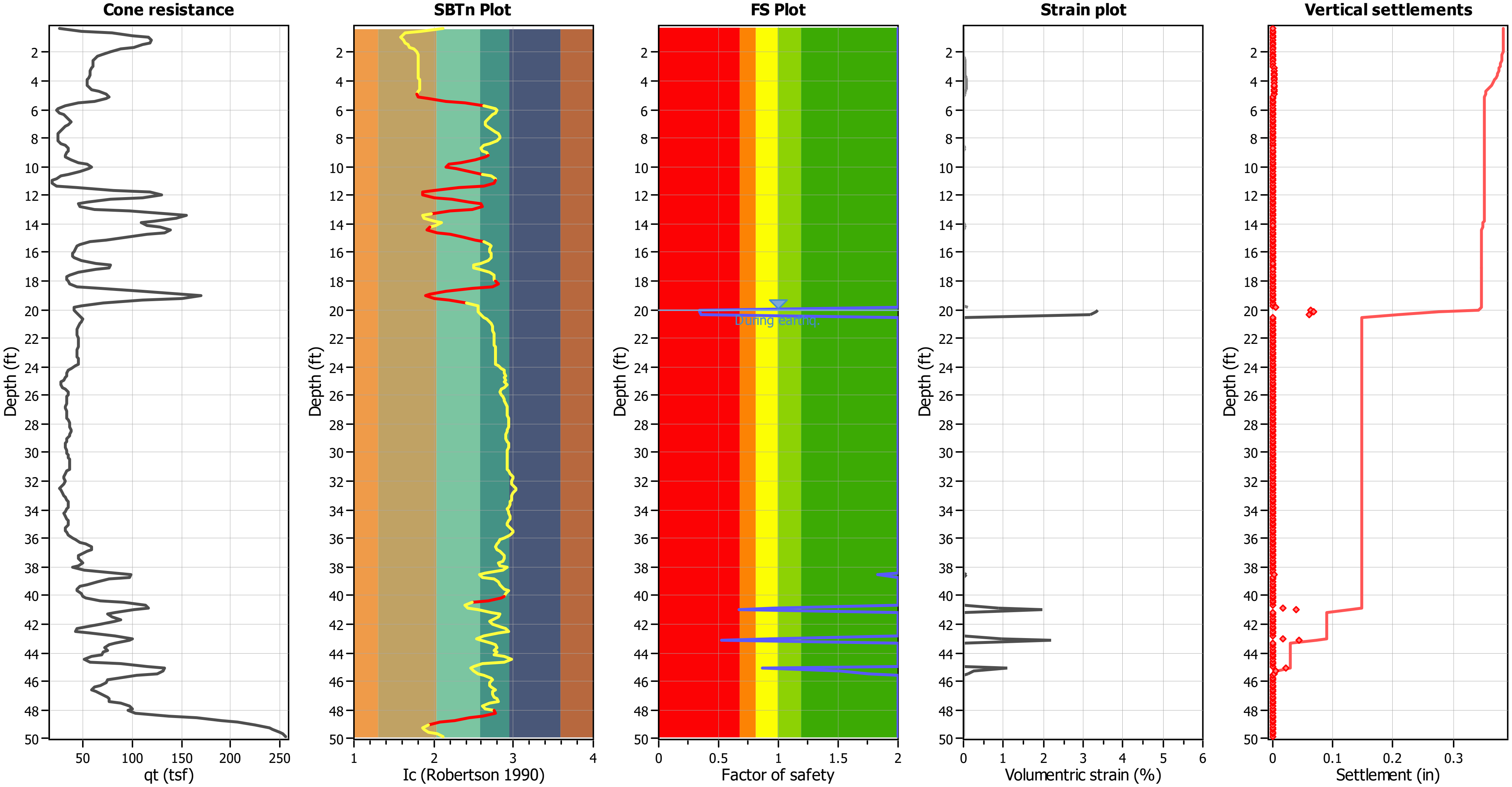
Input parameters and analysis data

Analysis method: B&I (2014)
Fines correction method: B&I (2014)
Points to test: Based on Ic value
Earthquake magnitude M_w: 7.00
Peak ground acceleration: 0.66
Depth to water table (insitu): 20.00 ft

Depth to GWT (erthq.): 20.00 ft
Average results interval: 3
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT
Use fill: No
Fill height: N/A

Fill weight: N/A
Transition detect. applied: Yes
K_σ applied: Yes
Clay like behavior applied: Sands only
Limit depth applied: No
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)

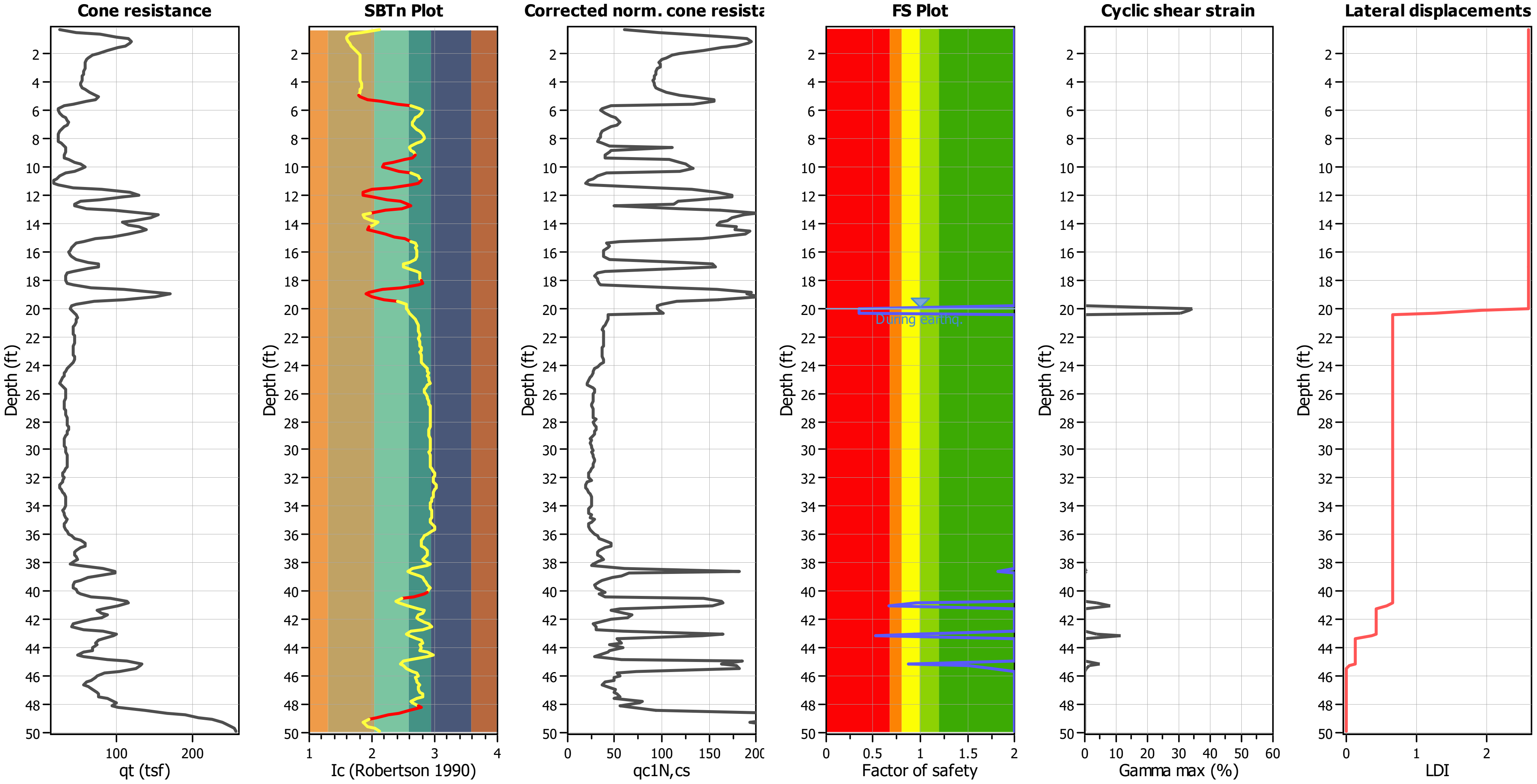
Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
39.37	32.96	2.00	0.00	1.00	0.00	39.54	29.30	2.00	0.00	1.00	0.00
39.70	29.49	2.00	0.00	1.00	0.00	39.86	32.60	2.00	0.00	1.00	0.00
40.03	40.31	2.00	0.00	1.00	0.00	40.19	33.23	2.00	0.00	1.00	0.00
40.36	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)

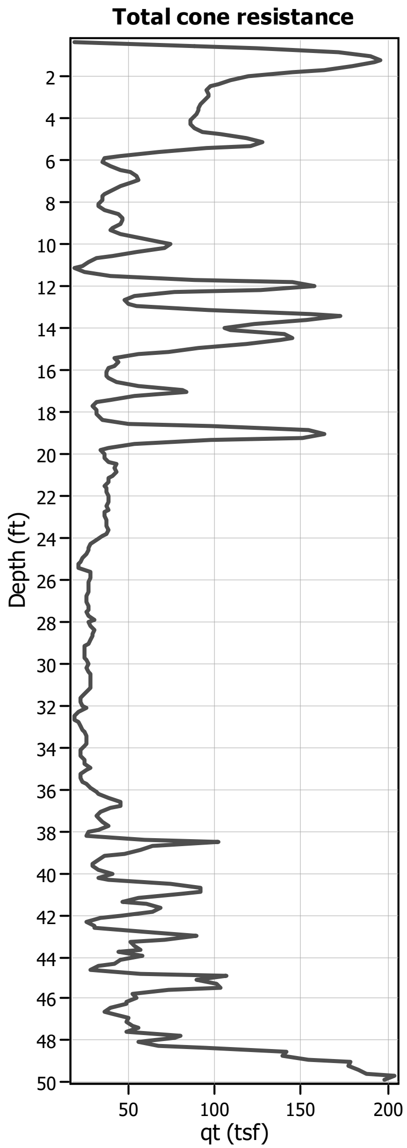
Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
43.64	56.88	0.00	2.00	0.00	0.00	0.00
43.80	43.90	0.00	2.00	0.00	0.00	0.00
43.97	58.59	0.00	2.00	0.00	0.00	0.00
44.13	45.06	0.00	2.00	0.00	0.00	0.00
44.29	42.12	0.00	2.00	0.00	0.00	0.00
44.46	32.97	0.00	2.00	0.00	0.00	0.00
44.62	28.10	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

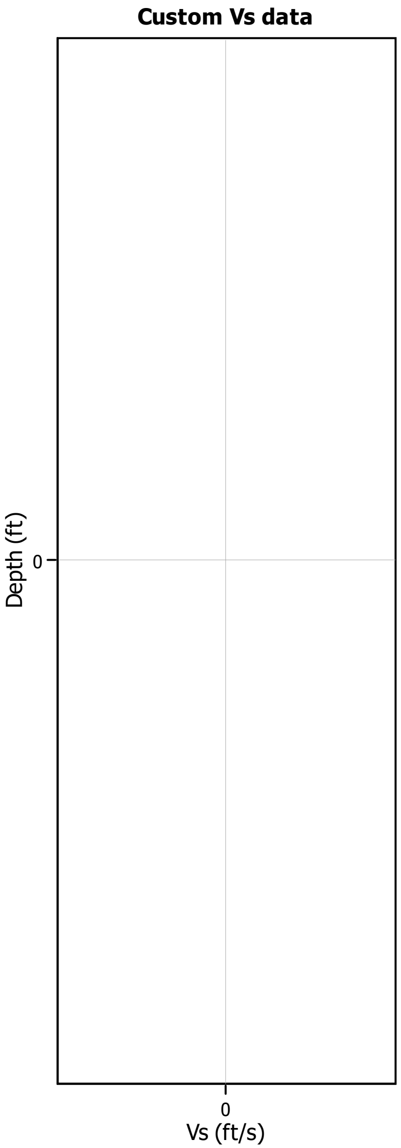
Total estimated displacement: 2.58

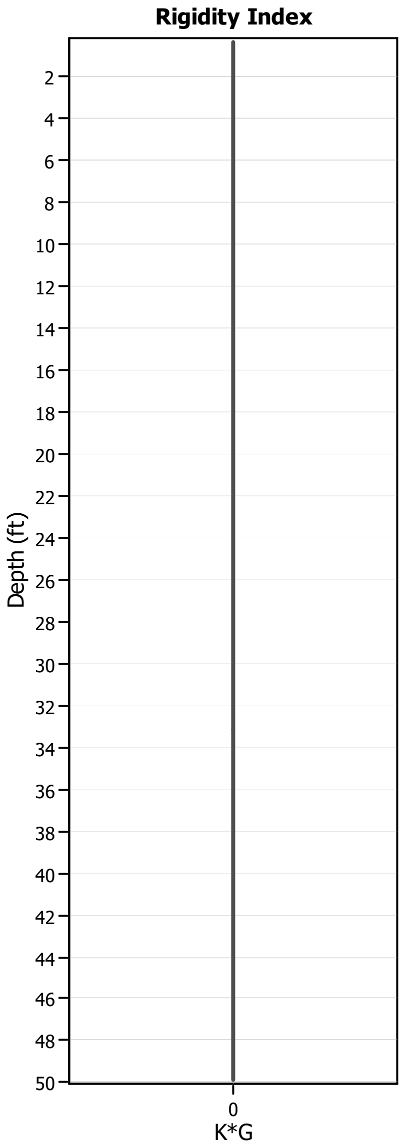
Abbreviations

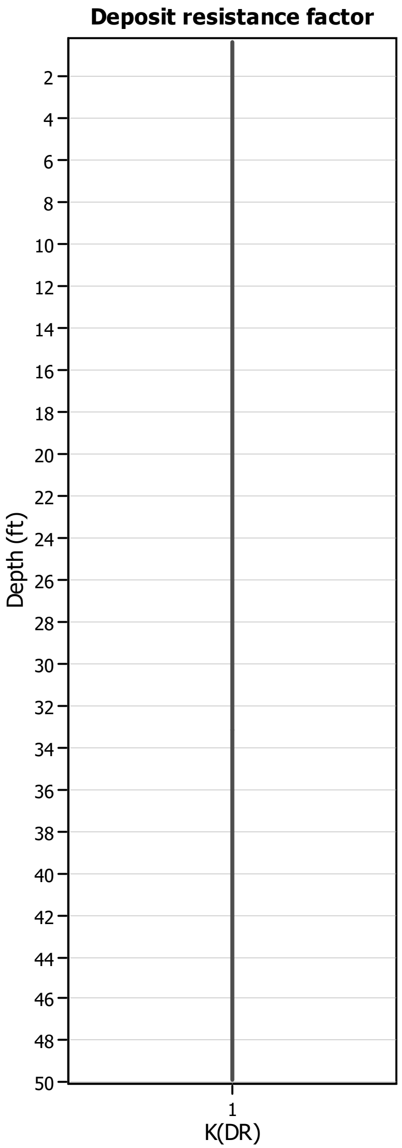
Depth:	Depth of test point
$q_{c1N,cs}$:	Adjusted and corrected cone resistance due to fines
$Gamma_{lim}$:	Limiting shear strain
FS:	Calculated factor of safety against liquefaction
Fa:	
$Gamma_{max}$:	Maximum cyclic shear strain
Lat. disp.:	Lateral displacement

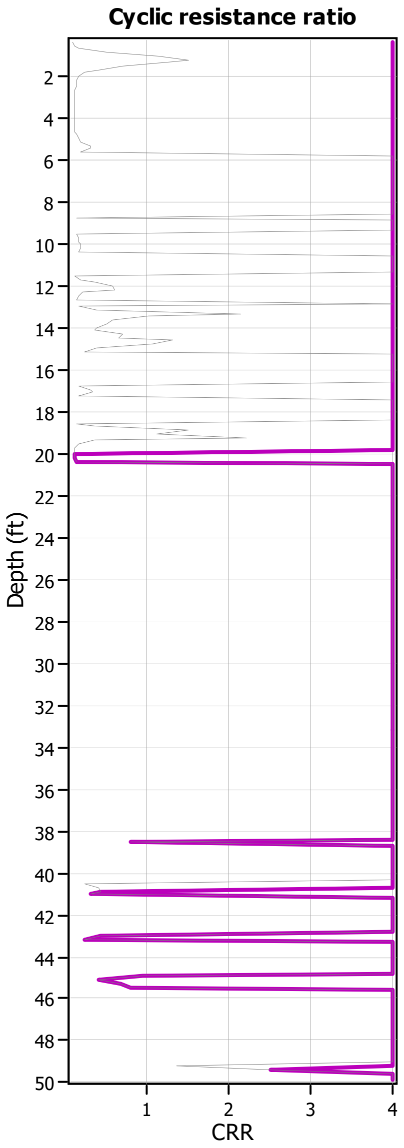
Aging Calculation Estimation



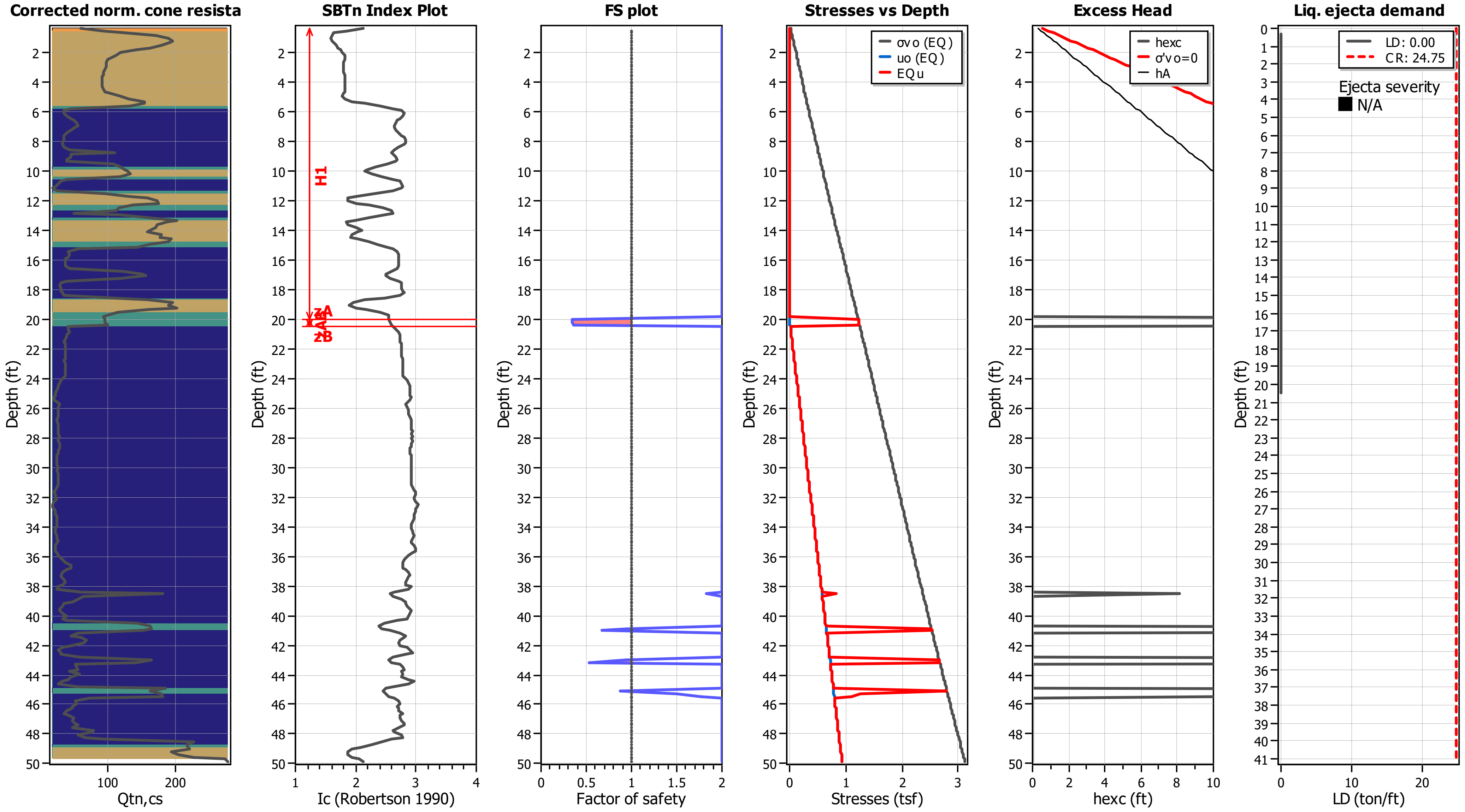








Ejecta Severity Estimation



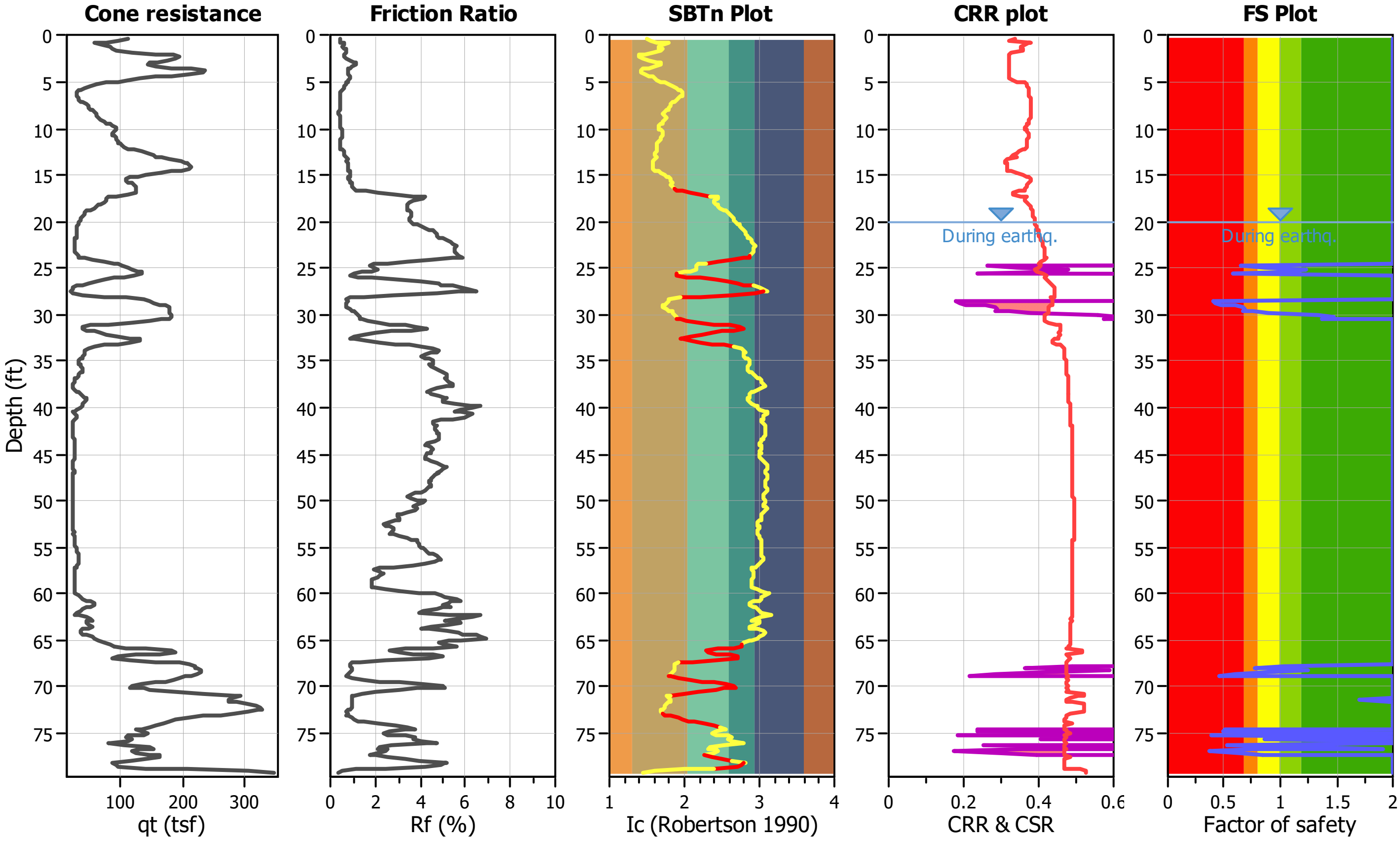
LIQUEFACTION ANALYSIS REPORT

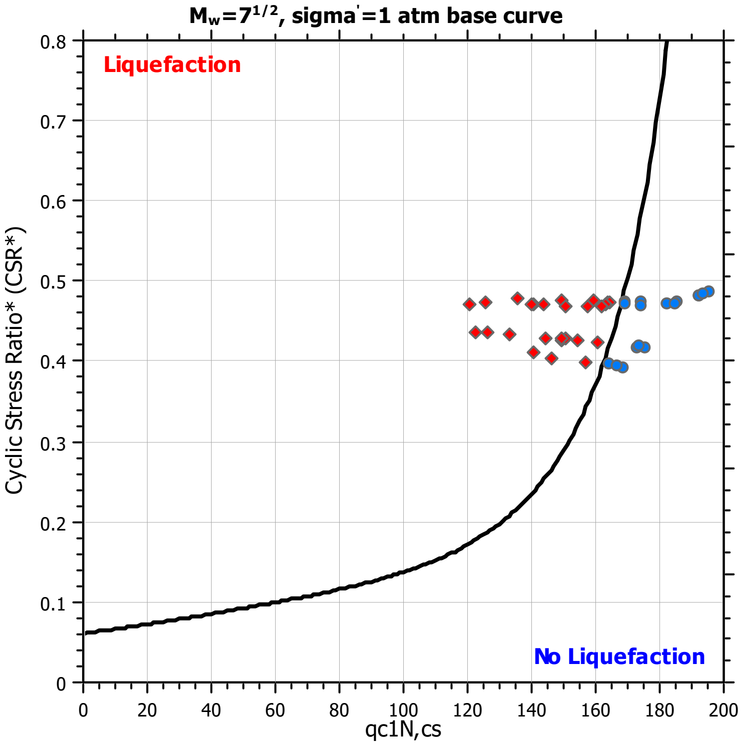
Project title : G289.01 Paseo **Location : Oakley Road, Oakley**

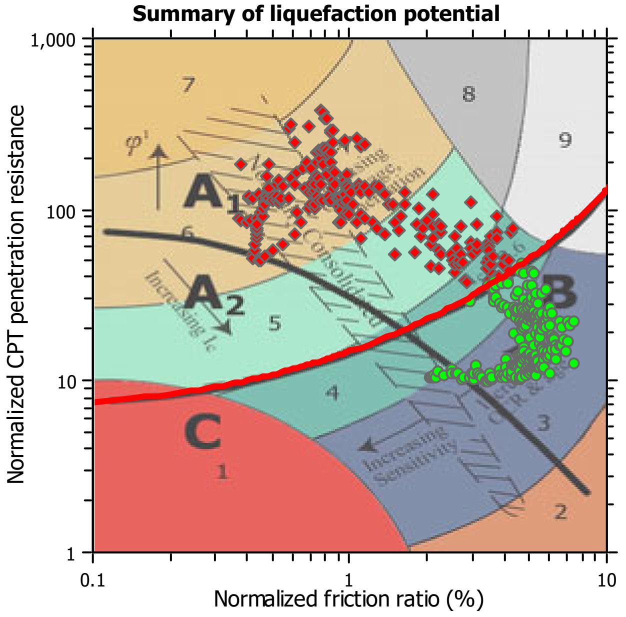
CPT file : CPT-02

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		

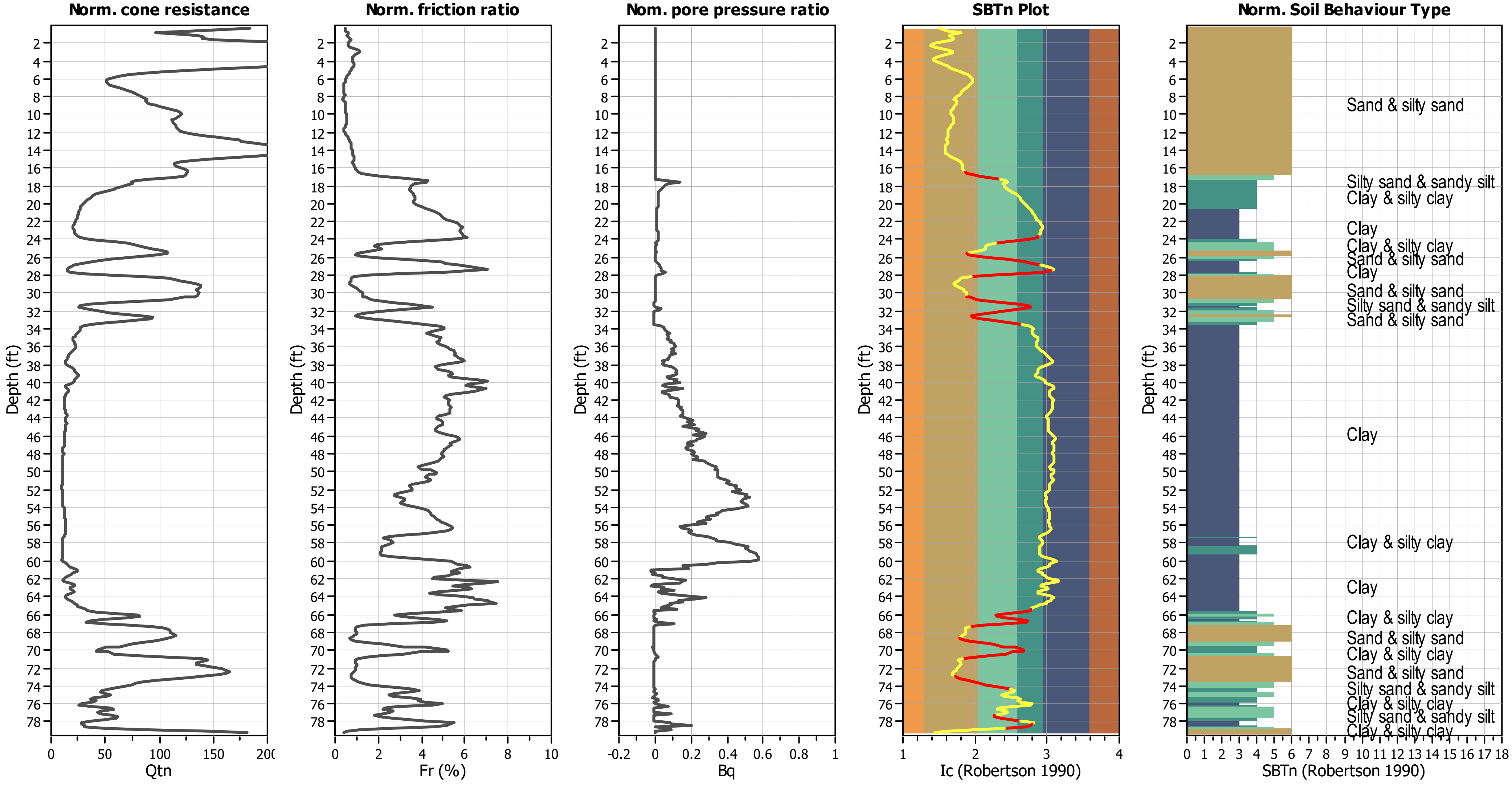






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normalized)



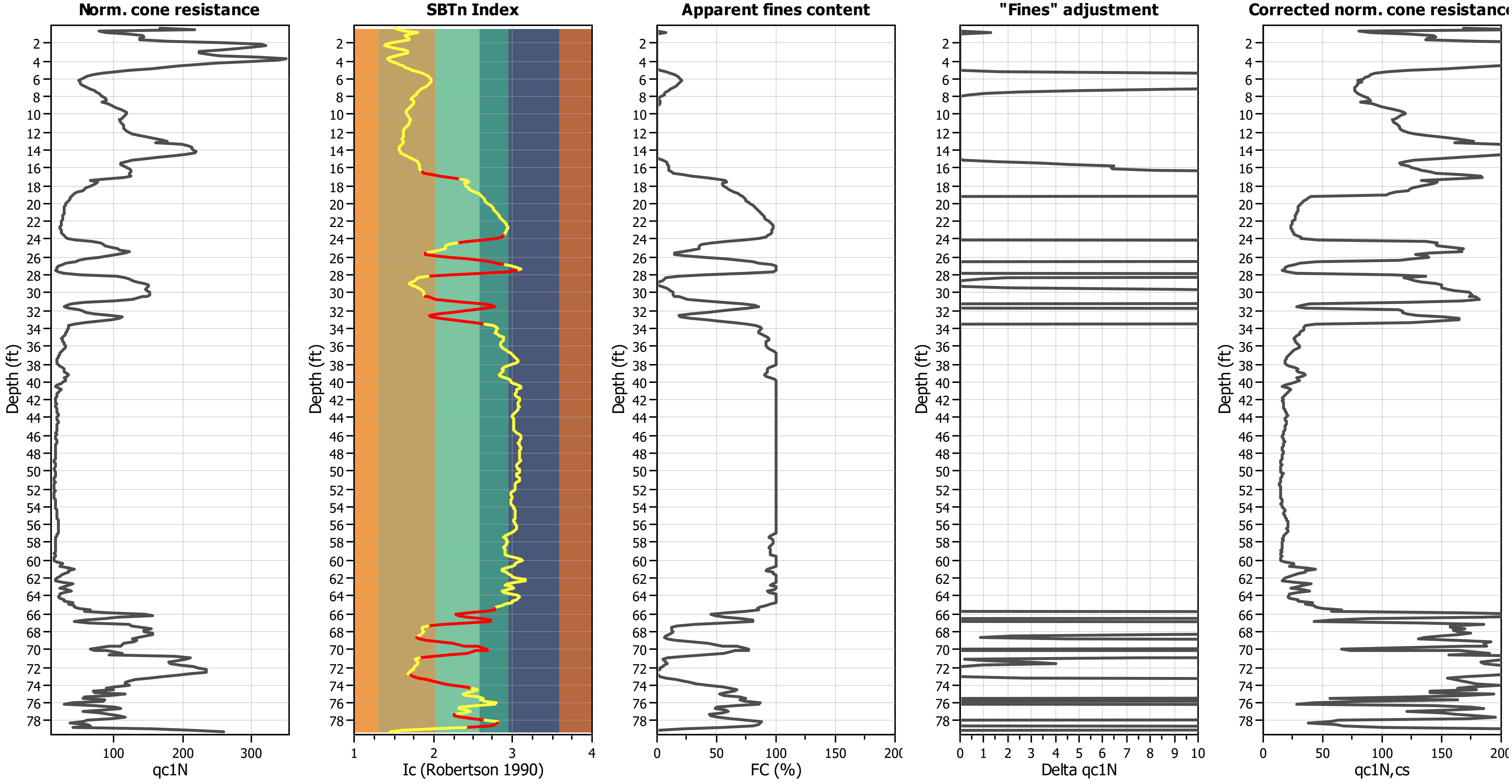
Input parameters and analysis data

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	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

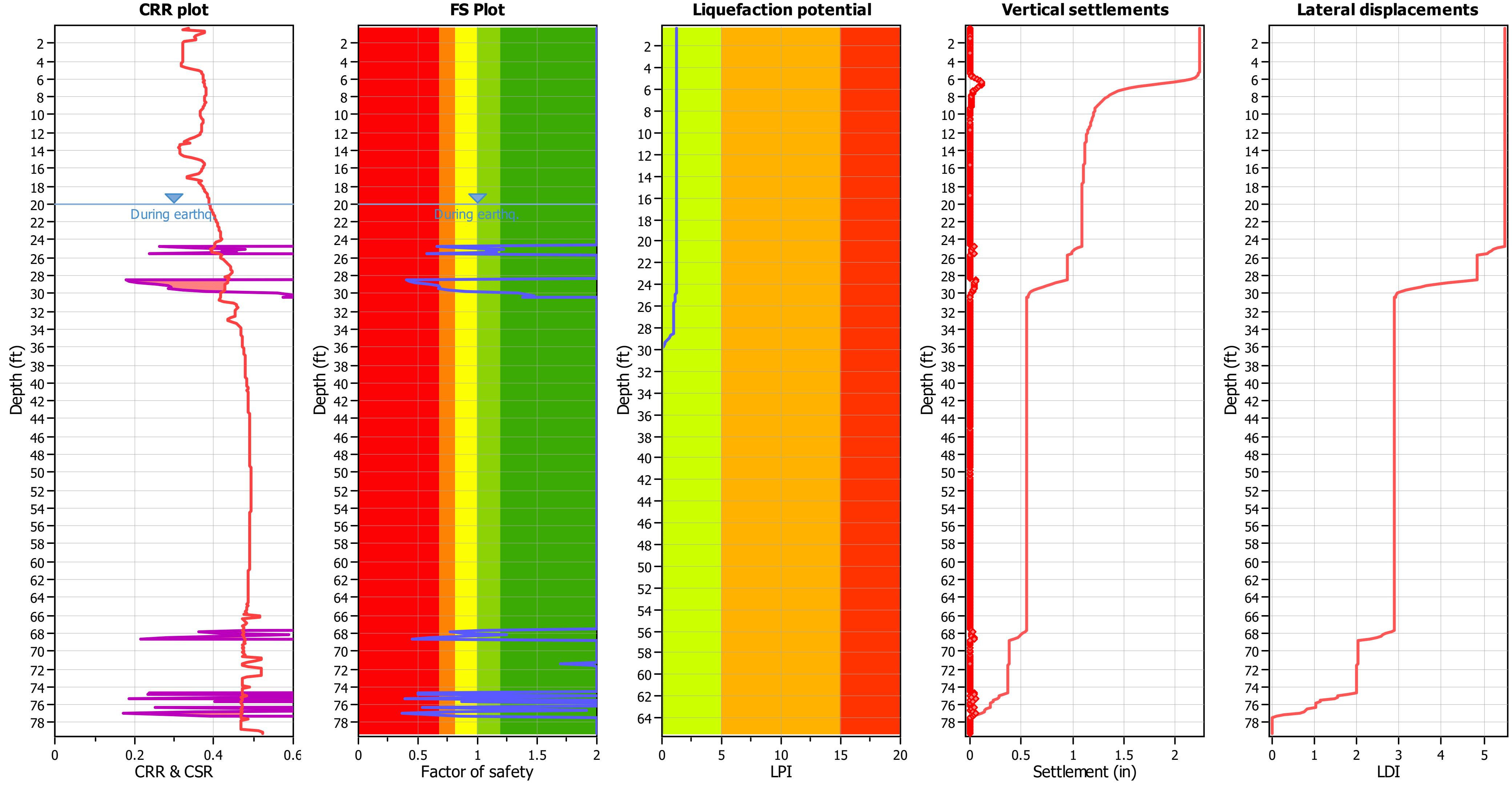
Liquefaction analysis overall plots (intermediate results)



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)
Fines correction method:	B&I (2014)
Points to test:	Based on Ic value
Earthquake magnitude M_w:	7.00
Peak ground acceleration:	0.66
Depth to water table (insitu):	20.00 ft
Depth to GWT (erthq.):	20.00 ft
Average results interval:	3
Ic cut-off value:	2.60
Unit weight calculation:	Based on SBT
Use fill:	No
Fill height:	N/A
Fill weight:	N/A
Transition detect. applied:	Yes
K_σ applied:	Yes
Clay like behavior applied:	Sands only
Limit depth applied:	No
Limit depth:	N/A

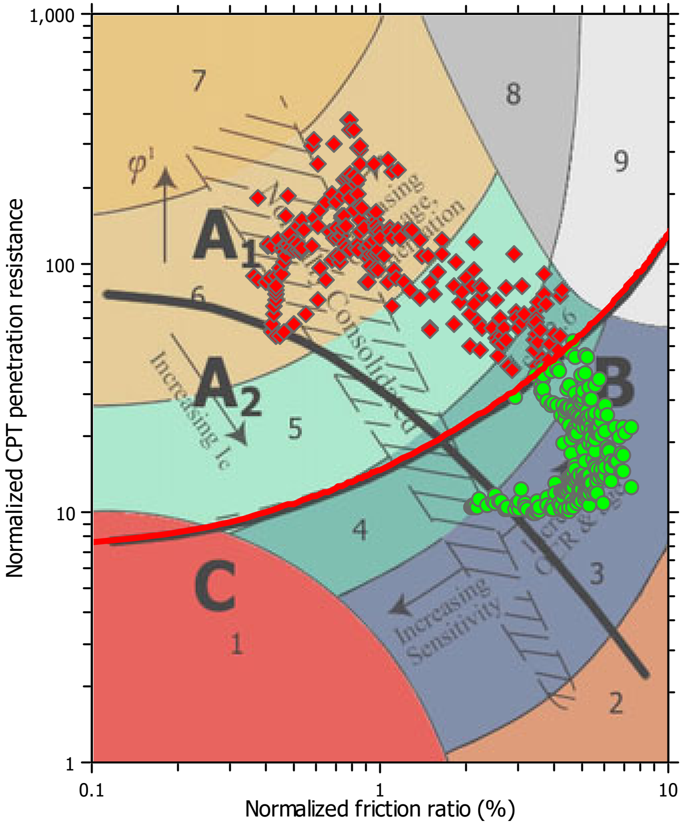
F.S. color scheme

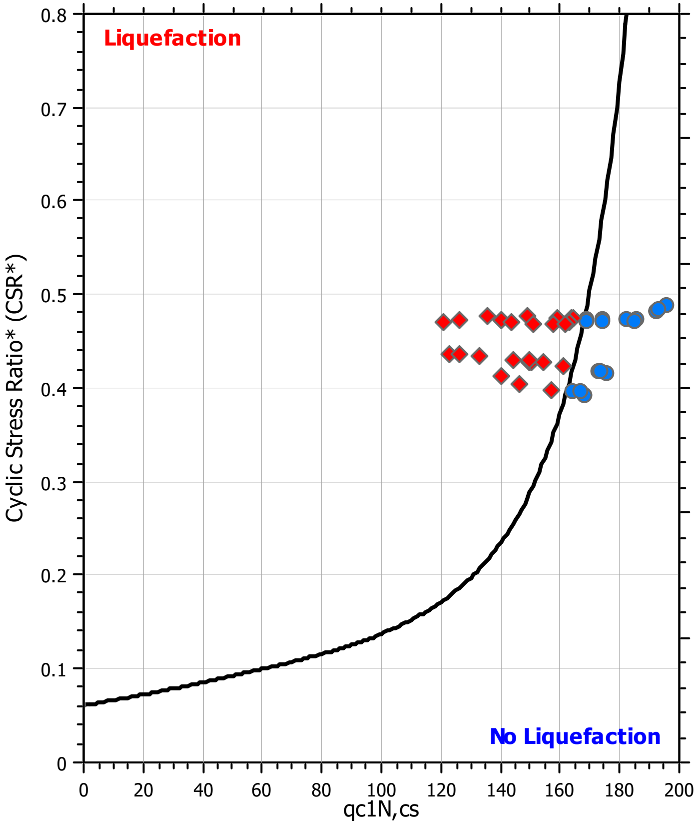
- 🟥 Almost certain it will liquefy
- 🟧 Very likely to liquefy
- 🟨 Liquefaction and no liq. are equally likely
- 🟩 Unlike to liquefy
- 🟩 Almost certain it will not liquefy

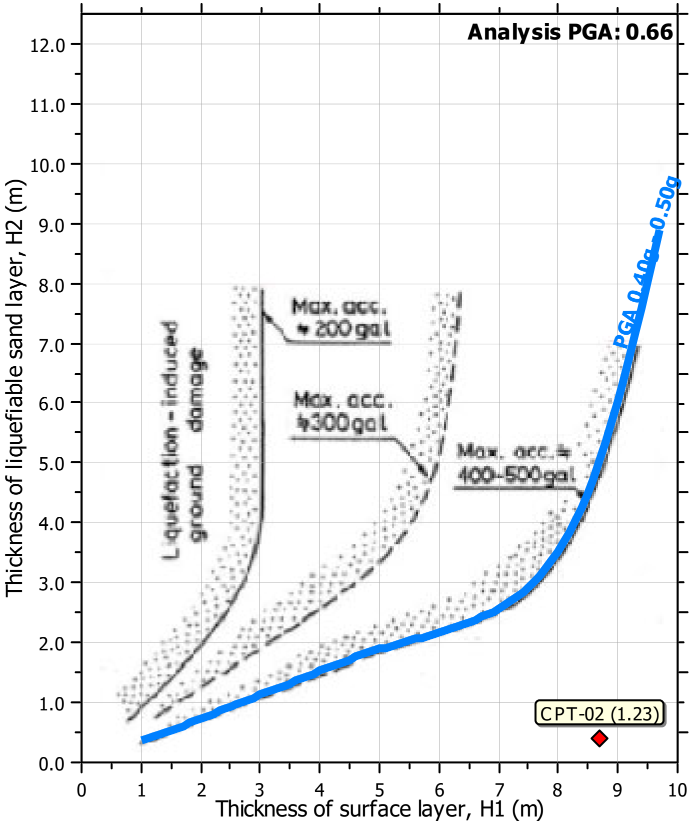
LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟩 Low risk

Liquefaction analysis summary plots



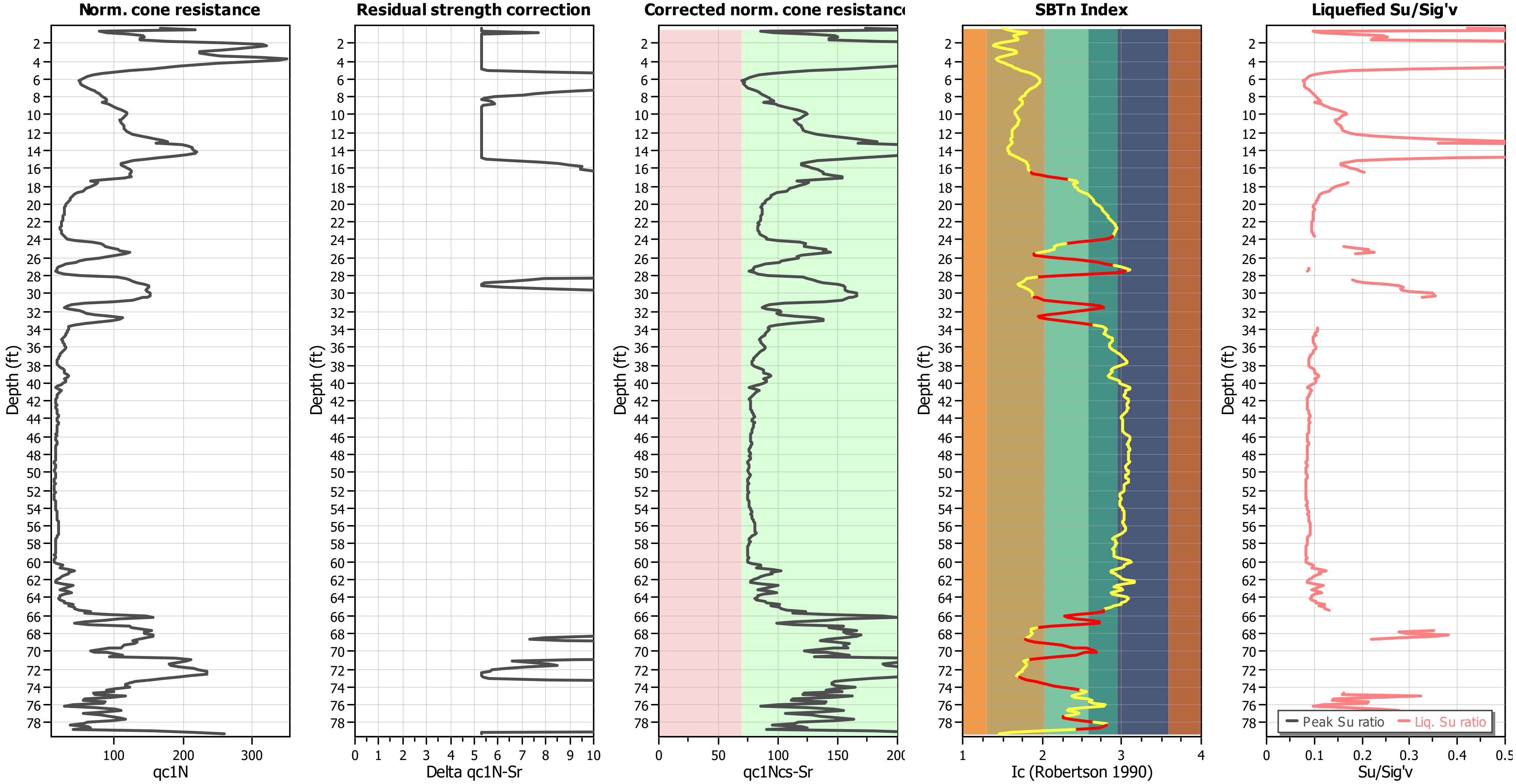




Input parameters and analysis data

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

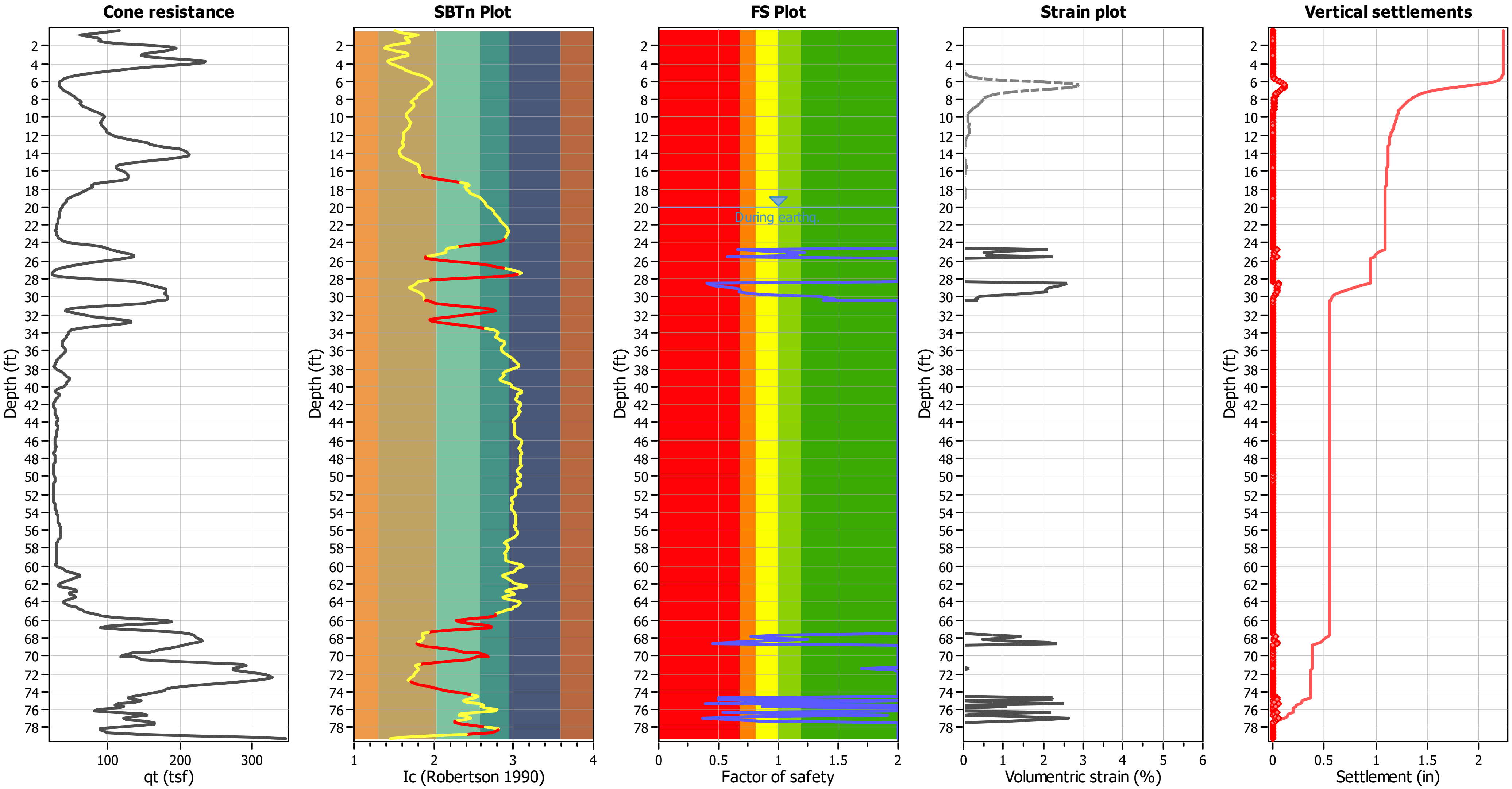
Check for strength loss plots (Idriss & Boulanger (2008))



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)

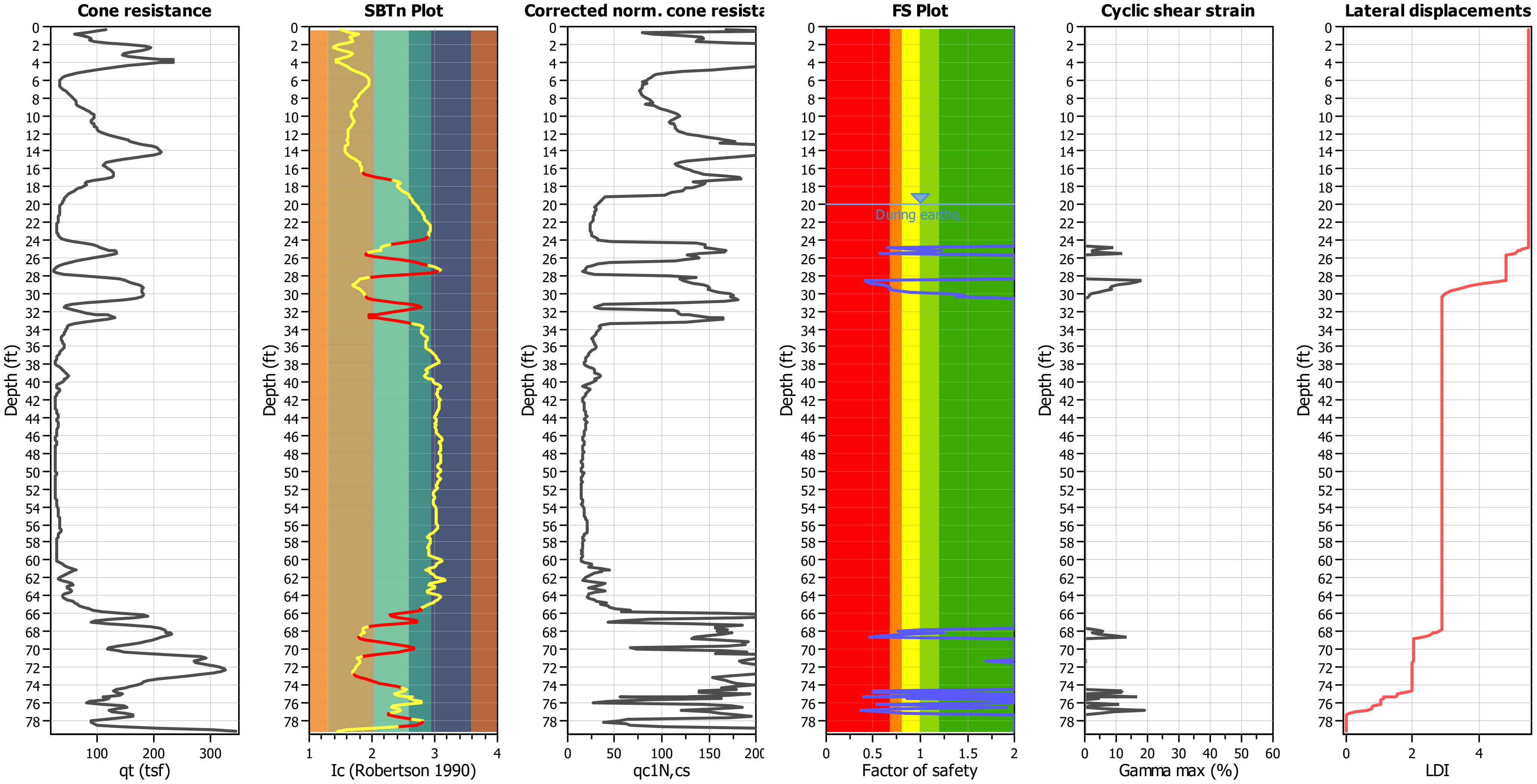
Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
71.03	204.77	2.00	0.00	1.00	0.00	71.20	192.70	2.00	0.00	1.00	0.00
71.36	182.43	1.70	0.14	1.00	0.00	71.53	185.75	1.96	0.02	1.00	0.00
71.69	195.86	2.00	0.00	1.00	0.00	71.85	215.90	2.00	0.00	1.00	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)

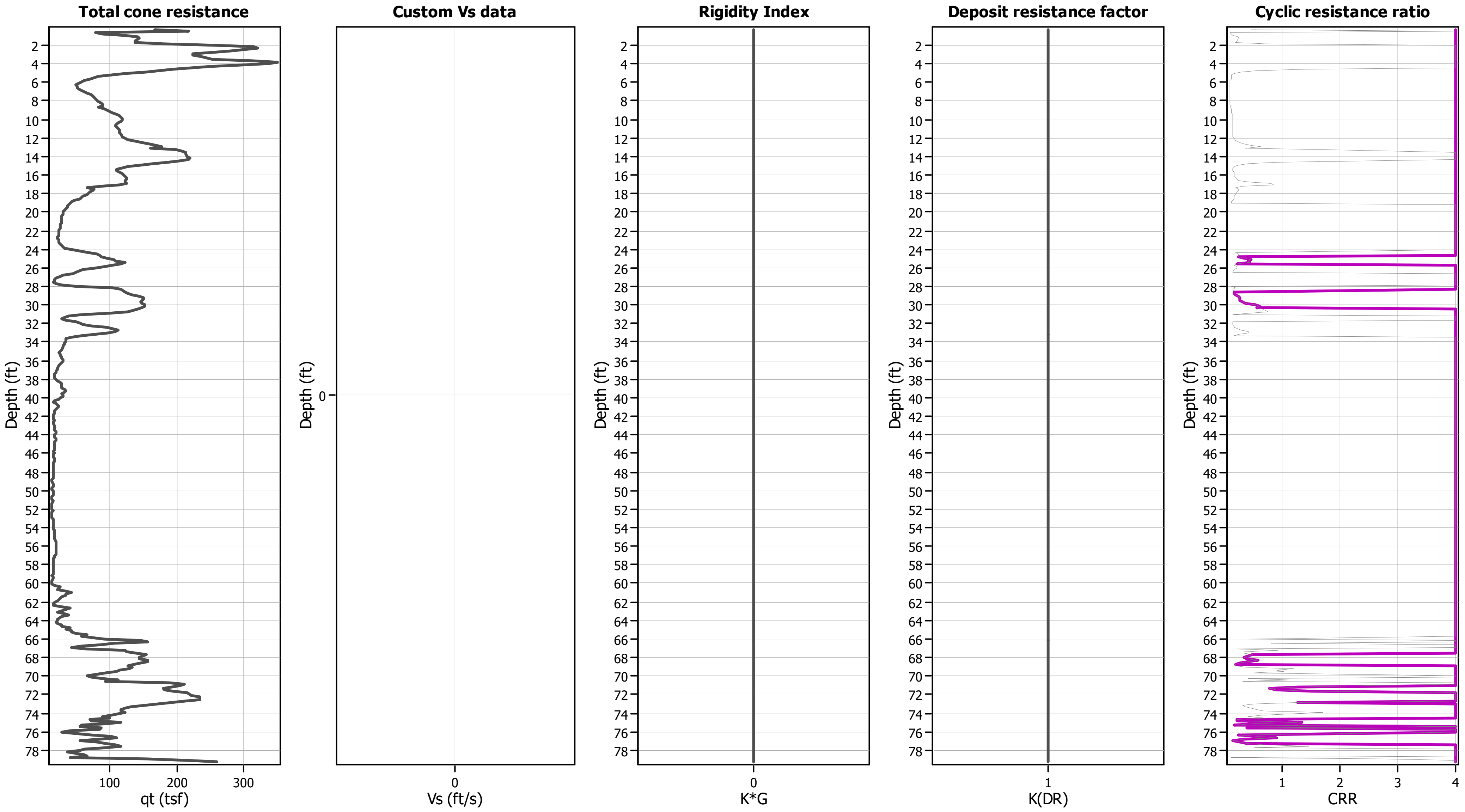
Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
75.30	125.91	0.17	0.39	0.54	0.17	0.34
75.46	56.08	0.00	2.00	0.00	0.00	0.00
75.63	162.94	0.07	0.86	0.08	0.05	0.10
75.79	84.59	0.00	2.00	0.00	0.00	0.00
75.96	42.21	0.00	2.00	0.00	0.00	0.00
76.12	27.61	0.00	2.00	0.00	0.00	0.00
76.28	143.53	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

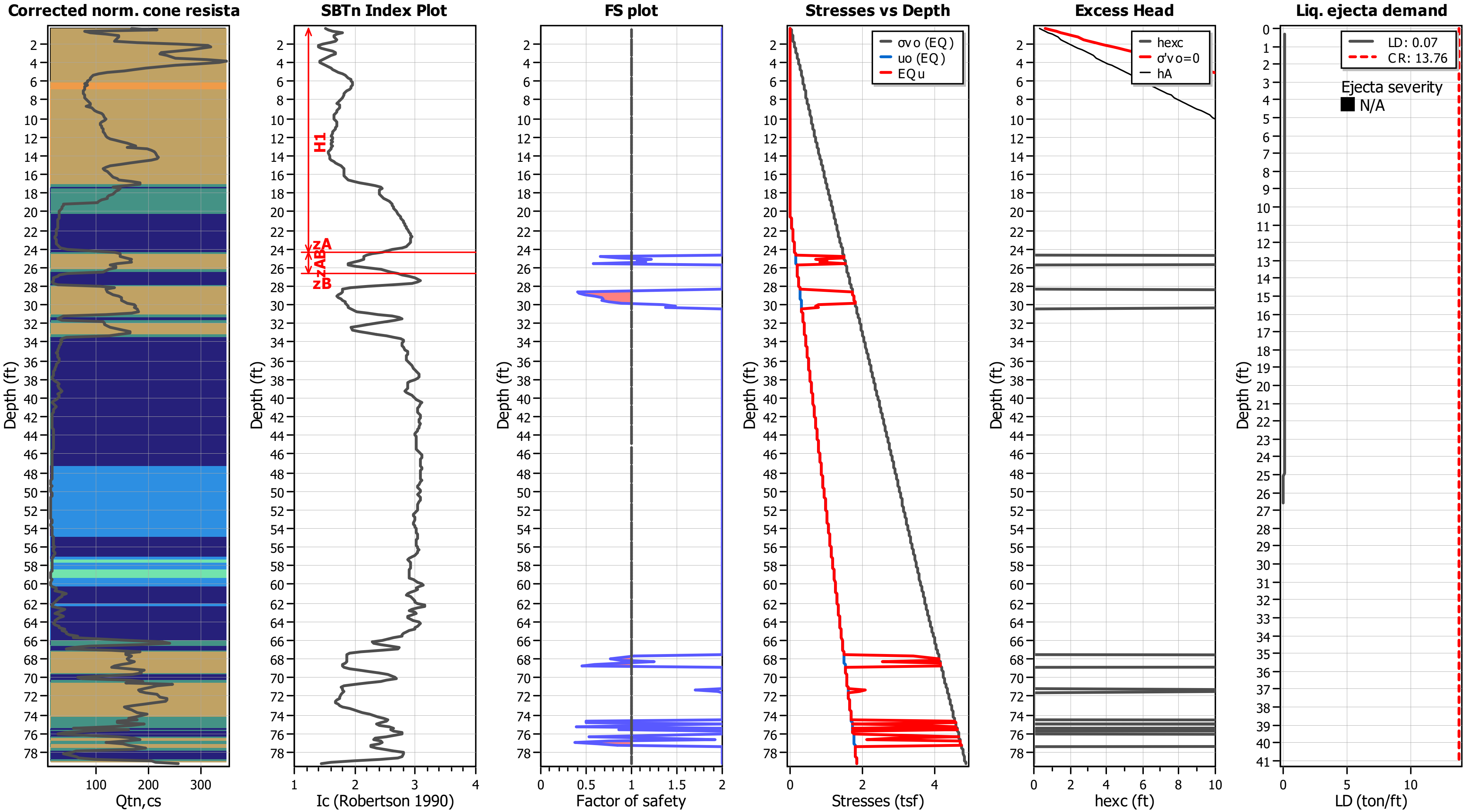
Abbreviations

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

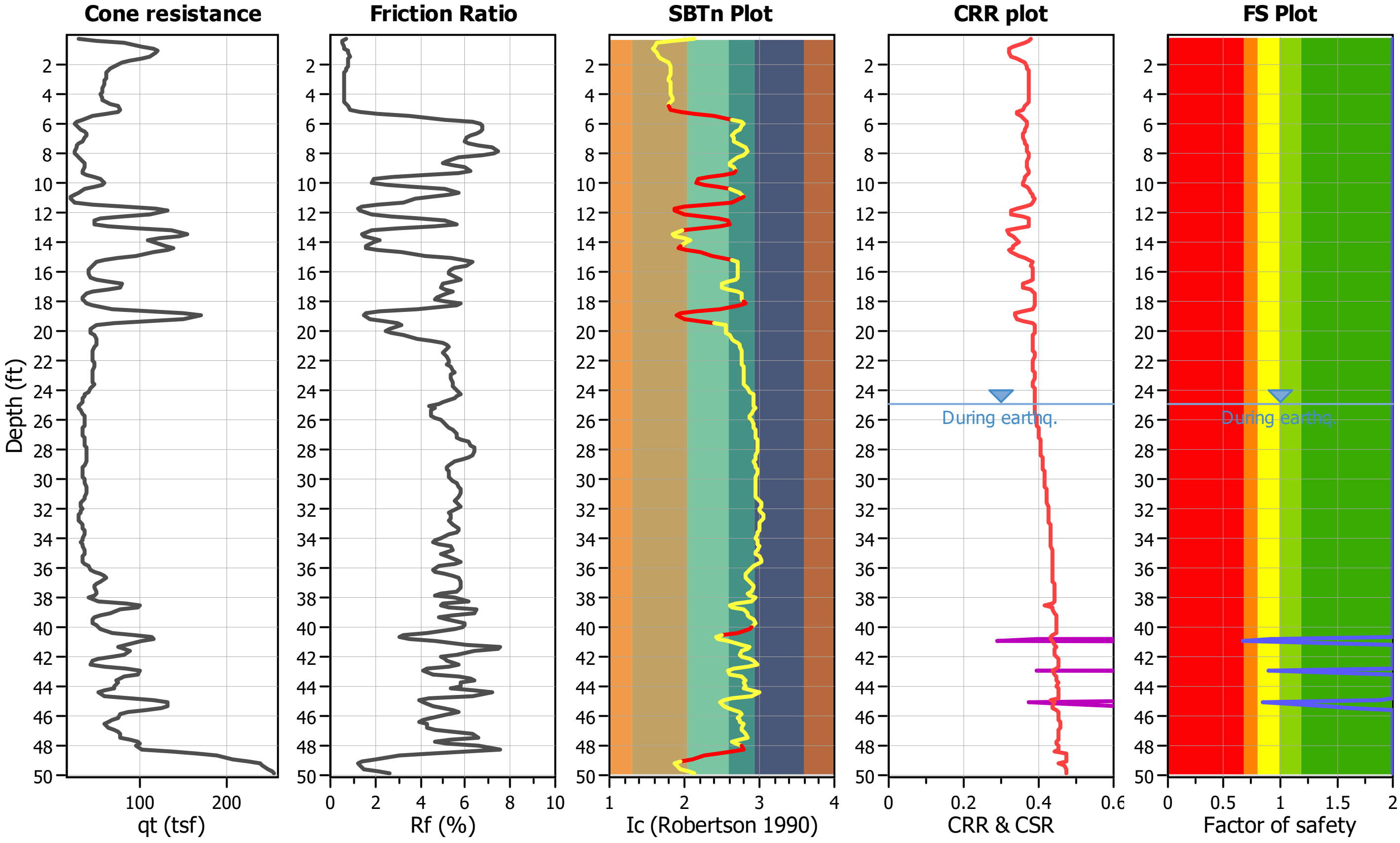
LIQUEFACTION ANALYSIS REPORT

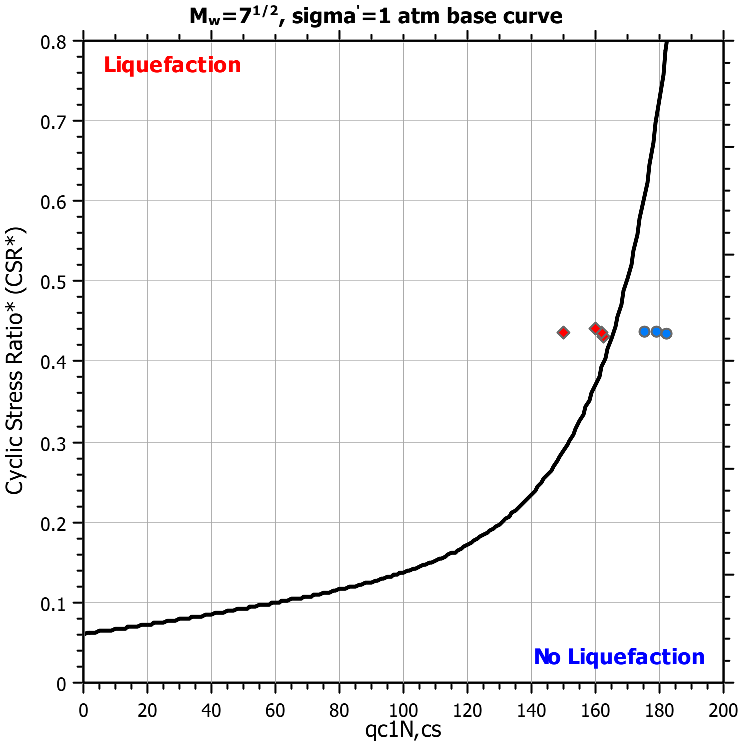
Project title : G289.01 Paseo **Location : Oakley Road, Oakley**

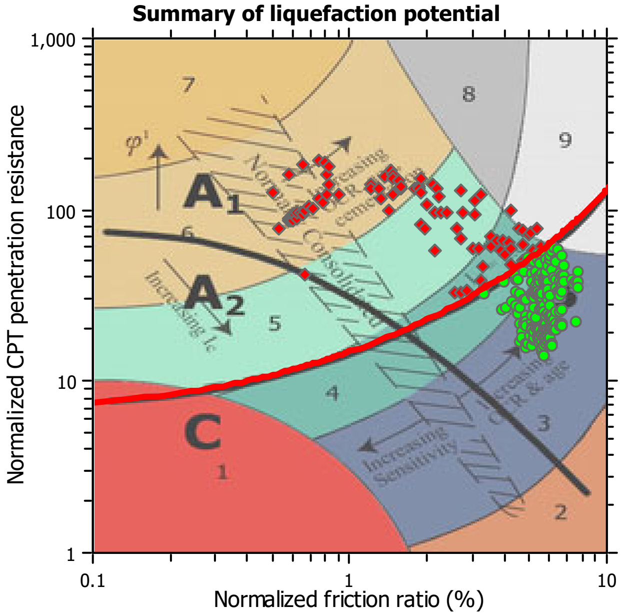
CPT file : CPT-01

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		

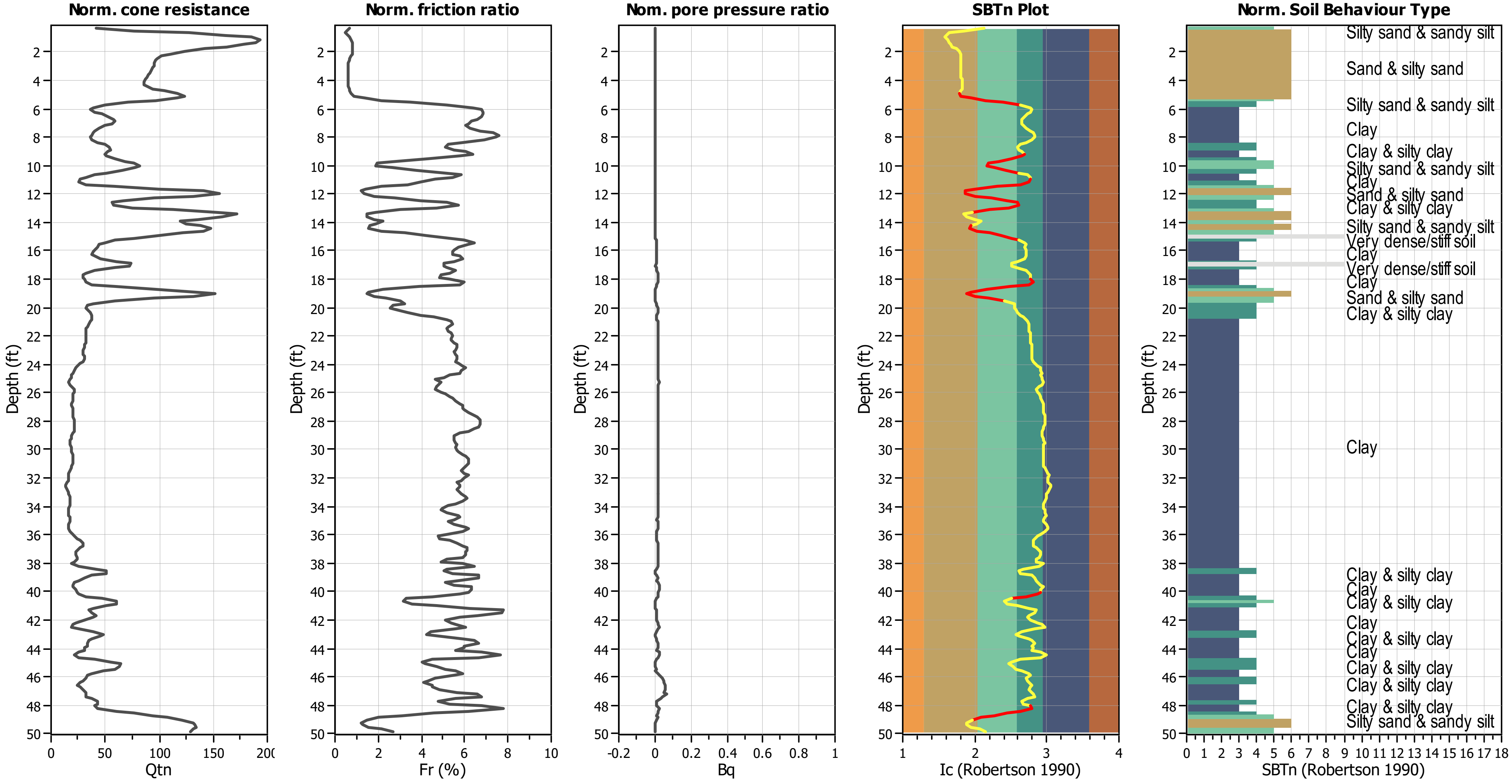






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and 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)
Fines correction method: B&I (2014)
Points to test: Based on Ic value
Earthquake magnitude M_w: 7.00
Peak ground acceleration: 0.66
Depth to water table (insitu): 25.00 ft

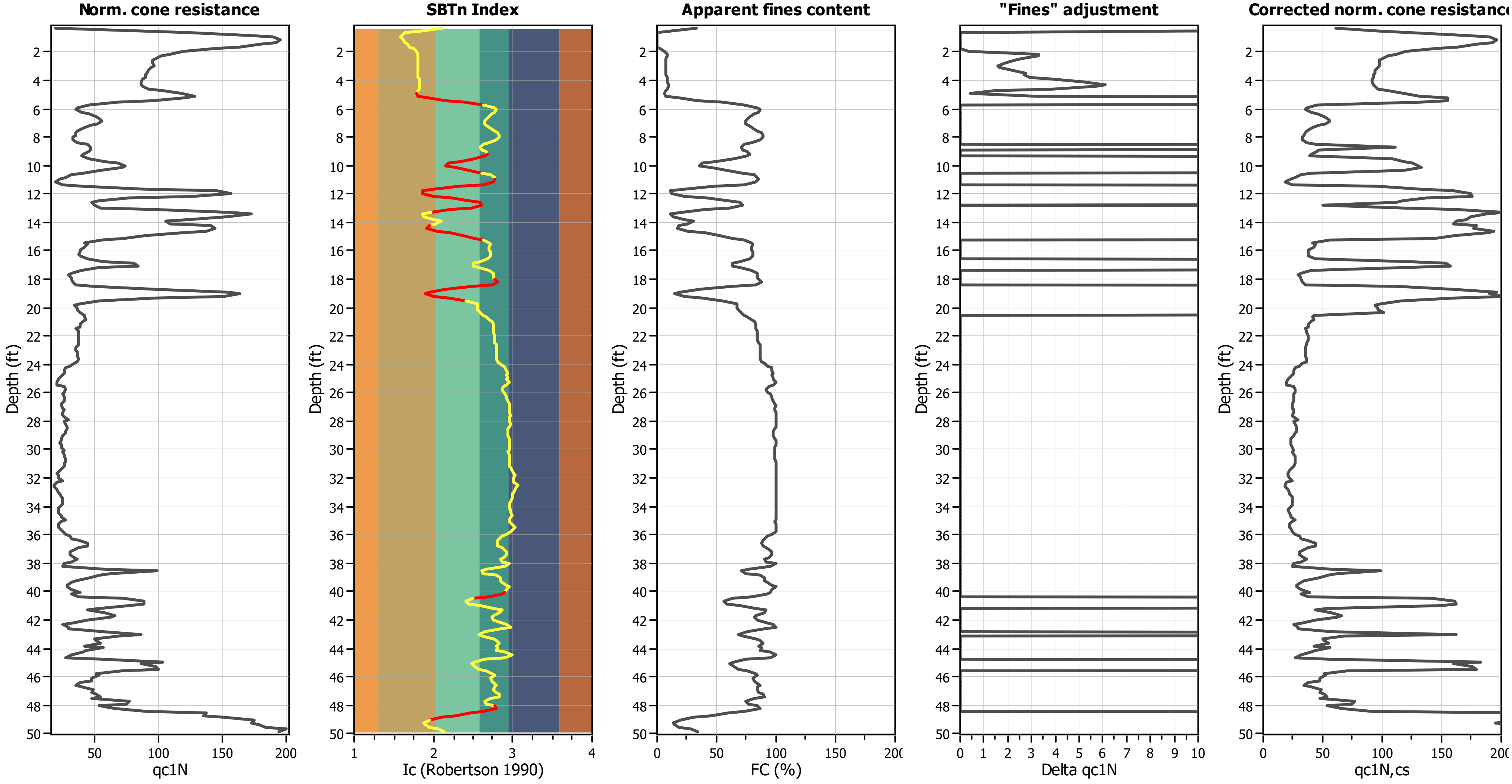
Depth to GWT (erthq.): 25.00 ft
Average results interval: 3
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT
Use fill: No
Fill height: N/A

Fill weight: N/A
Transition detect. applied: Yes
K_σ applied: Yes
Clay like behavior applied: Sands only
Limit depth applied: No
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

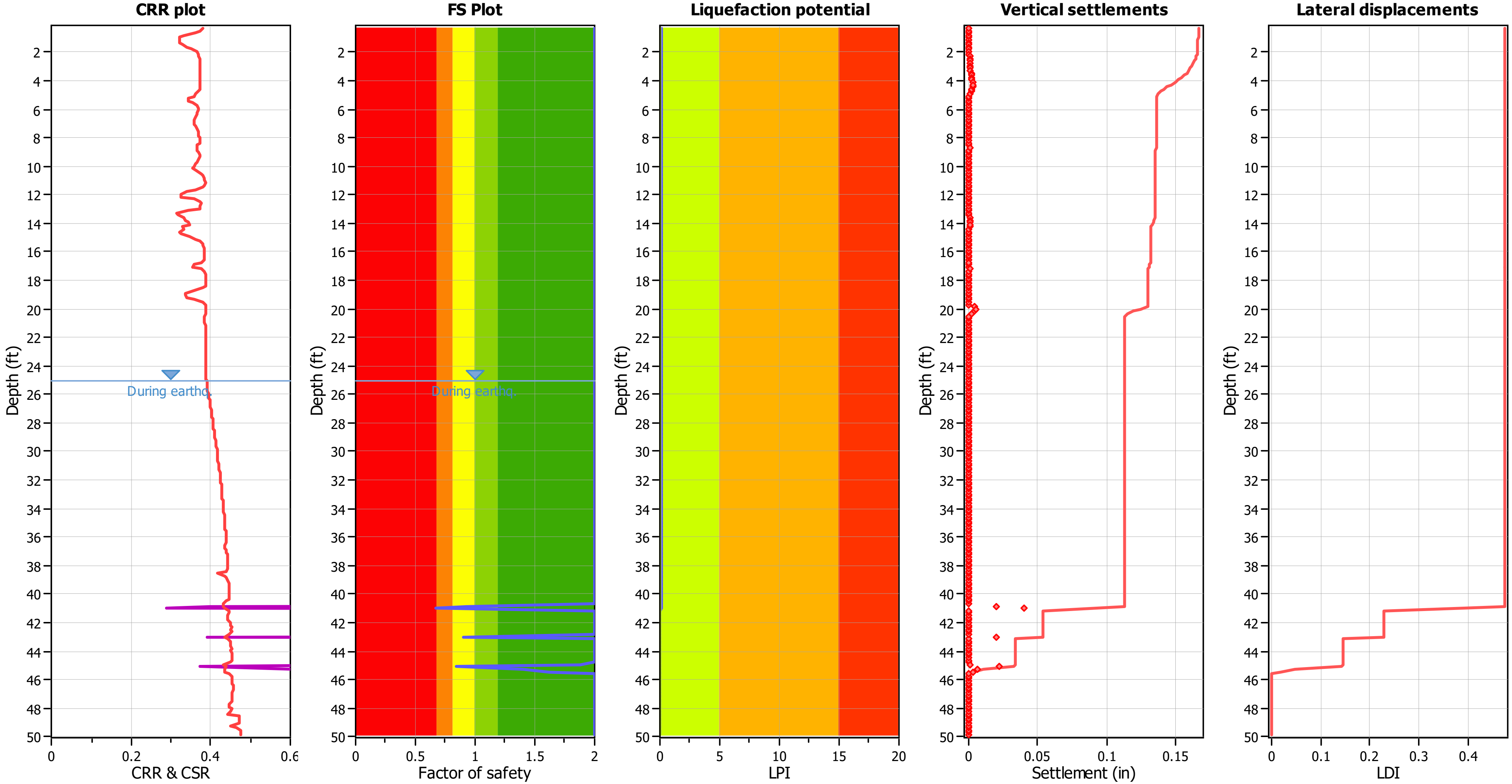
Liquefaction analysis overall plots (intermediate results)



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)
Fines correction method: B&I (2014)
Points to test: Based on Ic value
Earthquake magnitude M_w: 7.00
Peak ground acceleration: 0.66
Depth to water table (insitu): 25.00 ft

Depth to GWT (erthq.): 25.00 ft
Average results interval: 3
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT
Use fill: No
Fill height: N/A

Fill weight: N/A
Transition detect. applied: Yes
K_σ applied: Yes
Clay like behavior applied: Sands only
Limit depth applied: No
Limit depth: N/A

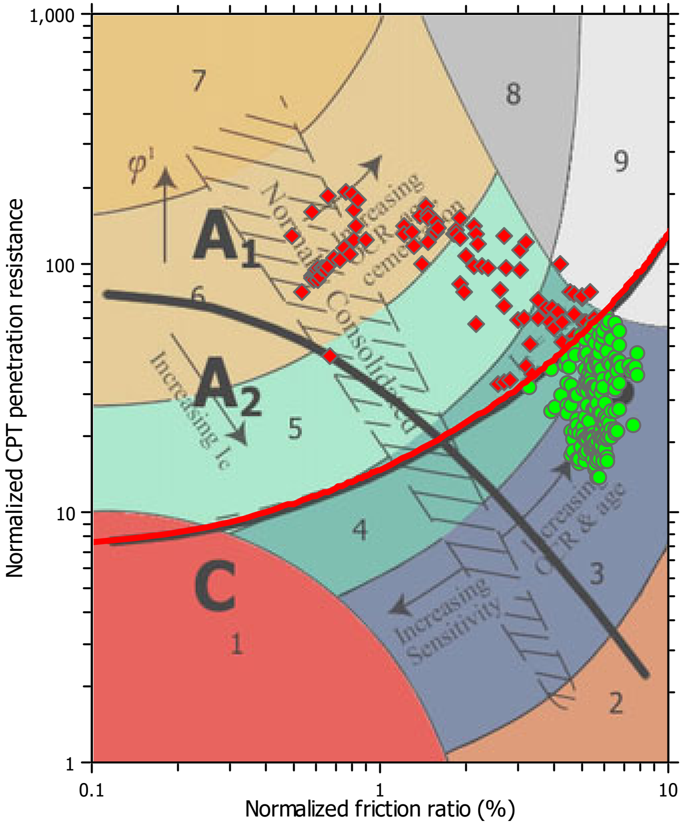
F.S. color scheme

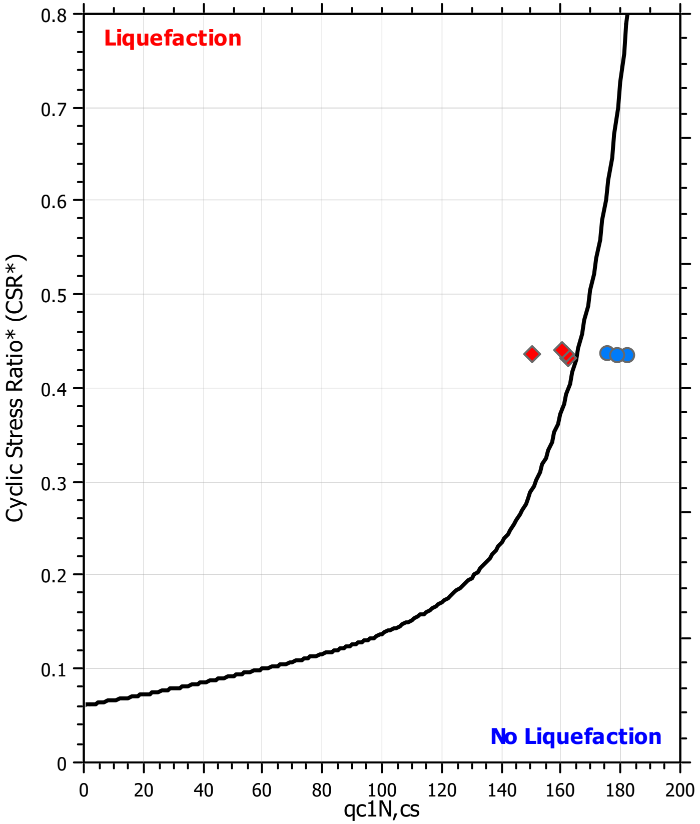
🟥 Almost certain it will liquefy
🟧 Very likely to liquefy
🟨 Liquefaction and no liq. are equally likely
🟩 Unlike to liquefy
🟩 Almost certain it will not liquefy

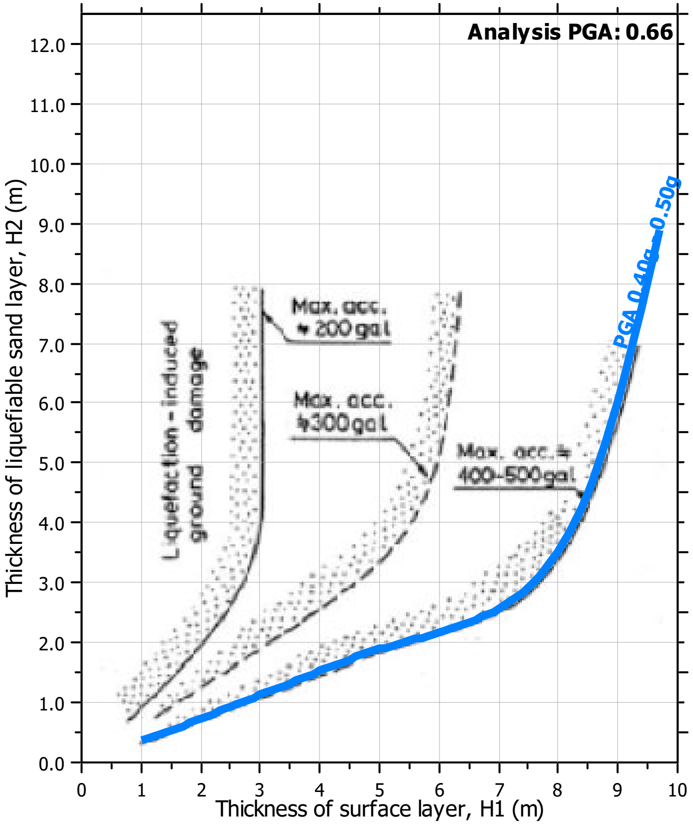
LPI color scheme

🟥 Very high risk
🟧 High risk
🟩 Low risk

Liquefaction analysis summary plots



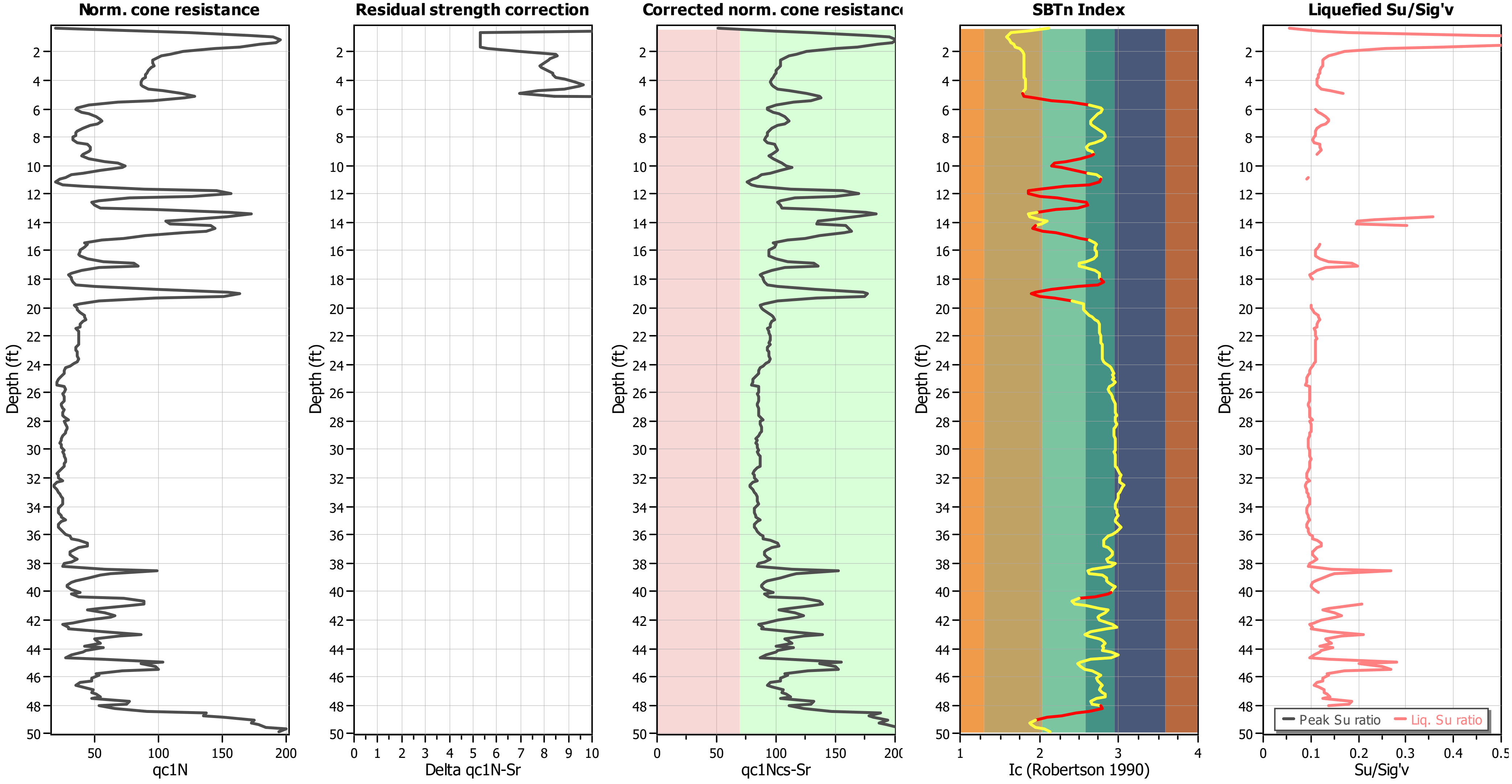




Input parameters and analysis data

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

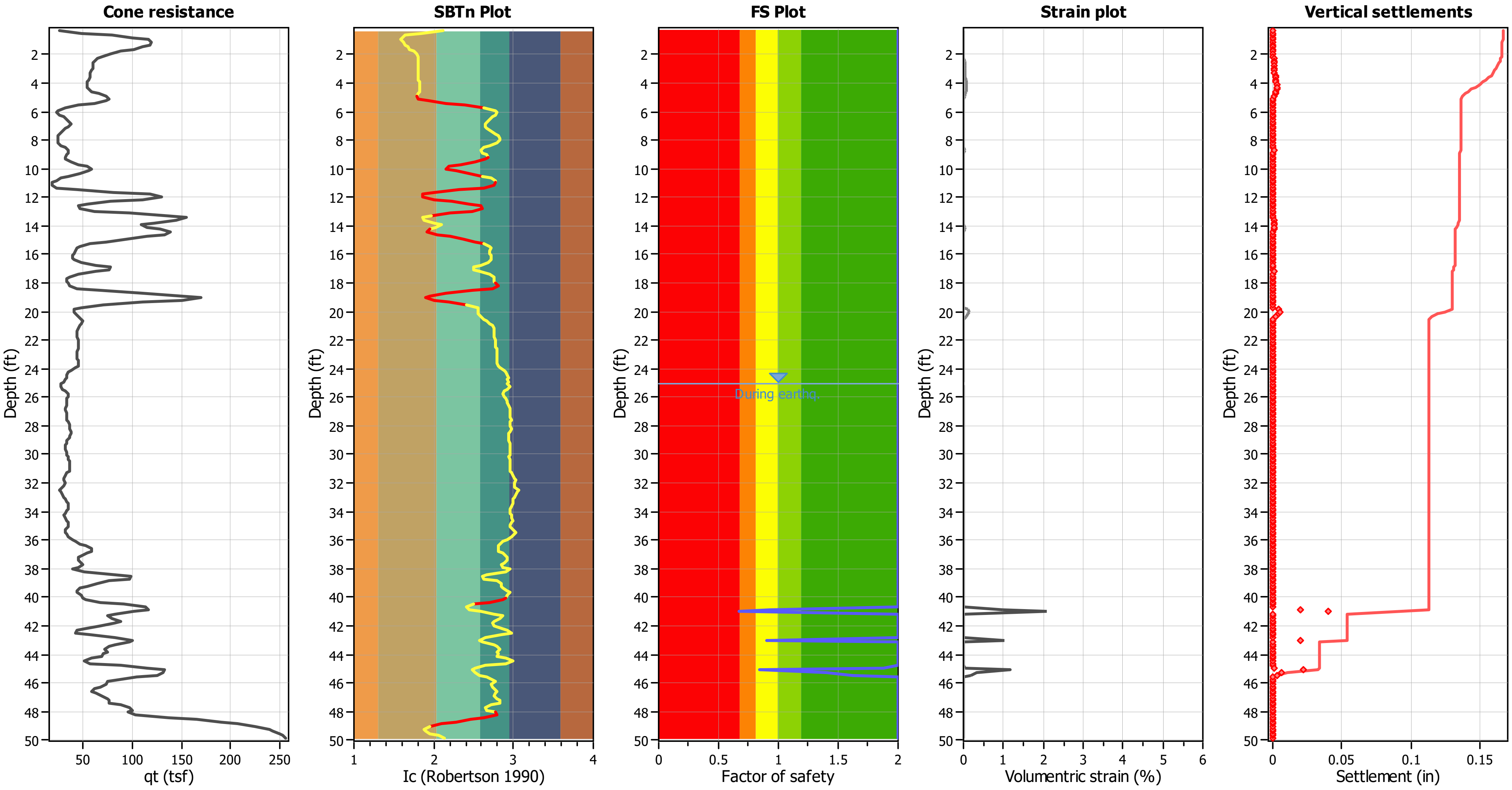
Check for strength loss plots (Idriss & Boulanger (2008))



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)

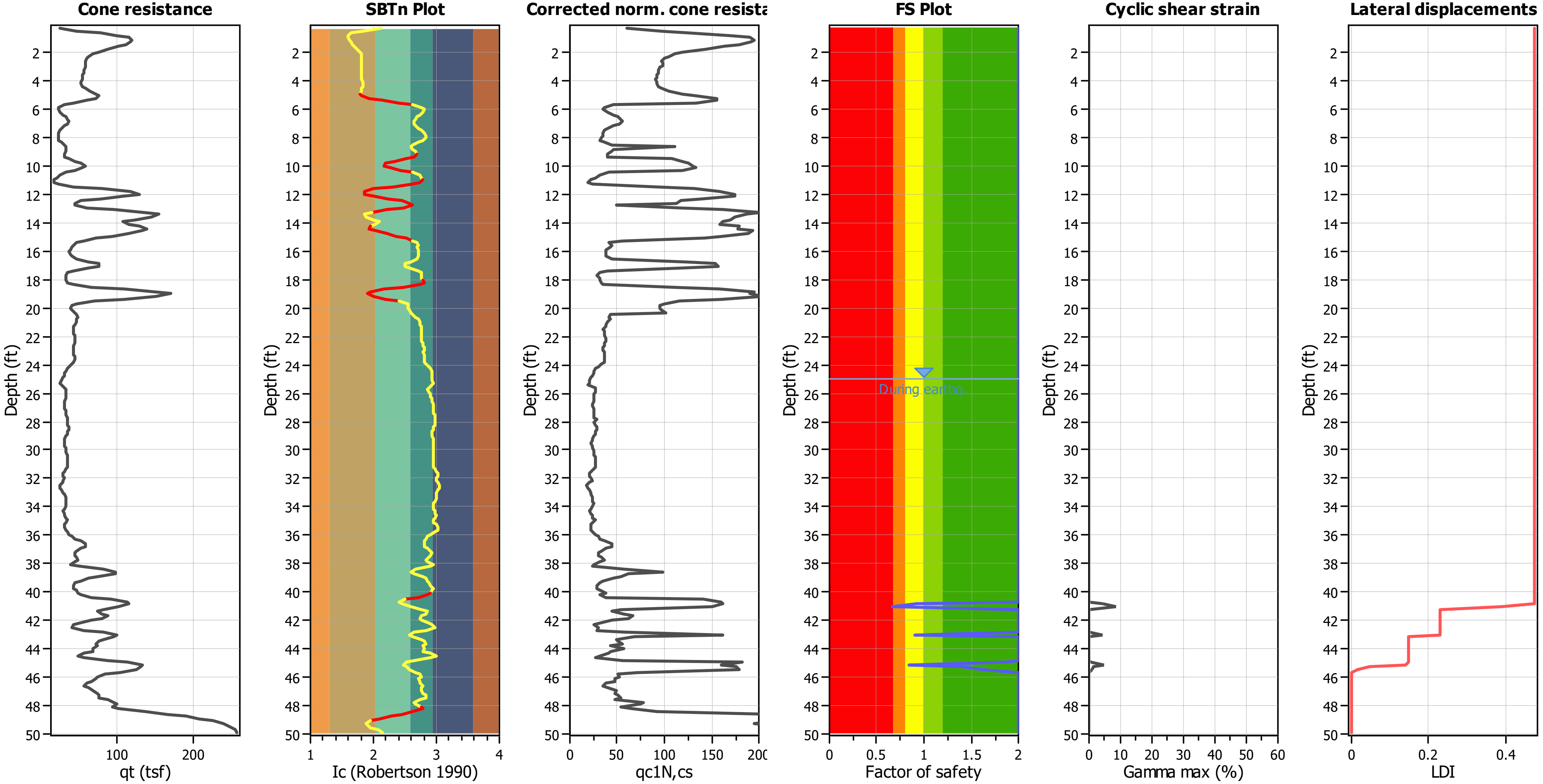
Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)

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)

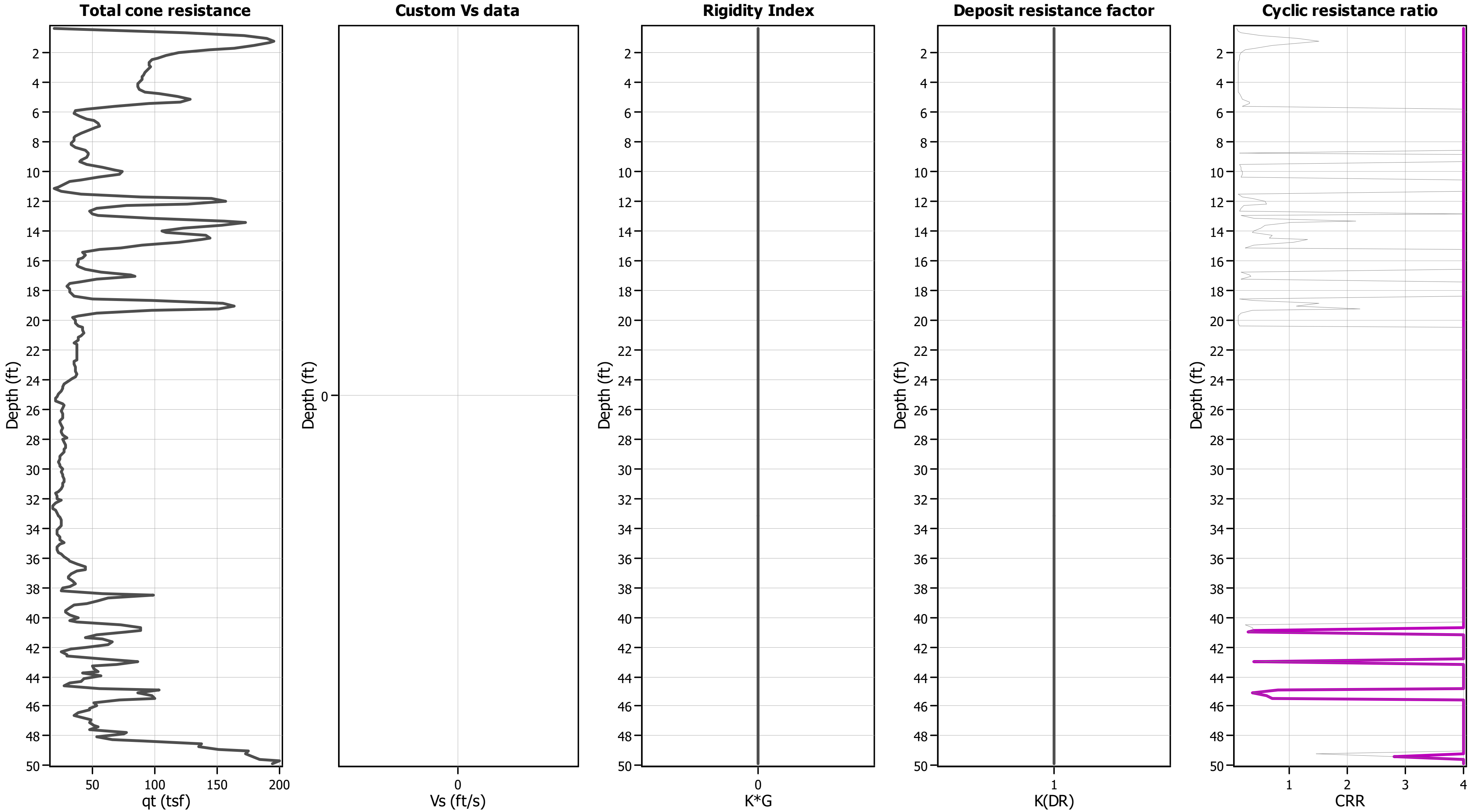
Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI
48.72	214.33	0.01	2.00	-0.67	0.00	0.00
48.89	217.50	0.01	2.00	-0.71	0.00	0.00
49.05	221.25	0.01	2.00	-0.77	0.00	0.00
49.22	195.43	0.03	2.00	-0.38	0.00	0.00
49.38	206.56	0.02	2.00	-0.55	0.00	0.00
49.54	228.21	0.01	2.00	-0.88	0.00	0.00
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

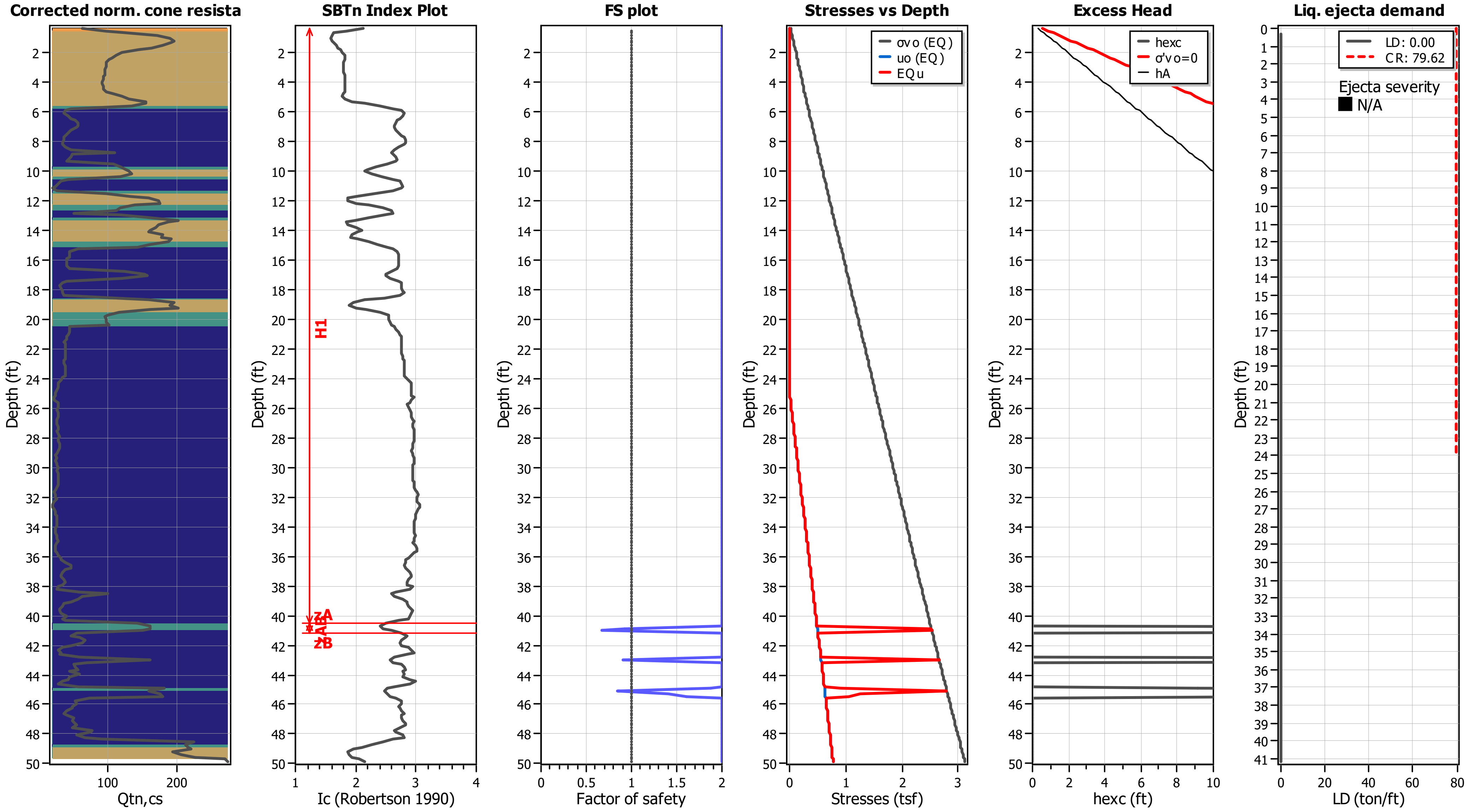
Abbreviations

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



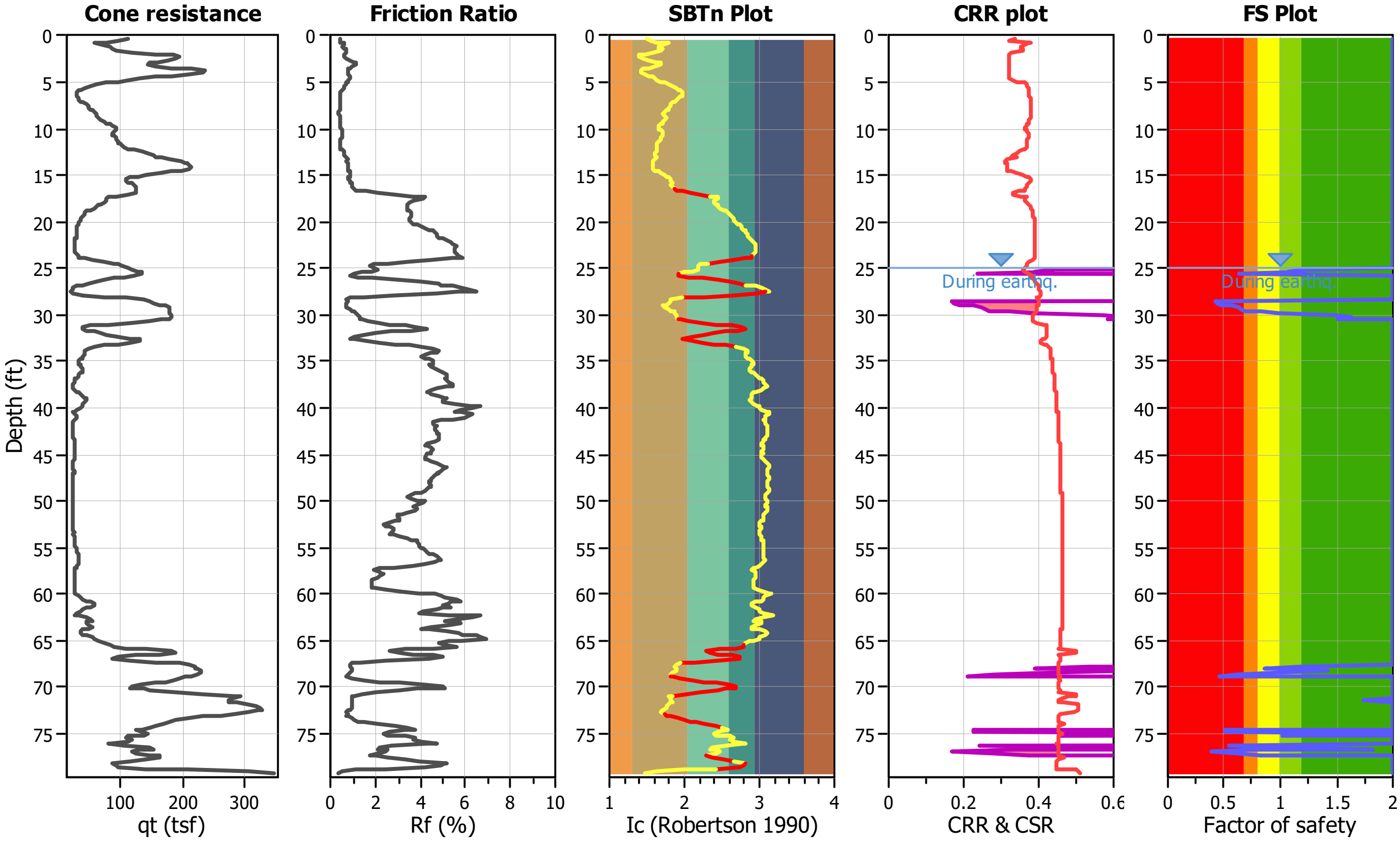
LIQUEFACTION ANALYSIS REPORT

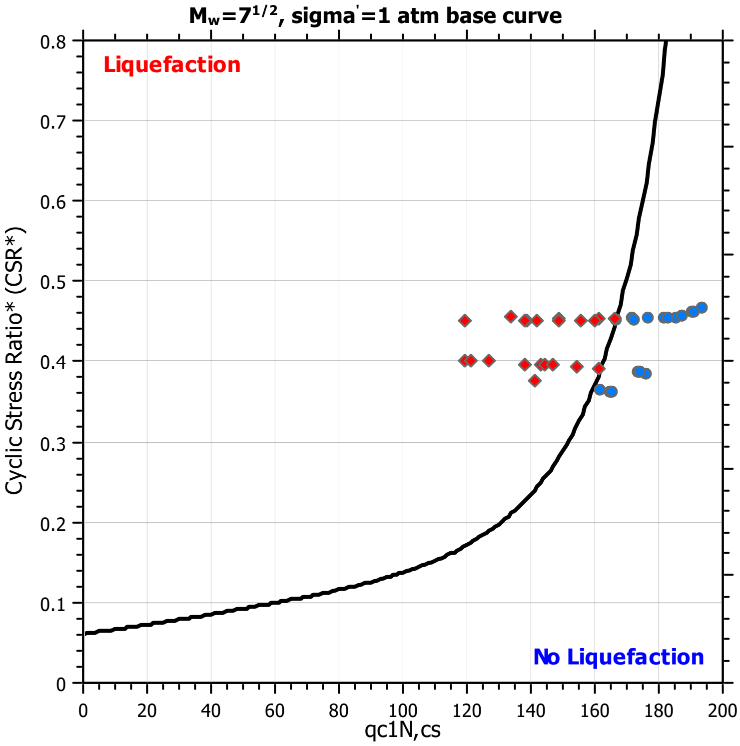
Project title : G289.01 Paseo **Location : Oakley Road, Oakley**

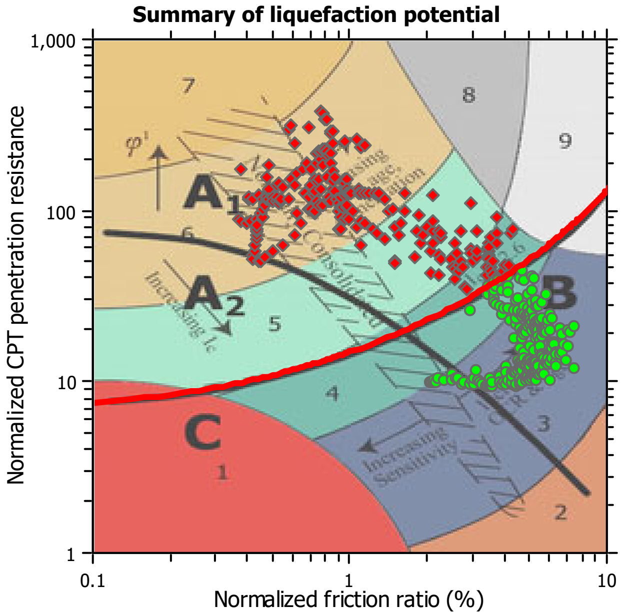
CPT file : CPT-02

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		

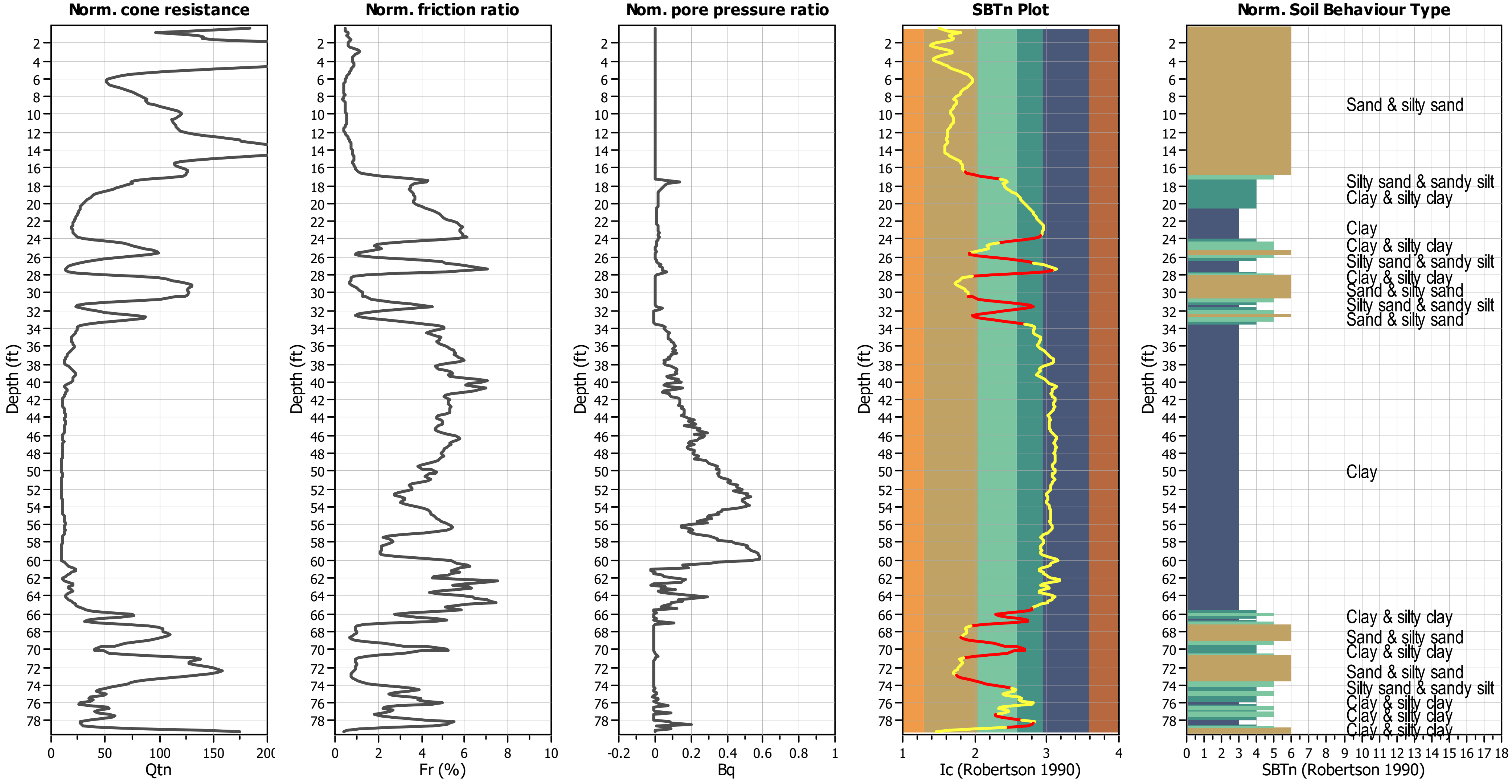






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots (normalized)



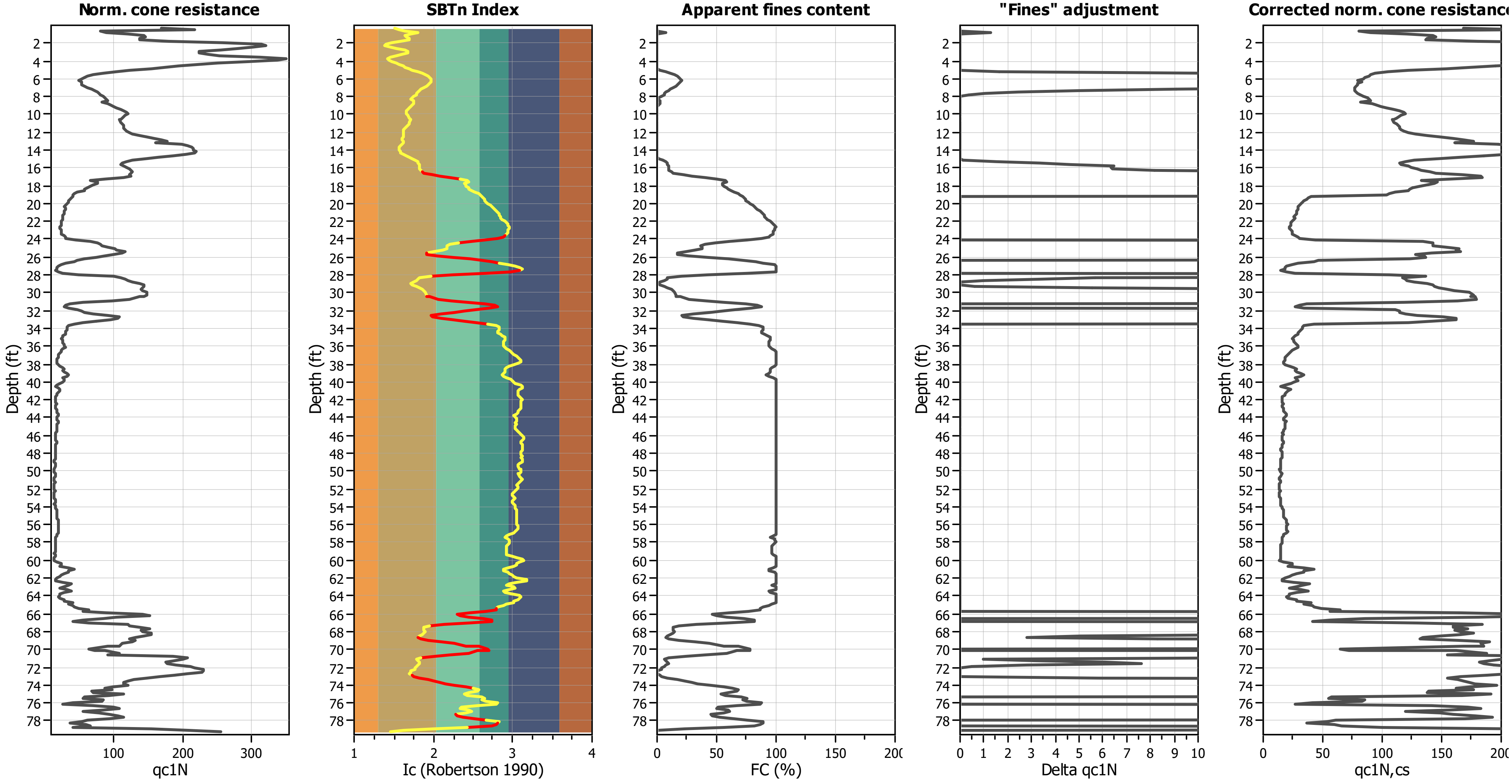
Input parameters and analysis data

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

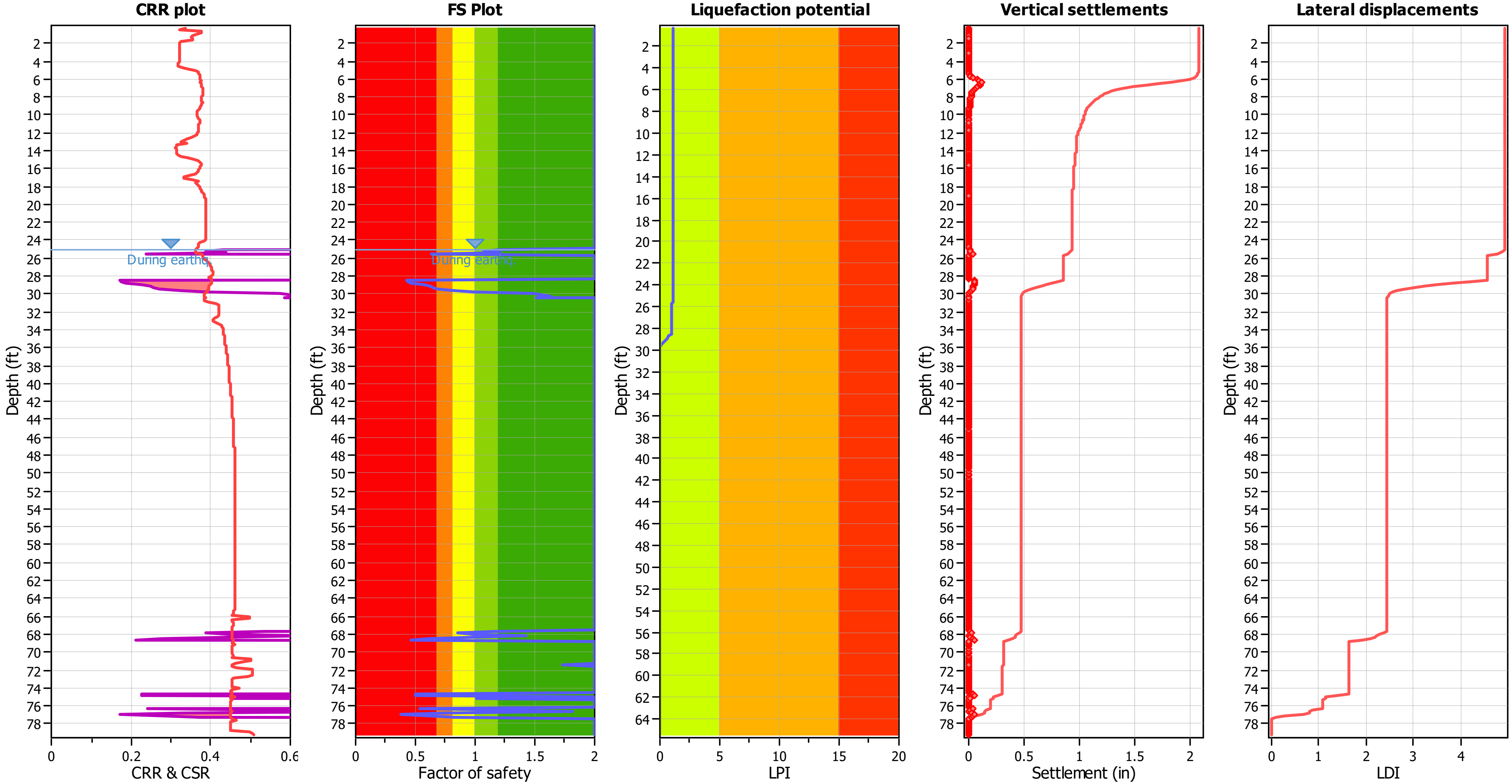
Liquefaction analysis overall plots (intermediate results)



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

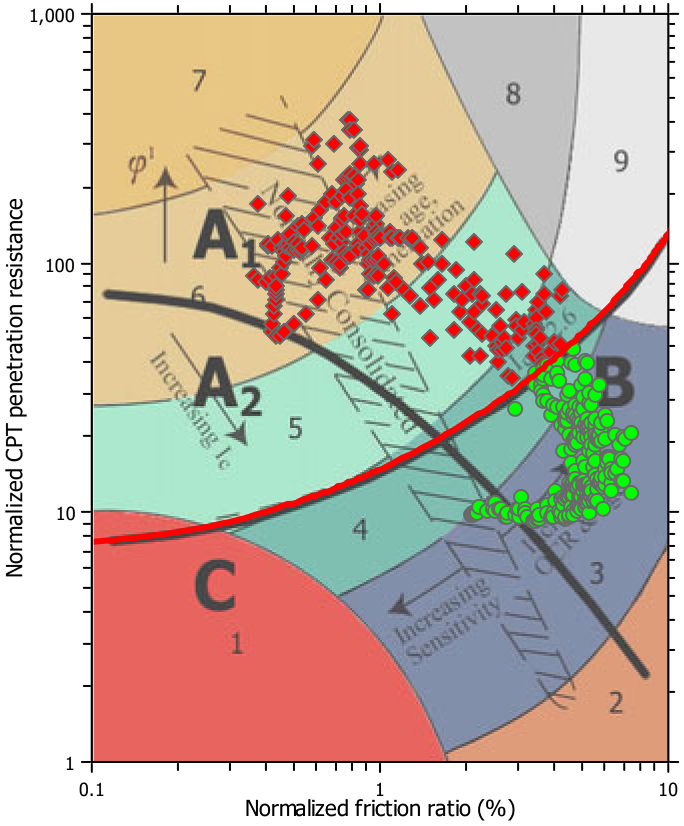
F.S. color scheme

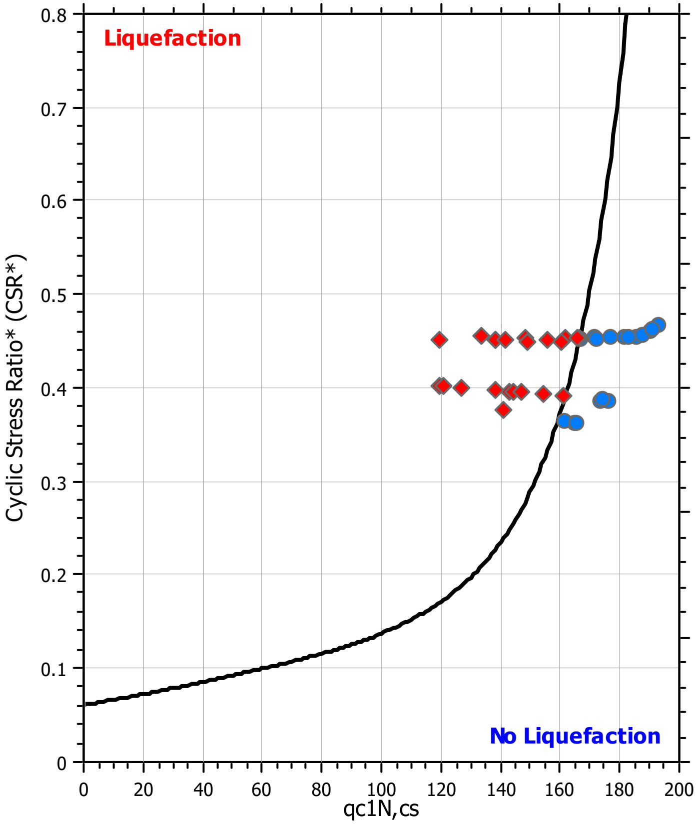
- 🟥 Almost certain it will liquefy
- 🟧 Very likely to liquefy
- 🟨 Liquefaction and no liq. are equally likely
- 🟩 Unlike to liquefy
- 🟩 Almost certain it will not liquefy

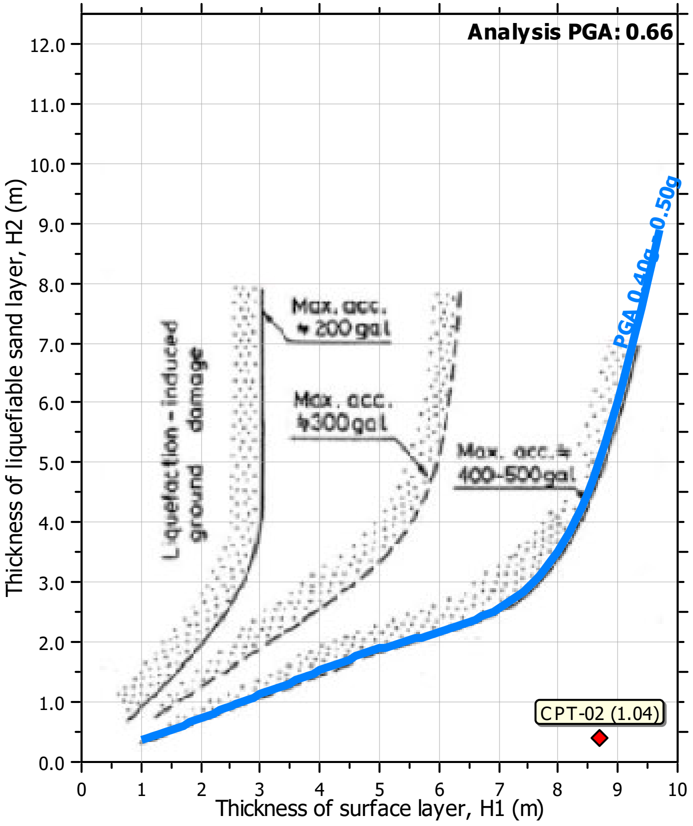
LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟨 Low risk

Liquefaction analysis summary plots



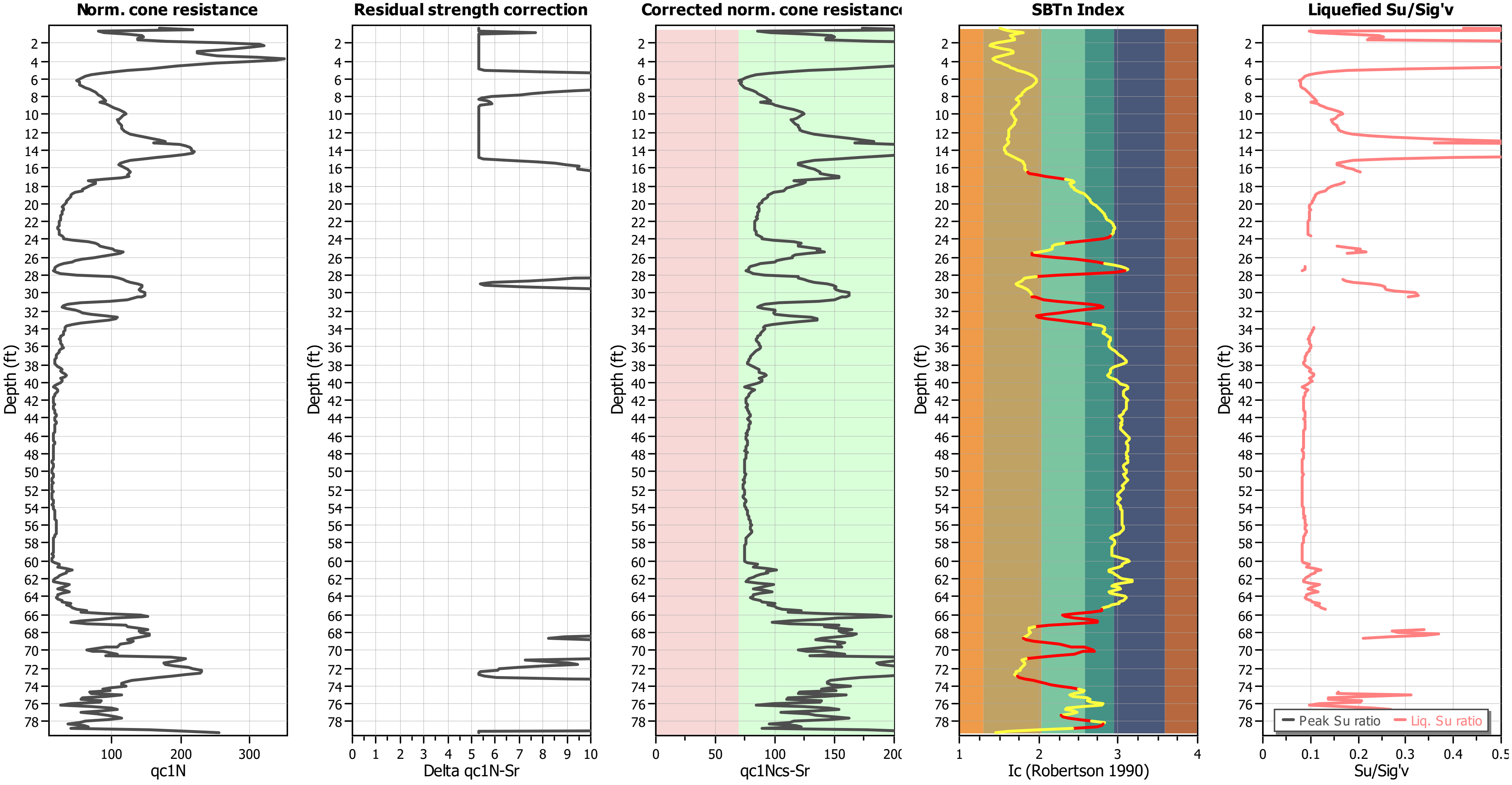




Input parameters and analysis data

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))



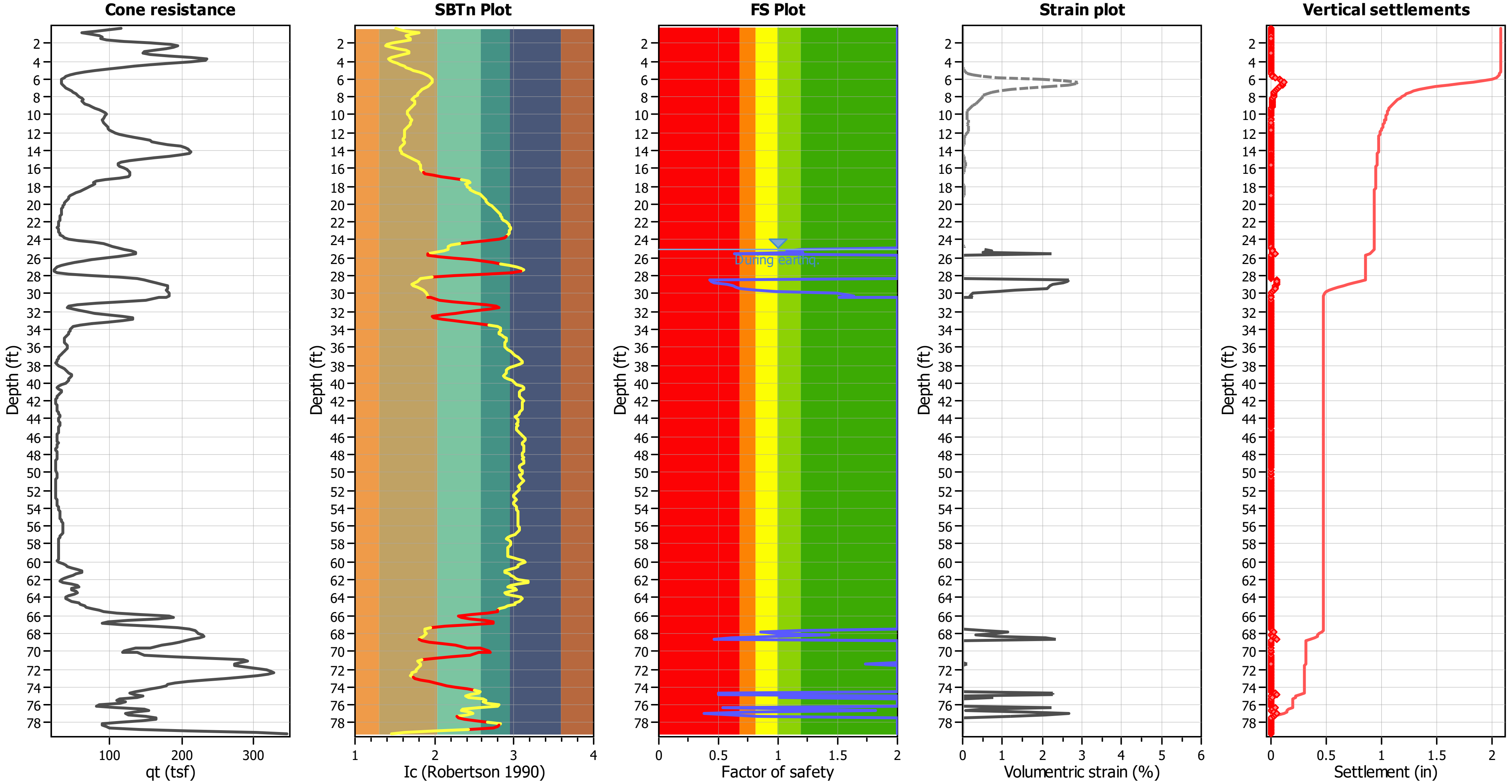
Input parameters and analysis data

Analysis method: B&I (2014)
Fines correction method: B&I (2014)
Points to test: Based on Ic value
Earthquake magnitude M_w: 7.00
Peak ground acceleration: 0.66
Depth to water table (insitu): 25.00 ft

Depth to GWT (erthq.): 25.00 ft
Average results interval: 3
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT
Use fill: No
Fill height: N/A

Fill weight: N/A
Transition detect. applied: Yes
K_σ applied: Yes
Clay like behavior applied: Sands only
Limit depth applied: No
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)

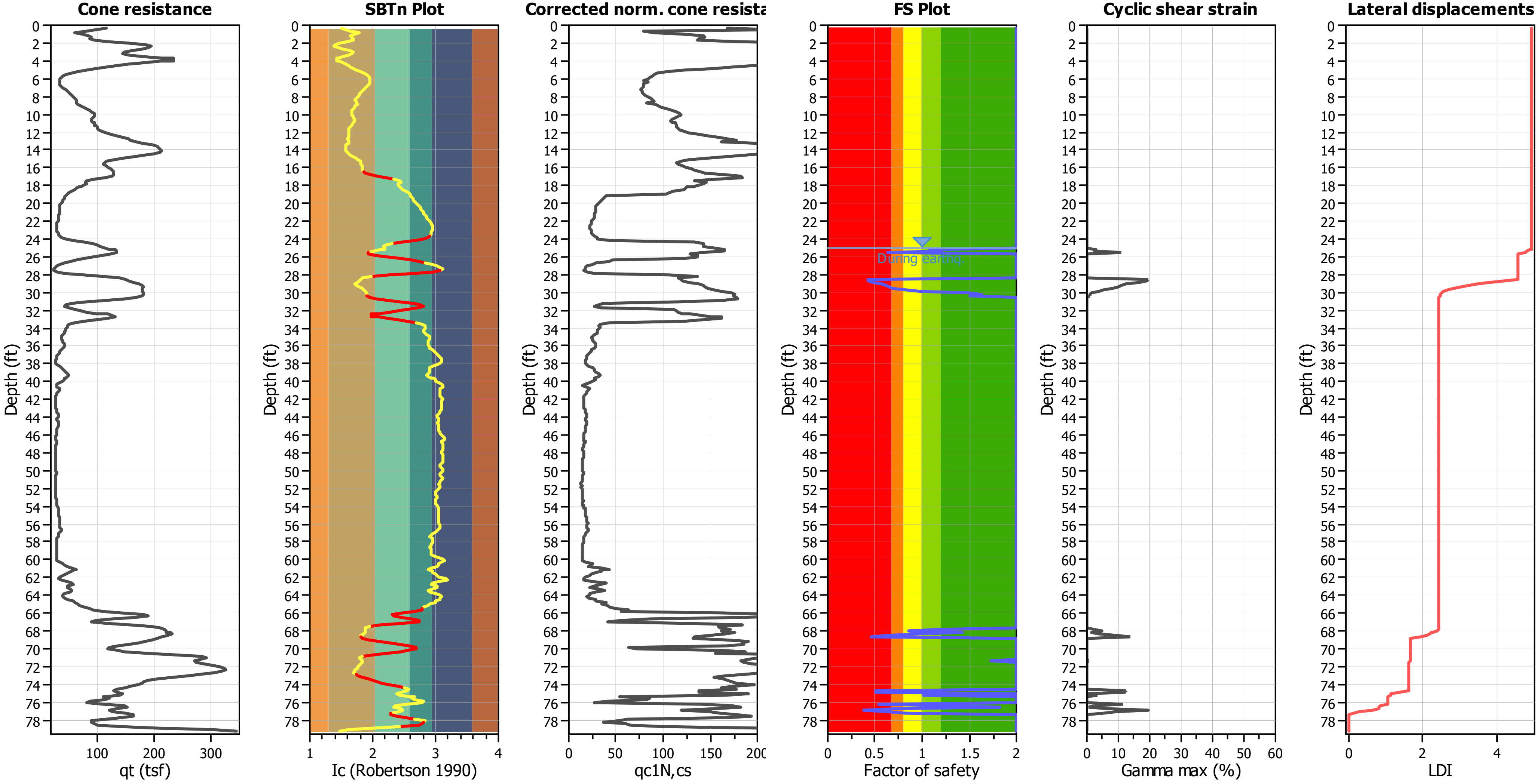
Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$q_{c1N,cs}$	FS	e_v (%)	DF	Settlement (in)
65.95	164.10	2.00	0.00	1.00	0.00	66.11	223.79	2.00	0.00	1.00	0.00
66.28	239.37	2.00	0.00	1.00	0.00	66.44	180.20	2.00	0.00	1.00	0.00
66.60	85.14	2.00	0.00	1.00	0.00	66.77	55.60	2.00	0.00	1.00	0.00
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)

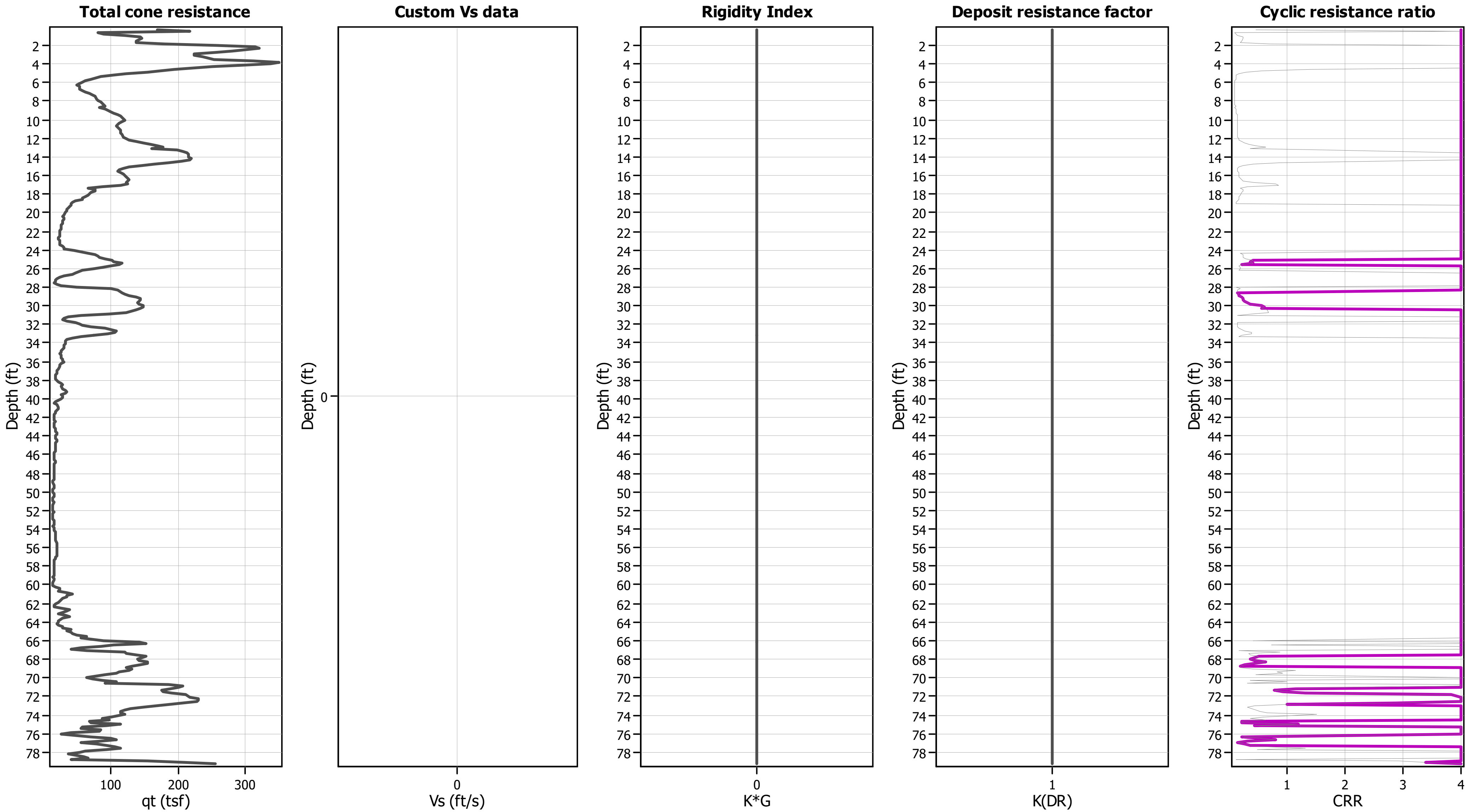
Depth (ft)	$q_{c1N,cs}$	$Gamma_{lim}$ (%)	FS	Fa	$Gamma_{max}$ (%)	LDI

Total estimated displacement: 4.94

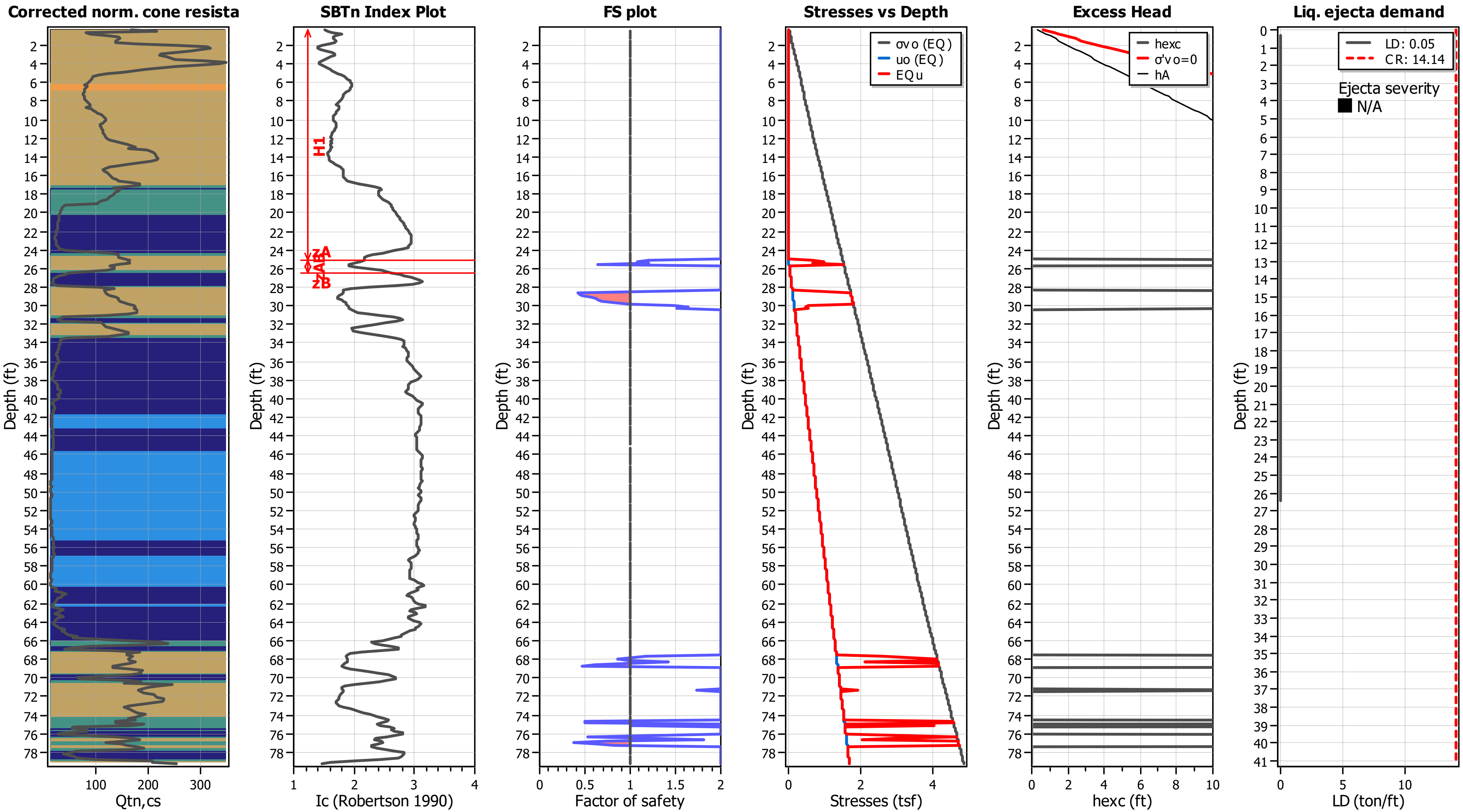
Abbreviations

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

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

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List of Drawings

<u>Appendices</u>

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.

One-Story Single-Family Residential Dwelling with Associated Detached Garage/Carport and Yard (2092 Oakley Road) (circa 1943) - 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.

<u>Cell Tower Facility (2092 Oakley Road) (circa 2015)</u> - 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.

<u>Associated Vineyard</u> - 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
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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)

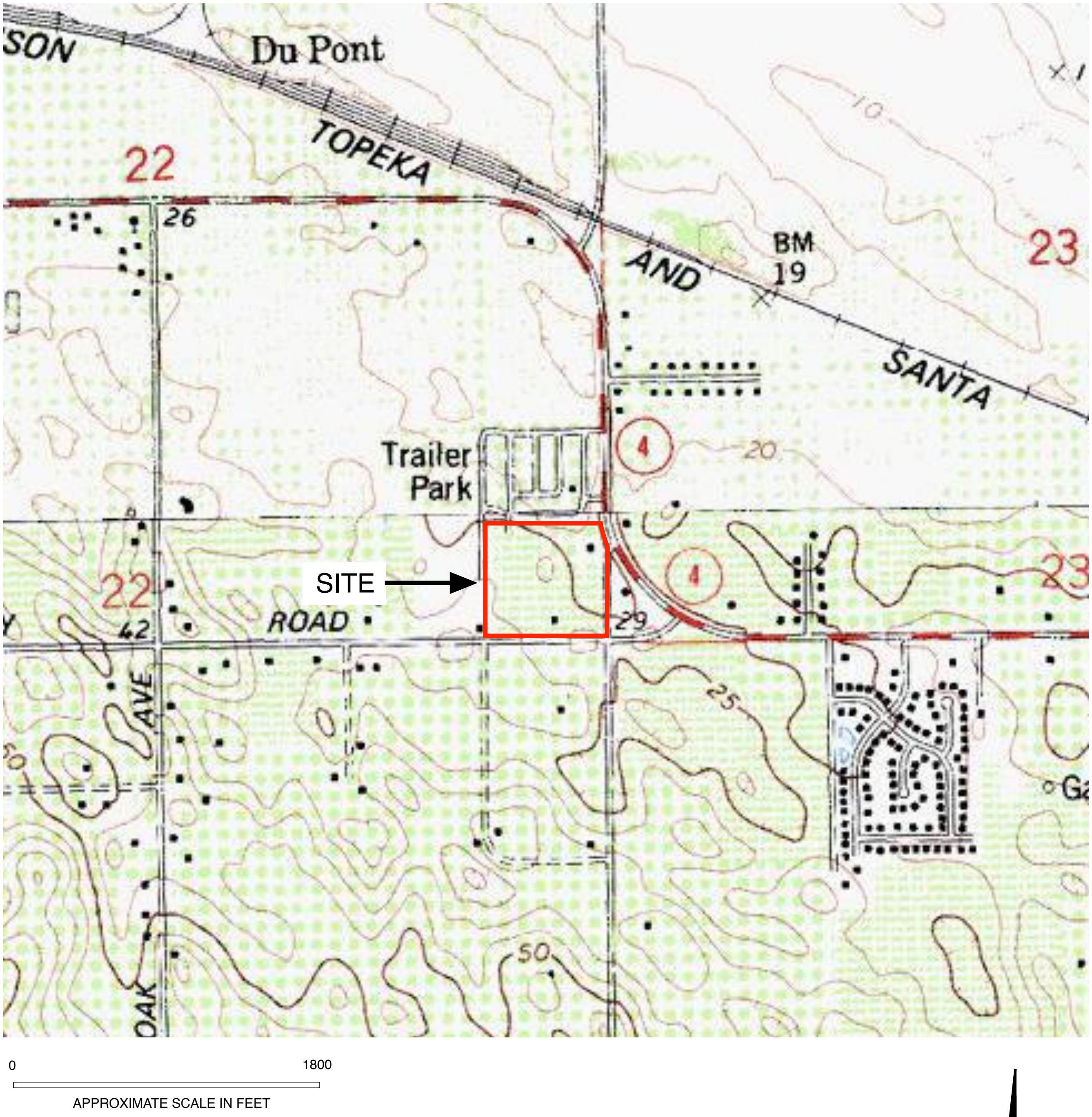
Controlled Recognized Environmental Conditions (CRECs) are defined by the ASTM Standard Practice E1527-21 as a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority, with hazardous substances or petroleum products 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

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

N

SITE 🟥

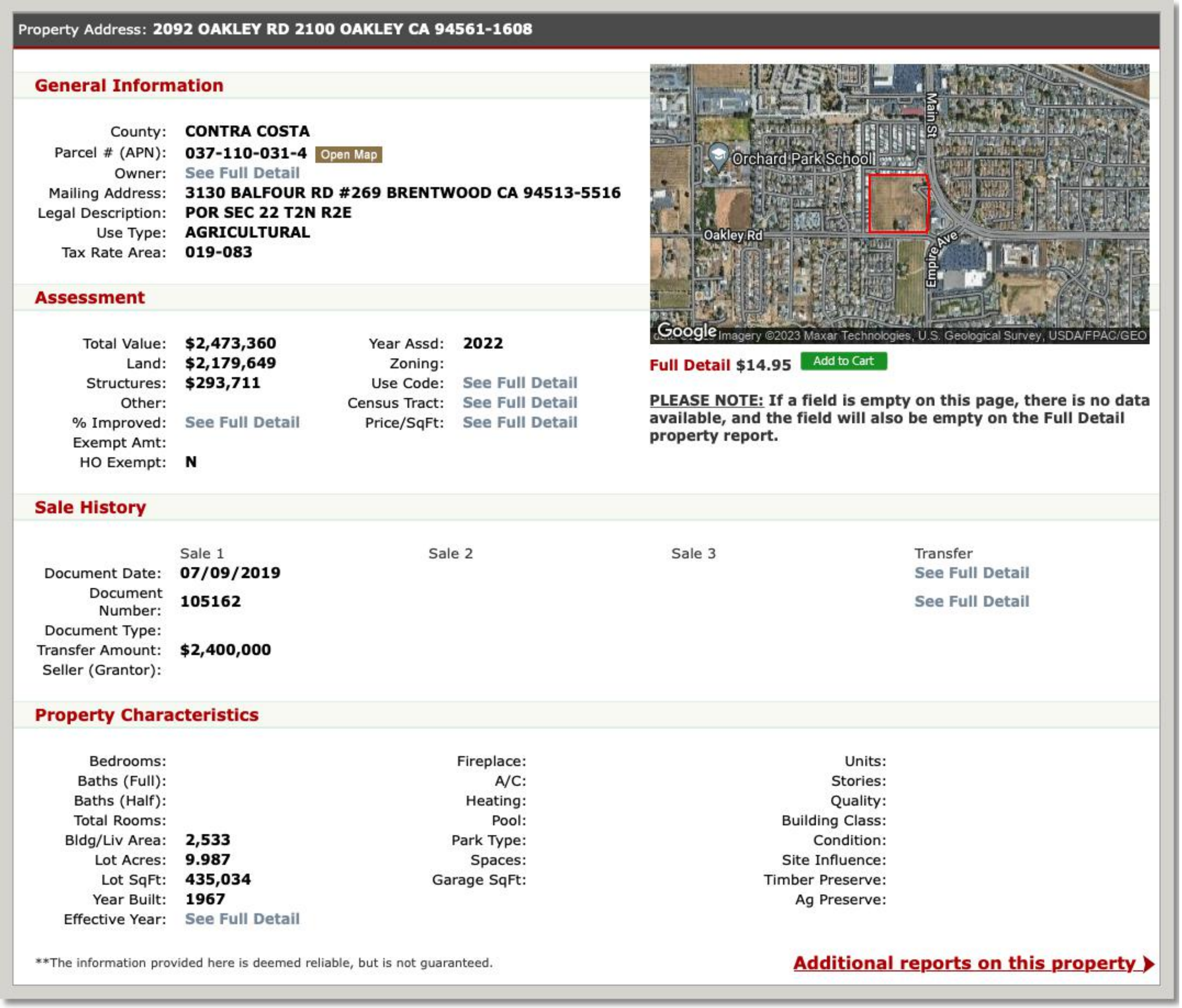
Site Plan

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**
Land: **$2,179,649**
Structures: **$293,711**
Other:
% Improved: See Full Detail
Exempt Amt:
HO Exempt: **N**

Year Assd: **2022**
Zoning:
Use Code: See Full Detail
Census Tract: See Full Detail
Price/SqFt: See Full Detail

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:
Baths (Full):
Baths (Half):
Total Rooms:
Bldg/Liv Area: **2,533**
Lot Acres: **9.987**
Lot SqFt: **435,034**
Year Built: **1967**
Effective Year: See Full Detail

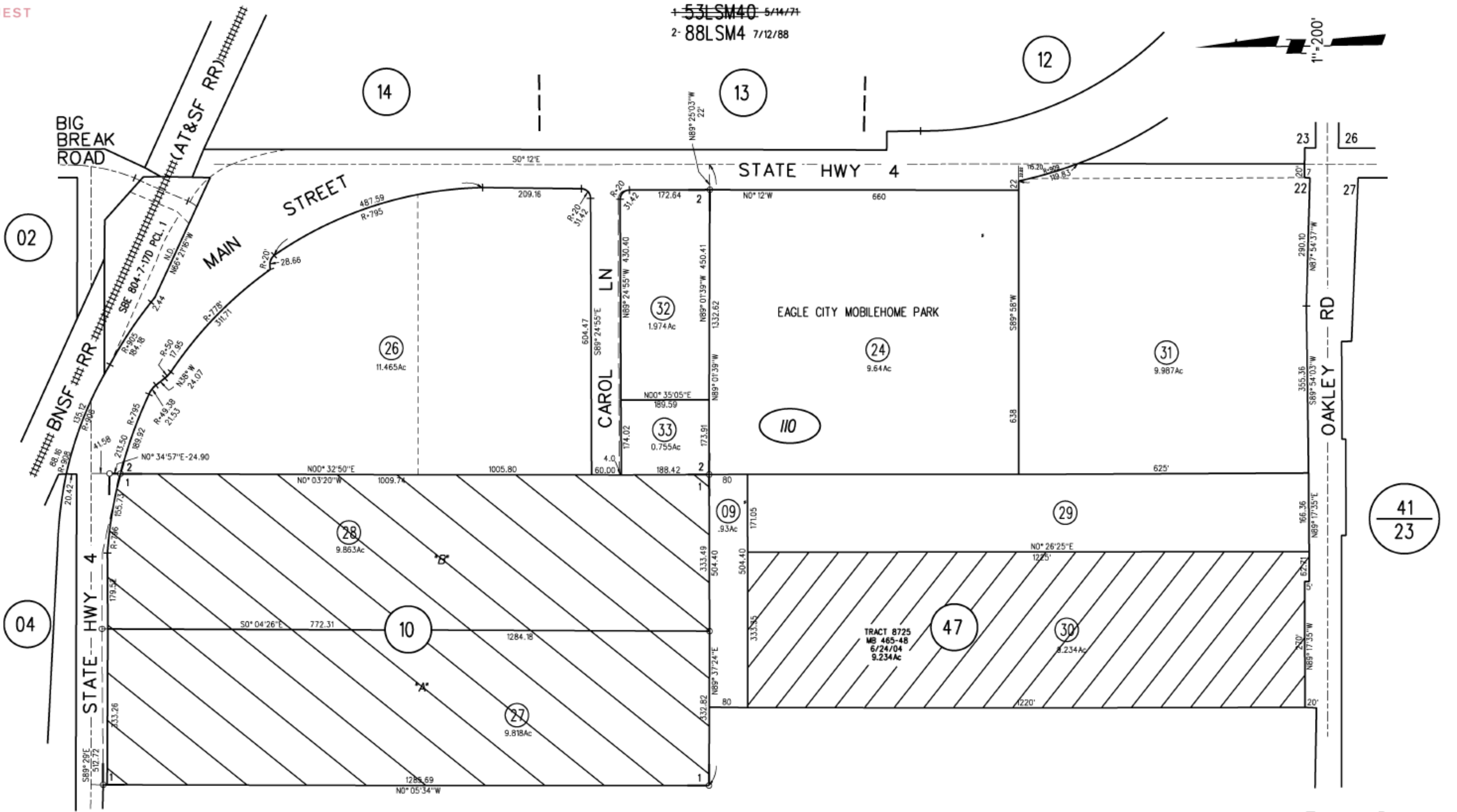
Fireplace:
A/C:
Heating:
Pool:
Park Type:
Spaces:
Garage SqFt:

Units:
Stories:
Quality:
Building Class:
Condition:
Site Influence:
Timber Preserve:
Ag Preserve:

**The information provided here is deemed reliable, but is not guaranteed.

Additional reports on this property ▶

POR SEC 22 T2N R2E MDBM
~~1- 53LSM40 5/14/71~~
2- 88LSM4 7/12/88



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.

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)

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

REGISTERED PROFESSIONAL ENGINEER
SHARATCHANDRA BANDUGULA
No. 82491
CIVIL
STATE OF CALIFORNIA

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

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

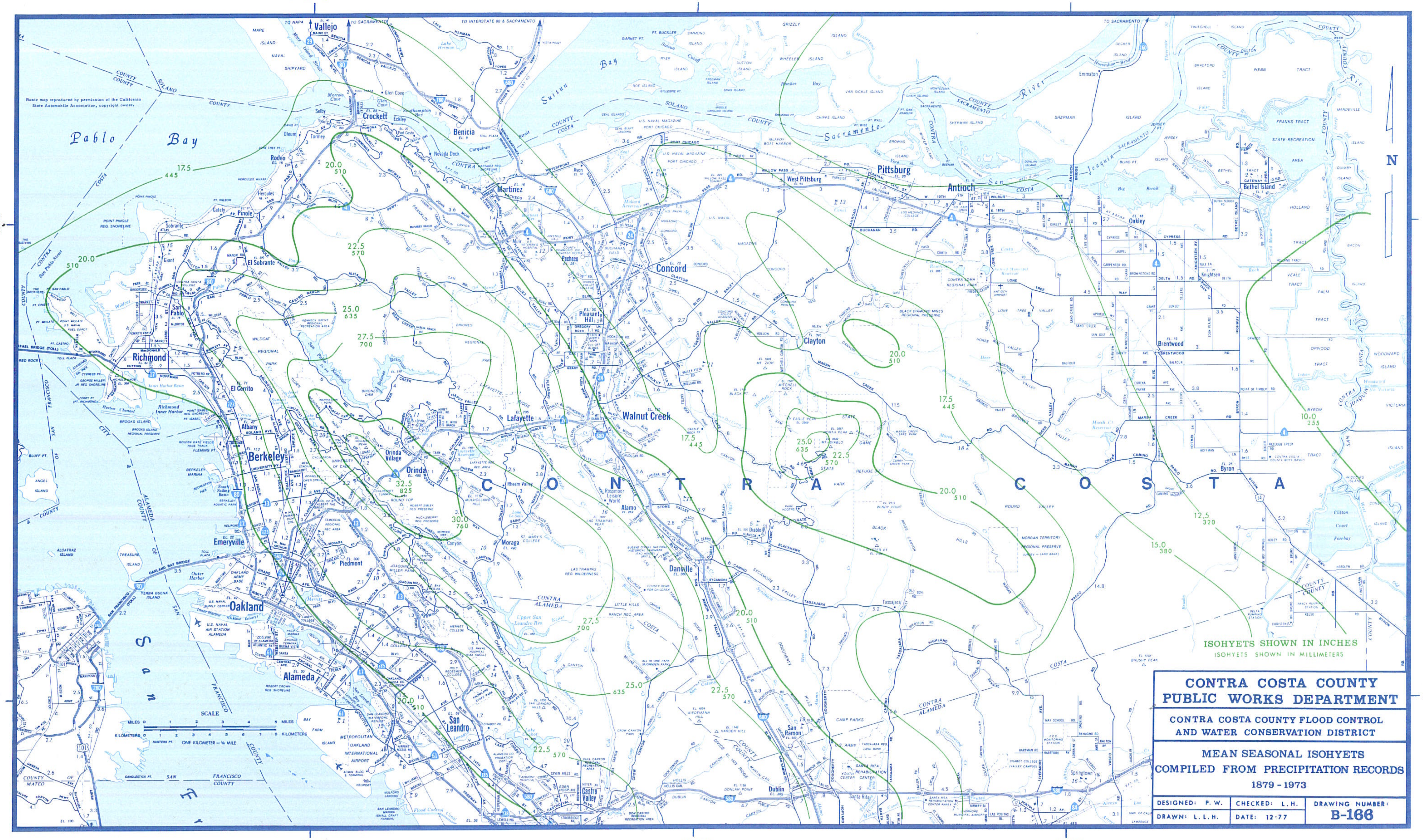
Notes:

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)



Basic map reproduced by permission of the California State Automobile Association, copyright owner.

ISOHYETS SHOWN IN INCHES
ISOHYETS SHOWN IN MILLIMETERS

CONTRA COSTA COUNTY PUBLIC WORKS DEPARTMENT

CONTRA COSTA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

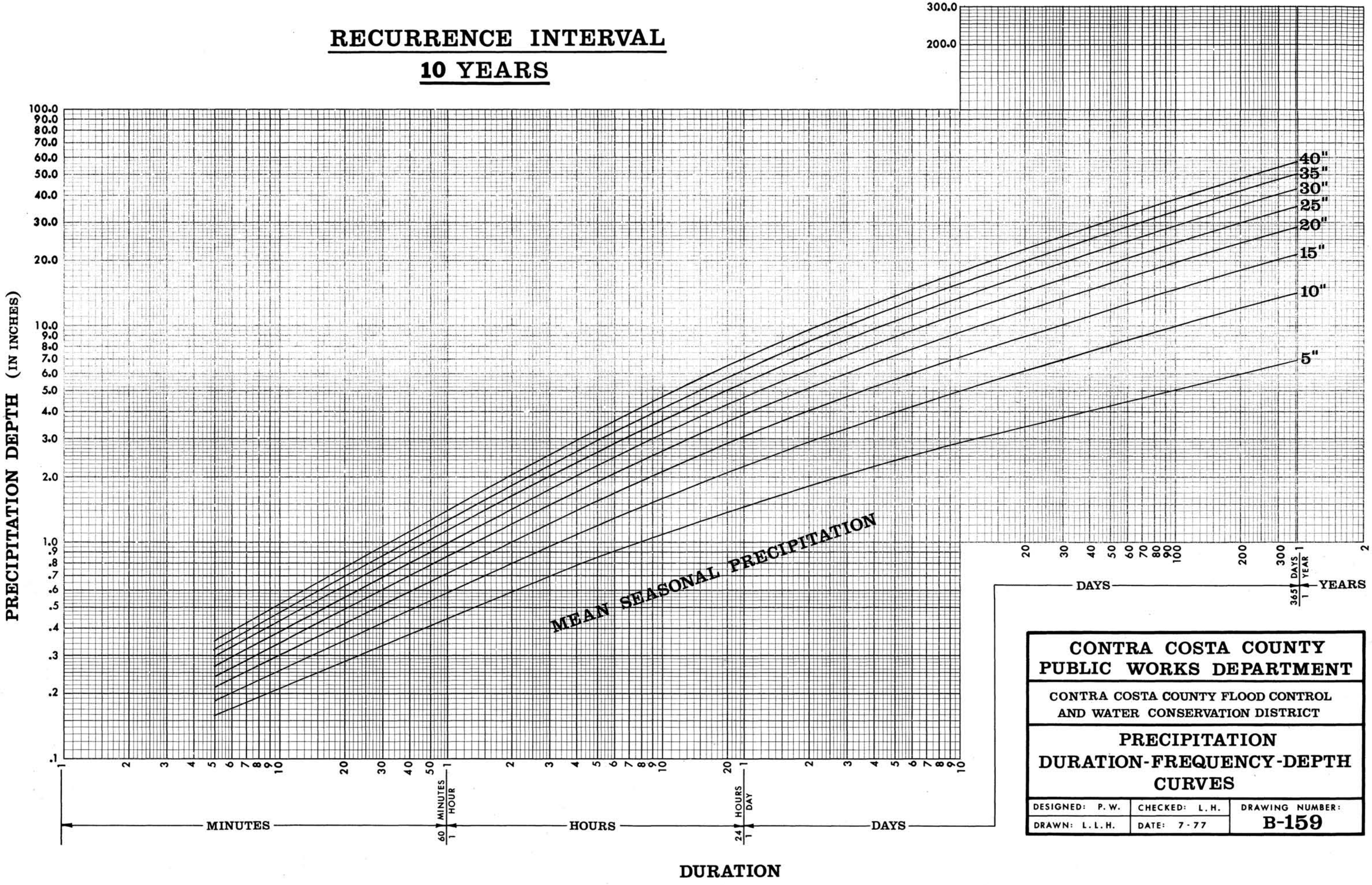
MEAN SEASONAL ISOHYETS COMPILED FROM PRECIPITATION RECORDS

1879 - 1973

DESIGNED: P. W.
CHECKED: L. H.
DRAWING NUMBER: B-166
DRAWN: L. L. H.
DATE: 12-77

Attachment C: CCCFCD Precipitation Duration-Frequency-Depth Curves
(B-159)

RECURRENCE INTERVAL
10 YEARS



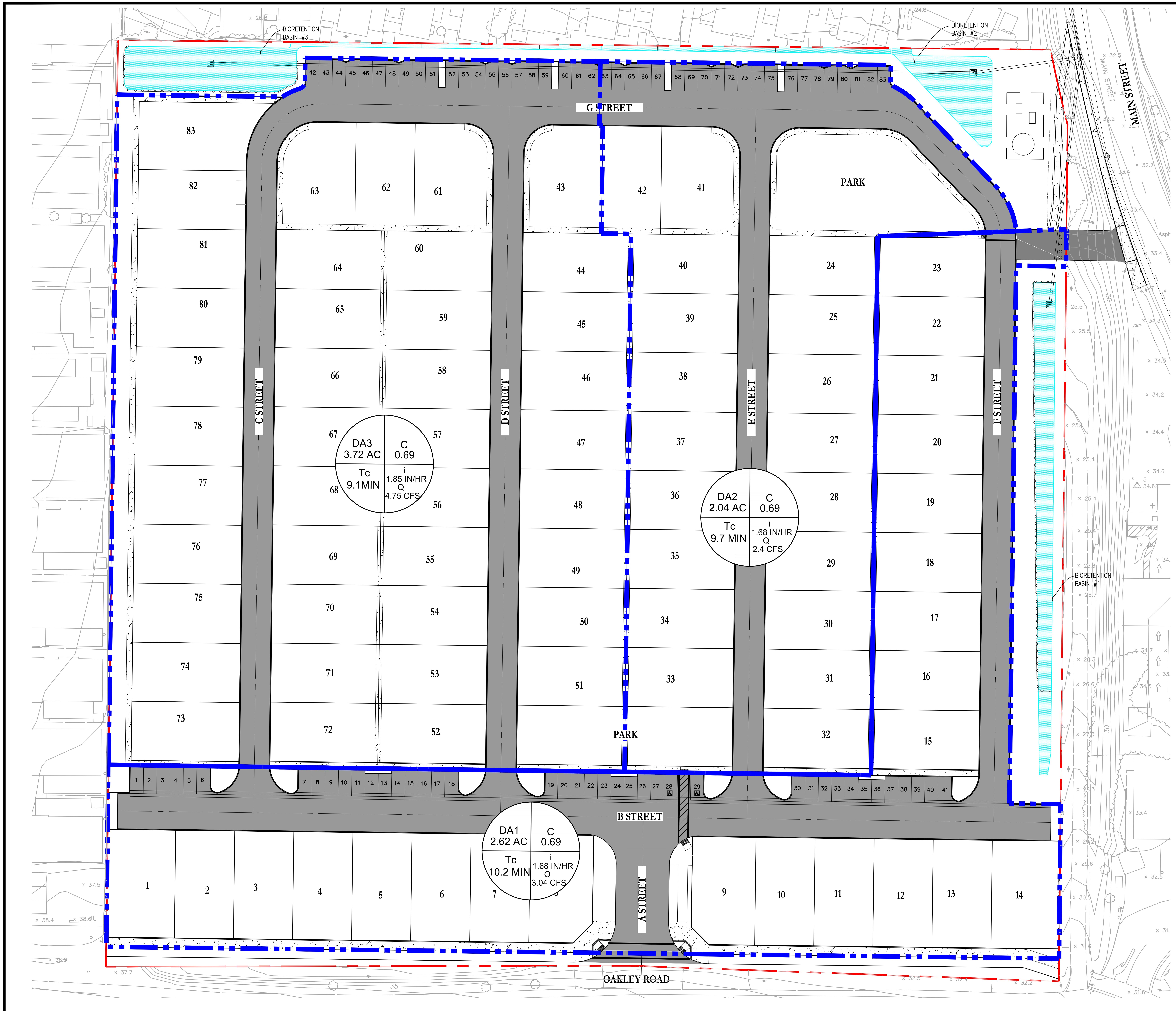
CONTRA COSTA COUNTY
PUBLIC WORKS DEPARTMENT

CONTRA COSTA COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

PRECIPITATION DURATION-FREQUENCY-DEPTH CURVES

DESIGNED: P. W.	CHECKED: L. H.	DRAWING NUMBER:
DRAWN: L. L. H.	DATE: 7-77	B-159

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

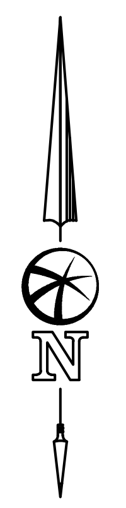
TOTAL PROPERTY AREA = 435,164± SF
PROPOSED ROOF AREA = 98,961 SF
PROPOSED STREETS, DRIVEWAY AREA, SIDEWALKS = 127,223 SF
PROPOSED OPEN SPACE = 208,980 SF

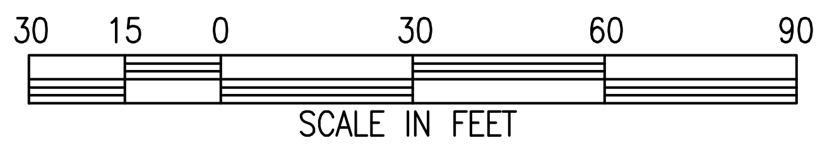
PERVIOUS AREA (OPEN SPACE) = 208,980 SF (4.80 ACRES)
IMPERVIOUS AREA (STREETS, DRIVEWAYS, SIDEWALKS) = 127,223 SF (2.92 ACRES)
IMPERVIOUS AREA (ROOFS) = 98,961 SF (2.27 ACRES)

COMPOSITE "C" RUNOFF COEFFICIENT:

$$\frac{(0.40*4.80) + (0.95*2.92) + (0.95*2.27)}{(4.80 + 2.92 + 2.27)}$$

$$= \quad 0.69$$





SCALE IN FEET
GRAPHIC SCALE: 1"=30'

SHEET 1
OF 1
JOB NO. 200056

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

REGISTERED PROFESSIONAL ENGINEER
ALEXANDRA FARROS-HOEPPNER
No. 91247
CIVIL
STATE OF CALIFORNIA

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

Tables

Figures

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

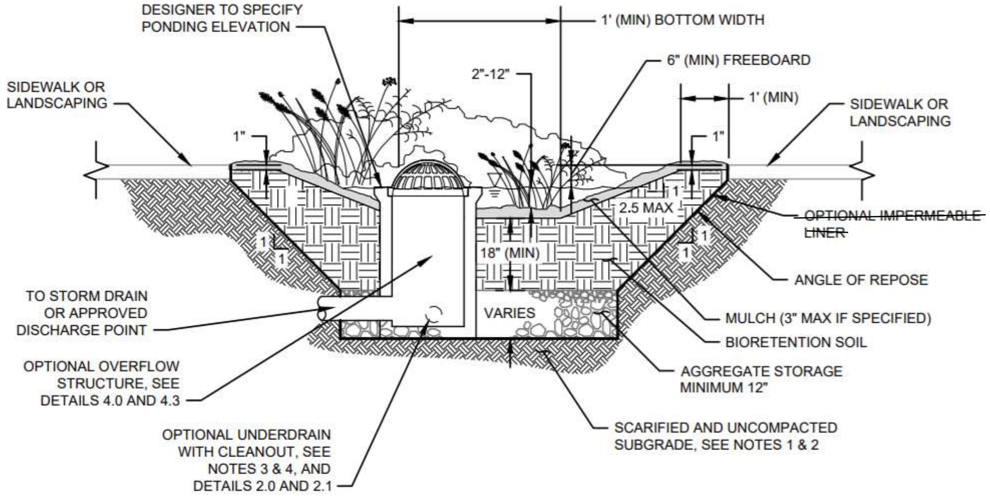
III.D. Bioretention or other Integrated Management Practices

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.

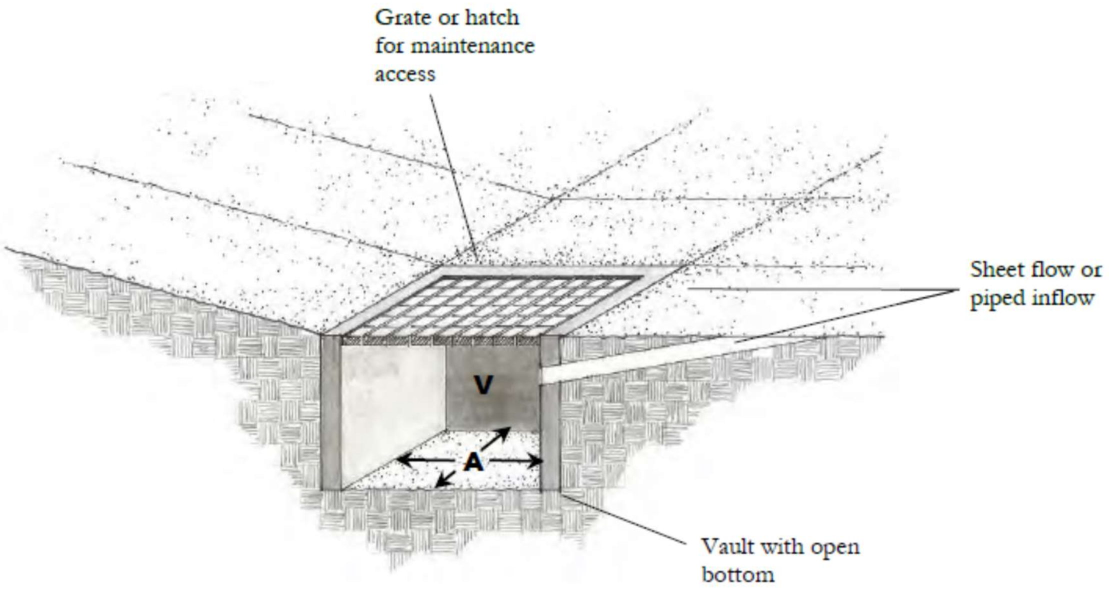
Figure 2. Typical Bioretention Facility



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

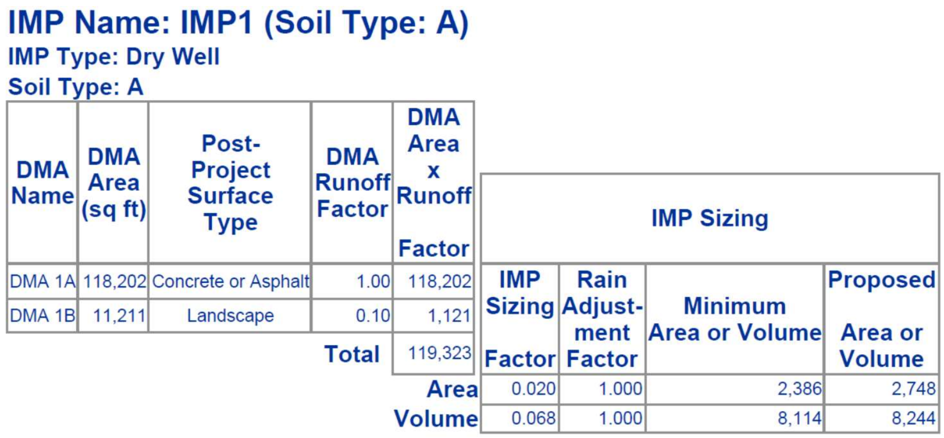
There are no self-retaining areas.

IV.B.4. Areas Draining to Self-Retaining Areas

There are no DMAs draining to self-retaining areas.

IV.B.5. Areas Draining to IMPs

Table 5. IMP Sizing Calculations



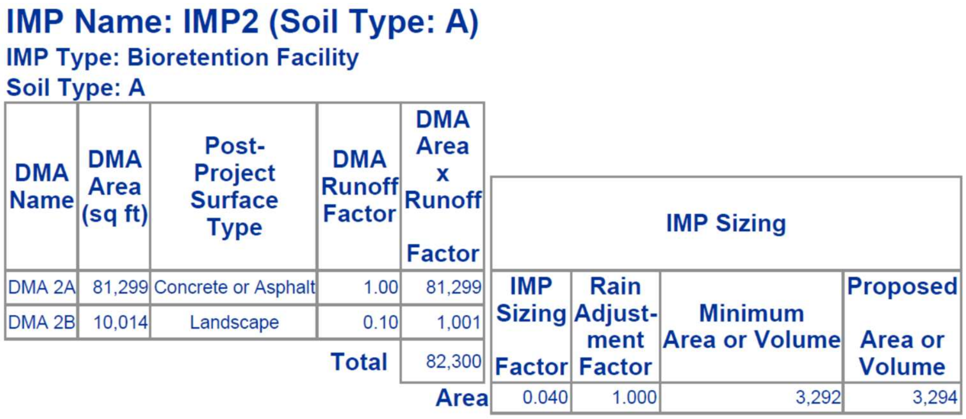
IMP Name: IMP1 (Soil Type: A)

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



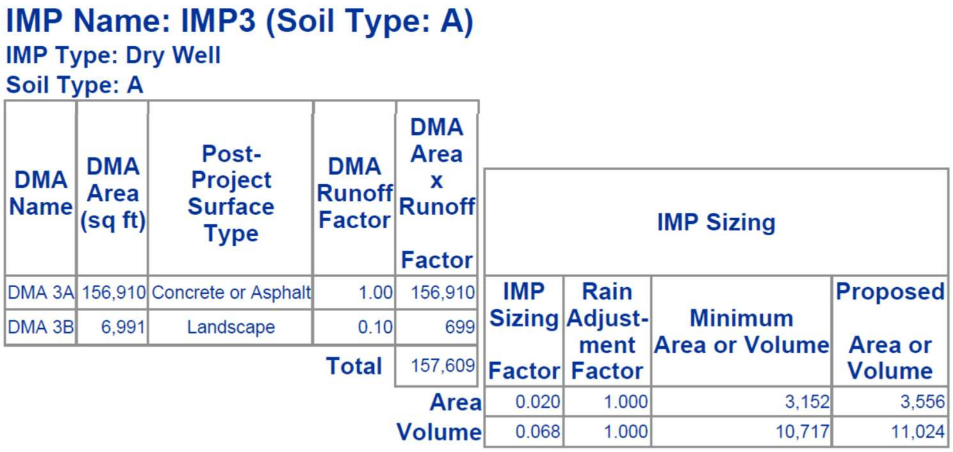
IMP Name: IMP2 (Soil Type: A)

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

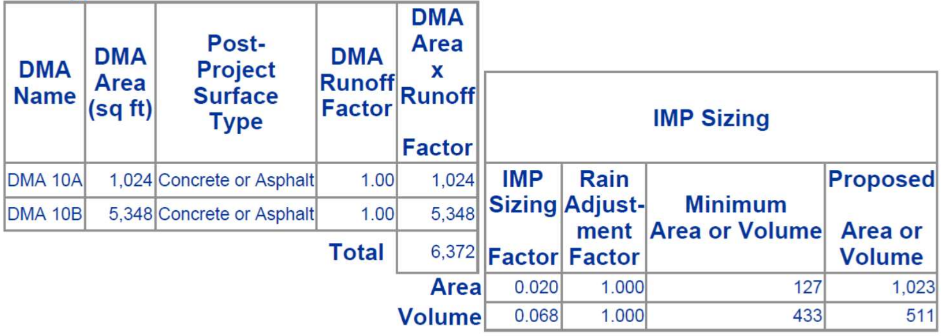
DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor
DMA 3A	156,910	Concrete or Asphalt	1.00	156,910
DMA 3B	6,991	Landscape	0.10	699
			Total	157,609

	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



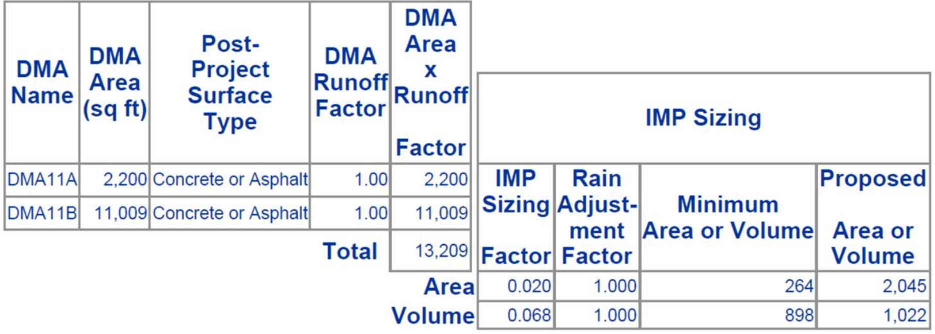
DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor
DMA 10A	1,024	Concrete or Asphalt	1.00	1,024
DMA 10B	5,348	Concrete or Asphalt	1.00	5,348
			Total	6,372

IMP Sizing				
	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
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



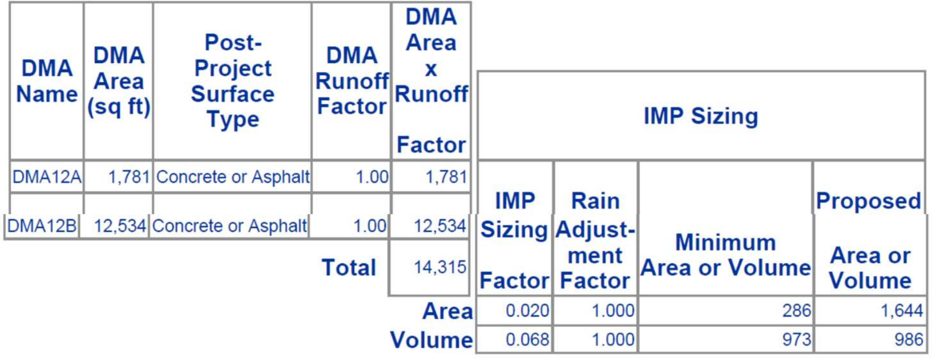
DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor
DMA11A	2,200	Concrete or Asphalt	1.00	2,200
DMA11B	11,009	Concrete or Asphalt	1.00	11,009
			Total	13,209

IMP Sizing				
	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
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
DMA12A	1,781	Concrete or Asphalt	1.00	1,781
DMA12B	12,534	Concrete or Asphalt	1.00	12,534
			Total	14,315

IMP Sizing				
	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
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

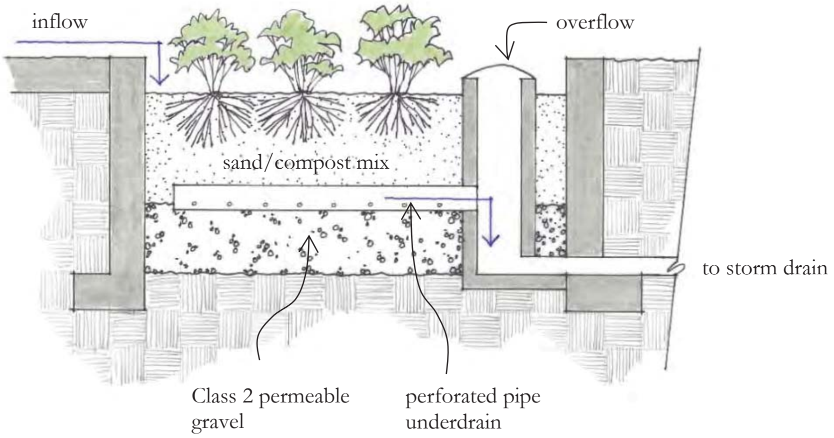
Print Name

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.

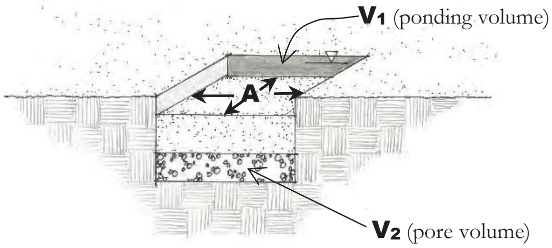
- Place bioretention facilities in visible, well-trafficked areas and make them a focal point in the landscape.
- On flatter sites, use surface drainage, rather than underground pipes, to convey runoff to the bioretention facility inlets. The top of soil elevation should be as high as possible—typically 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.

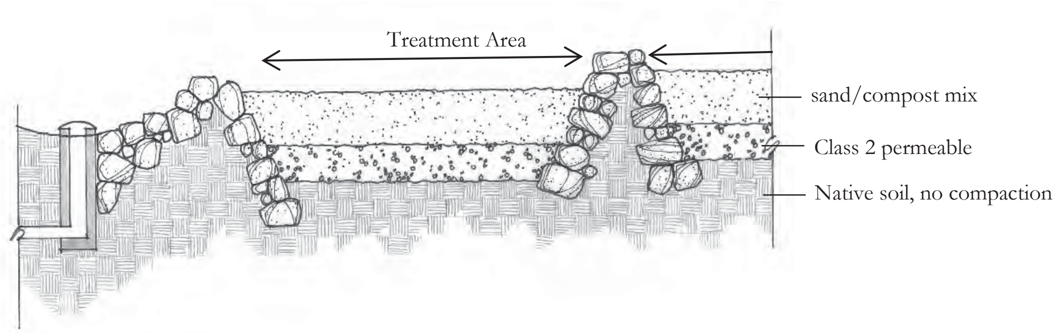
Residential subdivisions. In the design of many subdivisions, it has proven easiest and most effective to drain roofs and driveways to the streets (in the conventional manner) and then drain the streets to bioretention areas, with one bioretention area for each 1 to 10 lots, depending on subdivision 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.

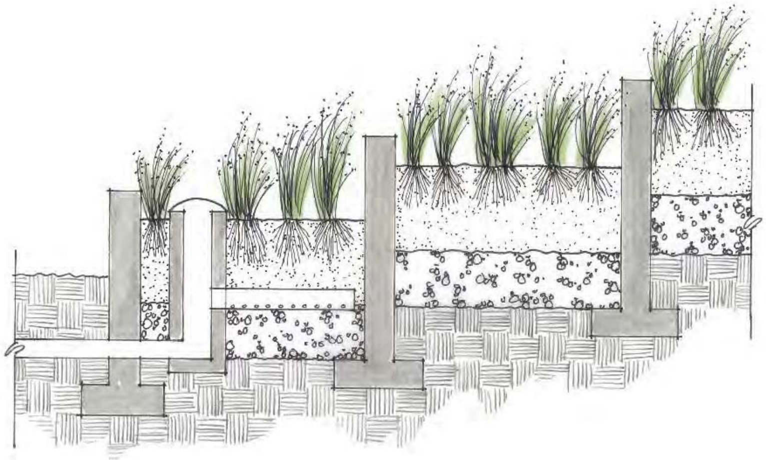
On the surface, a bioretention facility should be one level, shallow basin—or a series of basins. As runoff enters each basin, it should flood and fill throughout before runoff overflows to the outlet or to the next downstream basin. This helps prevent movement of surface mulch and soil mix.

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.

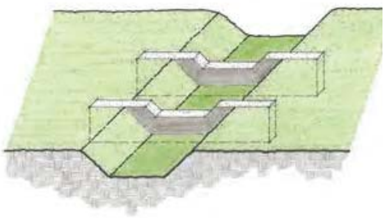


Swale with check dams. Not suitable for steeper slopes. Movement of soil can be a problem even at mild slopes. Design must ensure ponding behind each check dam.

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:

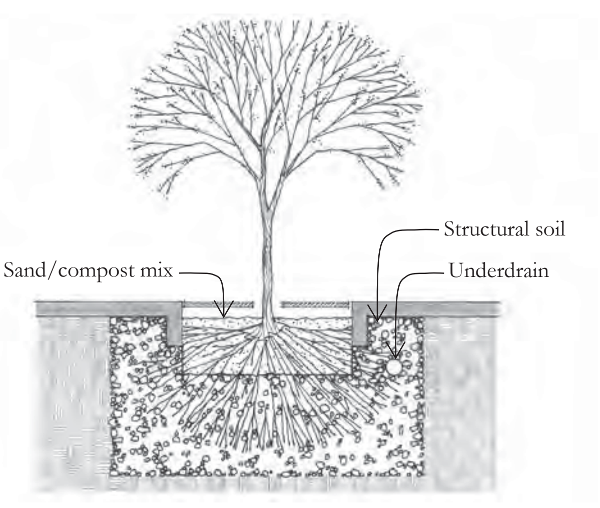
- Increasing the facility area and reducing the surface depth accordingly.
- Incorporating steps down into the facility.
- Specifying taller, woody plants to block or discourage entry.

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.

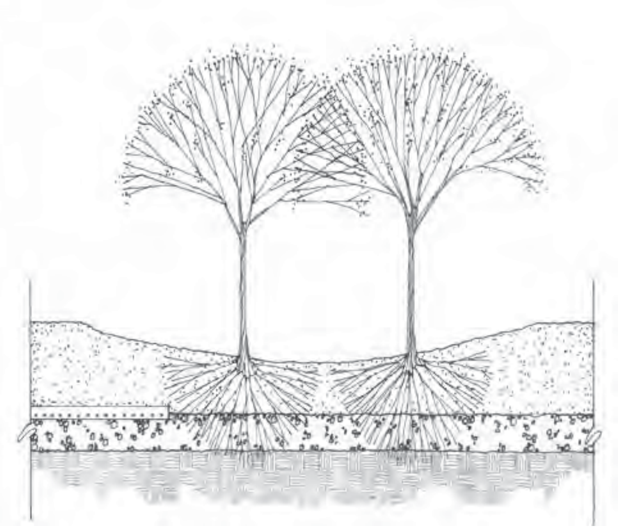
Trees. Bioretention areas can accommodate small or large trees within the minimum areas and volumes calculated by Equation 3-3. Tree canopies intercept rain, and tree roots maintain soil permeability and help retain runoff. Normal maintenance of a bioretention facility should not affect tree lifespan.



Bioretention facility configured as a tree well.

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.



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

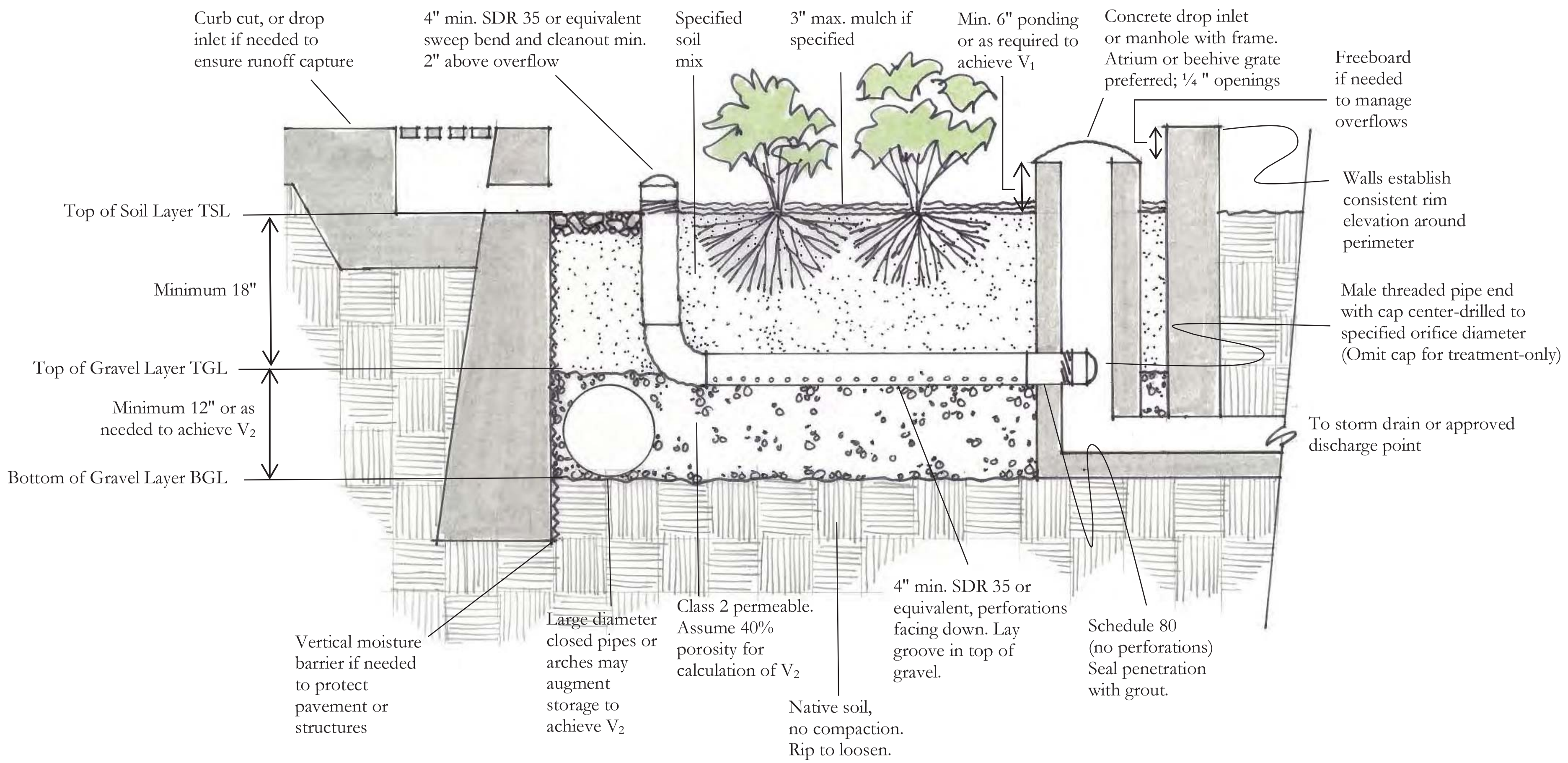
☐ Volume of surface storage meets or exceeds minimum (V_1).

☐ 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

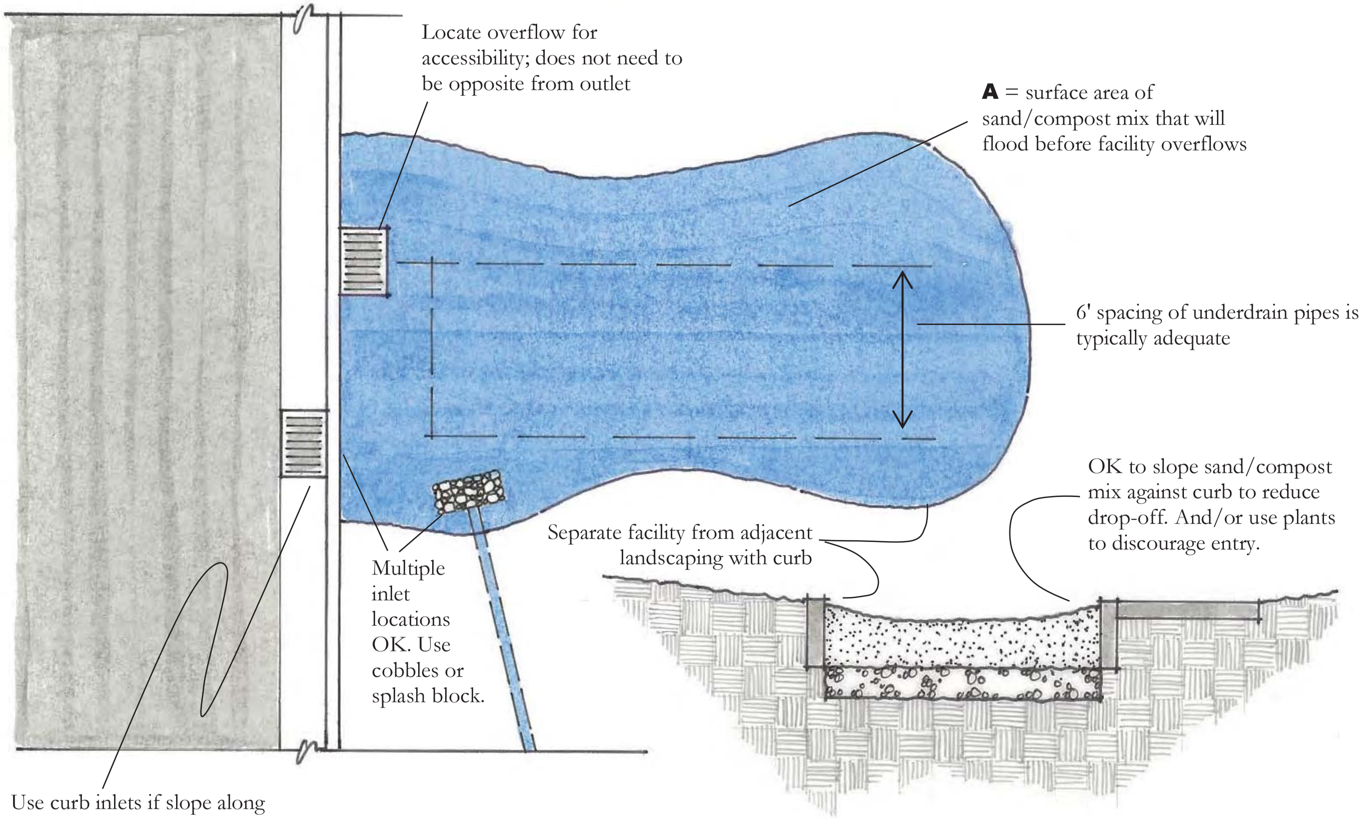


Notes:
- No liner, no filter fabric, no landscape cloth.
- Maintain BGL. TGL, TSL throughout facility area at elevations to be specified on drawing.
- Class 2 perm layer may extend below and underneath drop inlet.
- Elevation of perforated pipe underdrain is atop gravel layer.
- See Appendix B for soil 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.

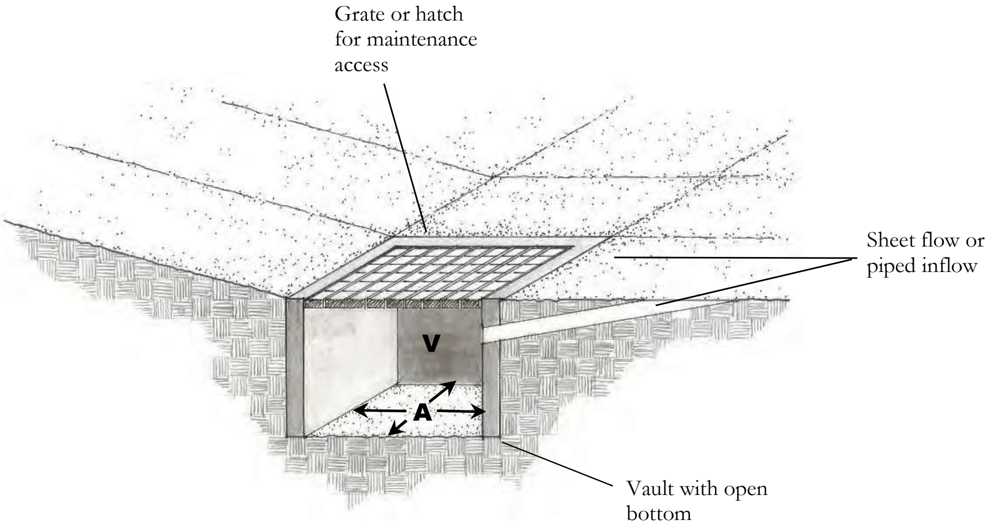
☐ Emergency spillage will be safely conveyed overland.

☐ 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

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

September 13, 2022

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

Contents

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.

Soil Map


121° 44' 7" W
121° 43' 53" W
37° 59' 59" N
37° 59' 52" N
611040
611070
611100
611130
611160
611190
611220
611250
611280
611310
611340
611370
4206550
4206520
4206490
4206460
4206430
4206400
4206370
4206340
DaC
Zartop St
Main St
4
Oakley
Soil Map may not be valid at this scale.
N
Map Scale: 1:1,580 if printed on A landscape (11" x 8.5") sheet.
Meters
0
20
40
80
120
Feet
0
50
100
200
300
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil 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

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ATTACHMENT C

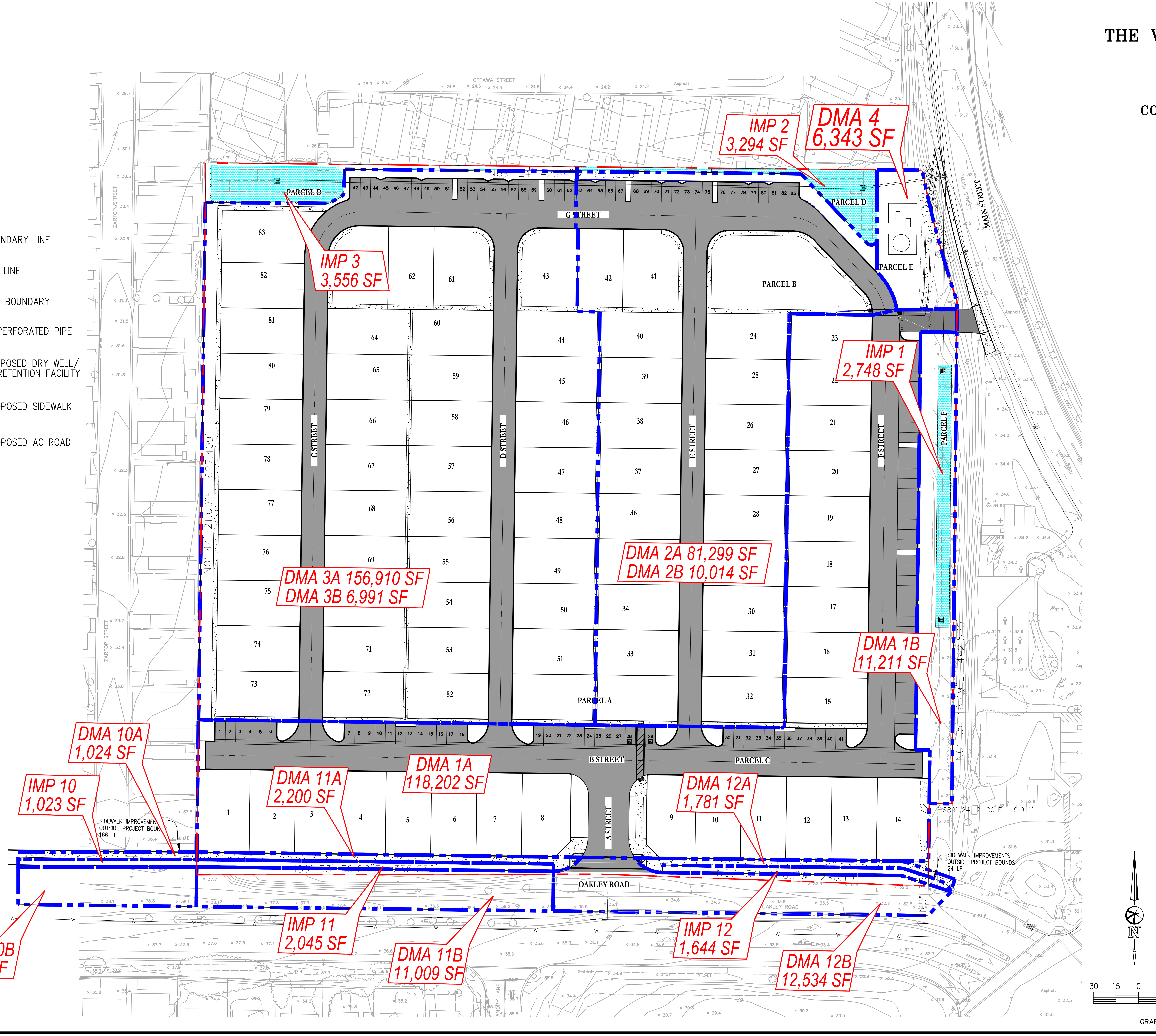
SUBDIVISION 9634
THE VILLAGE AT 2092 OAKLEY ROAD
STORM WATER CONTROL PLAN EXHIBIT

CITY OF OAKLEY
CONTRA COSTA COUNTY, CALIFORNIA

BELLECCI & ASSOCIATES, INC.
CONCORD, CALIFORNIA
MARCH 8, 2023 SCALE: 1"=30'

LEGEND

— - —	BOUNDARY LINE
——	LOT LINE
━ · ━	DMA BOUNDARY
- - - -	4" PERFORATED PIPE
▭	PROPOSED DRY WELL/ BIORETENTION FACILITY
⬚	PROPOSED SIDEWALK
■	PROPOSED AC ROAD



30 15 0 30 60 90
SCALE IN FEET
GRAPHIC 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

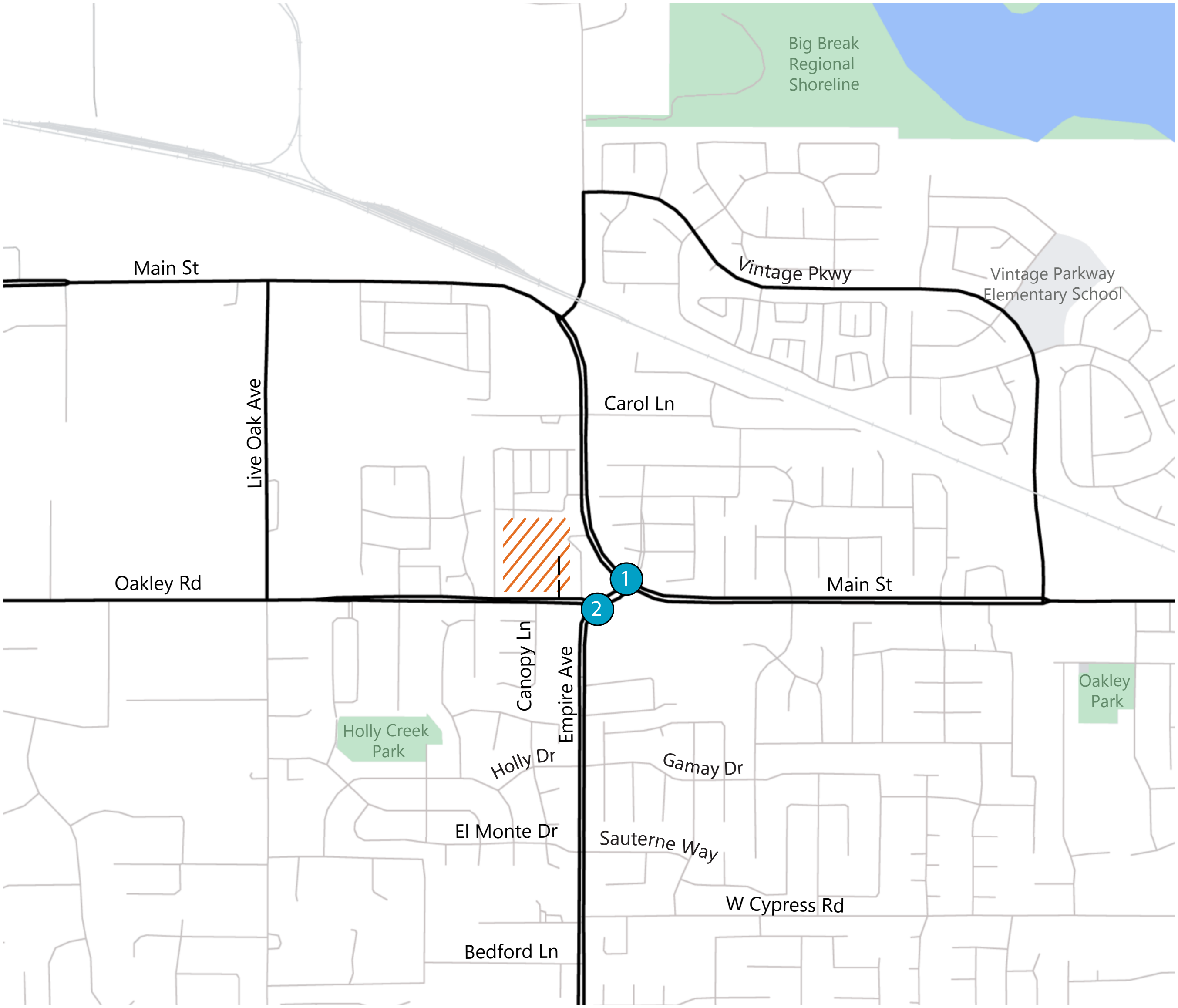
Date:	November 1, 2022
To:	Dan Cosgrove, dan.cosgrove@mercsystems.com
From:	Chris Kinzel, TJKM
Subject:	***Traffic Study for 2092 Oakley Road in Oakley, CA***

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



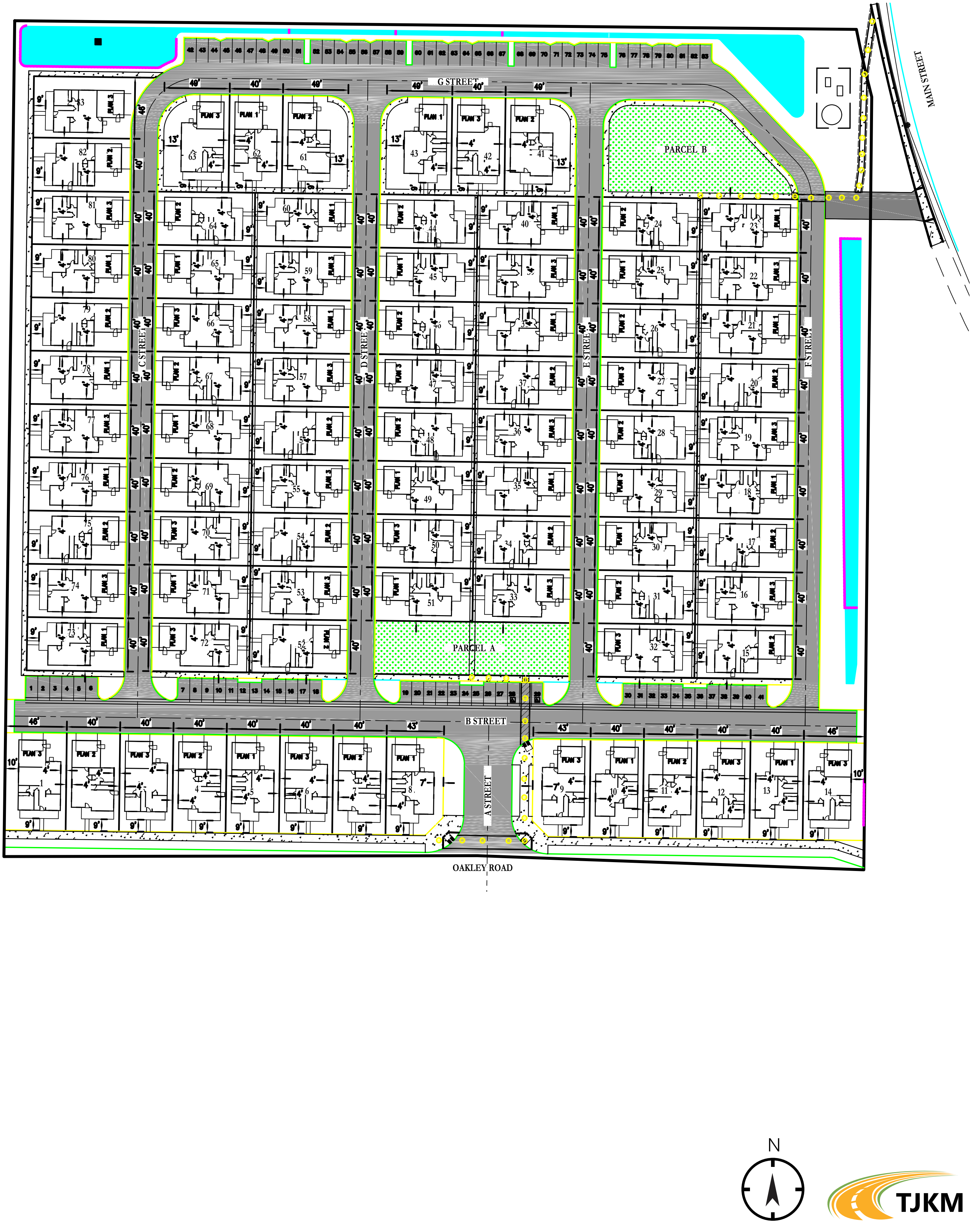
LEGEND

x Study Intersection	┆ Project Entrance	▨ Project Site

N

TJKM

Figure 2: Site Plan



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

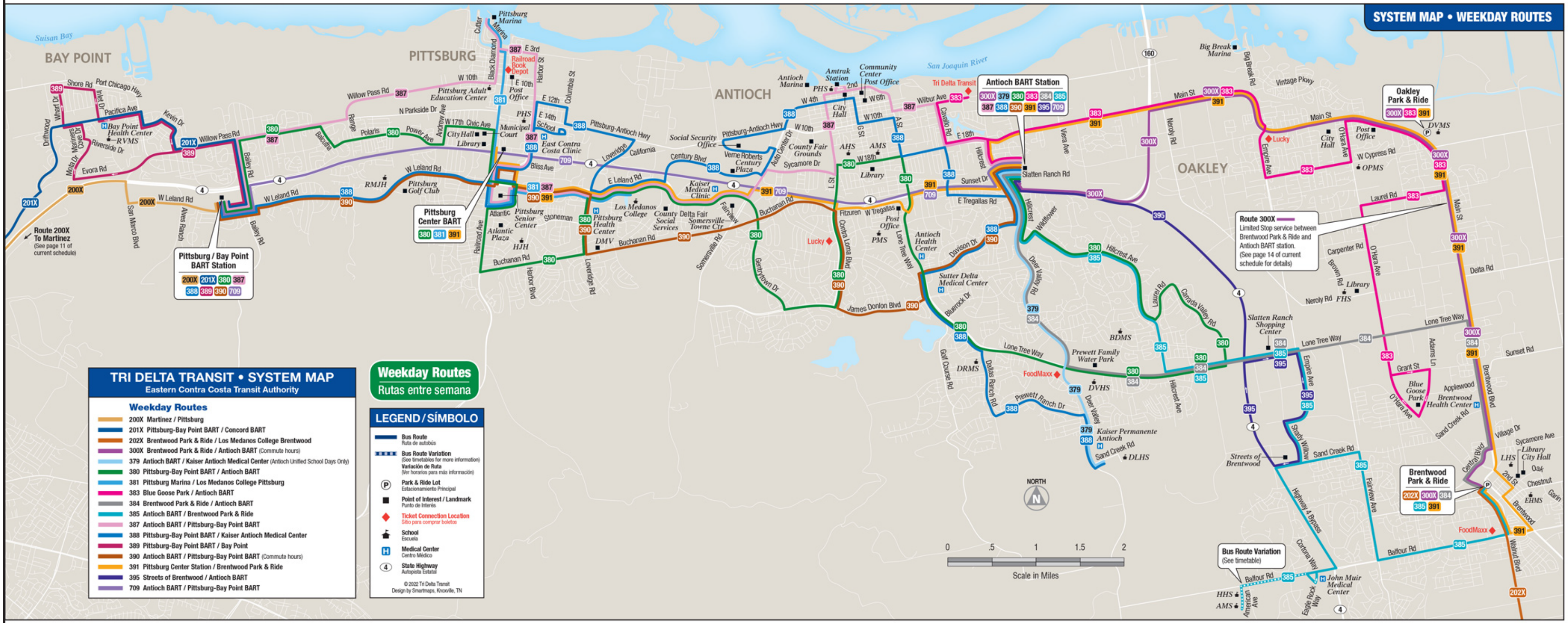
Tri Delta Transit operates bus service services in the City of Oakley and surrounding East Contra Costa County. The closest transit stops to the proposed project site are located at the Main Street and Empire Avenue intersection, located 0.4 miles from the project site. These stops are served by Tri 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:

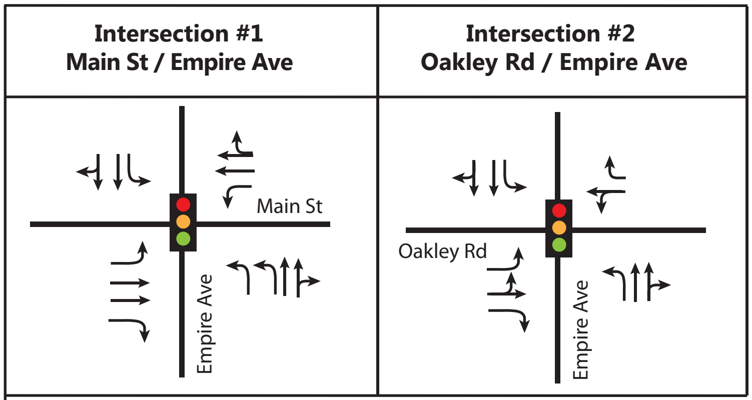
[1] AM – morning peak hour; PM – evening peak hour.

[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

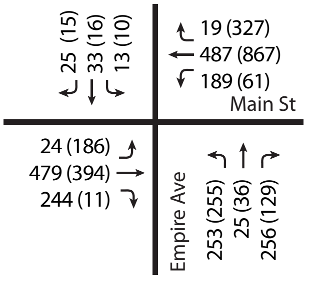
LEGEND

🚦 Traffic Signal

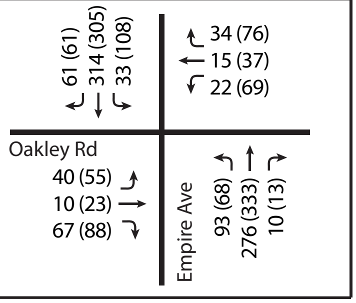
TJKM

Figure 5: Existing Peak Hour Traffic Volumes

Intersection #1
Main St / Empire Ave



Intersection #2
Oakley Rd / Empire Ave



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**

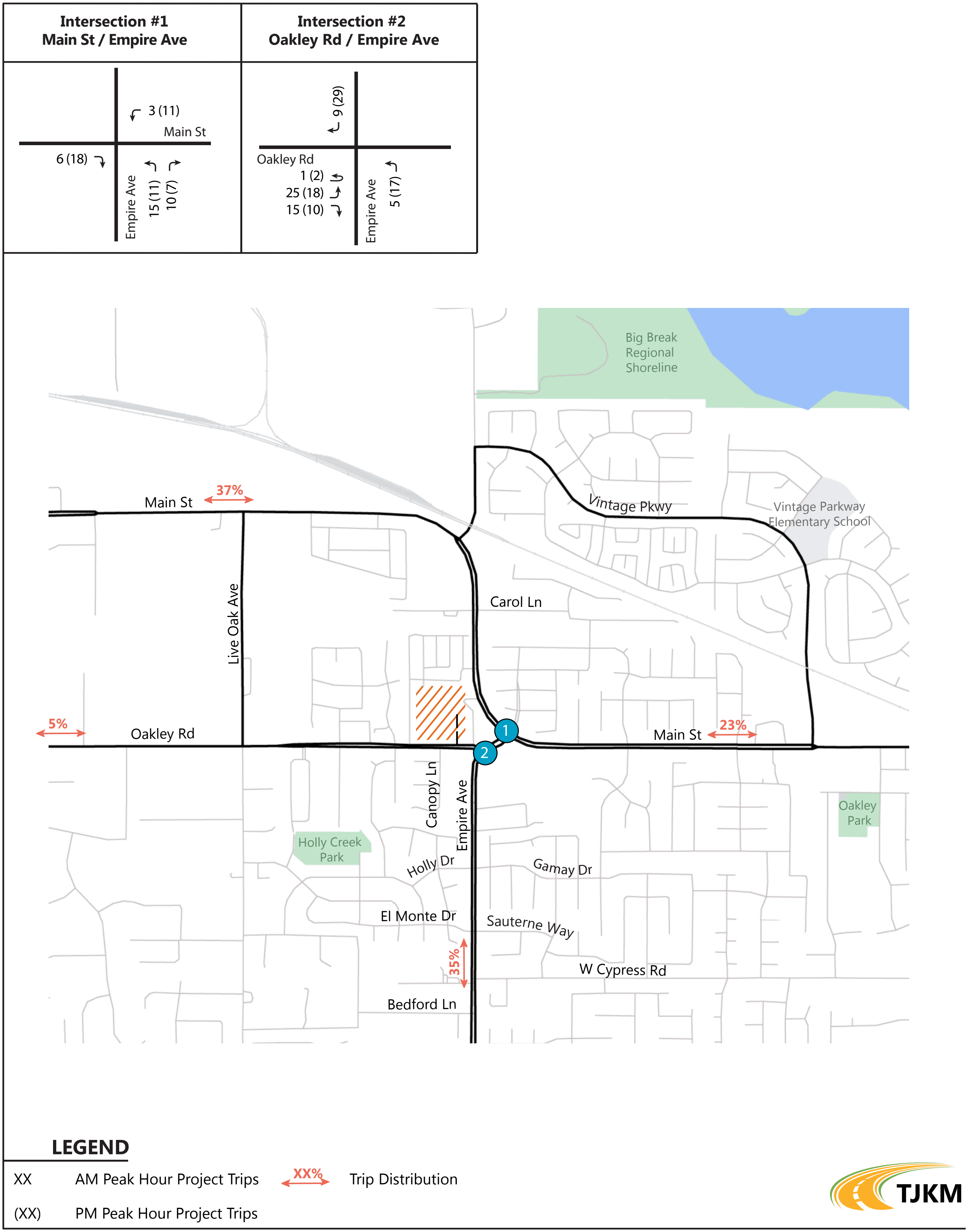
Source: ITE Trip Generation Manual, 11th Edition, 2021.

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 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:

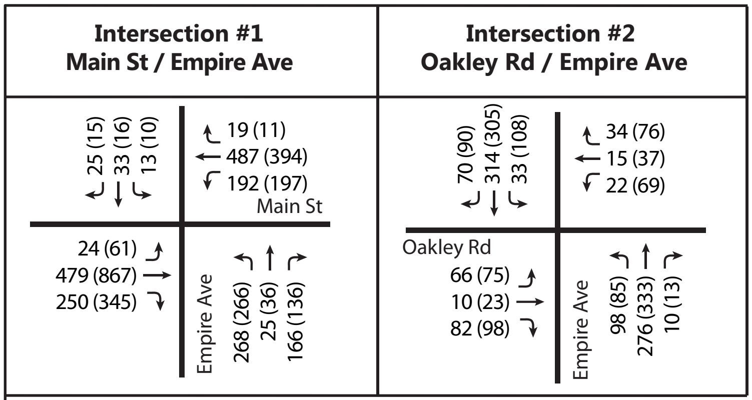
[1] AM – morning peak hour; PM – evening peak hour.

[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:

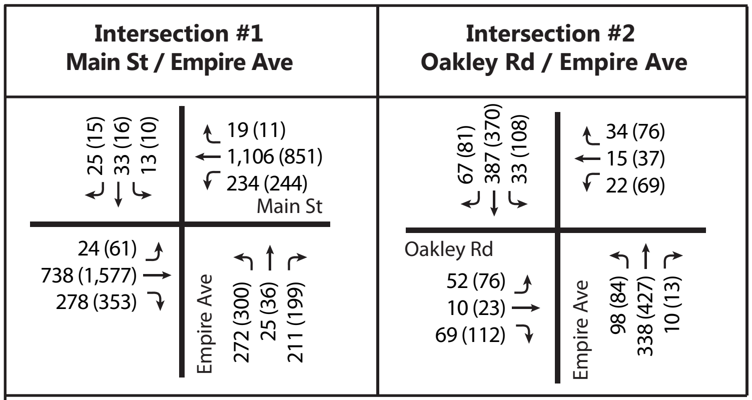
[1] AM – morning peak hour; PM – evening peak hour.

[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


Intersection #1
Main St / Empire Ave

Intersection #2
Oakley Rd / Empire Ave

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:

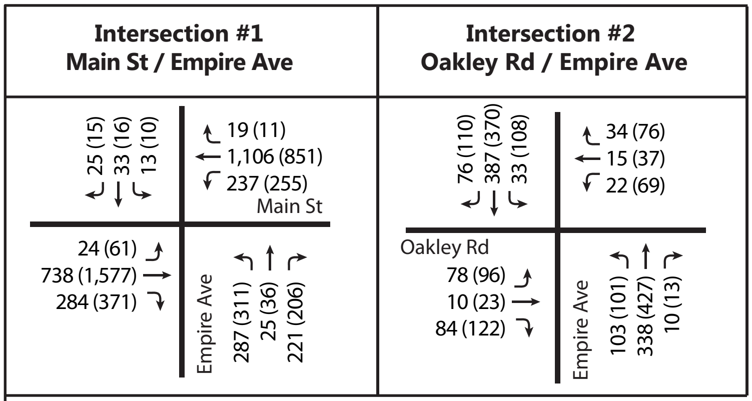
[1] AM – morning peak hour; PM – evening peak hour.

[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

TJKM

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.

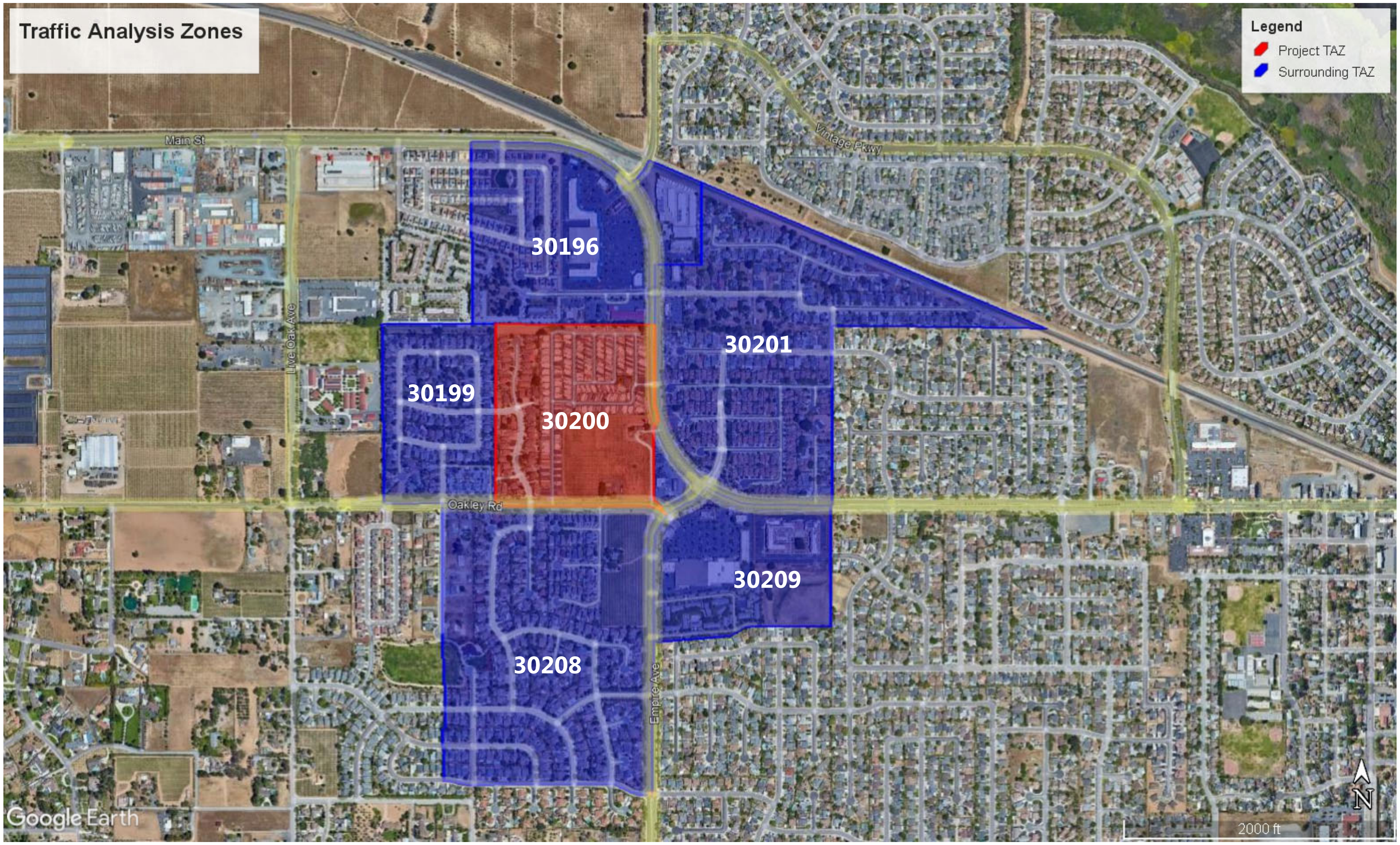
As this project is not screened out from VMT analysis, two full model runs were performed for this project in accordance to CCTA VMT methodology. The first one is a base year 2020 run to analyze existing VMT per capita numbers for the City of Oakley. The second run is a base year plus project 2020 run 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



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

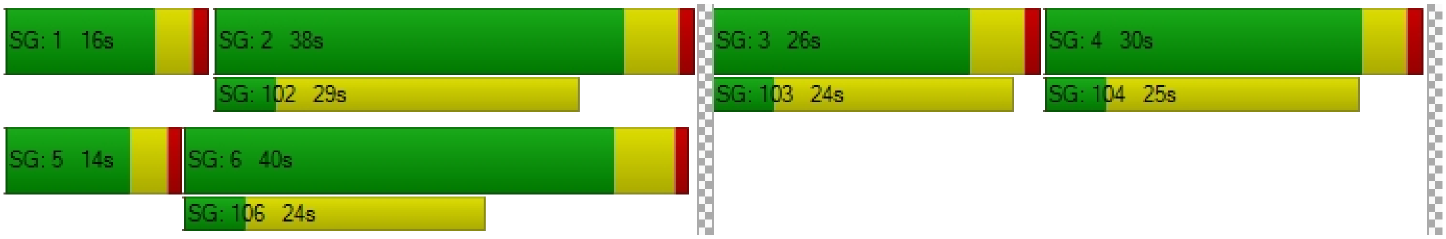
d_M, Delay for Movement [s/veh]	43.79	39.77	55.93	53.86	53.86	51.29	136.43	12.01	12.01	72.86	17.33	18.82
Movement LOS	D	D	E	D	D	D	F	B	B	E	B	B
d_A, Approach Delay [s/veh]	47.93			52.95			45.83			19.59		
Approach LOS	D			D			D			B		
d_I, Intersection Delay [s/veh]	36.33											
Intersection LOS	D											
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
I_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
I_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

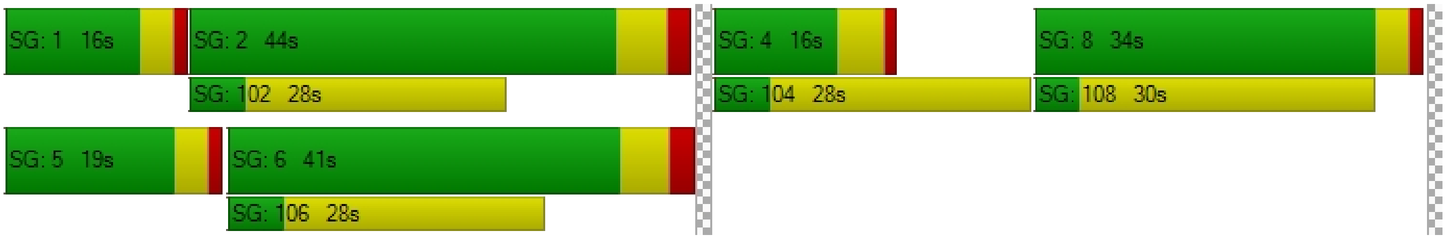
d_M, Delay for Movement [s/veh]	48.04	48.02	52.69	53.98	7.04	7.04	60.66	9.75	9.78	53.29	53.29	53.95
Movement LOS	D	D	D	D	A	A	E	A	A	D	D	D
d_A, Approach Delay [s/veh]	50.70			18.52			13.85			53.61		
Approach LOS	D			B			B			D		
d_I, Intersection Delay [s/veh]	22.88											
Intersection LOS	C											
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 [ft^2/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft^2/ped]	1867.90	3721.41	6829.45	2599.84
d_p, Pedestrian Delay [s]	46.37	46.37	47.29	46.37
I_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
I_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

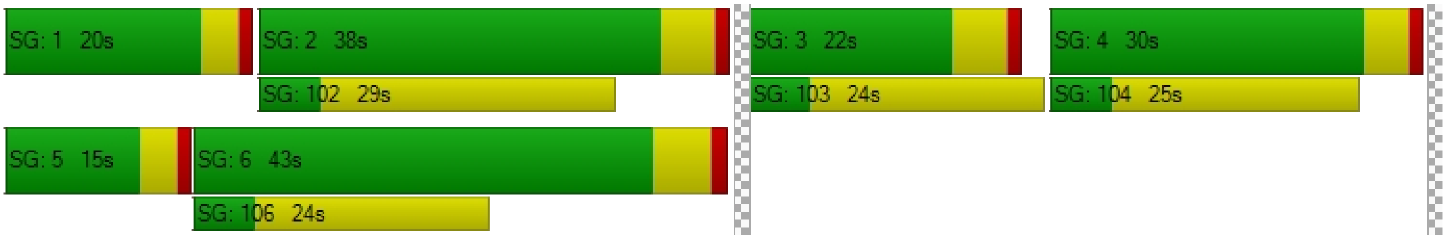
d_M, Delay for Movement [s/veh]	47.63	44.18	49.90	56.71	56.71	54.45	65.47	9.12	9.12	61.51	16.30	16.01
Movement LOS	D	D	D	E	E	D	E	A	A	E	B	B
d_A, Approach Delay [s/veh]	48.03			55.88			26.85			18.43		
Approach LOS	D			E			C			B		
d_I, Intersection Delay [s/veh]	26.38											
Intersection LOS	C											
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
I_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
I_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

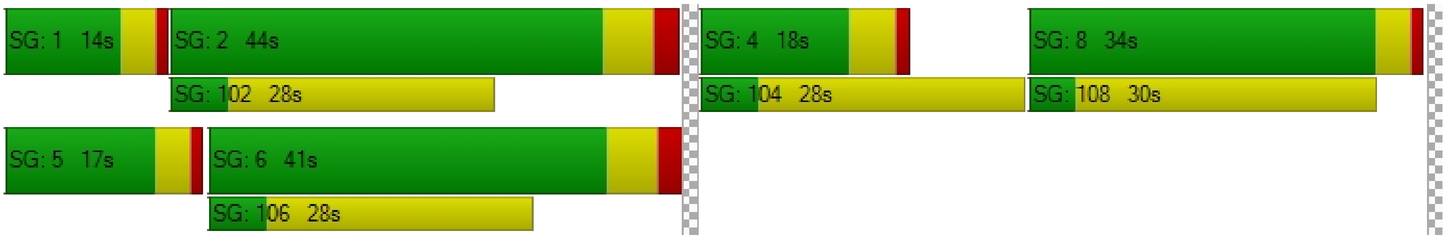
d_M, Delay for Movement [s/veh]	56.33	12.33	12.33	62.19	11.03	11.07	50.36	50.36	49.01	47.05	47.02	51.60
Movement LOS	E	B	B	E	B	B	D	D	D	D	D	D
d_A, Approach Delay [s/veh]	19.56			22.67			49.80			49.46		
Approach LOS	B			C			D			D		
d_I, Intersection Delay [s/veh]	29.59											
Intersection LOS	C											
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 [ft^2/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft^2/ped]	2422.80	2123.23	3886.57	0.00
d_p, Pedestrian Delay [s]	46.37	47.29	46.37	46.37
I_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
I_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

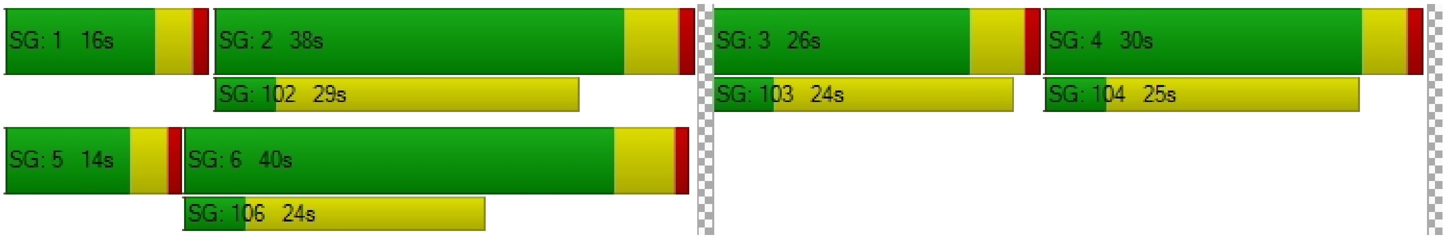
d_M, Delay for Movement [s/veh]	43.33	39.09	58.30	53.86	53.86	51.29	144.17	12.42	12.42	72.86	17.84	19.55
Movement LOS	D	D	E	D	D	D	F	B	B	E	B	B
d_A, Approach Delay [s/veh]	48.51			52.95			48.72			20.15		
Approach LOS	D			D			D			C		
d_I, Intersection Delay [s/veh]	37.71											
Intersection LOS	D											
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
I_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
I_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

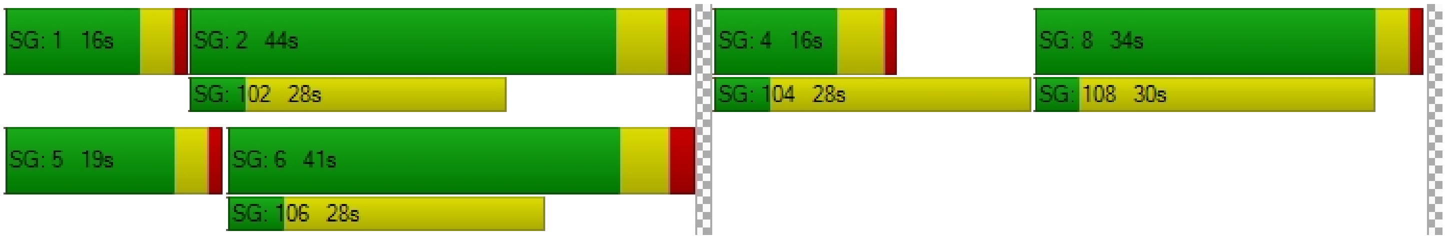
d_M, Delay for Movement [s/veh]	47.37	47.36	54.55	53.68	7.54	7.54	60.66	10.64	10.68	53.29	53.29	53.95
Movement LOS	D	D	D	D	A	A	E	B	B	D	D	D
d_A, Approach Delay [s/veh]	51.08			19.34			14.59			53.61		
Approach LOS	D			B			B			D		
d_I, Intersection Delay [s/veh]	24.53											
Intersection LOS	C											
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
I_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
I_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

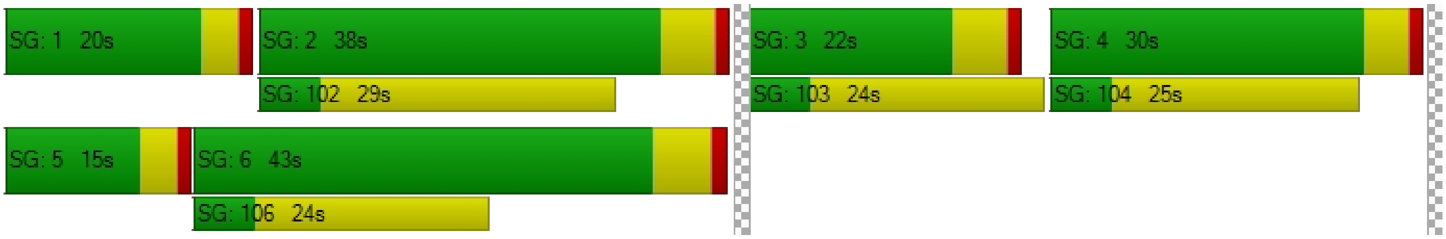
d_M, Delay for Movement [s/veh]	47.38	43.77	49.89	56.71	56.71	54.45	67.24	9.31	9.31	61.51	17.05	17.18
Movement LOS	D	D	D	E	E	D	E	A	A	E	B	B
d_A, Approach Delay [s/veh]	47.86			55.88			28.23			19.22		
Approach LOS	D			E			C			B		
d_I, Intersection Delay [s/veh]	27.22											
Intersection LOS	C											
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
I_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
I_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

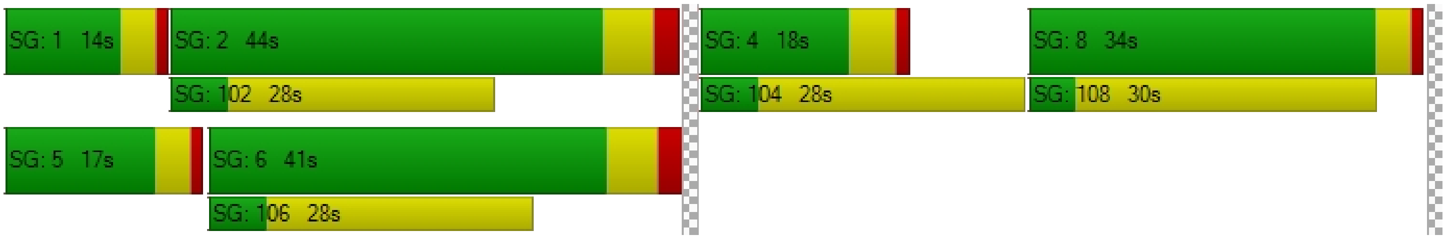
d_M, Delay for Movement [s/veh]	55.05	12.69	12.70	62.19	12.20	12.25	50.36	50.36	49.02	46.73	46.72	51.89
Movement LOS	E	B	B	E	B	B	D	D	D	D	D	D
d_A, Approach Delay [s/veh]	21.02			22.93			49.80			49.31		
Approach LOS	C			C			D			D		
d_I, Intersection Delay [s/veh]	30.33											
Intersection LOS	C											
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
I_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
I_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

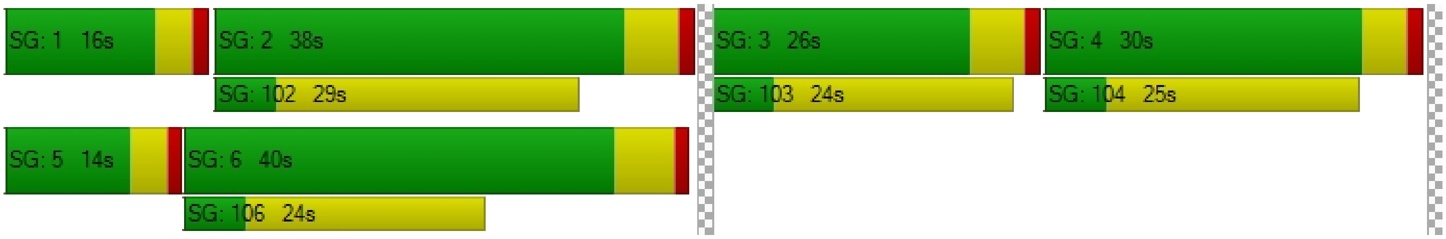
d_M, Delay for Movement [s/veh]	41.02	37.04	82.60	53.87	53.87	51.30	238.04	19.47	19.50	72.86	22.66	22.32
Movement LOS	D	D	F	D	D	D	F	B	B	E	C	C
d_A, Approach Delay [s/veh]	58.09			52.96			57.12			23.72		
Approach LOS	E			D			E			C		
d_I, Intersection Delay [s/veh]	44.95											
Intersection LOS	D											
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 [ft^2/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft^2/ped]	0.00	0.00	869.10	0.00
d_p, Pedestrian Delay [s]	46.37	46.37	46.37	46.37
I_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
I_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

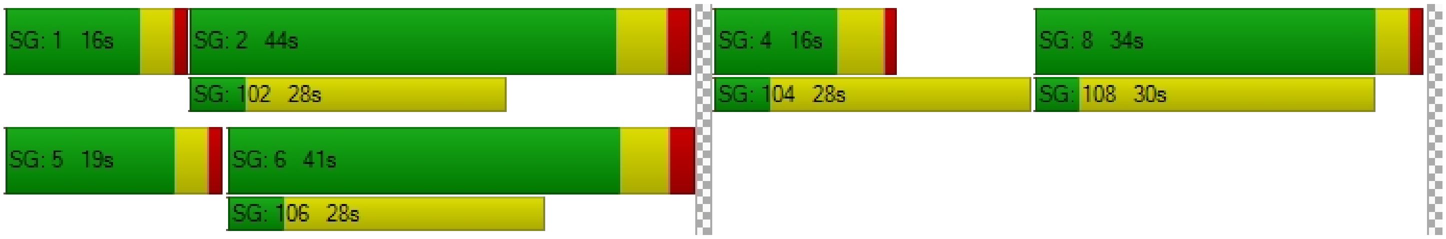
d_M, Delay for Movement [s/veh]	47.56	47.55	52.83	53.68	7.63	7.64	60.66	10.91	10.94	53.28	53.28	54.10
Movement LOS	D	D	D	D	A	A	E	B	B	D	D	D
d_A, Approach Delay [s/veh]	50.33			17.79			14.27			53.68		
Approach LOS	D			B			B			D		
d_I, Intersection Delay [s/veh]	22.61											
Intersection LOS	C											
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
I_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
I_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

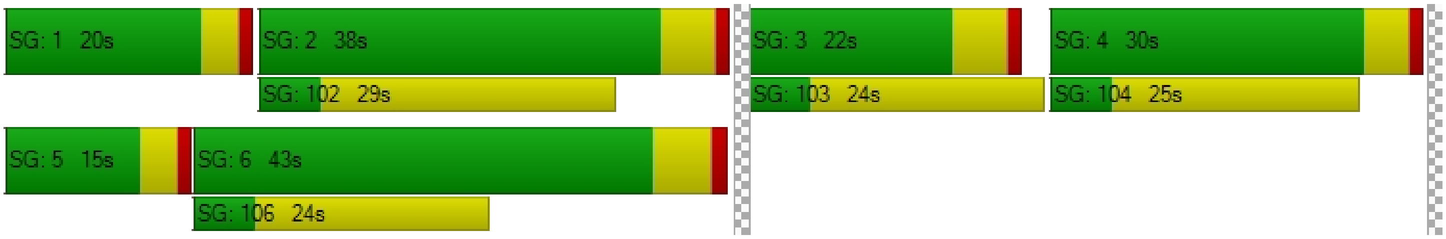
d_M, Delay for Movement [s/veh]	44.18	40.58	68.95	56.71	56.71	54.45	95.07	13.49	13.50	61.51	58.73	21.14
Movement LOS	D	D	E	E	E	D	F	B	B	E	F	C
d_A, Approach Delay [s/veh]	53.14			55.88			31.49			52.16		
Approach LOS	D			E			C			D		
d_I, Intersection Delay [s/veh]	46.48											
Intersection LOS	D											
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
I_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
I_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

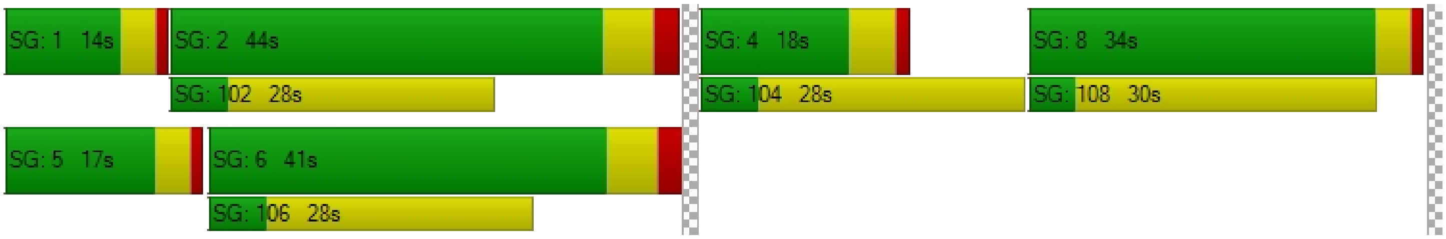
d_M, Delay for Movement [s/veh]	45.67	45.65	56.80	55.11	13.80	13.80	62.19	13.02	13.07	50.36	50.36	49.02
Movement LOS	D	D	E	E	B	B	E	B	B	D	D	D
d_A, Approach Delay [s/veh]	51.59			20.41			22.52			49.80		
Approach LOS	D			C			C			D		
d_I, Intersection Delay [s/veh]	29.67											
Intersection LOS	C											
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 [ft^2/ped]	0.00	0.00	0.00	0.00
M_CW, Crosswalk Circulation Area [ft^2/ped]	0.00	2327.71	2123.23	3886.57
d_p, Pedestrian Delay [s]	46.37	46.37	47.29	46.37
I_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
I_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

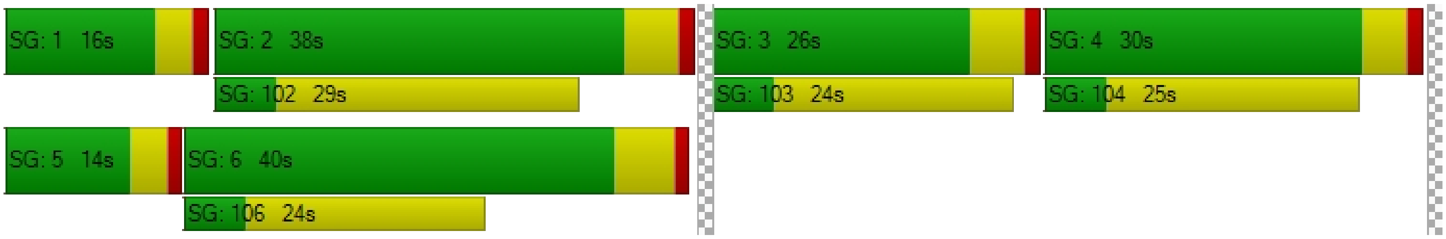
d_M, Delay for Movement [s/veh]	41.33	37.04	96.91	53.87	53.87	51.30	244.35	19.47	19.50	72.86	22.66	22.54
Movement LOS	D	D	F	D	D	D	F	B	B	E	C	C
d_A, Approach Delay [s/veh]	64.20			52.96			58.57			23.78		
Approach LOS	E			D			E			C		
d_I, Intersection Delay [s/veh]	46.84											
Intersection LOS	D											
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
I_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
I_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

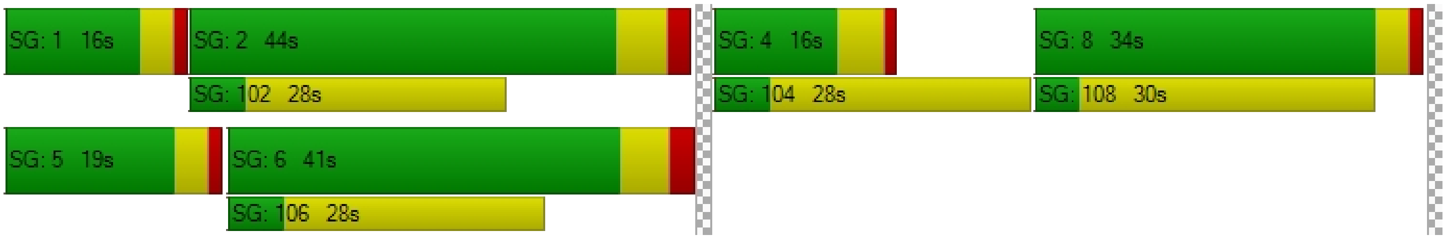
d_M, Delay for Movement [s/veh]	46.79	46.79	61.06	53.43	8.22	8.23	60.66	11.92	11.96	53.29	53.29	54.10
Movement LOS	D	D	E	D	A	A	E	B	B	D	D	D
d_A, Approach Delay [s/veh]	53.76			18.58			15.16			53.68		
Approach LOS	D			B			B			D		
d_I, Intersection Delay [s/veh]	24.83											
Intersection LOS	C											
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
I_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
I_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

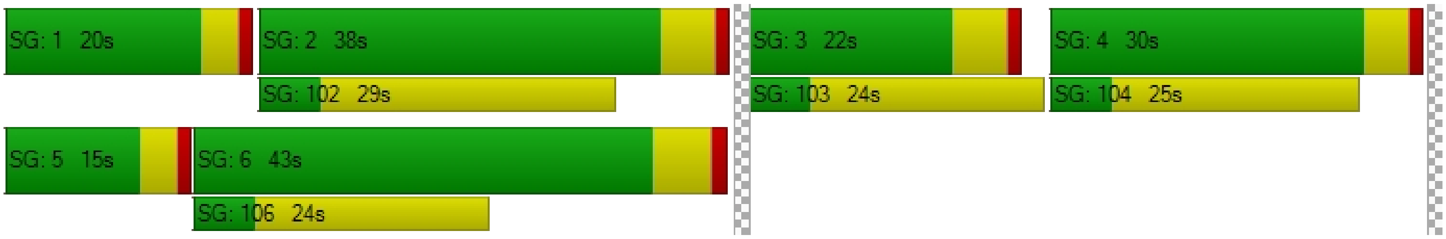
d_M, Delay for Movement [s/veh]	44.38	40.58	76.13	56.71	56.71	54.45	108.25	13.49	13.50	61.51	58.73	21.74
Movement LOS	D	D	E	E	E	D	F	B	B	E	F	C
d_A, Approach Delay [s/veh]	55.98			55.88			35.09			51.99		
Approach LOS	E			E			D			D		
d_I, Intersection Delay [s/veh]	47.83											
Intersection LOS	D											
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
I_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
I_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

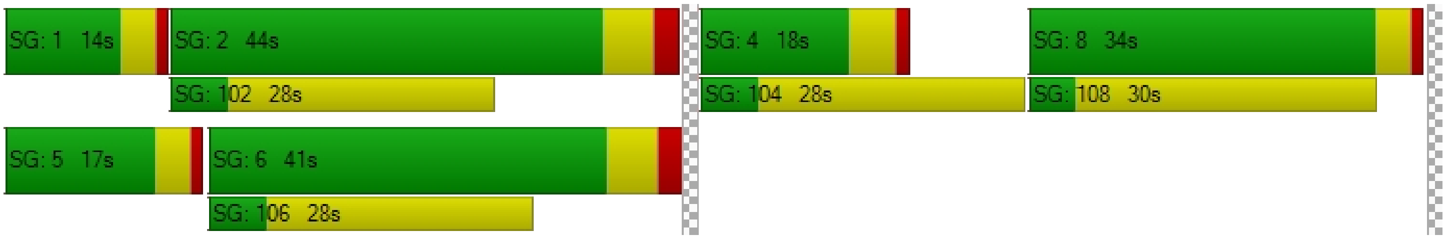
d_M, Delay for Movement [s/veh]	45.32	45.32	60.30	54.12	14.22	14.22	62.19	14.36	14.43	50.36	50.36	49.02
Movement LOS	D	D	E	D	B	B	E	B	B	D	D	D
d_A, Approach Delay [s/veh]	52.92			21.68			23.15			49.80		
Approach LOS	D			C			C			D		
d_I, Intersection Delay [s/veh]	30.79											
Intersection LOS	C											
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
I_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
I_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											