INITIAL STUDY AND MITIGATED NEGATIVE DECLARATION

(MND NO. 20-01)

FOR THE PROPOSED DOWNTOWN BELLFLOWER TRANSIT ORIENTED DEVELOPMENT MIXED USE PROJECT

Applicant:

Serrano Development Group
500 North Brand Boulevard
Suite 2120
Glendale, CA 91203

Lead Agency:

City of Bellflower
16600 Civic Center Drive
Bellflower, California 90706

May 2020

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LIST OF ABBREVIATIONS

AB 939	California Integrated Waste Management Act of 1989
ac-ft/yr	Acre-feet per year
APN	Assessor Parcel Numbers
AQMP	Air Quality Management Plan
Basin	South Coast Air Basin
BMP	Best Management Practice
BSMWC	Bellflower Somerset Mutual Water Company
BVOZ	Bellflower Village Overlay Zone
CAAQS	California Ambient Air Quality Standards
CAL FIRE	California Department of Forestry and Fire Protection
CAP	Climate Action Plan
CARB	California Air Resources Board
CBC	California Building Code
Central Basin	Coastal Plain of Los Angeles Groundwater Basin
CEQA	California Environmental Quality Act
CEQA Guidelines	State California Environmental Quality Act Guidelines
CH_4	Methane
City	City of Bellflower
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	CO_2 equivalents
CWA	Clean Water Act
DART	Downey Area Recycling and Transfer Facility
dbA	A-weighted decibels
DNL	Day-night average noise level
DTSC	California Department of Toxic Substances Control
EIR	Environmental Impact Report
FEMA	Federal Emergency Management Agency
GHG	Greenhouse Gas
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
HCP	Habitat Conservation Plan

HFC	Hydrofluorocarbon
HRA	Health Risk Assessment
HSC	Health and Safety Code
I-105	Interstate 105
I-605	Interstate 605
ICU	Intersection Capacity Utilization
IS/MND	Initial Study and Mitigated Negative Declaration
LA County MS4 Permit	*Waste Discharge Requirements for Municipal Separate Storm Sewer System Discharges Within the Coast Watersheds of Los Angeles County, Except Those Discharges Originating from the City of Long Beach MS4*
LACFD	Los Angeles County Fire Department
LACSD	Los Angeles County Sanitation Districts
LASD	Los Angeles County Sheriff's Department
LARWQCB	Los Angeles Regional Water Quality Control Board
LBT	Long Beach Transit
L_{dn}	Day-night average noise level
LOS	Level of Service
Metro	Los Angeles Metropolitan Transportation Authority
MMT	Million Metric Tons
MND	Mitigated Negative Declaration
MT	Metric Ton
MTA	Metropolitan Transportation Authority
N_2O	Nitrous Oxide
NAAQS	National Ambient Air Quality Standards
NCCP	Natural Community Conservation Plan
ND	Negative Declaration
NO_2	Nitrogen Dioxide
NO_X	Oxides of Nitrogen
NPDES	National Pollutant Discharge Elimination System
OEHHA	Office of Environmental Health and Hazard Assessment
OPR	Governor's Office of Planning and Research
or Basin Plan	Regional Water Quality Control Plan
OSHA	Cal Occupational Health and Safety Administration

PFC	Perfluorocarbon
PM_{10}	Respirable Particulate Matter
$PM_{2.5}$	Fine Particulate Matter
ppm	Parts per million
proposed project	Proposed Downtown Bellflower Transit Oriented Development (TOD) Mixed-Use Project
ROG	Reactive organic gases
RWQCB	Regional Water Quality Control Board
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SF	Square feet
SF_6	Sulfur hexafluoride
SGMA	Sustainable Groundwater Management Act
SMP	City of Bellflower Sewer Master Plan
SO_2	Sulfur dioxide
SR-91	State Route 91
SWPPP	Stormwater pollution prevention plan
TAC	Toxic air contaminant
TIA	Traffic Impact Analysis
TOD SP	The Downtown Bellflower Transit Oriented Development Specific Plan (TOD SP)
UWMP	Urban Water Management Plan
V/C	Volume-to-capacity
VMT	Vehicle miles travelled
VOC	Volatile organic compounds
WMP	Waste management plan
WRD	Water Replenishment District of Southern California
WSAB	West Santa Ana Branch

A. INTRODUCTION

1. PURPOSE

This document is an Initial Study and Mitigated Negative Declaration (IS/MND) prepared pursuant to the California Environmental Quality Act (CEQA) that evaluates environmental impacts resulting from implementation of the proposed project. This document can be found at the Bellflower City Hall, 16600 Civic Center Drive, Bellflower CA 90706, phone: (562) 804-1424.

2. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) REQUIREMENTS

As defined by Section 21065 of the CEQA statute, the proposed Downtown Bellflower TOD Mixed Use proposed project constitutes a "project," and therefore, an Initial Study is required to be prepared to determine the appropriate type of CEQA document to be prepared. As defined by Section 15063 of the State California Environmental Quality Act Guidelines (CEQA Guidelines), an **Initial Study** is prepared primarily to provide the Lead Agency with information to be used as the basis for determining whether an environmental impact report (EIR), negative declaration (ND), or mitigated negative declaration (MND) would be appropriate for providing the necessary environmental documentation and clearance for the proposed project.

Pursuant to Section 15065 of the CEQA Guidelines, an **EIR** is deemed appropriate for a particular proposal if the following conditions occur:

- The proposal has the potential to substantially degrade quality of the environment.
- The proposal has the potential to achieve short-term environmental goals to the disadvantage of long-term environmental goals.
- The proposal has possible environmental effects that are individually limited but cumulatively considerable.
- The proposal could cause direct or indirect adverse effects on human beings.

Pursuant to Section 15070(a) of the CEQA Guidelines, a **Negative Declaration (ND)** is deemed appropriate if the proposal would not result in any significant effect on the environment.

Pursuant to Section 15070(b) of the CEQA Guidelines, a **Mitigated Negative Declaration (MND)** is deemed appropriate if it is determined that though a proposal could result in a significant effect, mitigation measures are available to reduce these significant effects to less than significant levels.

This Initial Study has determined that the proposed project would not result in any significant effect on the environment with the incorporation of those mitigation measures contained in this document and therefore, a MND is deemed as the appropriate document to provide the necessary environmental evaluations and clearance for the proposed project. This IS/MND document is prepared according to the aforementioned CEQA Guidelines and applicable requirements of the City of Bellflower.

This MND provides decision-makers and the public with information that enables them to intelligently consider the environmental consequences of the proposed project; functions as a method for fact-finding; and provides the City, concerned citizens, and other applicable public agencies with an opportunity to collectively review and evaluate baseline conditions and environmental impacts through a process of full disclosure.

3. LEAD AGENCY

The City of Bellflower is designated the Lead Agency, in accordance with Section 15050 of the CEQA Guidelines and shall consider this IS/MND during public hearings for the proposed project.

4. CIRCULATION OF INITIAL STUDY AND MITIGATED NEGATIVE DECLARATION

This IS/MND informs the City's decision makers, other responsible or interested agencies, and the general public of potential environmental effects of the proposed project. The environmental review process has been established to allow public agencies to evaluate environmental consequences and to examine and implement methods of eliminating or reducing any potentially adverse impacts. While CEQA requires that consideration be given to avoiding environmental damage, the Lead Agency and other responsible public agencies must balance adverse environmental effects against other public objectives, including economic and social goals.

The IS/MND will be circulated for a period of 20 days for public and responsible agency review. Public notice will be placed in the Herald American, which is a newspaper of general circulation and the City website (www.bellflower.org). Comments received on the IS/MND will be considered and addressed in a Response to Comments document.

5. CONTENTS OF INITIAL STUDY

This IS/MND document is organized to facilitate a basic understanding of the existing setting and environmental implications of the proposed project.

A. INTRODUCTION presents an introduction to the entire document. This section describes the scope of environmental review, environmental procedures, and contents of this IS/MND.

B. PROJECT DESCRIPTION describes the proposed project including the project location and surrounding uses, site background and existing conditions, existing planning and zoning, construction schedule and phasing, scope of environmental analysis, and necessary project approvals.

C. INITIAL STUDY/ENVIRONMENTAL CHECKLIST FORM contains the City's Initial Study Checklist Form. The checklist form presents results of the environmental evaluation for the proposed project and those issue areas that would have either a significant impact, potentially significant impact, or no impact.

D. CHECKLIST RESPONSES evaluate each response provided in the Initial Study checklist form. Each response checked in the checklist form is discussed and supported with sufficient data and analysis. As appropriate, each response discussion describes and identifies environmental impacts anticipated with the proposed project. Based upon the findings of the Initial Study Checklist, it has been determined that a MND will be prepared. Mandatory Findings of Significance in accordance with Section 15065 of the CEQA Guidelines are also presented.

E. PERSONS AND ORGANIZATIONS CONSULTED identifies those persons consulted and involved in preparation of this Initial Study.

F. SOURCES section lists bibliographical materials used in preparation of this document.

B. DESCRIPTION OF PROPOSED DOWNTOWN BELLFLOWER TOD MIXED USE PROJECT

1. INTRODUCTION

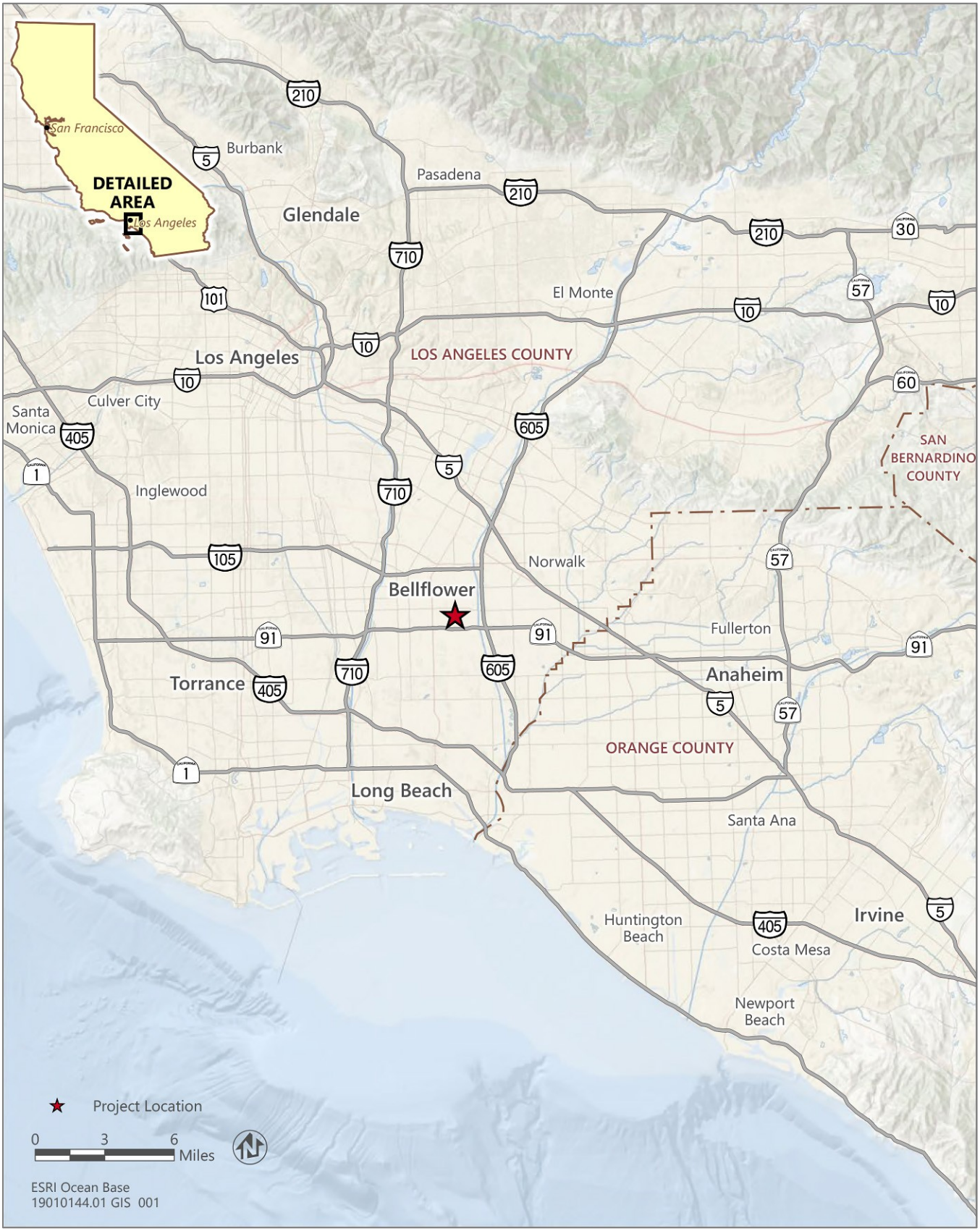
The 16411 Bellflower, LLC (the Applicant) proposes to construct a mixed-use (theater, residential and service commercial) project on the 1.56-acre (68,000-square-foot [SF]) site. The project site is located south of Mayne Street, west of Bellflower Boulevard and north of Oak Street. Existing project site addresses are: 1) 9742 Mayne Street, 2) 16411 Bellflower Boulevard and 3) 9735 Oak Street. The project site is comprised of three (3) Assessor Parcel Numbers (APN): 7106-020-901, 7106-020-902 and 7106-020-900. The project is proposed in two parts: Parcel A) redevelopment of the existing and vacant "Cosmopolitan Grocers" building for new theater and retail commercial/restaurant uses, and 2) construction of a five (5) story, mixed-use, 91-unit condominium development and associated parking. The existing commercial uses/structures located south of the proposed Downtown Bellflower TOD building and north of Oak Street are not part of this proposed project and will remain as is.

2. PROJECT LOCATION AND SURROUNDING USES

Regionally, the project site is located within the City of Bellflower (City) approximately 0.6 miles north of State Route 91 (SR-91), approximately 1.2 miles west of Interstate 605 (I-605), and approximately 1.9 miles south of Interstate 105 (I-105), as shown on **Figure 1**, *Regional Location Map*. The project site is located across the street from the under-construction City of Bellflower parking garage, and the existing Los Angeles County Fire Museum, and within the vicinity of the future West Santa Ana Branch (WSAB) Transit Corridor light rail station to be constructed on Bellflower Boulevard. The WSAB Transit Corridor project is a proposed 20-mile light rail transit line that would connect downtown Los Angeles to southeast Los Angeles County, serving the cities and communities of the Arts District, Little Tokyo, Los Angeles, unincorporated Florence-Graham community of Los Angeles County, Vernon, Huntington Park, Bell, Cudahy, South Gate, Downey, Paramount, Bellflower, Cerritos and Artesia. In addition, the project site is located within three miles of the Metro Green Line. Three bus systems including the Metropolitan Transportation Authority (MTA), Long Beach Transit (LBT), and Bellflower Bus, all operate lines within the project vicinity.

The project site is generally located on the southwest corner of Bellflower Boulevard at Mayne Street within the City's downtown area. As depicted on **Figure 2,** *project site and Surrounding Land Uses*, the Bellflower Bike Trail (segment west of Bellflower Boulevard), commercial uses and an associated parking garage (currently under construction) are located to the north; Bellflower Boulevard, the Bellflower Bike Trail (segment east of Bellflower Boulevard), surface parking lots, commercial uses, and the existing Pacific Electric Train Depot are located to the northeast; the Bellflower Events Center and Los Angeles County Fire Museum to the east; Oak Street, commercial uses, and a surface parking lot to the south; single and multi-family residential uses to the southwest; and single and multi-family residential uses located immediately to the west.

The Bellflower Bike Trail runs approximately 2.7 miles along the right-of-way of the old Pacific Electric transit system, known as the Red Cars, across the City. The Trail begins at a bridge connection with the San Gabriel Trail at Ruth R. Caruthers Park on the banks of the San Gabriel River. The Trail then joins the former rail corridor at the southern end of Ripon Avenue and heads northwest to its terminus on Somerset Boulevard, just beyond the Bellflower-Paramount City line. Most of the trail consists of asphalt striped bike lanes and a pedestrian path separated by a small strip of decomposed granite. The Trail runs along the Pacific Electric Train Depot, located along Bellflower Boulevard, which was restored to its original state in 2008.



Source: adapted by Ascent Environmental in 2019

Figure 1 Regional Location

Source: adapted by Ascent Environmental in 2019

Figure 2 Project Site and Surrounding Land Uses

3. SITE BACKGROUND AND EXISTING CONDITIONS

As shown on Figure 2, the project site is currently partially developed. One vacant commercial building (Cosmopolitan Grocers) is present on the eastern portion of the site. Although not shown in Figure 2, the former "Grecian Farmers'" building and associated parking lot located at 9742 Mayne Street has been demolished by the City and is currently being used as a staging and parking area for the construction of their new parking garage. This site includes a concrete sidewalk, curb, gutter, landscaping and overhead utilities situated along Mayne Street, Bellflower Boulevard and Oak Street. Access to the project site is currently provided via Mayne Street and Oak Street. The project site is relatively flat and includes no native vegetation.

Two CEQA documents have been recently prepared in the vicinity of the proposed project and are incorporated by reference:

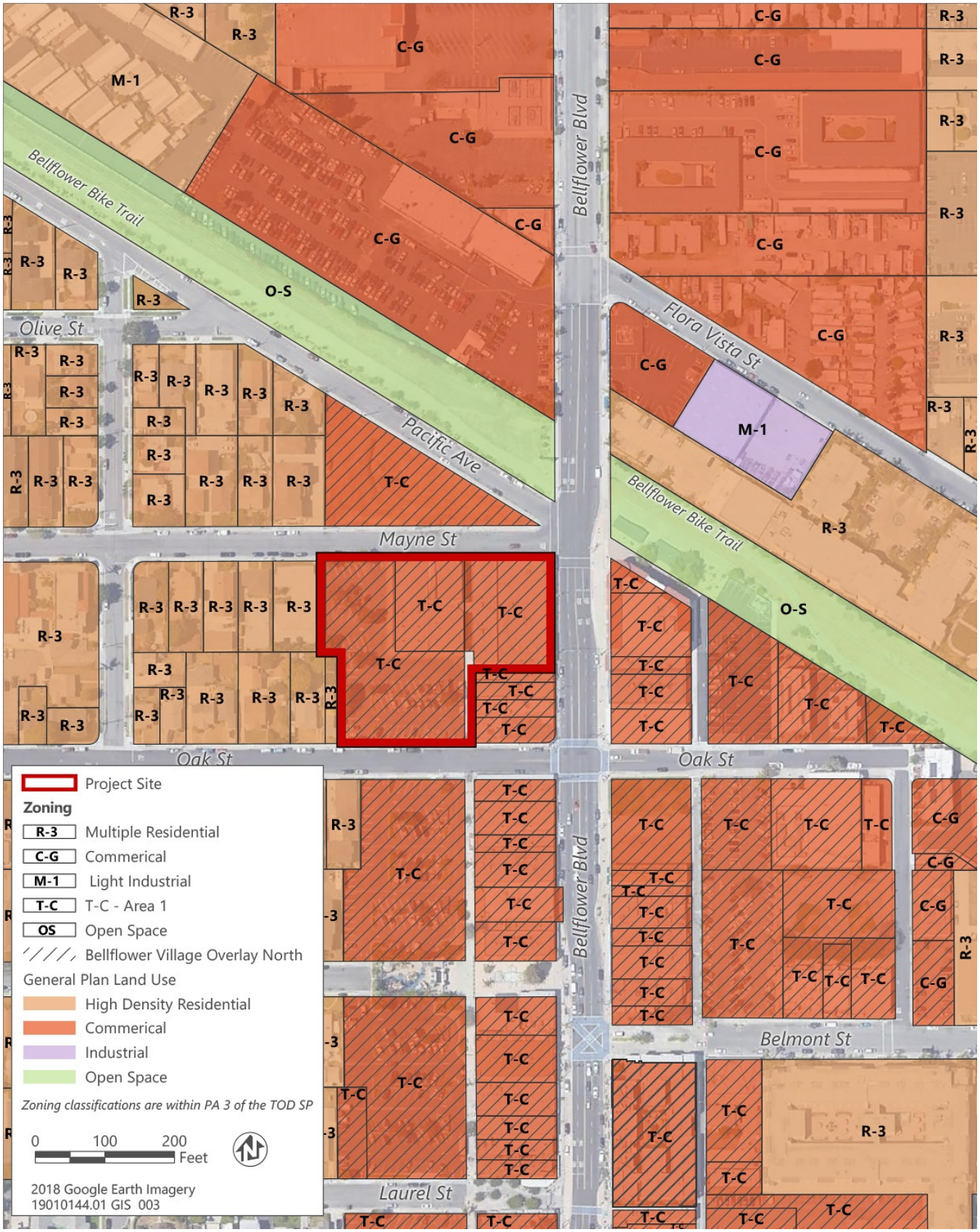
- Downtown Bellflower Station Area Specific Plan Negative Declaration (ND 19-01) – Adopted 06/15/19. The Downtown Bellflower Station Area Specific Plan provides design guideline sand development standards for the TOD area, which are applicable to the proposed project.

- Downtown Bellflower Parking Structure Mitigated Negative Declaration (MND 17-04) – Adopted 11/02/17. The downtown Bellflower parking structure is under construction and was proposed to provide needed parking in the downtown area for existing and proposed projects including the proposed project.

4. EXISTING GENERAL PLAN AND ZONING LAND USE DESIGNATIONS

The City of Bellflower General Plan designation for the project site is Mixed-Use (MU). No change to the project site's existing general plan designation is proposed as part of the project as mixed-use land uses are permitted by right in the "MU" land use designation. The project site's existing zoning designations are is the Downtown Bellflower Transit Oriented Development Specific Plan (TOD SP), and includes the Town Center (TC-1) District, Area 1 and the Bellflower Village Overlay Zone – North (BVOZ-N) and are included in Planning Area 3. The purpose of the TOD SP is to prepare a transit-supportive specific plan that guides the future land use, mobility, and economic development in the TOD SP area. The TOD SP is intended to provide a regulatory framework for the downtown Bellflower area that includes customized land uses and development standards, guidelines, provides expanded multimodal transportation choices, and identifies locations for future development potential. The purpose of the TC District is to provide for the development and redevelopment of the City's downtown area. The purpose of the BVOZ-N is to encourage unique, quality and viable development in order to promote the orderly recycling of existing land uses within the Overlay Zone boundaries. These zoning designations are located within Planning Area 3 of the TOD Specific Plan. According to the City's Zoning Code, Allowable Use Table 4.16 of the TOD SP document, BVOZ-N, mixed uses are allowed. Per the Development Standards Table in Section 4.17 of the TOD SP document, the maximum building height for any building or structure is up to 5 stories or 59 feet. No change to the site's existing zoning designations are proposed as part of the proposed project. The proposed project would be consistent with the permitted uses within the City's Zoning Code and TOD Specific Plan.

The TOD SP provides an opportunity to align the City's long-term goals for the downtown area with the potential benefit of the anticipated rail transit corridor. The TOD SP would be used in conjunction with the General Plan to provide more detailed design and development criteria for individual project proposals and public improvements in the project area. The TOD SP defines an updated land use plan, development standards, mobility plan, infrastructure improvements, design guidelines, and implementation programs for any proposed project in the TOD SP area. The project is consistent with the goals, policies and objectives of for future development associated with the TOD SP. The site's general plan and zoning designations are shown on **Figure 3**.



Source: adapted by Ascent Environmental in 2019

Figure 3 Zoning and General Plan Land Use Designations

5. DESCRIPTION OF THE PROJECT

The project is proposed in two parcels: 1) Parcel A: Redevelopment of the existing vacant "Cosmopolitan Grocers" building with a new four (4) screen theater and retail commercial/restaurant land uses, and 2) Parcel B: Construction of a five (5) story, mixed-use, 91-unit condominium development with at-grade parking. Both Parcels A and B will be constructed concurrently and will be permitted separately. This Initial Study/MND evaluates the potential environmental impacts associated with both Parcel A and Parcel B.

The proposed land uses are summarized in **Table 1**.

Table 1
Land Use Summary

Parcel A	***Land Use***
Multi-screen Theater	9,350 SF, 4-screen multiplex theater, 278 seats
Retail Commercial/Restaurant	4,750 SF Retail (50% Retail Commercial / 50% Fast Casual Restaurant).
Trash Area	350 SF
Parking	0 parking spaces provided. 95 spaces required. Applicant is requesting parking agreement for required parking spaces to be placed off-site in adjacent city parking structure and surface parking lots.
Parcel B	***Land Use***
Condominium / 1-bedroom units	62 units
Condominium / 2-bedroom units	29 units
Parking	139 spaces provided with partial tandem parking spaces. 228 spaces are required which will include offsite parking pursuant to a Development Agreement and parking study.
Retail Commercial	650 SF Retail. 2 spaces required. Applicant requesting parking agreement for required parking spaces to be placed off-site in adjacent city parking structure and/or surface lots.

Parcel A: includes a 14,450 SF development footprint and proposes a complete redevelopment of the existing vacant "Cosmopolitan Grocers" building, and complete façade renovation/public plaza at Mayne Street and Bellflower Boulevard. The theater will have an approximately 42-foot high illuminated marquee/roof sign. Additional improvements include conversion of the 10 feet of the eastern portion of the existing building into a colonnade and repaving and enhancements to the existing alley behind the building.

Parcel B: proposes construction of a new five (5) story, mixed-use, 91-unit condominium development with a 39,800 SF development footprint. 650 square feet of commercial retail is included on the ground floor, in the north east corner of the building. Primary access to the residential building will be via an ingress/egress driveway off Oak Street and egress only onto Mayne Street.

As shown on the site plan in **Figure 4**, direct ingress/egress vehicular access to the project would be provided at-grade from Oak Street, via a 24-foot wide dual lane driveway. Egress only would be

allowed from the site onto Mayne Street. Pedestrian access would be provided from the existing sidewalks along Mayne Street and Oak Street. The project would provide sidewalk improvements as well as maintain the above-ground utilities (i.e., electrical lines) located along both Mayne Street and Oak Street. project design is anticipated to consist of a concrete construction with heavy perimeter landscaping provided along Mayne Street, Bellflower Boulevard, and Pacific Avenue. project renderings are shown on **Figure 5a and Figure 5b**.

project redevelopment will require approximately 2,500 tons of debris removal/grading and 5,000 cubic yards of grading to create the residential building pad. Approximately 1,000 square feet of existing landscaping will be removed as part of the proposed project.

6. CONSTRUCTION SCHEDULE AND PHASING

The proposed project construction schedule is anticipated to begin in March 2021 and be complete in March 2023. Construction hours are proposed to be from 7:00 a.m. to 5:00 p.m., Monday through Saturday.

7. SCOPE OF ENVIRONMENTAL ANALYSIS

This IS/MND will provide the environmental evaluation and clearance for the Downtown Bellflower TOD Mixed Use project. Specific mitigation measures are recommended in this document to reduce potential environmental impact to an insignificant level. Existing City regulations, programs, requirements, and procedures that would reduce potential impacts will be referenced but are not considered specific mitigation measures, since these regulations, programs, etc. would be required for any development in the City, including the proposed project.

8. NECESSARY PROJECT APPROVALS

The proposed project requires the following project entitlements:

Entitlements:

1. Development Review (TODPR 1-20-10630) for the mixed-use project located at 16411 Bellflower Blvd, 9742 Mayne Street, and 9735 Oak Street (the Project). The scope of the project includes the following:

    - Renovation and conversion of the 16411 Bellflower building into an approximately 9,350 SF multi-screen movie theater with approximately 4,750 square feet of retail facing Bellflower Blvd; scope of the improvement includes a complete seismic retrofit, renovation, facade renovation of the 16411 Bellflower building; construction of a public plaza at Mayne Street and Bellflower Blvd., conversion of approximately 10'-0" of the eastern portion of the 16411 Bellflower building into a publicly accessible colonnade, and re-paving and enhancements to the former alley between the 16411 Bellflower building and the 9742 Mayne Street lot. All retail and theater parking is off-site via a parking license agreement with the City of Bellflower.

    - New construction of an approximately 91-unit residential condominium building at the 9735 Oak Street and 9742 Mayne Street lots. The residential condominium building will be separate from the 16411 Bellflower retail/theater building. The gross residential building area will be approximately 138,600 SF and the approximate dwelling area will be 65,130 SF. The residential condominium building also will include approximately 600 SF of ground-floor retail along Mayne Street. Residential parking at no less than 1.50 stalls per unit (including 9

guest stalls) will be on-site; all retail parking is off-site via a parking license agreement with the City of Bellflower. Note that Developer intends to initially operate the residential condominium building as apartments, but in the future, if demand is sufficient, sell each residential unit to individual owners.

2. Conditional Use Permit (CU 20-02):
   - A conditional use permit for a 5-story, “multiple family attached” residential condominium building within the BVOZ-N/Downtown Bellflower Station Area Specific Plan.
   - A conditional use permit for a theater use within the BVOZ-N/Downtown Bellflower Station Area Specific Plan.

3. Administrative Conditional Use Permit (ACU20-10)
   - An administrative conditional use permit for beer, wine, and alcohol sales at the retail and accessory theater uses (SP and BVOZ-N) at the 16411 Bellflower Blvd building:
   - - For the theater space, one type 41 license.
   - - For the retail/restaurant space, three type 47 licenses

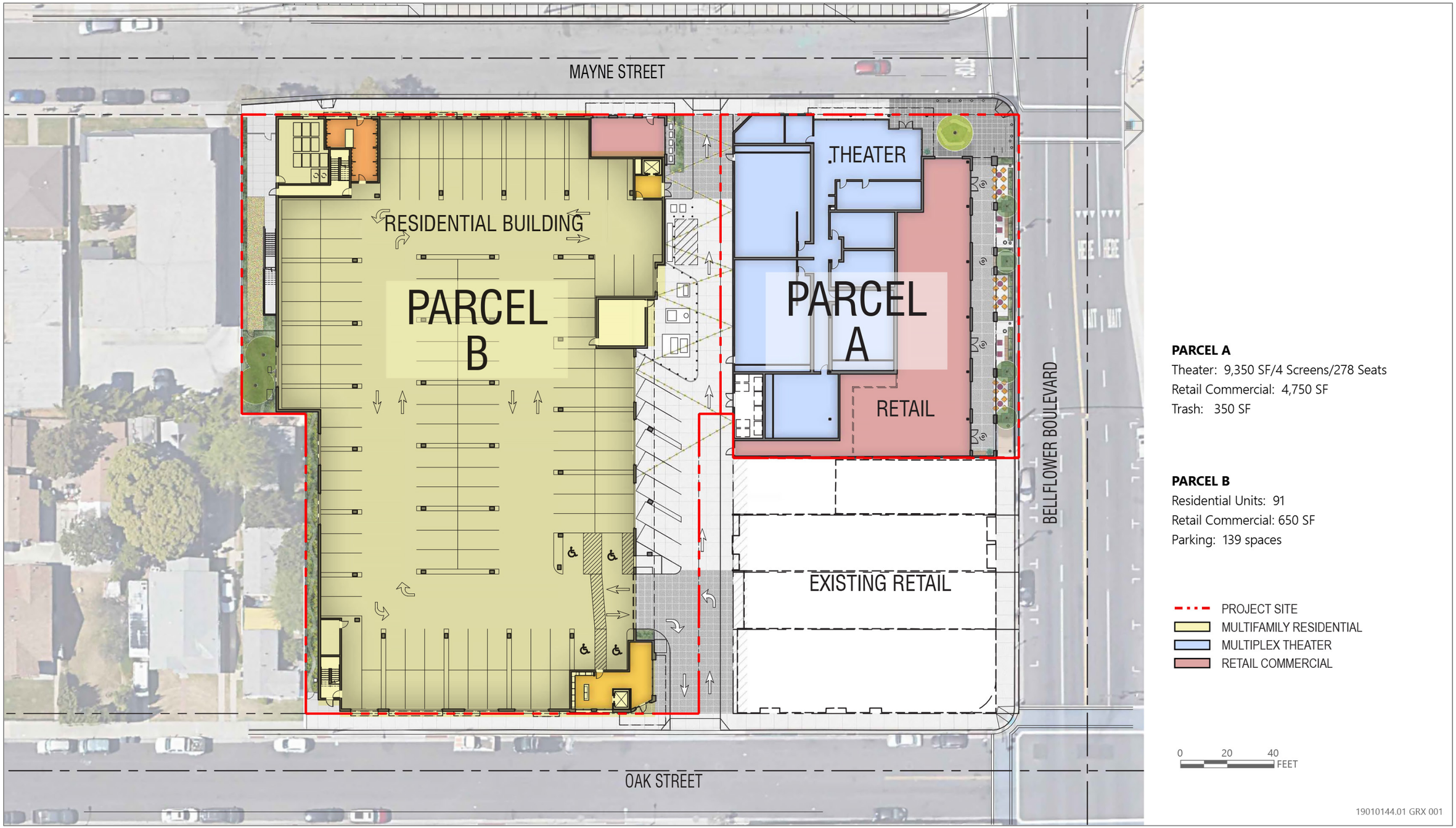
4. Vesting Tentative Tract Map (VTM 82987):
   - The project is requesting a vesting tentative tract map to create two lots. Lot A will be for a theater and retail use. Lot B will be for the purposes of creating 91 residential condominium units. The 650 SF of ground floor retail on Lot B will be common area owned by the association and not a separate commercial condominium.

5. Development Agreement (AFN 837.1):
   - A development agreement to memorialize the terms and conditions under which the Developer will operate, park, and construct the project. The development agreement includes four parking license agreements for the use of off-site parking in City-owned lots for the theater use, retail uses within the theater building, residential guest parking, and retail uses on the residential building’s ground floor.

6. Parking License Agreement for offsite commercial parking, reduced residential parking, and parklet in right of way adjacent to Bellflower Boulevard.

7. Easements - Granting City a permanent easement for public sidewalk purposes adjacent Bellflower Boulevard as well as a permanent easement for vehicular and pedestrian access over the alley between parcels A and B; and

8. Master Signage Plan.



Source: Image produced and provided by WHA Inc. in 2019, adapted by Ascent 2019

Figure 4 Site Plan

Source: Image produced and provided by WHA Inc. in 2019, adapted by Ascent 2019

Figure 5a Project Rendering – View from the Northeast

Source: Image produced and provided by WHA Inc. in 2019, adapted by Ascent 2019

Figure 5b Project Rendering – View from the Northwest

C. INITIAL STUDY/ENVIRONMENTAL CHECKLIST FORM

PROJECT TITLE: Proposed Downtown Bellflower TOD Mixed Use Project

LEAD AGENCY AND ADDRESS: City of Bellflower
16600 Civic Center Drive
Bellflower, CA 90706

CONTACT PERSON: Jason P. Clarke
Senior Planner
562-804-1424

PROJECT LOCATION: The project site is generally located on the southwest corner of Bellflower Boulevard at Mayne Street, and north of Oak Street. The project site consists of 16441 Bellflower Boulevard, 9735 Oak Street and 9743 Mayne Street or APN 7106-020-900, 901 and 902.

SPONSOR'S NAME AND ADDRESS: 16411 Bellflower, LLC
500 North Brand Boulevard
Suite 2120
Glendale, CA 91203

GENERAL PLAN DESIGNATIONS: Mixed-Use (MU),

ZONING CLASSIFICATIONS: Downtown Bellflower Transit Specific Plan TODSP (Planning Area 3), Bellflower Village Overlay Zone – North (BVOZ-N) and Town Center (TC-1) District, Area 1

PROJECT DESCRIPTION: The project is proposed in two parcels (A and B): Parcel A) Redevelopment of the existing vacant "Cosmopolitan Grocers" building with a new four (4) screen multiplex theater and retail commercial/restaurant land uses, and Parcel PB) and construction of a five (5) story, mixed-use, 91-unit condominium building with at-grade parking.

Parcel A includes a 14,450 SF development footprint and proposes a complete redevelopment of the existing vacant "Cosmopolitan Grocers" building, and complete façade renovation/public plaza at Mayne Street and Bellflower Boulevard. The theater will have a 42-foot high illuminated marquee. Additional improvements include conversion of the 10 feet of the eastern portion of the existing building into a colonnade and repaving and enhancements to the existing alley behind the building.

Parcel B includes the construction of a new five (5) story, mixed-use, 91-unit condominium building with a 39,800 SF development footprint located at 9742 Mayne Street. Primary access to the residential building will be via an ingress/egress driveway off Oak Street and egress only onto Mayne Street.

Direct ingress/egress vehicular access to the project would be provided at-grade from Oak Street, via a 24-foot wide dual lane driveway. Egress only would be allowed from the site onto Mayne Street. Pedestrian access would be provided from the existing sidewalks along Mayne Street and Oak Street. The project would provide sidewalk improvements as well as maintain the above-ground utilities (i.e., electrical lines) located along both Mayne Street and Oak Street. p roject design is anticipated to consist of a concrete construction with heavy perimeter landscaping provided along Mayne Street, Bellflower Boulevard, and Pacific Avenue.

Project redevelopment will require approximately 2,500 tons of debris removal/grading and 5,000 cubic yards of grading to create the residential building pad. Approximately 1,000 square feet of existing landscaping will be removed as part of the proposed project.

ONSITE AND SURROUNDING LAND USES AND SETTING:

Locally, the project site is generally located on the southwest corner of Bellflower Boulevard at Mayne Street within the City's downtown area. As depicted on Figure 2, project site and Surrounding Land Uses, the Bellflower Bike Trail (segment west of Bellflower Boulevard), commercial uses and an associated parking garage (currently under construction) are located to the north; Bellflower Boulevard, the Bellflower Bike Trail (segment east of Bellflower Boulevard), surface parking lots, commercial uses, and the existing Pacific Electric Train Depot are located to the northeast; the Bellflower Events Center and Los Angeles County Fire Museum to the east; Mayne Street, vacant commercial uses, and a surface parking lot to the south; single and multi-family residential uses to the southwest; and single and multi-family residential uses located immediately to the west.

OTHER REQUIRED AGENCY APPROVALS:

None

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a “Potentially Significant Impact” as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture and Forest Resources	☐ Air Quality
☐ Biological Resources	☒ Cultural Resources	☐ Energy
☐ Geology / Soils	☐ Greenhouse Gas Emissions	☒ Hazards / Hazardous Materials
☐ Hydrology / Water Quality	☐ Land Use / Planning	☐ Mineral Resources
☐ Noise	☐ Population / Housing	☐ Public Services
☐ Recreation	☐ Transportation	☐ Tribal Cultural Resources
☐ Utilities / Service Systems	☐ Wildfire	☐ Mandatory Findings of Significance
	☐ None	☐ None with Mitigation Incorporated

DETERMINATION (To be completed by the Lead Agency): On the basis of this initial evaluation:

On the basis of this initial evaluation:

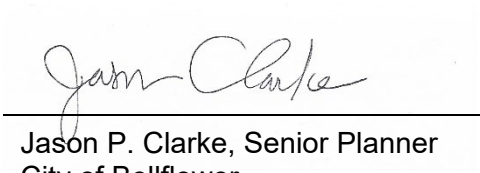
☐ I find that the proposed project could not have a significant effect on the environment, and a **NEGATIVE DECLARATION** will be prepared.

☒ 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 project proponent. 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" impact 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** or **NEGATIVE DECLARATION** pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier **EIR** or **NEGATIVE DECLARATION**, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.



Jason P. Clarke, Senior Planner
City of Bellflower

May 7, 2020

Date

EVALUATION OF ENVIRONMENTAL IMPACTS

1. A brief explanation is required for all answers except “No Impact” answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A “No Impact” answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A “No Impact” answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

2. All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3. Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. “Potentially Significant Impact” is appropriate if there is substantial evidence that an effect may be significant. If there are one or more “Potentially Significant Impact” entries when the determination is made, an EIR is required.

4. “Negative Declaration: Less Than Significant with Mitigation Incorporated” applies where the incorporation of mitigation measures has reduced an effect from “Potentially Significant Impact” to a “Less Than Significant Impact.” The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from “Earlier Analyses,” as described in (5) below, may be cross-referenced).

5. Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:
   a) Earlier Analysis Used. Identify and state where they are available for review.
   b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.
   c) Mitigation Measures. For effects that are “Less than Significant with Mitigation Measures Incorporated,” describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

6. Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

7. Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

8. This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project’s environmental effects in whatever format is selected.

9. The explanation of each issue should identify:
   a) the significance criteria or threshold, if any, used to evaluate each question; and
   b) the mitigation measure identified, if any, to reduce the impact to less than significance.

1. AESTHETICS

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
I. Aesthetics.				
Except as provided in Public Resources Code section 21099 (where aesthetic impacts shall not be considered significant for qualifying residential, mixed-use residential, and employment centers), would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage points.) 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) A scenic vista is defined as a viewpoint that provides expansive views of a highly valued landscape for the benefit of the general public. The City's General Plan Open Space/Recreation Element addresses the management of natural resources and the preservation and enhancement of scenic and recreation opportunities in the City. Based on a review of the General Plan, no designated scenic vistas were identified (City of Bellflower 1994). The City of Bellflower is urbanized and developed with commercial, industrial, residential, and public uses and structures. There are no scenic vistas within the City or the proposed project site. The project site is generally bordered by commercial uses and a parking garage (currently under construction) are located to the north; Bellflower Boulevard, the Bellflower Bike Trail (segment east of Bellflower Boulevard), surface parking lots, commercial uses, and the existing Pacific Electric Train Depot are located to the east; the Mayne Events Center and Los Angeles County Fire Museum to the southeast; Mayne Street, vacant commercial uses, and a surface parking lot to the south; single and multi-family residential uses to the southwest; and single and multi-family residential uses located immediately to the west. The proposed 5-story residential building is proposed immediately east of the existing single family and multifamily residential units, and will alter their views to the east. Since the project site is already developed with existing uses that does not support any scenic resources and because there are no offsite viewpoints in the City, the proposed project would not have a substantial adverse effect on any scenic vista. No impact would occur.

b) The proposed project would be located within the City of Bellflower, which is urbanized and developed with commercial, industrial, residential, and public uses and structures. There are no scenic resources within the City or within the project site. The project site is not located within the vicinity of a designated or eligible state scenic highway based on a review of the California Scenic Highway Mapping System. As such, the proposed project would not substantially damage scenic resources within a state scenic highway. No impact would occur.

c) As discussed under threshold a, the project site is already developed and surrounded by development on all sides (including the parking structure to the north of the site, currently under construction). The proposed project would be located in an urbanized area zoned Downtown Bellflower Transit Oriented Development Specific Plan (TOD SP) and developed and designed

under the Bellflower Village Overlay Zone – North (BVOZ-N). The proposed project includes development of a mixed-use project, consistent with this zoning. The TOD SP and BVOZ-N overlay zone includes design guidelines such as architectural design/style, construction materials and use of colors, signage requirements, and landscape and hardscape requirements. The architectural design and style required under the TOD SP and the BVOZ-N overlay zone requires that a project eliminate bulk through the use of elevation planes, varied rooflines, balconies, and patio covers. As shown on Figure 5, Renderings, the proposed project incorporates various shapes through alteration of rooflines through incorporation of balconies and parapets. The TOD SP and BVOZ-N overlay zone also requires multiple construction materials that would introduce shading, textures, and buildings relief. As shown on Figure 5, the proposed project accomplishes this through the use of varying materials such as brick, steal, stucco, and glass. Thus, because the proposed project is consistent with the zoning of the site, and through compliance with the design guidelines under the TOD SP and BVOZ-N overlay zone, regulating scenic quality, impacts would be less than significant.

d) New light and glare would be created on site as a result of the proposed project from new commercial and residential uses, exterior lighting, parking areas, and vehicles entering and exiting the project site. However, the proposed project would be required to comply with Section 17.48.240(B) of the City's Municipal Code, which requires all light and glare associated with operations and illuminated signs be shielded or directed so as not to illuminate abutting residential districts. Also, building lighting, for the purpose of accenting architectural elements through the use of exposed neon, may be approved by the Director. As shown on Figure 5, Renderings, the proposed project incorporates a variety of materials, including glass and metal. Although the proposed project would incorporate metal railings and glass, the proposed project does not include large expanses of glass or other highly reflective materials. As such, with compliance with the City's Municipal Code, the proposed project would not result in substantial light or glare that would adversely affect day or nighttime views in the area. Impacts would be less than significant.

2. AGRICULTURE AND FOREST RESOURCES

ENVIRONMENTAL ISSUES	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
II. Agriculture and Forest Resources.				
In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997, as updated) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland.				
In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.				
Would the project:				
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) The proposed project would be located within the City of Bellflower, within the greater Los Angeles metropolitan area, which is largely developed and urbanized. There is no area within the City that is designated Prime Farmland, Unique Farmland or Farmland of Statewide Importance (DOC 2016). Thus, the proposed project would not convert any farmland into non-agricultural land or affect any Prime Farmland, Unique Farmland or Farmland of Statewide Importance. No impact would occur.

b) The California Land Conservation Act of 1965, commonly referred to as the Williamson Act, enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use. In return, landowners receive property tax assessments which are much lower than normal because they are based upon farming and open space uses as opposed to full market value. As discussed under Threshold a, above, the City is developed and urbanized. Accordingly, there is no area in the City that is under a Williamson Act Contract (DOC 2019). The site is zoned TOD SP with the following underlying zone: Town Center (TC-1) District, Area 1 and overlay: Bellflower Village Overlay Zone – North (BVOZ-N) (City of Bellflower 2019). Thus, the proposed project would not conflict with existing zoning for agricultural use or a Williamson Act contract. No impact would occur.

c) As discussed above, the City, including the project site and surrounding area is developed and urbanized. Further, the site is zoned TOD SP with the following underlying zone: Town Center (TC-1) District, Area 1 and overly: Bellflower Village Overlay Zone – North (BVOZ-N) (City of Bellflower 2019) and thus is not zoned for forest or timber land and there is no area in the City that is designated forest land or timberland. Thus, the proposed project would not conflict with existing zoning for forest or timber land. No impact would occur.

d) As discussed above, the City, including the project site and surrounding area is developed and urbanized. Accordingly, there is no area in the City that is designated forest land. Thus, the proposed project would not result in loss of forest land or conversion of forest land to non-forest use. No impact would occur.

e) As discussed above, the project site and surrounding area are developed and urbanized and no farm or forest land is present on site or in the surrounding area. Thus, the proposed project would not result in changes in the environment that would result in the conversion of farmland to non-agricultural use. No impact would occur.

3. AIR QUALITY

ENVIRONMENTAL ISSUES	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
III. Air Quality.				
Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied on to make the following determinations.				
Are significance criteria established by the applicable air district available to rely on for significance determinations?	☒ Yes		☐ No	
Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☐	☐	☒	☐
c) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐

Discussion

a) The proposed project is located within the South Coast Air Basin (Basin). Air quality planning for the Basin is under the jurisdiction of the South Coast Air Quality Management District (SCAQMD). The Air Quality Management Plan (AQMP) was adopted by the SCAQMD as a program to lead the Basin into compliance with the National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS). It relies on emissions forecasts based on demographic and economic growth projections provided by the Southern California Association of Governments (SCAG) Regional Transportation Program (SCAQMD 2016). SCAG is charged by federal and state law to prepare and approve "the portions of each AQMP relating to demographic projections and integrated regional land use, housing, employment, and transportation programs, measures and strategies" (SCAQMD 2016). Projects whose growth is included in the projections used in the formulation of the AQMP are considered to be consistent with the plan and not to interfere with its attainment. The SCAQMD recommends that, when determining whether a project is consistent with the current AQMP, a lead agency must assess whether the project would directly obstruct implementation of the plan and whether it is consistent with the demographic and economic assumptions (typically land use related, such as resultant employment or residential units) upon which the plan is based (SCAQMD 1993).

Construction

The proposed project would result in an increase in short-term employment compared to existing conditions. Being relatively small in number and temporary in nature, construction jobs under the proposed project would not conflict with the long-term employment projections upon which the AQMP is based. Control strategies in the AQMP with potential applicability to short-term emissions from construction activities include strategies denoted in the 2016 AQMP as ONRD-04 and OFFRD-01 and in the 2016 AQMP as MOB-08 and MOB-10, which are intended to reduce emissions from on-road and off-road heavy-duty vehicles and equipment by accelerating replacement of older, emissions-prone engines with newer engines meeting more stringent emission standards. The proposed project would not conflict with implementation of these strategies. Additionally, the proposed project would comply with California Air Resources Board's (CARB) diesel particulate matter control measures to minimize short-term emissions from on-road and off-road diesel

equipment. The proposed project would also comply with SCAQMD regulations for controlling fugitive dust pursuant to SCAQMD Rule 403.

Thresholds

Given that construction impacts are temporary and limited to the construction phase, the SCAQMD has established numeric indicators of significance specific to construction activity. Based on the indicators in the SCAQMD CEQA Air Quality Handbook, the proposed project would potentially cause or contribute to an exceedance of an ambient air quality standard if the following would occur:

Regional construction emissions from both direct and indirect sources would exceed any of the following SCAQMD-prescribed daily regional emissions thresholds (SCAQMD 2015):

- VOC: 75 pounds per day;
- NO_X: 100 pounds per day;
- CO: 550 pounds per day;
- SO_2: 150 pounds per day;
- PM_{10}: 150 pounds per day; or
- $PM_{2.5}$: 55 pounds per day.

Analysis

Construction would occur for two years beginning in early 2021 and ending in early 2023. Construction activities would include site preparation, grading, building construction and retrofit, paving, tenant improvements and architectural coating. The worst-case daily emissions were calculated for each phase of construction. This allows the air quality assessment to capture changes in maximum daily construction emissions over time. It should be noted that the maximum daily emissions are predicted values for the worst-case day and do not represent the emissions that would occur for every day within the construction period. Detailed emissions calculations and assumptions are provided in Appendix A of this MND. Results of the criteria pollutant calculations are presented in Table 3, *Estimated Maximum Regional Construction Emissions*. As shown therein, construction-related daily emissions for the criteria and precursor pollutants would not exceed the SCAQMD numeric indicators for VOC, NO_X, CO, SO_X, PM_{10}, and $PM_{2.5}$. These calculations include appropriate dust control measures that would be implemented during each phase of development, as required by SCAQMD Rule 403 (Control of Fugitive Dust).

The SCAQMD's project thresholds are intended to maintain or achieve attainment designations in the Basin with respect to the CAAQS and NAAQS. If the project does not exceed SCAQMD's thresholds and does not contribute to nonattainment designations, it would not exacerbate or interfere with the region's ability to attain the health-based standards. Furthermore, the lack of exposure of criteria air pollutants that may exceed the NAAQS and CAAQS would avoid health impacts. Because the project's construction phase emissions would be below SCAQMD's recommended thresholds, they would not violate any air quality standard or contribute substantially to an existing or projected air quality violation. Because the ambient air quality standards are established to be protective of public health, adverse health impacts to receptors are not anticipated due to the project's emissions being below SCAQMD's thresholds. Therefore, with respect to regional construction emissions, impacts would be less than significant. Air quality/emissions calculation worksheets are attached as Appendix A.

Table 3
Estimated Maximum Regional Construction Emissions (pounds per day) [a]

Regional Emissions	*ROG*	*NO_X*	*CO*	*SO_2*	*PM_{10} Total*	*$PM_{2.5}$ Total*
Demolition - 2021[c]	2	24	16	<1	3	1
Site Preparation - 2021	2	17	8	<1	3	2
Grading – 2021	2	21	8	<1	3	2
Building Construction/Retrofit – 2021-2022	2	15	16	<1	2	1
Paving - 2022	1	7	9	<1	1	<1
Architectural Coating – 2022-2023	12	1	2	<1	<1	<1
Maximum Daily Emissions	**12**	**24**	**16**	**<1**	**3**	**2**
SCAQMD Thresholds	75	100	550	150	150	55
Exceeds Indicators?	**No**	**No**	**No**	**No**	**No**	**No**

Notes:
[a] Emission quantities are rounded to "whole number" values. As such, the "total" values presented herein may be one unit more or less than actual values. Exact values (i.e., non-rounded) are provided in the Appendix A.
[b] PM_{10} and $PM_{2.5}$ emissions estimates are based on compliance with SCAQMD Rule 403 requirements for fugitive dust suppression.
[c] Demolition of existing building has already occurred. By presenting demolition activities, the modeling reflects a conservative estimate of emissions.
Source: Modeling performed by Ascent Environmental in 2019

Compliance with these requirements is consistent with and meets or exceeds the AQMP requirements for control strategies intended to reduce emissions from construction equipment and activities. Because the proposed project would not conflict with the control strategies intended to reduce emissions from construction equipment, the proposed project would not conflict with or obstruct implementation of the AQMP, and impacts would be less than significant.

Operation

The proposed project is the retrofit of a vacant building into a theater and the construction of a retail commercial/restaurant space and mixed-use condominium building with a land use designation of Commercial (C). The project site's existing zoning designations are SP TOD with underlying zones: 1) TC District, which provides for development and redevelopment of the downtown area, and 2) BVOZ-N, which encourages redevelopment of existing land uses within the Overlay Zone, which permits by right mixed-use residential developments. No change to the site's existing zoning designations are proposed as part of the project. The project site is located within the Downtown Bellflower Station Area Specific Plan (Specific Plan), which aligns the City's long-term goals for the downtown area with the potential benefit of the anticipated rail transit corridor. The proposed project would support future development associated with the Specific Plan. As such, the proposed project would be consistent with the City's General Plan and Zoning Code.

The proposed project includes Parcel A which would involve redevelopment of an existing vacant building with a new four screen theater and retail commercial/restaurant land uses and Parcel B which would involve construction of a five story, mixed-use, 91-unit podium condominium building with an at-grade parking structure. The new uses are allowed under the site's existing designations. Thus, the project's commercial/retail and residential uses would be consistent with applicable growth-related projections in plans and policies, such as the City's General Plan, TOD SP, SCAG's RTP, and the AQMP. Additionally, the proposed project would support Transportation Control Measures in the AQMP that are intended to reduce regional mobile source emissions through the installation of development close to transit facilities (the future West Santa Ana Branch (WSAB) Transit Corridor light rail station, three bus systems including the Metropolitan Transportation Authority (MTA), Long Beach Transit (LBT), and Bellflower Bus, and within three miles of the Metro Green Line), and links

to Class I Bellflower bike/pedestrian pathways adjacent to the proposed project. As the proposed project would be consistent with the growth projections in the AQMP and consistent with the General Plan and TOD SP, and would be supportive of relevant Transportation Control Measures aimed at reducing vehicle trips, impacts would be less than significant. Therefore, project operations would not conflict with or obstruct implementation of the AQMP, and impacts would be less than significant.

Additionally, the proposed project, as discussed below, would not obstruct implementation of the AQMP as its construction and operational emissions would be less than significant. The proposed project's criteria pollutant emissions would not cause the Basin's criteria pollutant emissions to worsen so as to impede the SCAQMD's efforts to achieve attainment with respect to any criteria pollutant for which it is currently not in attainment, or to cause the Basin to deteriorate from its current attainment status with respect to any other criteria pollutant emissions.

Pursuant to the State CEQA Guidelines (Section 15064.7), a lead agency may consider using, when available, the significance criteria established by the applicable air quality management district or air pollution control district when making determinations of significance. The proposed project is under the SCAQMD's jurisdiction. SCAQMD has established air quality significance thresholds in its CEQA Air Quality Handbook. These thresholds are based on the recognition that the Basin is a distinct geographic area with a critical air pollution problem for which ambient air quality standards have been promulgated to protect public health (SCAQMD 1993). Table 2 presents emission source types and health effects associated with criteria air pollutants. The City has not adopted specific city-wide significance thresholds for air quality impacts; therefore, it is appropriate to rely on thresholds established by the SCAQMD (refer to CEQA Guidelines Section 15064.7). The potential air quality impacts of the proposed project are, therefore, evaluated according to the most recent thresholds adopted by the SCAQMD in connection with its CEQA Air Quality Handbook, Air Quality Analysis Guidance Handbook, and other applicable SCAQMD guidance.

Table 2
Sources and Health Effects of Criteria Air Pollutants

Pollutant	***Sources***	***Acute[a] Health Effects***	***Chronic[b] Health Effects***
Ozone	Secondary pollutant resulting from reaction of ROG/VOC and NO_X in presence of sunlight. ROG/VOC emissions result from incomplete combustion and evaporation of chemical solvents and fuels; NO_X results from the combustion of fuels	increased respiration and pulmonary resistance; cough, pain, shortness of breath, lung inflammation	permeability of respiratory epithelia, possibility of permanent lung impairment
Carbon monoxide (CO)	Incomplete combustion of fuels; motor vehicle exhaust	headache, dizziness, fatigue, nausea, vomiting, death	permanent heart and brain damage
Nitrogen dioxide (NO_2)	combustion devices; e.g., boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines	coughing, difficulty breathing, vomiting, headache, eye irritation, chemical pneumonitis or pulmonary edema; breathing abnormalities, cough, cyanosis, chest pain, rapid heartbeat, death	chronic bronchitis, decreased lung function

Pollutant	*Sources*	*Acute[a] Health Effects*	*Chronic[b] Health Effects*
Sulfur dioxide (SO_2)	coal and oil combustion, steel mills, refineries, and pulp and paper mills	Irritation of upper respiratory tract, increased asthma symptoms	Insufficient evidence linking SO^2 exposure to chronic health impacts
Respirable particulate matter (PM_{10}), Fine particulate matter ($PM_{2.5}$)	fugitive dust, soot, smoke, mobile and stationary sources, construction, fires and natural windblown dust, and formation in the atmosphere by condensation and/or transformation of SO^2 and ROG/VOC	breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular diseases, premature death	alterations to the immune system, carcinogenesis
Lead	metal processing	reproductive/ developmental effects (fetuses and children)	numerous effects including neurological, endocrine, and cardiovascular effects

Notes: NO_X = oxides of nitrogen; ROG = reactive organic gases; VOC = volatile organic compounds.
a Acute health effects refers to immediate illnesses caused by short-term exposures to criteria air pollutants at fairly high concentrations. An example of an acute health effect includes fatality resulting from short-term exposure to carbon monoxide levels in excess of 1,200 parts per million.
b Chronic health effects refers to cumulative effects of long-term exposures to criteria air pollutants, usually at lower, ambient concentrations. An example of a chronic health effect includes the development of cancer from prolonged exposure to particulate matter at concentrations above the national ambient air quality standards.
Sources: EPA 2018

Thresholds

For regional operational emissions, the operational numerical emissions indicators in the SCAQMD Air Quality Handbook are used for determining impact significance. The SCAQMD has established numeric indicators of significance in part based on Section 182(e) of the Clean Air Act which identifies 10 tons per year of VOC as a significance level for stationary source emissions in extreme nonattainment areas for ozone (SCAQMD 1993). The Basin is designated as extreme non-attainment for ozone. The SCAQMD converted this significance level to pounds per day for ozone precursor emissions (10 tons per year × 2,000 pounds per ton ÷ 365 days per year = 55 pounds per day). The numeric indicators for other pollutants are also based on federal stationary source significance levels. SCAQMD's numeric indicators are based on the recognition that the Basin is a distinct geographic area with a critical air pollution problem for which ambient air quality standards have been promulgated to protect public health (SCAQMD 1993). Based on the indicators in the SCAQMD CEQA Air Quality Handbook, the proposed project would potentially cause or contribute to an exceedance of an ambient air quality standard if the following daily regional emissions thresholds would be exceeded (SCAQMD 2015):

- VOC: 55 pounds per day;
- NOx: 55 pounds per day;
- CO: 550 pounds per day;
- SO_2: 150 pounds per day;
- PM_{10}: 150 pounds per day; or
- $PM_{2.5}$: 55 pounds per day.

Analysis

Operational emissions were assessed for mobile and area sources. Operational criteria pollutant emissions were calculated for the proposed project for the buildout year, 2023. As the existing use is non-operational, the construction and operation of Parcels A and B would generate new vehicle trips. For a worst-case analysis, it is conservatively assumed that the proposed project would generate 2,207 new vehicle trips per day for both weekdays and weekends (Appendix F). In addition to mobile source emissions, operational emission sources also include energy from natural gas use, and area sources from the use of landscaping equipment, consumer projects, and architectural coatings. Area source emissions from landscaping equipment are based on off-road emission factors from CARB. Emissions from the reapplication of architectural coatings are based on data provided in CalEEMod Version: CalEEMod.2016.3.2. Detailed emissions calculations are provided in Appendix A of this MND. Results of the criteria pollutant calculations are presented in Table 4, *Estimated Maximum Regional Operational Emissions*. The maximum daily emissions from operation of the proposed project are compared to the SCAQMD daily regional numeric indicators. As shown therein, the proposed project operational-related daily emissions for the criteria and precursor pollutants (VOC, NO_X, CO, SO_2, PM_{10}, and $PM_{2.5}$) would not exceed the SCAQMD numeric indicators.

SCAQMD's project thresholds are intended to maintain or achieve attainment designations in the SCAB with respect to the CAAQS and NAAQS. If the project does not exceed SCAQMD's thresholds and does not contribute to nonattainment designations, it would not exacerbate or interfere with the region's ability to attain the health-based standards. Furthermore, the lack of exposure of criteria air pollutants that may exceed the NAAQS and CAAQS would avoid health impacts. Because the proposed project's construction phase emissions would be below SCAQMD's recommended thresholds, they would not violate any air quality standard or contribute substantially to an existing or projected air quality violation. Because the ambient air quality standards are established to be protective of public health, adverse health impacts to receptors are not anticipated due to the proposed project's emissions being below SCAQMD's thresholds. Therefore, with respect to regional emissions from operations, impacts would be less than significant.

Table 4
Estimated Maximum Regional Operational Emissions (pounds per day) [a]

Source	*VOC*	*NO_X*	*CO*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
Area (Consumer Products, Landscaping, Architectural Coating)	3	<1	8	<1	<1	<1
Energy (Natural Gas, Electricity)	<1	1	<1	<1	<1	<1
Mobile	3	12	31	<1	9	2
Total Project Emissions	6	13	39	<1	9	3
Maximum Regional Emissions	6	13	39	<1	9	3
SCAQMD Thresholds	55	55	550	150	150	55
Exceeds Indicators?	**No**	**No**	**No**	**No**	**No**	**No**

Note:
[a] Emission quantities are rounded to "whole number" values. As such, the "total" values presented herein may be one unit more or less than actual values. Exact values (i.e., non-rounded) are provided in Appendix A.
Source: Modeling performed by Ascent Environmental in 2019

b) A significant impact may occur if a project were to add a cumulatively considerable contribution of a federal or state non-attainment pollutant. The Basin is currently in nonattainment for ozone (federal and state standards), PM_{10} (state standards only) and $PM_{2.5}$ (federal and state standards), therefore, related projects could cause ambient concentrations to exceed an air quality standard or contribute to an existing or projected air quality exceedance. Cumulative impacts to air quality are evaluated under two sets of thresholds for CEQA and the SCAQMD.

In particular, CEQA Guidelines Sections 15064(h)(3) provides guidance in determining the significance of cumulative impacts. Specifically, Section 15064(h)(3) states in part that:

> *"A lead agency may determine that a project's incremental contribution to a cumulative effect is not cumulatively considerable if the project will comply with the requirements in a previously approved plan or mitigation program which provides specific requirements that will avoid or substantially lessen the cumulative problem (e.g., water quality control plan, air quality plan, integrated waste management plan) within the geographic area in which the project is located. Such plans or programs must be specified in law or adopted by the public agency with jurisdiction over the affected resources through a public review process to implement, interpret, or make specific the law enforced or administered by the public agency…"*

For purposes of the cumulative air quality analysis with respect to CEQA Guidelines Section 15064(h)(3), the project's incremental contribution to cumulative air quality impacts is determined based on compliance with the SCAQMD-adopted AQMP. As discussed previously under Threshold a, the project would be consistent with the AQMP and would not have a cumulatively considerable air quality impact. As the project is not part of an ongoing regulatory program, the SCAQMD also recommends that project-specific air quality impacts be used to determine the potential cumulative impacts to regional air quality. The SCAQMD has provided guidance on an acceptable approach to addressing the cumulative impacts issue for air quality as discussed below (SCAQMD 2003a):

> *"As Lead Agency, the AQMD uses the same significance thresholds for project specific and cumulative impacts for all environmental topics analyzed in an Environmental Assessment or EIR… projects that exceed the project-specific significance thresholds are considered by the SCAQMD to be cumulatively considerable. This is the reason project-specific and cumulative significance thresholds are the same. Conversely, projects that do not exceed the project-specific thresholds are generally not considered to be cumulatively significant."*

Consistent with accepted and established SCAQMD cumulative impact evaluation methodologies, the potential for the proposed project to result in cumulative impacts is assessed based on the SCAQMD thresholds.

As discussed under Response III (b) and shown in Tables 2 and 3, the daily emission levels for ozone precursors (NO_X and VOC) and particulate matter (PM_{10} and $PM_{2.5}$) generated during construction and operational activities by the proposed project would not exceed the SCAQMD CEQA thresholds. By applying SCAQMD's cumulative air quality impact methodology, implementation of the proposed project would not result in an addition of criteria pollutants such that cumulative impacts would occur, in conjunction with related projects in the region. In addition, as discussed in Response III (d)., below, construction and operation of the proposed project is not expected to result in a cumulatively considerable net increase of any criteria pollutant for which the SCAQMD has established a localized numeric indicator. Therefore, the proposed project's construction and operation would not result in a cumulatively considerable increase of any criteria air pollutant for which the Basin is in non-attainment. Thus, the proposed project's contribution to cumulative air quality impacts would be less than significant.

c) **Localized Emissions**

The localized effects from the on-site portion of proposed project emissions are evaluated at nearby sensitive receptor locations potentially impacted by the proposed project. The nearest sensitive receptors to the proposed project are single and multi-family residential uses located immediately west of the project site. The SCAQMD's *Localized Significance Threshold Methodology* (June 2003, revised July 2008) (SCAQMD 2008), which relies on on-site mass emission rate screening tables and project-specific dispersion modeling, where appropriate, is used to evaluate localized impacts to

sensitive receptors. The localized significance thresholds are only applicable to NO_X, CO, PM_{10}, and $PM_{2.5}$. For NO_X and CO, the thresholds are based on the ambient air quality standards. For PM_{10} and $PM_{2.5}$, the thresholds are based on requirements in SCAQMD Rule 403, Fugitive Dust. The SCAQMD has established screening criteria that can be used to determine the maximum allowable daily emissions that would satisfy the localized significance thresholds and therefore not cause or contribute to an exceedance of the applicable ambient air quality standards without project-specific dispersion modeling. The screening criteria depend on: (1) the area in which the project is located, (2) the size of the project site, (3) the distance between the project site and the nearest sensitive receptor (e.g., residences, schools, hospitals) and (4) construction equipment types used and their duration of operation. The localized significance thresholds are provided for distances to sensitive receptors of 25, 50, 100, 200, and 500 meters. The project site is located in the City of Bellflower and is approximately 1.02 acres in size. The nearest off-site receptors are located adjacent to the project site to the west. Therefore, the screening criteria applicable to a 1-acre site in the Southeast Los Angeles County area with sensitive receptors located 25 meters away were used. Although the receptors are closer than 25 meters, the SCAQMD methodology is to use the 25-meter distance for any receptors that are at 25 meters or closer to a project site.

Construction

Thresholds

The SCAQMD has developed a methodology to assess the potential for localized emissions to cause an exceedance of applicable ambient air quality standards or ambient concentration limits. Impacts would be considered significant if the following would occur:

- Maximum daily localized emissions of NO_X and/or CO during construction are greater than the applicable localized significance thresholds, resulting in predicted ambient concentrations in the vicinity of the project site greater than the most stringent ambient air quality standards for NO_2 and/or CO (SCAQMD 2008).

- Maximum daily localized emissions of PM_{10} and/or $PM_{2.5}$ during construction are greater than the applicable localized significance thresholds, resulting in predicted ambient concentrations in the vicinity of the project site to exceed 10.4 microgram per cubic meter ($\mu g/m^3$) over 24 hours (SCAQMD Rule 403 control requirement) (SCAQMD 2008).

Analysis

The localized construction air quality analysis was conducted using the methodology described in the SCAQMD *Localized Significance Threshold Methodology* (June 2003, revised July 2008) (SCAQMD 2008). The screening criteria provided in the *Localized Significance Threshold Methodology* were used to determine localized construction emissions thresholds for the proposed project. The maximum daily localized emissions for each of the construction phases and localized significance thresholds are presented in Table 5, *Estimated Maximum Localized Construction Emissions*. As shown therein, maximum localized construction emissions for sensitive receptors would not exceed the localized thresholds for CO, NO_X, PM_{10}, and $PM_{2.5}$. Therefore, with respect to localized construction emissions, impacts to nearby receptors would be less than significant.

Table 5
Estimated Maximum Localized Construction Emissions (pounds per day) [a]

	NO_X	CO	PM_{10} Total	$PM_{2.5}$ Total
Demolition – 2021[c]	20	14	2	1
SCAQMD Significance Thresholds	99	733	6	4
Exceeds Thresholds?	No	No	No	No
Site Preparation - 2021	17	8	3	2
SCAQMD Significance Thresholds	95	698	5	3
Exceeds Thresholds?	No	No	No	No
Grading - 2021	13	13	1	1
SCAQMD Significance Thresholds	80	571	4	3
Exceeds Thresholds?	No	No	No	No
Building Construction – 2021-22	14	13	1	1
Paving - 2022	7	9	<1	<1
Architectural Coating – 2022-2023	1	2	1	1
SCAQMD Significance Thresholds	80	571	4	3
Exceeds Thresholds?	No	No	No	No

Notes:
[a] Totals may not add up exactly due to rounding in the modeling calculations Detailed emissions calculations are provided in Appendix A.
[b] The SCAQMD LSTs are based on Source Receptor Area 5 (southeast Los Angeles County) for a 1-acre site within a 25-meter receptor distance.
c Demolition of existing building has already occurred. By presenting demolition activities, the modeling reflects a conservative estimate of emissions.
Source: Modeling performed by Ascent Environmental in 2019

Operational

Thresholds

The SCAQMD has developed a methodology to assess the potential for localized emissions to cause an exceedance of applicable ambient air quality standards. Impacts would be considered significant if the following were to occur:

- Maximum daily localized emissions of NO_X and/or CO during operation are greater than the applicable localized significance thresholds, resulting in predicted ambient concentrations in the vicinity of the project site greater than the most stringent ambient air quality standards for NO_2 and/or CO (SCAQMD 2008).

- Maximum daily localized emissions of PM_{10} and/or $PM_{2.5}$ during operation are greater than the applicable localized significance thresholds, resulting in predicted ambient concentrations in the vicinity of the project site to exceed 2.5 µg/m^3 over 24 hours (SCAQMD Rule 1303 allowable change in concentration).

Analysis

The localized operational air quality analysis was conducted using the methodology described in the SCAQMD *Localized Significance Threshold Methodology* (June 2003, revised July 2008) (SCAQMD 2008). The screening criteria provided in the *Localized Significance Threshold Methodology* were used to determine localized operational emissions thresholds for the proposed project. The maximum daily localized emissions and localized significance thresholds are presented in Table 6, *Estimated Maximum Localized Operational Emissions*. As shown therein, maximum localized operational emissions for sensitive receptors would not exceed the localized thresholds for NO_X, CO, PM_{10} and $PM_{2.5}$. Therefore, with respect to localized operational emissions, impacts to nearby local receptors would be less than significant.

Table 6
Estimated Maximum Localized Operational Emissions (pounds per day) [a, b]

Source	*NO_X*	*CO*	*PM_{10}*	*$PM_{2.5}$*
Area (Consumer Products, Landscaping, Architectural Coating)	1	8	<1	<1
Total Project On-Site Emissions	1	8	<1	<1
Maximum Localized (On-Site) Emissions	**1**	**8**	**<1**	**<1**
SCAQMD Numeric Indicators	80	571	4	3
Exceeds Thresholds?	**No**	**No**	**No**	**No**

Notes:

[a] Totals may not add up exactly due to rounding in the modeling calculations Detailed emissions calculations are provided in Appendix A.

[b] The SCAQMD LSTs are based on Source Receptor Area 5 (southeast Los Angeles County) for a 1-acre site within a 25-meter receptor distance.

Source: Modeling performed by Ascent Environmental in 2019

Carbon Monoxide Hotspots

Ambient CO levels in the vicinity of the project site is measured at the Compton monitoring station, South Central Los Angeles County, which is located approximately 4.75 miles northwest of the project site. The maximum ambient CO concentration in 2018 was measured at 4.7 parts per million (ppm) (one-hour average) and 3.5 ppm (eight-hour average) (SCAQMD 2019).

Carbon Monoxide Hotspots Thresholds

With respect to the formation of CO hotspots, the project would be considered significant if the following would occur:

- The project would cause or contribute to an exceedance of the CAAQS one-hour or eight-hour CO standards of 20 or 9.0 ppm, respectively.

Carbon Monoxide Hotspots Analysis

The potential for the project to cause or contribute to CO hotspots is evaluated by comparing project intersections (both intersection geometry and traffic volumes) with prior studies conducted by the SCAQMD in support of their AQMPs and considering existing background CO concentrations. As discussed below, this comparison provides evidence that the project would not cause or contribute to the formation of CO hotspots, that CO concentrations at project impacted intersections would remain well below the ambient air quality standards, and that no further CO analysis is warranted or required.

CO levels in the project area are substantially below the federal and state standards. Maximum CO levels in recent years are 4.7 ppm (one-hour average) and 3.5 ppm (eight-hour average) compared to the thresholds of 20 ppm (one-hour average) and 9.0 (eight-hour average). Carbon monoxide decreased dramatically in the Basin with the introduction of the catalytic converter in 1975. No exceedances of CO have been recorded at monitoring stations in the Basin for some time and the Basin is currently designated as a CO attainment area for both the CAAQS and NAAQS. Thus, it is not expected that CO levels at project-impacted intersections would rise to the level of an exceedance of these standards.

Based on the traffic study conducted for the project, the addition of the project-generated traffic to existing conditions (i.e. existing-plus-project conditions) would not result in the downgrading of project-affected intersection to level of service (LOS) level E or F. All intersections would continue to operate at a LOS C or better overall. Furthermore, the traffic study estimated a peak traffic volume of 114 per hour (Appendix F). As a result, CO concentrations are expected to be up to a maximum of

approximately 4.7 ppm (one-hour average) and 3.5 ppm (eight-hour average), which would not exceed the thresholds.[1] Thus, this comparison provides evidence that the project would not contribute to the formation of CO hotspots and no further CO analysis is required. Therefore, the project would result in less than significant impacts to nearby receptors with respect to CO hotspots.

Toxic Air Contaminants

The potential for the project to cause impacts from toxic air contaminants (TACs) is evaluated by conducting a screening-level analysis. The screening-level analysis consists of reviewing the proposed project's conceptual site plan and project description to identify any new or modified TAC emission sources. If it is determined that the proposed project would introduce a new source of TACs, or modify an existing source, then downwind sensitive receptor locations are identified and a site-specific analysis is conducted.

The greatest potential for TAC emissions during construction would be related to diesel particulate matter emissions associated with heavy-duty equipment during demolition[2], excavation and grading activities. Construction activities associated with the project would be sporadic, transitory, and short term in nature (approximately 24 months). Given the temporary duration of the construction phase of the project, construction impacts associated with TACs are addressed qualitatively based on consistency with strategies and measures that limit, minimize, or reduce diesel emissions.

During long-term operations, TACs could be emitted as part of periodic maintenance operations, cleaning, painting, etc., and from diesel-powered delivery and service vehicles. However, these uses are expected to be occasional and result in minimal exposure to off-site sensitive receptors. As the project consists of a theater, retail commercial/restaurant space, and apartments the project would not include sources of substantive TAC emissions identified by the SCAQMD or CARB siting recommendations. Thus, a qualitative approach is appropriate.

Toxic Air Contaminants

Construction

Thresholds

Based on criteria set forth by the SCAQMD, the project would expose sensitive receptors to substantial concentrations of TACs if any of the following were to occur (SCAQMD 1993):

- The project would emit carcinogenic materials or TACs that exceed the maximum incremental cancer risk of ten in one million or a cancer burden greater than 0.5 excess cancer cases (in areas greater than or equal to 1 in 1 million) or an acute or chronic hazard index of 1.0.

Analysis

The greatest potential TAC emissions would be related to diesel particulate matter (DPM) emissions associated with heavy equipment usage during demolition, grading and excavation, and building construction activities. DPM emissions are highly correlated with exhaust $PM_{2.5}$ emissions. These products would comply with all applicable SCAQMD rules for their manufacture and use. The project would be subject to SCAQMD rules designed to limit exposure to TACs during construction activities. The project would be required to comply with the CARB Air Toxics Control Measure that limits diesel powered equipment and vehicle idling to no more than five minutes at a location, and the CARB In-Use Off-Road Diesel Vehicle Regulation that aims to reduce emissions through the installation of

[1] The expected CO concentrations are calculated based on the ratio of 114/100,000 multiplied by the screening values of 4.6 ppm (one-hour average) and 3.2 ppm (eight-hour average) and adding the background concentrations. Actual CO value would likely be less than the expected values reported in the analysis as the average CO emissions from motor vehicles operating today have declined as compared to motor vehicles operating in year 2003.

[2] Demolition of existing building has already occurred. By presenting demolition activities, the modeling reflects a conservative estimate of emissions.

diesel particulate matter filters and encouraging the retirement, replacement, or repower of older, higher-emitting engines with newer emission-controlled models. Compliance with these regulations would minimize emissions of TACs during construction. Therefore, the project to a less than significant level.

Although project construction activities would be temporary and short-term, diesel particulate emissions from equipment exhaust would likely result in an exceedance of the SCAQMD 10 in one million cancer risk threshold at the nearest sensitive receptors (residential uses to the west of the site). The Office of Environmental Health and Hazard Assessment (OEHHA) is responsible for developing guidelines for performing health risk assessments (HRAs). In March 2015, OEHHA has adopted new guidelines which results in numeric life-time health risk values to be approximately two to three times higher than those calculated under the previous guidelines.

According to the SCAQMD, under the new OEHHA guidelines, a typical 1-acre office project with a 6-month construction duration would likely result in a significant health risk impact with regard to construction emissions (SCAQMD 2014). As the project is approximately 1.56-acre in size, with a 2-year construction duration, construction emissions would also likely result in significant impacts with regard to cancer risk. Since the new OEHHA guidelines have been adopted, the SCAQMD significance threshold with regard to health risk has remain unchanged.

In the absence of refined guidance from the SCAQMD, the responsible air quality regulatory agency for the Basin, it is conservatively assumed that, based on SCAQMD's estimated health risk impacts for typical construction activities, the project would not result in a potentially significant incremental increase in health risk. Therefore, the project would not result in a potentially significant impact with regard to construction. Impacts to nearby receptors would be less than significant.

Operations

Project operations would generate only minor amounts of diesel fuel emissions from delivery trucks and incidental maintenance activities. These activities would be intermittent and would not include extended periods of idling at the project site. Trucks would comply with applicable provisions of the CARB Truck and Bus regulation to reduce PM and NO_X emissions from existing diesel trucks. Therefore, project operations are not considered a substantial source of diesel particulates. In addition, project operations would only result in minimal emissions of air toxics from maintenance or other ongoing activities, such as from the use of architectural coatings and other products. As a result, toxic or carcinogenic air pollutants are not expected to occur in any meaningful amounts in conjunction with operation of the project. Based on the uses expected on the project site, potential long-term operational impacts associated with the release of TACs would be minimal and would not be expected to exceed the SCAQMD thresholds of significance. Therefore, impacts would be less than significant.

d) With respect to odors, the project would be considered significant if it created objectionable odors affecting a substantial number of people.

Construction

Potential activities that may emit odors during construction activities include the use of architectural coatings and solvents and the combustion of diesel fuel in on- and off-road equipment. Compliance with SCAQMD Rule 1113 would limit the amount of VOCs in architectural coatings and solvents. In addition, the project would comply with the applicable provisions of the CARB Air Toxics Control Measure regarding idling limitations for diesel trucks. Through mandatory compliance with rules and regulations, no construction activities or materials are expected to create objectionable odors affecting a substantial number of people. Therefore, construction of the project would result in less than significant impact with respect to odors. Impacts to nearby receptors would be less than significant.

Operations

According to the SCAQMD CEQA Air Quality Handbook, land uses associated with odor complaints typically include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting, refineries, landfills, dairies, and fiberglass molding. The project does not include any uses identified by SCAQMD as being associated with substantial odors. As a result, the project is not expected to discharge contaminants into the air in quantities that would cause a nuisance, injury, or annoyance to the public or property pursuant to SCAQMD Rule 402. Therefore, the project would not create adverse odors affecting a substantial number of people and impacts would be less than significant.

4. BIOLOGICAL RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
IV. Biological Resources.				
Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or the U.S. Fish and Wildlife Service?	☐	☐	☐	☒
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or the U.S. 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 native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☒
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

Discussion

a) The City is located within southern Los Angeles County and is highly urbanized. Accordingly, the potential for candidate, sensitive, or special status species or habitats is low within City limits and thus at the project site. The California Department of Fish and Wildlife California Natural Diversity Database identifies six candidate, sensitive, or special status species or habitats within the Whitter quadrangle, which includes the City of Bellflower. These include the western yellow-billed cuckoo (*Coccyzus americanus occidentalis*), bank swallow (*riparia riparia*), coastal California gnatcatcher (*Polioptila californica californica*), least Bell's vireo (*Vireo bellii pusillus*), crotch bumble bee (*Bombus Crotchii*), and the California Orcutt grass (*Orcuttia californica*)[5]. Redevelopment of the site would not expand the existing footprint of the currently developed area or introduce any land uses that would adversely affect biological resources. However, the site is already developed with a vacant commercial building and a parking lot with limited landscaping and no native vegetation is present on site. Therefore, the proposed project is not expected to result in impacts to species identified as a candidate, sensitive, or special status. No impact would occur.

b) As discussed above, the project site and the surrounding area are highly developed and urbanized. No riparian habitat or other sensitive natural communities are present on the project site. Thus, the proposed project would not result in a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service. No impact would occur.

c) As discussed above, the project site and the surrounding area are highly developed and urbanized. Therefore, no wetlands are present on the project site or in the surrounding area. Thus, the proposed project would not have an adverse effect on any state or federally protected wetlands. No impact would occur.

d) As discussed above, the project site is entirely disturbed with one vacant commercial building and a graded dirt parking lot. The project site is surrounded by development to the east, west, and south. One disturbed vacant parcel is present to the north of the project site. A parking structure is currently being constructed on this parcel. As such, due to the highly developed nature of the site and its surroundings, this area is not designated as a native resident or migratory wildlife corridor. The proposed project would not Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites. No impact would occur.

e) The City does not have any local policies or ordinances that protect specific biological resources, including tree preservation. Thus, the proposed project would not conflict with any local policies or ordinances protecting biological resources. No impact would occur.

f) The City is not regulated by any Natural Community Conservation Plan (NCCP) or Habitat Conservation Plan (HCP) (CDFW 2019). Thus, the proposed project would not conflict with the provisions of an adopted HCP, NCCP, or other approved local, regional, or state habitat conservation plan. No impact would occur.

5. CULTURAL RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
V. Cultural Resources.				
Would the project:				
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 an archaeological resource pursuant to Section 15064.5?	☐	☒	☐	☐
c) Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☐	☒	☐

Discussion

a) A historical resource is defined in Section 15064.5(a)(3) of the CEQA Guidelines as any object, building, structure, site, area, place, record, or manuscript determined to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California. Historical resources are further defined as being associated with significant events, important persons, or distinctive characteristics of a type, period or method of construction; representing the work of an important creative individual; possessing high artistic values; or yielding information important in prehistory or history. Resources listed in or determined eligible for the California Register of Historical Resources, included in a local register, or identified as significant in a historic resource survey are also considered historical resources under CEQA.

According to Section 15064.5(b) of the CEQA Guidelines, a project with an effect that may cause substantial adverse change in the significance of a historical resource is a project that may have a significant impact on the environment. Substantial adverse change is defined as physical demolition, relocation, or alteration of a resource or its immediate surroundings such that the significance of an historical resource would be materially impaired. The project site is currently developed with one existing commercial building. According to the Phase I Environmental Site Assessment (Appendix D), this building was built sometime between 1952 and 1963. According to City public permit applications, this building has been altered a few times. Upgrades included placing concrete along additional footings in 2001 and renovation of the building which took place in 2002 (City of Bellflower 2002).

According to the City's General Plan, Conservation Element, the City does not include sites listed on the State or Federal Registers of Historic Place, however buildings with historical significance are located within the City. The closest one to the project site, as identified in the City's General Plan is the Pacific Electric Railway Depot building, which is located approximately 95 feet to the northeast of the project site, across Mayne Street (City of Bellflower 1995). However, the proposed project would not result in any disturbance of this structure. Therefore, because the site does not contain any historic resources, and because the existing structure on site has previously been altered and not considered a historic resource, impacts would be less than significant.

b) The project site is currently developed with a vacant commercial building and a parking lot with limited landscaping. The potential for archaeological materials to be present at the project site is considered low because the entire project site has been previously disturbed. However, although unlikely, there is the potential for previously unknown subsurface artifacts to be encountered during ground-disturbance activities. Therefore, impacts to archaeological resources would be potentially significant, and implementation of mitigation measure **MM-CUL-1** would be required. The impact would be less than significant with the above mitigation measure implemented.

MM-CUL-1: In the event that archaeological resources are unearthed during ground-disturbing activities, the project contractor halt or redirect ground-disturbing activities away from the vicinity of the find so that the find can be evaluated. The project applicant shall retain a qualified archaeologist to determine whether or not the find is significant. If the find is determined to be potentially significant, the archaeologist, in consultation with the City and appropriate Native American monitor(s) and group(s) (if the find is a prehistoric or Native American resource), shall develop a treatment plan. Construction activities shall be redirected to other work areas until the treatment plan has been implemented or the qualified archaeologist determines that work can resume in the vicinity of the find.

c) As discussed above, the project site is developed and thus has been previously disturbed. Therefore, the potential for human remains is deemed to be low considering the developed nature of the site. The project would also be required to comply with California Health and Safety Code Section 7050.5 and Public Resources Code 5097.98, which ensure proper handling of any inadvertent human remain finds. Thus, impacts to human remains would be less than significant.

6. ENERGY

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VI. Energy.				
Would the project:				
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☒	☐
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☒	☐

Discussion

a) Neither the law nor the State CEQA Guidelines establish thresholds that define when energy consumption is considered wasteful, inefficient and unnecessary. Compliance with California Code of Regulations (CCR) Title 24 Energy Efficiency Standards would result in energy-efficient buildings. However, compliance with building codes does not adequately address all potential energy impacts during construction and operation. For example, energy would be required to transport people and goods to and from the project site. Energy use is discussed by anticipated use type below. Project energy use calculations are contained in Appendix B.

Construction-Related Energy

Energy would be required to operate and maintain construction equipment and transport construction materials. The one-time energy expenditure required to construct the physical buildings and infrastructure associated with the project would be nonrecoverable. Most energy consumption would result from operation of off-road construction equipment and on-road vehicle trips associated with commutes by construction workers and haul trucks trips.

Table 7 summarizes the levels of energy consumption associated with the construction of the project by year. Most of the construction-related energy consumption would be associated with off-road equipment and the transport of equipment and waste using on-road haul trucks. An estimated 9,399 gallons of gasoline and 35,639 gallons of diesel fuel would be used during construction of the project (Appendix B).

Table 7
Construction Energy Consumption

Year	Gasoline (Gallons)	Diesel (Gallons)
2021	142	12,170
2022	9,257	23,469
Total	9,399	35,639

Notes: Gasoline gallons include on-road gallons from worker trips. Diesel gallons include off-road equipment and on-road gallons from worker and vendor trips. Demolition of building was already competed; thus energy consumption modeling is conservative.
Source: Calculations by Ascent Environmental in 2019

The energy needs for project construction would be temporary and are not anticipated to require additional capacity or substantially increase peak or base period demands for electricity and other forms of energy. Associated energy consumption would be typical of that associated with commercial projects in an urban setting. Automotive fuels would be consumed to transport people to and from the project site. Energy would be required for construction elements and transport construction materials. The one-time energy expenditure required to construct the physical infrastructure associated with the

project would be nonrecoverable. There is no atypical construction related energy demand associated with the proposed project. Non-renewable energy would not be consumed in a wasteful, inefficient, and unnecessary manner when compared to other construction activity in the region.

Operational-Related Energy

The project would increase electricity and natural gas consumption in the region relative to existing conditions. However, the new buildings would, at a minimum, be built to 2019 Title 24 Building Energy Efficiency Standards, which are 30 percent more efficient than 2016 Standards (CEC 2018). Table 8 summarizes the levels of energy consumption associated with the operation of the project for the first full year of operations (2023).

Table 8
Levels of Energy Consumption Summary Associated with the Operation of the Project for the First Full Year of Operations (2023)

Energy Type	*Energy Consumption*	*Units*
Electricity	718	MWh/year
Natural Gas	1,219	MMBTU/year
Gasoline	138,832	gal/year
Diesel	12,857	gal/year

Notes: MWh/year = megawatt-hours per year; MMBTU/year = million British thermal units per year, gal/year = gallons per year.
Source: Calculations by Ascent Environmental in 2019

Fuel consumption associated with project-related vehicle trips would not be considered wasteful, inefficient, or unnecessary in comparison to other similar developments in the region. Based on the estimated annual vehicle miles traveled (3,792,682 miles) from the CalEEMod model outputs and estimated miles per gallon (MPG) from the CARB mobile source emissions inventory EMFAC2017 Web Database, gasoline consumption is estimated at 138,832 gallons per year and diesel consumption is estimated at 12,857 gallons per year (See Appendix A). State and federal regulations regarding fuel efficiency standards for vehicles in California are designed to reduce wasteful, inefficient, and unnecessary use of energy for transportation. Additionally, the project is integrated with adjacent residential land uses. This integration would likely reduce VMT from neighboring residences who might otherwise travel further to shop. Although this potential reduction in VMT was not quantified, this effect would align with intent of the regional South Coast Association of Government's (SCAG's) Regional Transportation Plan/Sustainability Communities Strategy to reduce regional VMT.

The means to achieve the goal of conserving energy include decreasing per capita energy consumption, decreasing reliance on natural gas and oil, and increasing reliance on renewable energy sources. In addition to compliance with the 2019 Title 24 Building Energy Efficiency Standards, design features of the project include the installation of electric vehicle chargers, increased transit accessibility near the project site, and an enhanced pedestrian bike network. With these design features, the project's energy consumption through construction, building operation, and transportation would not be considered wasteful, inefficient, or unnecessary. This impact would be less than significant.

b) Relevant plans that pertain to the efficient use of energy include the 2019 Integrated Energy Policy Report (IEPR), which focuses on energy efficiency; demand response; renewable energy; the supply and reliability of electricity, natural gas, and transportation fuels; and achieving GHG reduction targets (CEC 2019). Although the project would require more energy use than the existing site, the project would be designed with energy efficiency design features under the 2019 California Energy Code. These standards establish minimum efficiency standards related to various building features, including appliances, water and space heating and cooling equipment, building installation and

roofing, and lighting. In addition, transportation energy demand from the implementation of the project would be reduced by federal and State regulations including the Low Carbon Fuel Standard, Advanced Clean Car Standards, and Low Emission Vehicle Program. In addition, the project will encourage alternative fuel use with the installation of electric vehicle chargers in the proposed parking lot and transit use by being located nearby transit options. Therefore, impacts would be less than significant.

7. GEOLOGY AND SOILS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VII. Geology and Soils. Would the project:				
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 California Geological Survey 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 18-1-B of the Uniform Building Code (1994, as updated), 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

A Preliminary Geotechnical Investigation for the proposed project was prepared by Geocon West, Inc. in March 2019 (Appendix C1). The results of this report serve as the basis for this analysis. Further analysis has been prepared by Geocon West, Inco for the liquefaction potential of the project site. The results of this liquefaction analysis have been summarized in an email from Petrina Zen, PE of Geocon West, Inc. from February 19, 2019, which has been included as Appendix C2 of this MND.

a.i) Fault rupture is the displacement that occurs along the surface of a fault during an earthquake. By definition, an active fault is one that has had surface displacement within Holocene time (about the last 11,700 years). A potentially active fault has demonstrated surface displacement during Quaternary time (approximately the last 1.6 million years), but has had no known Holocene movement. Faults that have not moved in the last 1.6 million years are considered inactive (Appendix C1). The project site is not located within an Alquist-Priolo Earthquake Fault Zone and no active or potentially active faults are present within the project site. Therefore, the potential for surface fault rupture due to faulting is considered low. Nonetheless, the project site is located in the seismically active Southern California region and various faults are present in the vicinity of the site. The closest active fault to the site is the Newport-Inglewood Fault, located approximately 5.8 miles southwest of the project site (Appendix C1). Thus, the proposed project could be subject to moderate to strong ground shaking in the event of an earthquake on one of the many nearby active faults.

Nonetheless the 2016 California Building Code (CBC) includes seismic design criteria, which would be required for the proposed project in order to reduce the potential for structural damage. With implementation of required CBC requirements, the proposed project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving fault rupture. Impacts would be less than significant.

a.ii)As discussed above, although no active fault traverses the project site, the site is located within the seismically active Southern California region and various faults are present in the vicinity of the site. The closest known active or potentially active fault to the project site is the Newport-Inglewood Fault, located approximately 5.8 miles southwest of the project site. Other nearby faults include the Whittier Fault, located approximately 9.1 miles northeast of the site; the Palos Verdes Fault, located 11.9 miles southwest of the site; the Raymond Fault, located approximately 16.4 miles north of the site; and the Hollywood Fault, located approximately 18 miles north-northwest of the project site. Lastly, the San Andreas Fault Zone is located approximately 42 miles northeast of the project site (Appendix C1). Thus, due to regional proximity to major known active fault zones, the project site is subject to strong ground motion from seismic activity similar to that of the rest of Southern California. However, as discussed above, the proposed project would be required to comply with the CBC, which incorporates seismic design criteria, including foundation design and grading requirements. The applicable seismic design criteria for this project are incorporated in the Preliminary Geotechnical Investigation (Appendix C1) and would be implemented for the proposed project. Therefore, impacts to geotechnical hazards would be potentially significant, and implementation of mitigation measure **MM-GEO-1** would be required. The impact would be less than significant with the above mitigation measure implemented.

MM-GEO-1: The proposed project shall comply with the recommendations and requirements contained in the geotechnical investigation in Appendix C1 and C2.

a.iii) Liquefaction is a phenomenon in which loose and saturated soil loses strength during strong ground shaking events. The factors known to influence liquefaction potential include intensity and duration of ground motion, gradation characteristics of the subsurface soils, and groundwater level (Appendix C1).

The Preliminary Geotechnical Investigation (Appendix C1) includes a liquefaction analysis of the project site. As identified in the Preliminary Geotechnical Investigation, the California Seismic Hazard Zone Map for the South Gate Quadrangle and the City's Safety Element identify the project site as having a potential for liquefaction. The Preliminary Geotechnical Investigation further evaluated the liquefaction potential at the project site using soil testing and confirmed that, due to the alluvial soils and historically high groundwater depth at the site, there is potential for liquefaction to occur on site in the event of an earthquake. Due to potential for liquefaction to occur on site, further analysis has been prepared by Geocon West, Inco for the liquefaction potential of the project site. The results of this liquefaction analysis have been summarized in an email from Petrina Zen, PE of Geocon West, Inc from February 19, 2019, which has been included as Appendix C2 of this MND. This liquefaction summary provided design features such as requiring that new development is placed on a mat foundation, place new development on-grade rather than with a subterranean level for development within Parcel B. For the renovation within Parcel A, the liquefaction summary recommends that although a conventional foundation is appropriate, the applicant shall coordinate with the structural engineer on tolerable settlements and the foundation would be required to be designated for seismic settlements and as well static settlements (Appendix C2). Therefore, impacts to geotechnical hazards would be potentially significant, and implementation of mitigation measure **MM-GEO-1** would be required. The impact would be less than significant with the above mitigation measure implemented.

MM-GEO-1: The proposed project shall comply with the recommendations and requirements contained in the geotechnical investigation in Appendix C1 and C2.

a.iv) According to the Preliminary Geotechnical Investigation, the topography of the project site is relatively level and the topography in the immediate vicinity slopes gently to the southwest. Both the City's General Plan Safety Element and the County of Los Angeles Safety Element indicate that the site is not located within an area of slope instability (Appendix C1). Therefore, because the potential for landslides on site is considered low, impacts would be less than significant.

b) Soil erosion refers to the process by which soil or earth material is loosened or dissolved and removed from its original location. Erosion can occur by varying processes and may occur in a particular development area where bare soil is exposed to wind or moving water (both rainfall and surface runoff). The processes of erosion are generally a function of material type, terrain steepness, rainfall or irrigation levels, surface drainage conditions, and general land uses. Topsoil is used to cover surface areas for the establishment and maintenance of vegetation due to its high concentrations of organic matter and micro-organisms.

The project is located in an urbanized area of the City and the project site has already been disturbed and developed. Therefore, extensive grading would not be required for the proposed project. Nonetheless, earth-moving activities during the construction phase could temporarily increase the potential for displaced soils and thus could be subject to soil erosion and loss of topsoil. The project would be required to be constructed in accordance with standard erosion control practices required by the CBC and the National Pollutant Discharge Elimination System (NPDES) General Construction Permit issued by the Los Angeles Regional Water Quality Control Board, as applicable. Consistent with these requirements, a stormwater pollution prevention plan (SWPPP) could be prepared that incorporates Best management practices (BMPs) to control water erosion during construction periods. Further, wind erosion would be minimized through soil stabilization measures required by the SCAQMD Rule 403 (Fugitive Dust), such as daily watering. Water erosion would also be reduced by implementation of standard erosion control measures imposed during site preparation and grading activities, as required under Section IX, *Hydrology and Water Quality*. Thus, the proposed project would not result in substantial soil erosion or topsoil loss. Impacts would be less than significant.

c) As discussed under Threshold a.iv, above, the potential for landslides to occur on the project site is considered low. project site is not located within an area prone to landslides.

According to the Preliminary Geotechnical Investigation (Appendix C1), the project site is underlain by Holocene age alluvium consisting of clay, silt, and sand. Artificial fill was also encountered at the project site during field explorations and characterized as dry to slightly moist and loose to medium dense. Further, groundwater was encountered on site during the field exploration. However, per the Preliminary Geotechnical Investigation, based on the depth of groundwater encountered and the depth of proposed construction, groundwater is not expected to be encountered during construction. Nonetheless, the Preliminary Geotechnical Investigation incorporates recommendations to ensure proposer drainage of the project site and ensure that potential for landslides, lateral spreading, subsidence, liquefaction, and collapse would be reduced. Impacts related to unstable soils would be less than significant.

d) According to the Preliminary Geotechnical Investigation (Appendix C1), the soils encountered during the field investigation are considered to have a very low expansive potential and are classified as non-expansive in accordance with the CBC. Preliminary Geotechnical Investigation also incorporates recommendations for building foundations to add additional support for structures. Thus, the proposed project would not be located on expansive soils, creating direct or indirect risks to life or property. Impacts would be less than significant.

e) Septic tanks or other similar alternative wastewater disposal systems are not proposed under the project. No impact would occur.

f) As discussed under Threshold c, above, the project site is underlain by Holocene age alluvium. The potential for paleontological resources to be present at the project site is considered low because the entire project site has been previously disturbed. Pleistocene or older (older than 11,000 years) continental sedimentary deposits are considered as having a high paleontological potential while Holocene-age deposits (less than 10,000 years old) are generally considered to have a low paleontological potential because they are geologically immature and are unlikely to have fossilized the remains of organisms. Therefore, due to the low potential for paleontological resources to occur and the developed nature of the site, impacts to paleontological resources would be less than significant.

8. GREENHOUSE GAS EMISSIONS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VIII. Greenhouse Gas Emissions.				
Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

Discussion

a) Certain gases in the earth's atmosphere, classified as greenhouse gases (GHGs), play a critical role in determining the earth's surface temperature. Solar radiation enters the atmosphere from space. A portion of the radiation is absorbed by the earth's surface, and a smaller portion of this radiation is reflected toward space. The absorbed radiation is then emitted from the earth as low-frequency infrared radiation. The frequencies at which bodies emit radiation are proportional to temperature. The earth has a much lower temperature than the sun; therefore, the earth emits lower frequency radiation. Most solar radiation passes through GHGs; however, infrared radiation is absorbed by these gases. As a result, radiation that otherwise would have escaped back into space is instead "trapped," resulting in a warming of the atmosphere. This phenomenon, known as the greenhouse effect, is responsible for maintaining a habitable climate on earth. Project-related greenhouse gas calculations are included in Appendix A.

The principal GHGs are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), perfluorocarbons (PFCs), and hydrofluorocarbons (HFCs). Because different GHGs have different warming potentials and CO_2 is the most common reference gas for climate change, GHG emissions are often quantified and reported as CO_2 equivalents (CO_2e). For example, SF_6 is a GHG commonly used in the utility industry as an insulating gas in circuit breakers and other electronic equipment. SF_6, while comprising a small fraction of the total GHGs emitted annually world-wide, is a much more potent GHG with 22,800 times the global warming potential as CO_2. Therefore, an emission of one metric ton (MT) of SF_6 could be reported as an emission of 22,800 MT of CO_2e. Large emission sources are reported in million metric tons (MMT) of CO_2e.[3]

The Office of Planning and Research's (OPR) latest 2018 CEQA Guidelines, encourage cities to make use of programmatic mitigation plans and programs from which to tier when they perform individual project analyses. Section 15183.5 of the CEQA Guidelines states that a city may determine that a particular project's incremental contribution to a cumulative effect is not cumulatively considerable if the project complies with the requirements in a previously adopted mitigation program, or plan for the reduction of GHG emissions that includes the following elements:

(A) Quantify GHG emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area;

(B) Establish a level, based on substantial evidence, below which the contribution to GHG emissions from activities covered by the plan would not be cumulatively considerable;

[3] A metric ton is 1,000 kilograms; it is equal to approximately 1.1 U.S. tons and approximately 2,204.6 pounds.

(C) Identify and analyze the GHG emissions resulting from specific actions or categories of actions anticipated within the geographic area;

(D) Specify measures or a group of measures, including performance standards, that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level;

(E) Establish a mechanism to monitor the plan's progress toward achieving the level and to require amendment if the plan is not achieving specified levels;

(F) Be adopted in a public process following environmental review.

In response to these requirements, the City, in December 2012, adopted a climate action plan (CAP) which explained how the City would achieve its proportional share of state GHG emission reductions. The City's CAP met the programmatic requirements of CEQA Guidelines Section 15183.5 and described specific measures and performance standards for reducing community emissions. The CAP Climate Ready Development Standards were established to provide a streamlined review process for proposed new development projects that were subject to discretionary review pursuant to CEQA. The Climate Ready Development Standards are part of the CAP and give points for energy efficiency and emissions-reducing features of new developments. Each standard has a point value assigned to it that reflects its general effectiveness at reducing GHG emissions. For a project to be fully compliant with the CAP, an applicant must select measures to achieve 16 points. For additional flexibility, the City established an in-lieu fee program that allowed applicants to pay a fee to be used to offset GHG emissions through energy efficiency retrofits of City's existing building stock. Thus, if a project didn't get 16 points, it could pay based on how many points it received.

Projects that are consistent with the CAP as determined through the use of these Climate Ready Development Standards could rely on the CAP for the cumulative impact analysis of GHG emissions. Projects that are not consistent with the CAP would need to prepare a comprehensive project-specific analysis of GHG emissions.

Project Consistency with CAP

A preliminary analysis of the Climate Ready Development Standards shows that the project would be designed to comply with the CAP as discussed below in Table 9, *Consistency with CAP Climate Ready Development Standards*. The analysis in the table shows the potential number of points the project would achieve for through its design or by complying with standards.

Table 9
Consistency with CAP Climate Ready Development Standards

Standard	***Points Available***	***Consistency***	***Potential Project Points***
Demonstrate the building will perform at least 15% better than the current Title 24. Three additional points can be achieved if the building will perform at least 30% better than the current Title 24.	3-6	Not applicable.	0
Provide preferred parking for low-emitting and fuel-efficient vehicles for 5% of the total vehicle parking or provide electric vehicle recharging stations for 3% of the total vehicle capacity.	3	Applicable. The project would be designed to provide electric vehicle charging stations at 3% of the parking spaces.	3

Standard	*Points Available*	*Consistency*	*Potential Project Points*
Hire a third-party commissioning agent to conduct a commissioning audit of the building and verify the building mechanical systems were installed and operate correctly	3	Not applicable.	0
Design and orient 75% or more new buildings such that one axis is at least 1.5 times longer than the other, and such that the longer axis is within 15 degrees of the geographical east/west axis. The length to width ratio shall be applied only to the length of walls enclosing conditioned spaces, walls enclosing unconditioned spaces such as garages, arcades or porches cannot contribute to standard achievement. South facing vertical surfaces of buildings counting towards standard achievement must not be more than 25% shaded at time of initial occupancy (measured at noon on December 21st).	3	Not applicable.	0
Implement a commute trip reduction program if the project generates more than 50 jobs.	3	Not applicable.	0
Install solar energy generation to meet 35% of the project's energy demand. The solar panels should be onsite, but can be located offsite and within the City Limits, at the approval of the Planning Director. Two additional points can be achieved for meeting 50% of the project's energy demand through installed solar energy generation.	3-5	Not applicable.	0
Use porous materials on all paved areas except fire lanes or specified fire access as required by the Fire Department.	2	Not applicable.	0
All non-permeable paving materials shall be high albedo materials with a Solar Reflectance index of at least 29.	2	Not applicable.	0
If a new development is within a ½ mile of a transit stop and requires off-street parking, parking must be unbundled from the rental or for-sale cost.	2	Applicable. Project is within ½ mile of projected train station and bus lines on Bellflower Boulevard.	2
Provide continuous rows of appropriately spaced trees (every 25 feet) along all streets (or an equivalent number of trees placed offsite at the discretion of the Planning Director.) Trees shall be of a type and nature that have broad canopies and provide ample shade. Evergreen trees are preferred. Palm trees shall be prohibited from consideration towards this standard.	2	Not applicable.	0
If a façade faces a street or sidewalk, 30% or greater of its continuous length shall not be blank (without windows and doors). Walls with public art installations such as murals may be exempted.	2	Applicable.	2
It is prohibited for more than 25% of the linear street frontage of new buildings to be garages and service bay openings.	2	Potentially applicable.	2
New multi-unit developments must install electricity, gas, and water meters for each unit.	2	Applicable (no gas)	2

Standard	*Points Available*	*Consistency*	*Potential Project Points*
Design and install landscaping to minimize summer heat gain through: (1) the placement of evergreen trees along the west façade of buildings, (2) the placement of trees so as to shade 50% of the site's hardscape within 5 years of construction, and (3) a covenant recorded that provides for the ongoing maintenance so as to maintain the tree's shade. Trees shall be of a type and nature that have broad canopies and provide ample shade. Evergreen trees are preferred. Palm trees shall be prohibited from consideration towards achieving this standard.	2	Not applicable.	0
Provide at least one secure, enclosed bicycle storage space, separated and independent from the required automobile parking areas, per occupant for a percentage of the planned occupancy and no less than one space per unit. Points shall be achieved as follows: (a) For provisions of spaces for 15% of planned occupancy, 1 point; (b) For provision of spaces for 30% of planned occupancy, a total of 2 points; (c) For provision of spaces for 45% of planned occupancy, a total of 3 points: and (d) For provision of spaces for 50% or more of planned occupancy, a total of 4 points.	1-4	Applicable. 15% of planned occupancy total of 14 secure, enclosed bicycle storage spaces.	1
Provide visitor bicycle racks on-site with at least one bicycle space per 10,000 square feet of new non-retail space or 5,000 square feet of retail space but not fewer than four bicycle spaces per building or 1 space per business (whichever is greater).	2	Applicable. The project would include bicycle spaces and racks.	2
Provide secure visitor bicycle racks on-site, with at least one bicycle space per 10 new dwelling units and not less than four spaces per project site.	2	Applicable. The project will include 10 secure visitor bicycle spaces.	2
Provide at least one on-site shower with changing facility for any development with 100 or more new workers and at least one additional on-site shower with changing facility for every 150 new workers thereafter.	2	Not applicable.	0
Provide at least one additional tree per unit above what is required by code. Trees shall be of a type and nature that have broad canopies and provide ample shade. Evergreen trees are preferred. Palm trees shall be prohibited from consideration towards achieving this standard.	2	Not applicable.	0
Provide at least one tree per 500 square feet of building area. Trees shall be of a type and nature that have broad canopies and provide ample shade. Evergreen trees are preferred. Palm trees shall be prohibited from consideration towards achieving this standard.	2	Not applicable.	0
Incorporate appropriate traffic calming features such as curb extensions, mini-circles, parking chicanes, roundabouts, medians, raised street crossing or similar features. (Applies to projects greater than 5 acres)	1	Not applicable.	0

Standard	*Points Available*	*Consistency*	*Potential Project Points*
Minimize the number of driveway cuts that intersect with sidewalks and other pedestrian walkways.	1	Potentially applicable. The project would be designed to minimize the number of driveway cuts that intersect with sidewalks and other pedestrian walkways. Removing one existing driveway cut along Oak Street and one along Mayne Street.	1
Delineate crosswalks at every intersection within ½ mile of the project site. (Applies to projects greater than 5 acres)	1	Not applicable.	0
Construct sidewalks on both sides of streets (except where the Bellflower Municipal Code exempts such) for frontage controlled by the project applicant that is contiguous to the project site.	1	Potentially applicable. The city decides where crosswalks go.	1
Create external pedestrian and bicycle connections every 800 feet along the project perimeter. (Applies to projects greater than 5 acres)	1	Not applicable.	0
Continue to divert 100% of all non-hazardous inert construction and demolition debris for recycling and salvage and divert 75% of all remaining construction and demolition debris.	1	Not applicable.	0
Locate the majority entry points to new buildings within a ¼ mile of a transit stop.	1	Applicable. Bus stops along Bellflower Boulevard and future train station.	1
Use salvaged, refurbished, or recycled materials such that the sum of these materials constitutes at least 5% based on cost, of the total value of materials on the project. One additional point can be achieved if the use of these materials constitutes 10% of the total value of materials.	1-2	Not applicable.	0
Provide designated space, facilities, and services for users to recycle and compost waste.	1	Applicable. Project will designate recycling bins.	1
Use only high efficiency lighting.	1	Applicable. The project will comply with Title 24.	1
Meet at least 5% of a project's indoor water use through a combination of reclaimed water and gray water. Providing plumbing for future reclaimed water availability will meet the requirement of this standard if reclaimed water is not yet available at the site.	1	Not applicable.	0
Design landscaping for very low water use.	1	Applicable.	1
Utilize artificial turf in place of grass.	1	Potentially applicable. Project will have no grass and will incorporate low water consuming plants.	1
Use of efficient irrigation systems and weather-based irrigation controllers.	1	Applicable.	1

Standard	*Points Available*	*Consistency*	*Potential Project Points*
Provide at least one of the following sidewalk amenities like benches, trash receptacles, drinking fountains, and/or public art in a new mixed-use and multi-family, for every 50 feet of sidewalk frontage.	1	Not applicable.	0
Locate all new off-street surface parking lots at the side or rear of buildings, leaving building frontages facing streets free of surface parking lots. Side lot parking shall be limited to double stacked drive aisles.	1	Not applicable.	0
Total Potential Points			**24**
Compliance Point Threshold			16
Project Compliant with CAP			**Yes**

Source: City of Bellflower and Ascent Environmental 2019

Project consistency with the CAP is shown in Table 9 above. The project would be designed to meet Climate Development Ready Standards to reach 24 points. According to City staff, the project would be designed to comply with the 16-point threshold. Since the project could meet the 16-point compliance standard, it is fully compliant with the CAP and would not result in a cumulative GHG impact. The project would, therefore, support the CAP's target of reducing GHG emissions 17 percent below 2010 levels by 2020 and 19 percent below 2010 levels by 2030 resulting in a less than significant impact.

b) A significant impact would occur if the project would generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment by conflicting with applicable regulatory plans and policies to reduce GHG emissions as discussed within CARB's Climate Change Scoping Plan, SCAG's 2016 Regional Transportation Plan / Sustainable Communities Strategy (RTP/SCS), and the City's CAP and Green Building Code.

As shown in Table 9, the project would be consistent with the CAP and would not interfere with the City's ability to meet GHG reduction measures. The discussion below, shows how the project would comply and not conflict with various plans, policies, and regulations to reduce GHG emissions.

CARB's Climate Change Scoping Plan

In support of Health and Safety Code (HSC) Division 25.5, the state has promulgated specific laws aimed at GHG reductions applicable to the project. The primary focus of many of the statewide and regional mandates, plans, policies and regulations is to address worldwide climate change. Due to the complex physical, chemical and atmospheric mechanisms involved in global climate change, there is no basis for concluding whether the project's annual GHG emissions would cause a measurable change in global GHG emissions necessary to influence global climate change. Newer construction materials and practices, energy efficiency requirements, and newer appliances tend to emit lower levels of air pollutant emissions, including GHGs, as compared to those built years ago; however, the net effect is difficult to quantify. The GHG emissions of the project alone would not likely cause a direct physical change in the environment. According to California Air Pollution Control Officers Association, "GHG impacts are exclusively cumulative impacts; there are no non-cumulative GHG emission impacts from a climate change perspective." It is global GHG emissions in their aggregate that contribute to climate change, not any single source of GHG emissions alone. Because the project would not cumulative impact global climate change, and the fact that the project incorporates physical and operational project characteristics that would reduce potential GHG emissions to a less than significant level by virtue of being consistent with the City's CAP, the project is considered not to conflict with the GHG reduction goals of HSC Division 25.5.

Table 10, *Consistency with Applicable Greenhouse Gas Reduction Strategies*, contains a list of GHG-reducing strategies potentially applicable to the project. The analysis describes the consistency of the Project with these strategies that support the state's strategies in the Climate Change Scoping Plan to reduce GHG emissions. The Climate Change Scoping Plan relies on a broad array of GHG reduction actions, which include direct regulations, alternative compliance mechanisms, incentives, voluntary actions, and market-based mechanisms such as the Cap-and-Trade program. As shown below, the project would be designed to incorporate characteristics to reduce energy and reduce vehicle travel consistent with statewide strategies and regulations. As a result, the project would not conflict with applicable Climate Change Scoping Plan strategies and regulations to reduce GHG emissions.

Table 10
Consistency with Applicable Greenhouse Gas Reduction Strategies

Sector / Source	Category / Description	Consistency Analysis
Energy		
California Renewables Portfolio Standard	Increases the proportion of electricity from renewable sources to 33% renewable power by 2020.	**Consistent**. The project would use electricity provided by Southern California Edison (SCE), which is committed to achieving 33% renewables by 2020.
California Renewables Portfolio Standard and SB 350	Increases the proportion of electricity from renewable sources to 33% renewable power by 2020. SB 350 requires 50% by 2030. It also requires the State Energy Resources Conservation and Development Commission to double the energy efficiency savings in electricity and natural gas final end uses of retail customers through energy efficiency and conservation.	**Consistent**. The project would use electricity provided by SCE, which is required to meet the 2050 performance standard. The project would also meet or exceed the applicable requirements of the State of California Green Building Standards Code. The project would incorporate energy efficiency measures as outlined in the CAP to get the necessary amount of points.
CCR, Title 24	Energy Efficiency Standards for Residential and Nonresidential Buildings	**Consistent**. The project would be designed to meet mandatory CALGreen Building Standards.
Assembly Bill 1109	The Lighting Efficiency and Toxics Reduction Act (AB1109) prohibits manufacturing specified general purpose lights that contain levels of hazardous substances prohibited by the European Union. AB 1109 also requires a reduction in average statewide electrical energy consumption by not less than 50% from the 2007 levels for indoor residential lighting and not less than 25% from the 2007 levels for indoor commercial and outdoor lighting by 2018	**Consistent**. As discussed above, the project would be designed to meet mandatory CALGreen Building Standards.
SB 1368	Establishes an emissions performance standard for power plants within the State of California.	**Consistent**. The project would not impede this regulation and would not conflict with implementation of the emissions standards for power plants.

Sector / Source	Category / Description	Consistency Analysis
California Green Building Standards Code Requirements	All bathroom exhaust fans shall be ENERGY STAR® compliant.	**Consistent**. The project would be designed to meet mandatory CALGreen Building Standards. The Project would meet or exceed the energy standards in the Title 24 Building Energy Efficiency Standards.
	Parking spaces shall be designed for carpool or alternative fueled vehicles. Up to eight % of total parking spaces will be designed for such vehicles.	**Consistent**. The project would meet this requirement as part of its compliance with the City's requirements and the CALGreen Code. The Project would be designed to comply with the CAP Climate Ready Development Standards as well, which are stricter.
	Long-term and short-term bike parking shall be provided for up to five % of vehicle trips.	**Consistent**. The project would meet this requirement as part of its compliance with the City's requirements and the CALGreen Code. The Project would be designed to comply with the CAP Climate Ready Development Standards as well, which are stricter.
	Stormwater Pollution Prevention Plan (SWPPP) required.	**Consistent**. The project would meet this requirement as part of its compliance with the City's requirements and the CALGreen Code.
	Indoor water usage must be reduced by 20% compared to current California Building Code Standards for maximum flow.	**Consistent**. The project would meet this requirement as part of its compliance with the City's requirements and the CALGreen Code
	All irrigation controllers must be installed with weather sensing or soil moisture sensors.	**Consistent**. The project would meet this requirement as part of its compliance with the City's requirements and the CALGreen Code.
	Wastewater usage shall be reduced by 20 % compared to current California Building Standards.	**Consistent**. The project would meet or exceed this requirement as part of its compliance with the City's requirements and the CALGreen Code.
	Requires a minimum of 50 % recycle or reuse of nonhazardous construction and demolition debris.	**Consistent**. The project would meet or exceed this requirement as part of its compliance with the City's requirements and the CALGreen Code. The Project would be designed to comply with the CAP Climate Ready Development Standards as well, which are stricter.
	Requires documentation of types of waste recycled, diverted or reused.	**Consistent**. The project would meet this requirement as part of its compliance with the City's requirements and the CALGreen Code.
	Requires use of low VOC coatings consistent with AQMD Rule 1168.	**Consistent**. The project would be consistent with this regulation and would meet or exceed the low VOC coating requirements.

Sector / Source	Category / Description	Consistency Analysis
	100 % of vegetation, rocks, and soils from land clearing shall be recycled or stockpiled on-site.	**Consistent**. The project would meet this requirement as part of its compliance with the City's requirements and the CALGreen Code. The Project would be designed to comply with the CAP Climate Ready Development Standards as well, which are stricter.
Mobile Sources		
Advanced Clean Cars Program	In 2012, CARB adopted the Advanced Clean Cars (ACC) program to reduce criteria pollutants and GHG emissions for model year vehicles 2015 through 2025. ACC includes the Low-Emission Vehicle (LEV) regulations that reduce criteria pollutants and GHG emissions from light- and medium-duty vehicles, and the Zero-Emission Vehicle (ZEV) regulation, which requires manufacturers to produce an increasing number of pure ZEVs (meaning battery electric and fuel cell electric vehicles), with provisions to also produce plug-in hybrid electric vehicles (PHEV) in the 2018 through 2025 model years.	**Consistent**. The standards would apply to all vehicles used by employees and customers associated with the Project. The project would consider the installation of electric vehicle charging stations during final design.
SB 375	SB 375 establishes mechanisms for the development of regional targets for reducing passenger vehicle GHG emissions. Under SB 375, CARB is required, in consultation with the state's Metropolitan Planning Organizations, to set regional GHG reduction targets for the passenger vehicle and light-duty truck sector for 2020 and 2035.	**Consistent**. The project would be consistent with SCAG RTP/SCS goals and objectives under SB 375 to implement "smart growth." The Project would provide residential and commercial land uses within close proximity to one another, the Project site is served by a high level of public transit, the Project could encourage use of non-motorized vehicles by considering installation of electric vehicle charging stations during final design, bike parking, and connectivity to the future West Santa Ana Branch Transit Corridor light rail station. The Project would be designed to meet the applicable requirements of CALGreen Code.
Water		
CCR, Title 24	Title 24 includes water efficiency requirements for new residential and non-residential uses.	**Consistent**. The project would meet this requirement as part of its compliance with the CALGreen Code. The Project would be designed to comply with the CAP Climate Ready Development Standards as well, which are stricter.

Sector / Source	Category / Description	Consistency Analysis
Solid Waste		
California Integrated Waste Management Act (IWMA) of 1989 and Assembly Bill (AB) 341	The IWMA mandated that state agencies develop and implement an integrated waste management plan which outlines the steps to be taken to divert at least 50 % of their solid waste from disposal facilities. AB 341 directs CalRecycle to develop and adopt regulations for mandatory commercial recycling and sets a statewide goal for 75 % disposal reduction by the year 2020.	**Consistent**. The project would be served by the City's solid waste collection and recycling services. The Project would be required to comply with AB 341.
Other Sources		
Climate Action Team	Reduce diesel-fueled commercial motor vehicle idling.	**Consistent**. The project would be consistent with the CARB Air Toxics Control Measure to limit heavy duty diesel motor vehicle idling to no more than 5 minutes at any given time.
	Achieve California's 50 % waste diversion mandate (Integrated Waste Management Act of 1989) to reduce GHG emissions associated with virgin material extraction.	**Consistent**. The project would meet this requirement as part of its compliance with the CALGreen Code.
	Implement efficient water management practices and incentives, as saving water saves energy and GHG emissions.	**Consistent**. The project would meet this requirement as part of its compliance with the CALGreen Code. The Project would provide drought tolerant landscaping or other low water landscaping to the greatest extent feasible.
	Apply strategies that integrate transportation and land-use decisions, including but not limited to promoting jobs/housing proximity, high-density residential/ commercial development along transit corridors, and implementing intelligent transportation systems.	**Consistent**. The project would incorporate physical characteristics that would reduce vehicle trips and VMT and encourage alternative modes of transportation for patrons as it in close proximity to the future West Santa Ana Branch Transit Corridor light rail station and existing bus and other transit options; rail, bicycle, walking.
	Reduce energy use in private buildings.	**Consistent**. The project would meet Title 24 Building Energy Efficiency Standards.

Source: Ascent Environmental 2019

Furthermore, not only is the project consistent with currently applicable GHG emission reduction strategies described in Table 10, but the project also would not conflict with or impede the future statewide GHG emission reductions goals. CARB has outlined a number of potential strategies for achieving the 2030 reduction target of 40 percent below 1990 levels in the 2017 Scoping Plan. Appendix C of the 2017 Scoping Plan includes detailed GHG reduction measures and local actions that land use development projects and municipalities can implement to support the statewide goal. For project-level CEQA analyses, the 2017 Scoping Plan states that projects should implement feasible mitigation, preferably measures that can be implemented on-site. The project would include GHG reduction features that would be consistent with the measures listed in Appendix C of the 2017 Scoping Plan. The project would be consistent with reducing the rate of growth in vehicle miles travelled (VMT) by providing onsite bicycle parking facilities, combining residential and commercial land uses, and being located in an area served by a high level of public transit including bus lines and train stations.

SCAG's 2016 RTP/SCS

The significance of the project's GHG emissions was first evaluated based on whether the emissions would be generated in connection with development located and designed consistent with relevant regional and local goals, actions, and recommendations designed to encourage development to reduce trips and VMTs. Transportation-related GHG emissions are the largest source of GHG emissions from the project. This project characteristic is consistent with the assumption in many regional plans, such as the SCAG RTP/SCS, which recognizes that the transportation sector is the largest contributor to the state's GHG emissions.

Consistent with SCAG's RTP/SCS alignment of transportation, land use, and housing strategies, the project would accommodate projected increases in travel demand by implementing smart land use strategies. The project would redevelop the infill land into a residential and commercial, retail space, encouraging alternative modes of transportation by combining land uses, considering the installation of electric vehicle charging stations, and by providing bike parking spaces and racks. The project site provides access to transit options such as carpooling, bus, bicycling, and rail travel. Overall, these project characteristics have the potential to reduce single occupancy vehicle trips and vehicle miles traveled, thus reducing their associated GHG emissions.

SCAG's 2016 RTP/SCS states that 38 percent of all trips in the region are less than 3 miles (SCAG 2016). The RTP/SCS intends to decrease these trips by extending local bikeway networks. The project would be consistent with this RTP/SCS goal by providing parking adjacent to the Class I Bellflower Bike Path, which would allow cyclists to visit the downtown area from their bike and the bike path connects to the longer San Gabriel River Trail path. Therefore, the project would be consistent with the SCAG 2016 RTP/SCS regional and local trip and VMT reduction goals.

Bellflower Green Building Standards Code

The proposed project would comply with the California Green Building Standards Code (City of Bellflower 2019) that would reduce GHG emissions by increasing energy-efficiency, reducing indoor and outdoor water demand, and installing energy-efficient equipment. The project would also incorporate characteristics that would reduce transportation-related GHG emissions by combining residential and commercial uses next to transit stations and the bicycle paths, thereby encouraging alternative forms of transportation and pedestrian activity. Therefore, the project would be consistent with the City's Green Building Standards Code.

Bellflower Climate Action Plan

As discussed above, the project would not impede implementation or conflict with policies of the Scoping Plan, SCAG's 2016 RTP/SCS, California Green Building Code, and the Bellflower CAP. In conclusion, the project would not conflict with any applicable plan, policy, or regulation of an agency adopted for reducing GHG emissions, and impacts would be less than significant.

9. HAZARDS AND HAZARDOUS MATERIALS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
IX. Hazards and Hazardous Materials.				
Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☒	☐	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and/or accident conditions involving the release of hazardous materials into the environment?	☐	☒	☐	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 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 a significant risk of loss, injury, or death involving wildland fires?	☐	☐	☐	☒

Discussion

a) A hazardous material is defined as any material that due to its quantity, concentration, physical or chemical characteristics, poses a significant present or potential hazard to human health or to the environment if released. Hazardous materials include, but are not limited to, inorganic and organic chemicals, solvents, mercury, lead, asbestos, paints, cleansers, or pesticides. Vehicles traveling along City streets could also use and/or transport potentially hazardous materials such as oil, gasoline, and other similar materials.

Construction the proposed project could potentially transport and/or handle potentially hazardous materials, such as oil, gas, etc. However, construction of the proposed project would be required to comply with existing hazardous materials regulations already enacted that protect people and locations from exposure to hazardous materials and substances. For instance, Titles 8, 22, and 26 of the California Code of Regulations, and their enabling legislation set forth in Chapter 6.95 of the California Health and Safety Code, were established at the State level to ensure compliance with Federal regulations to reduce the risk to human health and the environment from the routine use of hazardous substances. These regulations, as appropriate, could be monitored by the State (e.g., Cal Occupational Health and Safety Administration (OSHA) in the workplace or the California Department of Toxic Substances Control (DTSC) for hazardous waste), and/or local jurisdictions (e.g., the Los Angeles County Fire Department and the Los Angeles County Environmental Health Division) to ensure construction materials are properly handled, transported, and disposed of.

A Phase I Environmental Site Assessment (Phase I) has been prepared for the project by Environmental Help, Inc. on December 20, 2018 and included as Appendix D of this MND. As discussed in the Phase I, because the existing structure onsite has been constructed before 1980, lead-based paint and asbestos can be present within the existing structure on site. The Phase I also indicates that the existing structure contains a hydraulic freight elevator, which can result to hazards to people and the environment if not disposed of properly. Therefore, renovation within Parcel A has the potential to create a hazard of exposing the public to lead-based paint, asbestos and/or hydraulic fluid. Thus, the following mitigation would be required:

Mitigation Measures

MM HAZ-1: Prior to the issuance of a demolition permit for the partial demolition of the existing structure on-site, a lead-based paint and asbestos survey shall be conducted by a licensed lead and asbestos inspector retained by the project applicant. If any on-site abatement of lead-based paint or asbestos-containing materials is necessary, the licensed lead and asbestos inspector shall prepare an abatement work plan for removal of such materials in compliance with local, state, and federal regulations. The work plan shall include a monitoring plan to be conducted by a qualified consultant during abatement activities to ensure compliance with the work plan requirements and abatement contractor specifications. Demolition plans and contract specifications shall incorporate any necessary abatement measures for the removal of materials containing lead-based paint and asbestos to the satisfaction of the Planning and Building Department. The measures shall be consistent with the abatement work plan prepared for the project and conducted by a licensed lead/asbestos abatement contractor.

MM HAZ-2: Prior to the issuance of a demolition permit for the partial demolition of the existing structure on-site, a plan of removal of disposal shall be prepared for the existing hydraulic fluid elevator located within the existing structure. Demolition plans and contract specifications shall incorporate any necessary abatement measures for the removal of this elevator to the satisfaction of the Planning and Building Department. The measures shall be consistent with the abatement work plan prepared for the project and conducted by a licensed engineer.

Once project construction is complete, the transport, use, or disposal of hazardous materials during the operational phase of the project would be limited to cleaning products, landscaping chemicals and fertilizers, and other typical substances associated with the multifamily residential and commercial uses of the proposed project. Transportation, use, and disposal of these materials are required to comply with all federal, state, and local laws regulating the management and use of hazardous materials. Significant impacts associated with long-term operation of the site are not expected. Therefore, impacts from any potentially significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials during operation of the proposed project would be less than significant.

Therefore, with the implementation of the above mitigation, lead-based paint and asbestos-containing materials would be properly handled, transported and disposed of. Thus, impacts related to hazardous materials would be less than significant with mitigation incorporated.

b) As discussed above, construction of the proposed project would be required to comply with existing hazardous materials regulations already enacted that protect people and locations from exposure to hazardous materials and substances. For instance, Titles 8, 22, and 26 of the California Code of Regulations, and their enabling legislation set forth in Chapter 6.95 of the California Health and Safety Code, were established at the State level to ensure compliance with Federal regulations to reduce the risk to human health and the environment from the routine use of hazardous substances. These regulations, as appropriate, could be monitored by the State (e.g., Cal Occupational Health and Safety Administration (OSHA) in the workplace or the California Department of Toxic Substances Control (DTSC) for hazardous waste), and/or local jurisdictions (e.g., the Los Angeles County Fire

Department and the Los Angeles County Environmental Health Division) to ensure construction materials are properly handled, transported, and disposed of. This would reduce potential hazards to the public or the environment through reasonably foreseeable upset and/or accident of hazardous materials during construction. Further, because there is potential for asbestos and lead-based paint to be present within the existing building on site, there is the potential for the accidental release of these hazardous materials during earthmoving activities and construction of the proposed project. With the implementation of mitigation **MM-HAZ-1** and **MM-HAZ-2**, impacts to hazardous materials during construction would be less than significant with mitigation incorporated.

As described above, once project construction is complete, the transport, use, or disposal of hazardous materials during the operational phase of the project would be limited to cleaning products, landscaping chemicals and fertilizers, and other typical substances associated with the multi-family residential and commercial uses of the proposed project. Transportation, use, and disposal of these materials are required to comply with all federal, state, and local laws regulating the management and use of hazardous materials. Therefore, with compliance with these regulations, potential impacts related to the routine transport, use, or disposal of hazardous materials during operation of the proposed project would be less than significant.

c) No schools are present within a quarter mile of the site. However, the nearest school to the project site is Priscilla's Music School, located approximately 0.29-mile northwest of the site. School Ten, Inc. is located approximately 0.33 mile southwest of the project site. Ramona Elementary School is also 0.46 mile southwest of the site. As discussed under threshold a, above, construction of the proposed project would be required to comply with federal, state, County, and City regulations relating to control of hazardous materials. Compliance with these regulations would reduce the likelihood of accidents and risks associated with release of hazardous materials. The project would also be required to implement **MM-HAZ-1** which would reduce potential impacts from asbestos and lead based paint, and **MM-HAZ-2**, which would require proper removal and disposal of the existing freight elevator. Therefore, with implementation of mitigation, the 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. Impacts would be less than significant with mitigation incorporated.

d) Government Code Section 65962.5, amended in 1992, requires CalEPA to develop and update annually the Cortese List, which is a list of hazardous waste sites and other contaminated sites. While Government Code Section 65962.5 makes reference to the preparation of a list, many changes have occurred related to web-based information access since 1992, so information regarding the Cortese List is now compiled on the websites of DTSC, the State Water Board, and CalEPA. The Phase I (Appendix D) performed a review of standard, federal, state, and tribal environmental records searches of the project site and near the project site. The environmental records search performed in the Phase I identified one nearby site that could result in hazardous materials on site. This site is associated with a previous dry cleaner on an adjacent site. Because the potential for subsurface impact still exists and is related to release of tetrachloroethylene (TCE) and trichloroethene (TCE) on this adjacent site, a plume in groundwater under the southeast corner of the site exists. The Phase I recommends that, because of this existing hazardous condition, no subterranean parking lot should be constructed as part of the project. Because subterranean parking is not proposed, this existing hazardous condition would not result in a significant hazard to the public or the environment. The Phase I concluded that the existing TCE and PCE on the southeastern corner of the site should not create unhealthful conditions at the project site. To further ensure that potential impacts associated with the plume does not result, the following mitigation measure is required. It should be noted, however, that there are approximately ten full or partially filled five-gallon paint/tar containers present at the project site. However, these containers have a low migration potential to affect other areas of the site. Therefore, once removed, these containers should not result in a significant hazard to the public or the environment. All impacts associated with hazardous materials would be less than significant with mitigation.

MM HAZ-3: The project applicant shall install a vapor barrier below the proposed building foundations following grading and prior to building construction to ensure that TCE contaminated soil/groundwater does not adversely affect project occupants. The vapor barrier shall be designed per the requirements of the project toxicologist and the RWQCB.

e) The closest airport to the project site is the Long Beach Airport, located approximately 4 miles southwest of the project site, and is not located within the sphere of the airport's land use plan. Thus, the proposed project would not result in a safety hazard or excessive airplane noise for people residing or working in the project area. No impact would occur.

f) The City also has prepared an Emergency Operations Plan (EOP) which is placed into operations for extraordinary emergency situations associated with natural disasters, technological incidents, and human-caused events. Bellflower Boulevard is identified as a disaster movement route in the EOP (City of Bellflower 2017). However, the proposed project includes redevelopment of the site and would result in less than significant impacts at both the intersection of Bellflower Boulevard and Mayne Street and the intersection of Bellflower Boulevard and Oak Street (Appendix F). Therefore, the proposed project would not physically interfere with an adopted emergency response plan or emergency evacuation plan. Impacts would be less than significant.

g) The project site is located within a highly developed area of the City. The project site is not located within an area designated by the California Department of Forestry and Fire Protection (CAL FIRE) as a fire hazard severity zone or a local responsibility area (CAL FIRE 2007a; CAL FIRE 2007b).

10. HYDROLOGY AND WATER QUALITY

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
X. Hydrology and Water Quality.				
Would the project:				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater 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 on- or offsite erosion or siltation;	☐	☐	☒	☐
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) The State Water Resources Control Board, through its nine regional water quality control boards (RWQCBs), has developed Regional Water Quality Control Plans (or Basin Plans) that designate beneficial uses and water quality objectives for California's surface waters and groundwater basins, as mandated by both the Clean Water Act (CWA) and the State's Porter-Cologne Water Quality Control Act. Water quality standards are thus, established in these Basin Plans and provide the foundation for the regulatory programs implemented by the State.

The Los Angeles RWQCB's Basin Plan, which covers the project site, specifically designates beneficial uses for surface waters and ground waters; sets objectives to conform with the State's anti-degradation policy; and describes implementation programs to protect all waters in the Region. In other words, the Los Angeles RWQCB Basin Plan provides all relevant information necessary to carry out Federal mandates for the anti-degradation policy; 303(d) listing of impaired waters; and related total maximum daily loads; and provides information relative to NPDES and Waste Discharge Requirement permit limits. Under Section 303(d) of the CWA, States are required to identify water bodies that do not meet their water quality standards (LARWQCB 2014).

Construction of the proposed project would require site work for grading, clearing, partial demolition of the existing building, and construction of structures and infrastructure improvements. These construction activities could result in soil erosion and loss of topsoil which could then affect water quality.

However, the proposed project would be required to comply with all existing regulations that ensure protection of water quality standards. For instance, all projects that would result in disturbance of one acre of land or more (including laydown and stockpile areas) is required to comply with the State Water Resources Control Board Order No. 2012-0006-DWQ (NPDES Permit No. CAS000002), *National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities* (Construction General Permit). The Construction General Permit requires development of a SWPPP, implementation of erosion and sediment best management practices, monitoring, and reporting. Pursuant to the Construction General Permit, prior to terminating permit coverage, the proposed project site must be stabilized and not pose any additional sediment discharge risk than it did prior to the commencement of construction activity.

During operations of the proposed project, there is the potential for the proposed project to generate pollutants. Potential pollutants generated by the project post-construction that could affect water quality include sedimentation runoff from post-construction areas left exposed; fertilizer-derived nutrients from an increase in landscaped surface area; heavy-metal runoff from parking lots; organic compounds derived from hydrocarbons, solvents, and pesticides; trash and debris deposited in drain inlets; and hydrocarbons such as oil and grease from paved areas. Nonetheless, the project site is already disturbed and developed with an existing commercial structure and a graded lot. As such, the project would not result in additional impervious surfaces on site that could drastically alter the drainage pattern of the site and thus or result in waste discharge that would substantially surface or ground water quality. Further, all development within the City must comply with the Planning and Land Development Program requirements described in Los Angeles Regional Water Quality Control Board Order No R4-2012-0175 (NPDES Permit No. CAS004001), *Waste Discharge Requirements for Municipal Separate Storm Sewer System Discharges Within the Coast Watersheds of Los Angeles County, Except Those Discharges Originating from the City of Long Beach MS4* (LA County MS4 Permit) (LARWQCB 2012). The LA County MS4 Permit requires implementation of post-construction BMPs that would reduce stormwater pollution. As such, due to compliance with existing construction and post-construction regulations, impacts would be less than significant.

b) The project site is located within the Coastal Plain of Los Angeles Groundwater Basin (Central Basin) (Department of Water Resources 2019). The Central Basin is a high priority basin under the Sustainable Groundwater Management Act (SGMA), which requires that all basins designated as high or medium priority by DWR form a groundwater sustainability agency (GSA) to prepare and submit a groundwater sustainability plan (GSP) or directly submit an alternative analysis in lieu of forming a GSA. The Water Replenishment District of Southern California (WRD) submitted an alternative analysis on the basin condition that demonstrates that the basin has operated within a sustainable yield over a period of at least 10 years (Water Replenishment District of Southern California 2016). The project site is already developed with impervious surfaces and therefore is not considered a significant groundwater recharge area. As discussed in Section 19, water service at the site is provided by the Bellflower Somerset Mutual Water Company (BSMWC). Although BSMWC serves a lot of its customers from groundwater supplies, primary groundwater production wells are several miles away from the City and not within the project site. Therefore, the proposed project would not decrease groundwater supplies. Therefore, impacts would be less than significant.

c.i) The project site is developed with impervious surfaces. The closest river to the project site is the San Gabriel River, which runs in the north-south direction through the City boundaries, approximately 1 mile east of the project site. The proposed project would not result in the alteration of the San Gabriel River. Onsite runoff within the project site is presently conveyed to catch basins located along City streets. As discussed under Threshold b, above, the proposed project would not introduce additional impervious surfaces to the project site. Therefore, the drainage pattern of the project site will not be significantly altered with implementation of the proposed project. Further, per the LA County MS4 Permit, the proposed project would be required to prepare an erosion control plan which would incorporate BMPs to control erosion, debris, and construction-related pollutants (County of Los

Angeles 2017). Therefore, through compliance with existing regulations, the proposed project would not result in substantial erosion or siltation on- or off-site. Impacts would be less than significant.

c.ii) As discussed under Threshold c.i), above, the project site is developed with impervious surfaces. Onsite runoff within the project site is presently conveyed to catch basins located along City streets. The proposed project would not introduce additional impervious surfaces to the project site. Therefore, the drainage pattern of the project site will not be significantly altered with implementation of the proposed project. Thus, the proposed project would not substantially increase the rate or amount of runoff in a manner which would result in flooding on- or off-site. Impacts would be less than significant.

c.iii) As discussed under Threshold c.i), above, the project site is developed with impervious surfaces. Onsite runoff within the project site is presently conveyed to catch basins located along City streets. Because the proposed project would not introduce additional impervious surfaces to the project site, the proposed project would not significantly alter the existing drainage pattern. Further, the proposed project would be required to comply with the requirements of the LA County MS4 Permit, which requires implementation of post-construction BMPs that would reduce potential stormwater pollution. Thus, the proposed project would not 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. Impacts would be less than significant.

c.iv) As discussed under Threshold c.i), above, the project site is developed with impervious surfaces. Onsite runoff within the project site is presently conveyed to catch basins located along City streets. Because the proposed project would not introduce additional impervious surfaces to the project site, the proposed project would not significantly alter the existing drainage pattern in a way that would impede or redirect flood flows. Thus, impacts would be less than significant.

d) According to maps provided by the Federal Emergency Management Agency (FEMA), the project site is located within Zone X, which is outside of the 100-year flood zone area. Zone X includes areas of 0.2 percent annual chance of flood, areas of one percent annual chance of flood with average depths of less than one foot or with drainage areas less than one square mile, and areas protected by levees from one percent annual chance of flood (FEMA 2019). The proposed site is located approximately 16 miles east of the Pacific Ocean. Thus, the proposed project would not be located within a tsunami area. There are no existing lakes or reservoirs near the project site; thus, no seiche hazards are expected at the project site. Therefore, because no flood, tsunami, or seiche hazards are present nearby, there would be no impact.

e) The project site is located within the Los Angeles Region Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties (Basin Plan), designed to preserve and enhance water quality and protect the beneficial uses of all regional waters. As discussed under Threshold c.i), above, the nearest river to the project site is the San Gabriel River, which is located approximately 1 mile east of the project site. Various portions of the San Gabriel River are listed as impaired by Section 303(d) of the Clean Water Act and the Basin Plan (SWRCB 2016; LARWQCB 2014). As discussed under Thresholds c.i through c.iv, above, the proposed project would not result in the alteration of the San Gabriel River. Further, the proposed project would not introduce additional impervious surfaces to the project site that would result in significant alteration of the drainage pattern and drainage would be collected on site and thus not discharged into San Gabriel River. The proposed project would not affect the water quality in the San Gabriel River. The proposed project would not conflict with or obstruct the objectives of the Los Angeles Basin Plan for Coastal Watersheds. Impacts would be less than significant impact.

As discussed under Threshold b, above, the project site is located within the Central Basin (DWR 2019), a high priority basin under SGMA. The Water Recharge District (WRD) submitted an alternative analysis on the basin condition that demonstrates that the basin has operated within a

sustainable yield over a period of at least 10 years (Water Replenishment District of Southern California 2016). The project would not directly involve groundwater use, as no wells are proposed on-site. Further, the site is already developed with one existing structure and a graded lot. Therefore, the proposed project would not introduce additional impervious surfaces on site that would interfere with groundwater recharge in the area. The proposed project would not obstruct a sustainable groundwater management plan. Impacts would be less than significant.

11. LAND USE AND PLANNING

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XI. Land Use and Planning.				
Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☒	☐

Discussion

a) The project site is currently developed with a vacant commercial building and a parking lot with limited landscaping and is surrounded by development on all sides. Surrounding land uses include the Bellflower Bike Trail (segment west of Bellflower Boulevard), commercial uses and an associated parking garage (currently under construction) are located to the north; Bellflower Boulevard, the Bellflower Bike Trail (segment east of Bellflower Boulevard), surface parking lots, commercial uses, and the existing Pacific Electric Train Depot are located to the northeast; the Mayne Events Center and Los Angeles County Fire Museum to the east; Mayne Street, vacant commercial uses, and a surface parking lot to the south; single and multi-family residential uses to the southwest; and single and multi-family residential uses located immediately to the west (see Figure 2, project site and Surrounding Land Uses). Further, the proposed project would incorporate features that would improve circulation at the project site. As shown on the site plan in Figure 4, direct ingress/egress vehicular access to the Project would be provided at-grade from Oak Street, via a 24-foot wide dual lane driveway. Egress only would be allowed from the site onto Mayne Street. Pedestrian access would be provided from the existing sidewalks along Mayne Street and Oak Street. The Project would provide sidewalk improvements as well as maintain the above-ground utilities (i.e., electrical lines) located along both Mayne Street and Oak Street. As such, due to the developed nature of the site and its surroundings, and due to the circulation improvements proposed on-site, the project would not physically divide an established community. No impact would occur.

b) The project site is designated Mixed Use (MU) and Downtown Bellflower Station Area Specific Plan (Planning Area 3) in the General Plan. Development within Parcel A would involve a redevelopment of the existing structure and complete façade renovation/public plaza at Mayne Street and Bellflower Boulevard. Development within Parcel B would involve construction of a new five story, mixed-use, 91-unit condominium building with a 39,800 SF development footprint and 650 Square feet of commercial retail is included on the ground floor, in the north east corner of the building. Therefore, due to the commercial components incorporated into the proposed project, the project would be consistent with the existing general plan land use designation of the project site.

The project site is zoned TOD SP and includes the following underlying zone and overlay: 1) -Town Center (TC) District, Area 1 and Bellflower Village Overlay Zone – North (BVOZ-N). The TC zoning allows for various land uses such as office, restaurants, coffee house, game arcades, and pawn shops. The proposed project would be required to comply with the development standards of the TOD SP document (City of Bellflower 2019). These requirements include site dimension, height limits, and parking requirements. The project would be consistent with the permitted, conditionally permitted, and administrative conditionally permitted uses within the TOD SP. The land use requirements within the BVOZ-N area are outlined in the Specific Plan, which incorporates land use development standards and objectives within the Specific Plan area. The Specific Plan encourages the development and redevelopment of the City's downtown area into a creative, vital, and visionary neighborhood featuring a robust mix of residential and commercial uses (City of Bellflower 2019). The proposed

project incorporates a mixed-use development, which would include both residential and commercial uses. Therefore, the proposed project would be consistent with the Specific Plan. Impacts would be less than significant.

12. MINERAL RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XII. Mineral Resources.				
Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	☐	☐	☐	☒

Discussion

a) The City is urban and almost completely developed. No mineral resources are known to occur on or around the project site (Department of Conservation1982). Further, the project site is entirely disturbed. Therefore, valuable mineral resources are not known to exist within the City or the project site and the proposed project would not result in the loss of availability of a known mineral resource. No impact would occur.

b) The City is urban and almost completely developed. The City's General Plan Conservation Element does not identify any areas known to produce oil, natural gas, or coal deposits (City of Bellflower 1994). Further, the project site is entirely disturbed. Therefore, valuable mineral resources are not known to exist within the City or the project site and the proposed project would not result in the loss of availability of a known mineral resource. No impact would occur.

13. NOISE

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIII. Noise.				
Would the project result in:				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or in other applicable local, state, or federal standards?	☐	☐	☒	☐
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) Noise is defined as unwanted sound; however, not all unwanted sound rises to the level of a potentially significant noise impact. To differentiate unwanted sound from potentially significant noise impacts, the City has established noise regulations that take into account noise-sensitive land uses. The following discussion includes a brief description of the fundamental principles of noise and commonly used noise descriptors, a summary of applicable noise standards, and an evaluation of project-generated construction and operational noise.

Noise Principles and Descriptors

Audible sound is a physical disturbance in a medium, such as air, that is capable of being detected by the human ear. Sound waves in air are caused by variations in pressure above and below the static value of atmospheric pressure. Sound is measured in units of decibels on a logarithmic scale. The "pitch" (high or low) of the sound is a description of frequency, which is measured in hertz. Most common environmental sounds are composed of a composite of frequencies (Harris 1998).

The time-varying characteristic of environmental noise over specified periods of time is described using statistical noise descriptors in terms of a single numerical value, expressed as A-weighted decibels (dbA). The noise descriptors used in this analysis are summarized below (Harris 1998):

- **L_{eq}:** The L_{eq}, or equivalent sound level, is used to describe the noise level over a specified period of time, typically 1-hour, expressed as L_{eq}. The L_{eq} may also be referred to as the "average" sound level.

- **L_{max}:** The maximum, instantaneous noise level.

- **CNEL:** Community Noise Equivalent Level is the average noise level over a 24-hour day that includes an addition of 5 dBA to the measured hourly noise levels between the evening hours of 7:00 p.m. to 10:00 p.m. and an addition of 10 dBA to the measured hourly noise levels between the nighttime hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity during the evening and nighttime hours, respectively.

TOD SP Document

Section 4.5.4 requires Applicants for new noised-sensitive development (e.g., residential) must demonstrate to the Director that all habitable rooms would meet the45 dBA CNEL interior noise standard before the City issues building permits.

In addition, applicants must demonstrate that residential outdoor common areas and recreational areas within the 60 dBA CNEL noise contour of the transit line (which is the level considered normally acceptable for multifamily residential uses) will achieve 60 dBA CNEL to ensure compatibility with the ambient noise environment, or 65 dBA CNEL for areas where the acoustical analysis demonstrates that achieving a level of 60 dBA CNEL is clearly not feasible. Noise reduction measures could include increased setback from the rail right-of-way, shielding with noise barriers, or placing outdoor noise-sensitive areas behind buildings.

Section 17.48.240.2 prohibits loading/unloading activities abutting any residential building between the hours of 10:00 p.m. and 8:00 a.m. of the following day, including crates, containers, garbage cans, or similar objects.

Section 17.48.240.6 states any live music, or music systems (e.g., CD players, radios, tape players, digital audio players) shall be conducted, designed, installed, and operated in a manner which is not disturbing to surrounding Town Center (TC) District uses and abutting residential districts.

City of Bellflower General Plan Noise Element (1994)

In addition to the previously described provisions of the City's Municipal Code, the City has also established noise guidelines in the Noise Element of the City's General Plan that are used for planning purposes. These guidelines are based in part on the community noise compatibility guidelines established by the California State Governor's Office of Planning and Research and are intended for use in assessing the compatibility of various land use types with a range of noise levels. Table 11 provides the guidelines of land use compatibility for community noise sources. The CNEL noise levels for specific land uses are classified into four categories: (1) "normally acceptable" (2) "conditionally acceptable" (3) "normally unacceptable" and (4) "clearly unacceptable." A CNEL value of 70 dBA is considered the dividing line between a "conditionally acceptable" and "normally unacceptable" noise environment for noise sensitive land uses, including residences, transient lodgings, schools, and library.

The following policies that are applicable to the project address Citywide noise issues:

- Policy 1.4: Limit construction activities which impact adjacent residential uses to the hours of 7 a.m. to 8 p.m. during weekdays and Saturdays.

- Policy 1.5: Require construction activities to incorporate feasible and practical techniques which minimize noise impacts on adjacent areas.

- Policy 1.7: Ensure the outdoor noise limits for residential uses do not exceed 60 dBA CNEL for single family uses and 65 dB L_{dn} for multiple family uses.

- Policy 1.8: Ensure the indoor noise limits for all residential uses do not exceed 45 dB CNEL.

- Policy 1.9: Actively pursue sound wall mitigation measures with California Department of Transportation (Caltrans) and the Metropolitan Transit Authority (MTA).

Table 11
Guidelines for Noise Compatible Land Uses

Land Use Categories	*Day-Night Average Exterior Sound Level (CNEL, dB)*						
	50	*55*	*60*	*65*	*70*	*75*	*80*
Residential Single-Family, Duplex, Mobile Homes	A	A	A/C	C	N	U	U
Residential Multi- Family	A	A	A/C	C	N	U	U
Transient Lodging, Hotel, Motel	A	A	A/C	C	N	U	U
School, Library, Church, Hospital, Nursing Home	A	A	A/C	A/C	C/N	N	U
Auditorium, Concert Hall, Amphitheater	C	C	C	C/N	U	U	U
Sports Arena, Outdoor Spectator Sports	C	C	C	C	C/N	U	U
Playground, Neighborhood Park	A	A	A	A	A/U	N/U	U
Golf Course, Riding Stable, Water Recreation, Cemetery	A	A	A	A	A/N	A/N	U
Office Building, Business, Commercial, Professional	A	A	A	A	A/C	C/N	N
Agriculture, Industrial, Manufacturing, Utilities	A	A	A	A	A/C	C/N	N

Notes:
Based on the Governor's Office of Planning and Research, "General Plan Guidelines," 1990. To help guide determination of appropriate land use and mitigation measures vis-a-vis existing or anticipated ambient noise levels.
A = Normally Acceptable: Specified land use is satisfactory, based upon the assumption buildings involved are conventional construction without any special noise insulation.
C = Conditionally Acceptable: New construction or development only after a detailed analysis of noise mitigation is made and needed noise insulation features are included in project design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning would suffice.
N – Normally Unacceptable: New construction or development generally should be discouraged. A detailed analysis of the noise reduction requirements must be made and noise insulation features included in the design of a project.
U – Clearly Unacceptable: New construction or development should generally not be undertaken.
Source: City of Bellflower General Plan, Noise Element, 1994.

Construction Noise

The project construction schedule is anticipated to begin in March 2021 and be complete in March 2023. Construction hours are proposed to be from 7:00 a.m. to 5:00 p.m., Monday through Saturday. The project is proposed to be completed in one phase, with Theater renovation and residential building demolition occurring concurrently[4].

Noise from construction activities would be generated by the operation of vehicles and equipment involved during various stages of construction: demolition, site preparation, grading, building construction, architectural coating, and paving. The noise levels generated by construction equipment would vary depending on factors such as the type and number of equipment, the specific model (horsepower rating), the construction activities being performed, and the maintenance condition of the equipment.

Individual pieces of construction equipment anticipated to be used during project construction could produce maximum noise levels of 74 dBA to 90 dBA at a reference distance of 50 feet from the noise source (FHWA 2006). These maximum noise levels would occur when equipment is operating under full power conditions. Equipment operating under full power only occurs during a portion of a day. Thus, estimate usage factors, consistent with Federal Highway Administration (FHWA) guidance, were used to estimate average hourly noise levels for each piece of equipment. Then, to evaluate project anticipated construction noise levels that would occur throughout the day, the evaluation

[4] Demolition of existing building has already occurred. By presenting demolition activities, the modeling reflects a conservative estimate of noise impacts during construction.

assumed that up to four construction equipment pieces would operate simultaneously at 75 feet from the nearest residence, with demolition and renovation activities occurring simultaneously.

Based on modeling conducted, combined maximum noise levels could reach 85.3 dBA L_{max} and average hourly levels could reach 79.4 dBA L_{eq} at the nearest residential receptors located approximately 75 feet to the west of the project site. Refer to Appendix E (Noise Calculations) for modeling inputs and outputs.

The City of Bellflower has not adopted construction-related noise thresholds. However, construction noise impacts generally occur when construction activities are prolonged and occur during sensitive times of the day, thus, having the potential to disturb people when sleeping. As discussed above, construction activities would be required to comply with City Policy 1.4 that limits construction activities to the day-time hours (i.e., 7:00 a.m. and 8:00 p.m.), when people are not generally sleeping and are less sensitive to noise. In addition, for comparison purposes, noise levels can be compared to OSHA standard limit of noise exposure which are 90 dB or less over eight continuous hours, or 105 dB or less over one continuous hour. Modeling conducted assumed a worst-case scenario with multiple pieces of equipment operating simultaneously throughout the day and predicted noise levels would not exceed OSHA limits. Thus, because construction activities would be temporary (i.e., two years), would occur during the daytime hours when people are less sensitive to noise, and would not exceed OSHA's recommended maximum exposure levels, construction noise impacts would be less than significant**.**

Operational Traffic Noise

The existing noise environment in the project vicinity is dominated by traffic noise from nearby roadways, as well as nearby commercial activities. Long-term operations of the project would have a minimal effect on the noise environment within the proximity of the project area. Noise generated by the project would result primarily from the increased traffic on local roads.

Vehicle trips attributed to operation of the project would increase the average daily traffic (ADT) volumes along the major thoroughfares within the project vicinity which was analyzed to determine if any traffic-related noise impacts would result from project implementation. The street segments selected for this analysis include residential land uses which are the most affected by traffic increases generated by the project. Traffic noise modeling was conducted in accordance with FHWA and Caltrans guidance for both the existing and the existing plus project conditions and based on traffic data included in the Traffic Impact Assessment completed for the project (Appendix F). Traffic noise model inputs and outputs are included in Appendix E. Predicted noise levels under both existing and existing plus project conditions are shown below in Table 12.

Table 12
Modeled Existing and Existing Plus Project Traffic Noise Levels

Roadways Adjacent to Following Intersections	***Calculated Traffic Noise Levels at 100 feet from Roadway (dBA CNEL)***			***Exceed Threshold?***
	Existing [a]	***Existing +Project*** [a]	***Change***	
Ardmore Avenue, Flower Street to Oak Street	55.4	55.8	0.4	No
Ardmore Avenue, Oak Street to Mayne Street	54.9	55.2	0.2	No
Oak Street, West of Ardmore Avenue	55.4	55.6	0.2	No
Oak Street, Ardmore Avenue to Orchard Avenue	55.2	55.6	0.4	No

Roadways Adjacent to Following Intersections	Calculated Traffic Noise Levels at 100 feet from Roadway (dBA CNEL)			Exceed Threshold?
	Existing [a]	Existing +Project [a]	Change	
Oak Street, Orchard Avenue to Project site	56.5	56.9	0.3	No
Oak Street, Project site to Bellflower Boulevard	56.5	57.3	0.8	No
Mayne Street, Orchard Avenue to Project site	56.9	57.4	0.6	No
Mayne Street, Project site to Bellflower Boulevard	56.9	58.2	1.3	No
Bellflower Boulevard, South of Flower Street	64.0	64.1	0.1	No
Bellflower Boulevard, Flower Street to Oak Street	63.4	63.6	0.2	No
Bellflower Boulevard, Oak Street to Mayne Street	63.6	63.9	0.3	No
Bellflower Boulevard, Mayne Street to Alondra Boulevard	64.0	64.2	0.2	No
Bellflower Boulevard, North of Alondra Boulevard	63.4	63.5	0.1	No
Alondra Boulevard, West of Bellflower Boulevard	64.5	64.6	0.1	No
Alondra Boulevard, East of Bellflower Boulevard	64.6	64.7	0.1	No
Flower Street, Orchard Avenue to Bellflower Boulevard	61.1	61.1	0.1	No
Flower Street, East of Bellflower Boulevard	61.6	61.8	0.2	No

Source: Modeled by Ascent Environmental, Inc. 2019

As shown above in Table 12, operation of the project would not result in a substantial increase in project-related traffic noise levels over existing traffic noise levels.

With respect to the community noise assessment for operational noise levels, changes in noise levels of less than 3 dBA are generally not discernable to most people, while changes greater than 5 dBA are readily noticeable and would be considered a significant increase. Therefore, the significance threshold for mobile source noise is based on human perceptibility to changes in noise levels (increases) with consideration of existing ambient noise conditions and City's guidelines for noise compatible land use in Table 11. As shown above in Table 12, the increase in noise levels on all modeled roadway segments would be substantially less than the 3 dBA, with the greatest increase being slightly over 1 dBA. Increases in traffic noise as a result of the project would not be perceptible to the human ear. As a result, project-related traffic noise impacts would be less than significant.

b) The project would not result in any major operational sources of vibration (e.g., rail lines, transit stations), and therefore, this discussion focusses on short-term construction-generated vibration. Prior to the analysis, a brief discussion of vibration principles is included.

Foundations of Vibration

Vibration can be interpreted as energy transmitted in waves through the ground or man-made structures, which generally dissipate with distance from the vibration source. Because energy is lost during the transfer of energy from one particle to another, vibration becomes less perceptible with increasing distance from the source.

Vibration sources include the use of heavy-duty equipment during construction and operational sources include major transit (e.g., rail, transit stations) development. Maintenance operations and traffic traveling on roadways can also be a source of such vibration. If its amplitudes are high enough, ground vibration has the potential to damage structures, cause cosmetic damage or disrupt the operation of vibration-sensitive equipment such as electron microscopes and advanced technology production and research equipment. Ground vibration and groundborne noise can also be a source of annoyance to individuals who live or work close to vibration-generating activities.

In describing vibration in the ground and in structures, the motion of a particle (i.e., a point in or on the ground or structure) is used. The concepts of particle displacement, velocity, and acceleration are used to describe how the ground or structure responds to excitation. Although displacement is generally easier to understand than velocity or acceleration, it is rarely used to describe ground and structure borne vibration because most transducers used to measure vibration directly measure velocity or acceleration, not displacement. Accordingly, vibratory motion is commonly described by identifying the peak particle velocity (PPV).

Construction Vibration

Possible sources of vibration would include heavy-duty construction equipment such as pile drivers, bulldozers, dump trucks, backhoes, rollers, and blasting activities. It is not anticipated that blasting or pile driving would be required, thus, the use of heavy bull dozers would generate the greatest levels of vibration.

When considering potential impacts from construction-related vibration, both structural damage and human disturbance within occupied nearby structures are considered. Regarding structural damage, Caltrans provides guidance for various structure types. In accordance with Caltrans guidance, a residential structure could be damaged if exposed to vibration levels that exceed 0.5 PPV/second (Caltrans 2013). As documented in Appendix E, vibration levels would not exceed 0.044 PPV/second at a distance of 40 feet. Regarding human disturbance from construction activities, the Federal Transit Administration (FTA) considers a vibration level of 65 vibration decibels (VdB) to be the threshold of perceptibility for humans. Based on FTA's vibration criteria, a significant impact would occur if vibration levels exceeded 80 VdB within places where people normally sleep (FTA 2018). As discussed above, construction activities would take place during the daytime hours when people are generally not sleeping and would therefore not be disrupted. Thus, this analysis focusses on the potential for structural damage to nearby existing buildings. The proposed project would result in a less than significant impact.

c) The project is located within the City of Bellflower, not within the vicinity of a private airstrip, an airport land use plan, or within 2 miles of a public airport. Therefore, the project would not expose people to excessive airport-related noise and there would be no impact.

14. POPULATION AND HOUSING

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIV. Population and Housing. Would the project:				
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☒	☐
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Discussion

a) The proposed project would introduce 62 one-bedroom units and 29 two-bedroom units to the project site, for a total of 91 units. According to the 2018 U.S. Census data, the City had an estimated population of 77,131 persons and an average household size of 3.3 persons in 2018 (U.S. Census Bureau 2018). Due to the addition of 91 units, the proposed project is estimated to introduce approximately 301 persons to the project site. This represents an approximately 0.4 percent increase over the City's existing population. This increase is not considered substantial and thus would not directly induce substantial unplanned population growth in an area. Further, the proposed project would be located on a developed site that is already served by existing infrastructure. Thus, the project would not result in indirect unplanned growth in the area. Impacts would be less than significant.

b) The proposed project is already developed with an existing structure and no residential uses currently exist on site. Due to the fact that the proposed project site does not contain any housing, no people would be displaced as a result of the project. Therefore, development of the proposed project would not displace any existing housing or people, and no impact would occur.

15. PUBLIC SERVICES

ENVIRONMENTAL ISSUES	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
XV. Public Services.				
Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:				
Fire protection?	☐	☐	☒	☐
Police protection?	☐	☐	☒	☐
Schools?	☐	☐	☒	☐
Parks?	☐	☐	☒	☐
Other public facilities?	☐	☐	☒	☐

Discussion

a.i) The Los Angeles County Fire Department (LACFD) provides fire protection and emergency medical services for the City and the project site. The LACFD provides traditional fire and life safety services to approximately 4 million residents living in 1.23 million housing units in 58 cities and all unincorporated areas of Los Angeles County (LACFD 2017). The LACFD has two stations located within the City: Station 23, located at 9548 East Flower Street, approximately 0.32 miles southwest of the project site; and Station 98, located at 9814 Maplewood Avenue, approximately one-mile northeast of the project site (LACFC 2019).

Construction of the proposed project could temporarily increase the demand for fire protection and emergency medical services, and could cause the occasional exposure of combustible materials, such as wood, plastics, sawdust, coverings and coatings, to heat sources including machinery and equipment sparking, exposed electrical lines, welding activities, and chemical reactions in combustible materials and coatings. Typical of any development, however, all construction managers and personnel should be trained in fire prevention and emergency response, as required by OSHA. Further, fire suppression equipment required by any typical construction would also be maintained in accordance with the 2019 California Fire Code, and Chapter 15.40 Fire Code, of the Bellflower Municipal Code. Compliance with these regulations would reduce potential impacts of fire hazards to insignificant levels. Construction-related traffic could result in increased travel time due to flagging or stopping of traffic to accommodate trucks entering and exiting the construction site. However, all potential impacts would be temporary and on an intermittent basis and truck routes for material and equipment deliveries and disposal, would require approval by the City's Public Works Department. Therefore, impacts regarding emergency response times and emergency access during construction would be less than significant.

Following construction, operation of the proposed project would introduce approximately 301 persons to the project site, which would increase the demand for fire protection and emergency medical services. However, the proposed project would be subject to fire protection design standards, as applicable, per the 2016 CBC, the 2016 Los Angeles County Fire Code, and Chapter 15.40 of the City's Municipal Code, to ensure adequate fire protection. Further, the proposed project would be located an urban infill development site within an existing fire service area and is already served by LACFD. As such, due to the minimal increase of residents and employees at the project site, and the fact that the site is already served by LACFD, and with compliance all federal, state, and local fire

and emergency response regulations, the proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered fire or police facilities. Impacts would be less than significant.

a.ii) Police protection for the City and the project site is provided by the Los Angeles County Sheriff's Department (LASD), which is under contract with the City's local law enforcement services. The LASD serves an area of approximately 4,084 square miles with a population of approximately 10 million persons. The LASD provides general law enforcement services to 42 contract cities; 141 unincorporated communities; 216 facilities, hospitals, and clinics located throughout the County; nine community colleges; the Metropolitan Transit Authority; and 37 Superior Courts. The LASD further provided services such as laboratories and academy training to other law enforcement agencies located within the County. In addition, the LASD is responsible in securing approximately 18,000 inmates daily in seven custody facilities which includes providing food and medical treatment. The LASD includes approximately 18,000 employees (LASD 2017). The nearest station is the Bellflower Sheriff Substation Sub Station located at 16615 Bellflower Boulevard.

Construction of the proposed project could require the storage of equipment and building materials, which could result in theft, graffiti, and vandalism. Typical of any development, perimeter fencing will be required for those developments that store equipment and building materials onsite.

After construction, operations of future development could increase the demand for police protection services through the addition of approximately 301 persons at the project site. However, the project site is already developed and served by existing law enforcement, which is 0.003 percent of LASD's serving population of 10 million. Further, the proposed project would be consistent with the existing zoning and land use designation at the project site and therefore this increase in population has already been accounted for in the City's plans for growth. Therefore, the proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered police protection facilities.

a.iii) As discussed above, the proposed project would introduce approximately 301 persons to the project site, which could increase student enrollment within those schools located in the City. However, the applicant would be required to pay appropriate school fees to alleviate potential burden on existing school capacities for the residential component of the project to alleviate potential burden on existing school capacities. Therefore, with payment of appropriate fees, impacts to schools would be less than significant.

a.iv) As discussed above, the proposed project would introduce approximately 301 persons to the project site, which could increase demand for parks within the City. Typical of any development, the applicant would be required to pay park fees for the residential portion of the project in order to alleviate potential burden on existing parks. Therefore, with payment of appropriate fees, impacts to parks would be less than significant.

a.v) The proposed project does not propose any land uses that would directly result in the need for other additional public services. The additional population resulting with the proposed project represents about a 3.3 percent increase over the existing City population, which is not considered significant. The proposed project would not result in the need or alteration of any other public facilities. Impacts would be less than significant.

16. RECREATION

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVI. Recreation.				
Would the project:				
a) 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) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☐	☒

Discussion

a) As discussed under Section 9, the proposed project could potentially increase population by approximately 301 persons, which could increase demand on parks and recreational facilities nearby. However, the applicant would be required to pay park fees for the residential portion of the project in order to alleviate potential burden on existing parks. Therefore, with payment of appropriate fees, impacts to parks would be less than significant.

b) The proposed project does not include the construction of recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment. No impacts would occur.

17. TRANSPORTATION

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVII. Transportation.				
Would the project:				
a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?	☐	☐	☒	☐
b) Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	☐	☐	☐	☒
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐
d) Result in inadequate emergency access?	☐	☐	☒	☐

Discussion

a) The proposed project's potential impacts related to applicable plans, ordinances, and policies establishing measures of effectiveness for the performance of the circulation system were analyzed in the Traffic Impact Analysis (TIA) prepared by Gandini and included as Appendix F of this MND. The TIA conservatively assumed that the proposed project would generate 2,207 new vehicle trips per day for both weekdays and weekends, including 39 trips during the AM peak hour and 115 trips during the PM peak hour (Appendix F). The following analysis is based on that report.

Methodology

In accordance with City of Bellflower guidelines, analysis of signalized intersections is based on the Intersection Capacity Utilization (ICU) methodology, which compares the volume of traffic using the intersection to the capacity of the intersection. The resulting volume-to-capacity (V/C) represents the portion of the hour required to provide sufficient capacity to accommodate all intersection traffic if all approaches operate at capacity. Level of service (LOS) is used to qualitatively describe the performance of a roadway facility, ranging from LOS A (free-flow conditions) to LOS F (extreme congestion and system failure). The technique used to assess the performance of unsignalized intersections is known as the intersection delay methodology based on the procedures contained in the Highway Capacity Manual. The methodology compares the traffic volume using the intersection to the capacity of the intersection to calculate the delay associated with the traffic control at the intersection. LOS is also used to qualitatively describe the performance of a roadway facility, ranging from LOS A to LOS F. The City has established LOS D as the minimum acceptable LOS. Therefore, for the purposes of this analysis, a significant impact would occur if an intersection is operating at an acceptable LOS without the project but would operate at an unacceptable LOS (LOS E or F) with the project or if the project related increase in the volume-to-capacity ratio equals or exceeds a V/C ratio of 0.91 or more or results in an incremental increase of 0.02 or more.

Existing and Existing Plus Project Analysis

The existing traffic conditions are based on the current roadway conditions shown in Figure 3 of the TIA and traffic counts conducted on October 2019. Refer to the TIA for additional details regarding the roadway classifications, speed limits, and other details.

Intersection Analysis

Under the existing conditions, all intersections operate at acceptable LOS B or better during peak hours for existing conditions. With the addition of project traffic to the existing conditions, all

intersections would continue to operate acceptably at LOS C or better (Table 13). Thus, the project would have a less than significant impact to intersections under the existing conditions.

Table 13
Existing Plus Project Intersection Level of Service

Study Intersection	Traffic Control	AM Peak Hour		PM Peak Hour	
		ICU[b] or [Delay][c]	LOS[c]	ICU[b] or [Delay][c]	LOS[c]
Ardmore Avenue and Oak Street	AWS	[8.2]	A	[8.2]	A
Parking Garage Driveway and Mayne Street	CSS	[9.9]	A	[10.7]	B
Project Driveway and Oak Street	CSS	[10.7]	B	[11.2]	B
Bellflower Boulevard at Alondra Boulevard	TS	0.660	B	0.690	B
Bellflower Boulevard and Mayne Street	TS	0.552	A	0.603	B
Bellflower Boulevard and Oak Street	TS	0.575	A	0.617	B
Bellflower Boulevard and Flower Street	TS	0.663	B	0.707	C

Notes:
[a] AWS = All Way Stop; CSS = Cross Street Stop; TS = Traffic Signal
[b] ICU = Intersection Capacity Utilization.
[c] Delay is shown in [seconds/vehicle'. Delay is reported for un-signalized study intersections. For intersections with all way stop control, overall average intersection delay and LOS are shown. For intersections with cross street stop control, LOS is based on average delay of the worst individual lane (or movements sharing a lane)
Source: Appendix F

Opening Year (2023) Without Project

To develop Opening Year (2023) Without Project volume forecasts, Existing volumes were combined with trips generated by other developments. The delay and Levels of Service for Opening Year (2023) Without Project conditions are shown in Table 13. As shown in Table 14, the study intersections are forecast to operate at Levels of Service C or better during the peak hours for Opening Year (2023) Without Project conditions. Thus, the project would have a less than significant impact to intersections under the Opening Year (2023) Without Project.

Table 14
Opening Year (2023) Without Project Intersection Level of Service

Study Intersection	Traffic Control[a]	AM Peak Hour		PM Peak Hour	
		ICU[b] or [Delay][c]	LOS[c]	ICU[b] or [Delay][c]	LOS[c]
Ardmore Avenue and Oak Street	AWS	[8.3]	A	[8.3]	A
Parking Garage Driveway and Mayne Street	CSS	[11.7]	B	[13.5]	B
Project Driveway and Oak Street	CSS	[10.5]	B	[11.0]	B
Bellflower Boulevard at Alondra Boulevard	TS	0.692	B	0.791	C
Bellflower Boulevard and Mayne Street	TS	0.675	B	0748	C
Bellflower Boulevard and Oak Street	TS	0.623	B	0.674	B
Bellflower Boulevard and Flower Street	TS	0.717	C	0.7697	C

Notes:
[a] AWS = All Way Stop; CSS = Cross Street Stop; TS = Traffic Signal
[b] ICU = Intersection Capacity Utilization.
[c] Delay is shown in [seconds/vehicle'. Delay is reported for un-signalized study intersections. For intersections with all way stop control, overall average intersection delay and LOS are shown. For intersections with cross street stop control, LOS is based on average delay of the worst individual lane (or movements sharing a lane)
Source: Appendix F

Opening Year (2023) With Project

Opening Year (2023) With Project volume forecasts were developed by adding project-generated trips to the Opening Year (2023) Without Project forecast. The Opening Year (2023) Without Project forecasts have been reduced for the parking garage on the northwest corner of Bellflower Boulevard and Mayne Street to account for project traffic. Thus, when project traffic is added for Opening Year (2023) With Project conditions, the parking garage trip generation will be at its full trip generation forecast. As shown in Table 15, the proposed project is forecast to result in no significant traffic impacts at the study intersections for Opening Year (2023) With Project conditions. Thus, the project would have a less than significant impact to intersections under the Opening Year (2023) Without Project.

Table 15
Opening Year (2023) With Project Intersection Level of Service

Study Intersection	Traffic Control[a]	AM Peak Hour		PM Peak Hour	
		ICU[b] or [Delay][c]	LOS[c]	ICU[b] or [Delay][c]	LOS[c]
Ardmore Avenue and Oak Street	AWS	[8.3]	A	[8.4]	A
Parking Garage Driveway and Mayne Street	CSS	[11.8]	B	[13.7]	B
Project Driveway and Oak Street	CSS	[10.9]	B	[11.4]	B
Bellflower Boulevard at Alondra Boulevard	TS	0.695	B	0.791	C
Bellflower Boulevard and Mayne Street	TS	0.680	B	0.746	C
Bellflower Boulevard and Oak Street	TS	0.638	B	0.690	B
Bellflower Boulevard and Flower Street	TS	0.720	C	0.772	C

Notes:
[a] AWS = All Way Stop; CSS = Cross Street Stop; TS = Traffic Signal
[b] ICU = Intersection Capacity Utilization.
[c] Delay is shown in [seconds/vehicle'. Delay is reported for un-signalized study intersections. For intersections with all way stop control, overall average intersection delay and LOS are shown. For intersections with cross street stop control, LOS is based on average delay of the worst individual lane (or movements sharing a lane)
Source: Appendix F

Pedestrian, Bicycle, and Transit Access

Pedestrian and Bicycle Access

Pedestrian facilities at the project site include a sidewalk that extends from Bellflower Boulevard to the west along both Oak and Mayne Street. The proposed project would provide pedestrian improvements, such as pedestrian access, to be provided from the existing sidewalks along Mayne Street and Oak Street, which would enhance pedestrian activity within the project site. Bellflower Bike Trail is located along Pacific Avenue, approximately 85 feet north of the project site. The proposed project does not propose bicycle facilities or improvements and would not result in impacts to the Bellflower Bike Trail or other bicycle facilities nearby. Bicycle racks will be included in the adjacent parking structure. therefore, as the proposed project would promote the effectiveness for the performance of the pedestrian system and not impact the existing bicycle system, impacts would be less than significant.

Transit

Bellflower Bus North Route services Bellflower Boulevard and Flower Street, while Bellflower Bus South Route services Bellflower Boulevard, and Oak Street. A bus stop is situated on the west side of Bellflower Boulevard south of Oak Street and near the project site. Route 127, provided by the Los Angeles Metropolitan Transportation Authority (Metro), also services Bellflower Boulevard north of Alondra Boulevard and Route 128 services Alondra Boulevard in the study area. Lastly, Long Beach Transit also provides bus services near the project site. Long Beach Transit bus routes include Route 91, which services Bellflower Boulevard and Alondra Boulevard, and Route 93, which services Bellflower Boulevard, Alondra Boulevard, and Flower Street. A bus stop is situated on the west side

of Bellflower Boulevard and south of Oak Street, and on the east side of Bellflower Boulevard north of Mayne Street. As discussed in the TIA, using methodology included Metro's 2010 Congestion Management Program, the proposed project is expected to generate approximately 108 daily transit trips, including two a.m. peak hour and 6 PM peak hour trips. A light rail station is anticipated to be constructed at Bellflower Boulevard and Flower Street for the West Santa Ana Branch Transit Corridor by 2028. Upon completion of the West Santa Ana Branch Transit Corridor station, the proposed project would generate approximately 309 daily transit trips, including 5 a.m. peak hour and 16 p.m. peak hour trips. Based on the existing transit services available in the project vicinity and the relatively low transit trip generation, the proposed project is forecast to have a less than significant impact on transit service.

b) CEQA Guidelines Section 15064.3 (b) now requires that all traffic impacts be analyzed based on VMT. Traditionally, traffic impacts were analyzed based on levels of service on roadways and intersections. All cities will be required to conduct future traffic analysis based on VMT by July 1, 2020, unless adopted earlier by the lead agency. The City has not elected this provision ahead of the standard schedule and, therefore, this section does not yet apply. No impact would occur.

c) As shown in Figure 4, Site Plan, the proposed project includes circulation improvements of the site. Direct ingress/egress vehicular access to the Project would be provided at-grade from Oak Street, via a 24-foot wide dual lane driveway. Egress only would be allowed from the site onto Mayne Street. Pedestrian access would be provided from the existing sidewalks along Mayne Street and Oak Street. More specifically, the project would provide a north to south driveway at Oak Street which would provide one inbound lane and one outbound lane with southbound stop-control. Both the existing eastbound and westbound lane on Park Lane would be shared through left and right turn movements, while the new southbound lane at the project driveway will allow shared left, through, and right turn movements. At project driveway at Mayne Street would provide one outbound lane with a northbound stop-control. The new northbound lane at this driveway will allow share left and right turn movements. The proposed driveways would be required to comply with all applicable City standards and regulations relating to traffic circulation and access and would be designed to ensure that significant safety hazard would not result. Impacts would be less than significant.

d) As discussed under Threshold c, above, the project would provide two access points that may be utilized during an emergency. In addition, the project driveway would be provided in accordance with City standards that ensure adequate emergency access. Overall, the project would provide adequate emergency access. Impacts would be less than significant.

18. TRIBAL CULTURAL RESOURCES

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVIII. Tribal Cultural Resources.				
Has a California Native American Tribe requested consultation in accordance with Public Resources Code section 21080.3.1(b)?	☒ Yes		☐ No	
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:				
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 Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?	☐	☒	☐	☐

Discussion

a) The project site is developed with existing structures and improvements. None of these existing structures and improvements are listed or eligible for listing on the California Register of Historical Resources as defined by PRC Section 5020.1(k) or of any known value to a Native American Tribe. To confirm that Native American resources would not be disturbed, in accordance with AB52, staff sent letters on April 15, 2019, requesting consultation with the following Native American Tribal Governments: Gabrielino Tongva Nation; Soboba Band of Luiseno Indians; Gabrielino-Tongva Tribe; Gabrielino Band of Mission Indians – Kizh Nation; Gabrielino/Tongva San Gabriel Band of Mission Indians; Gabrielino Tongva Indians of California Tribal Council and Torres Martinez Desert Cahuilla Indians. The Torrez Martinez Desert Cahuilla Indians submitted a letter dated June 3, 2019 and had no comments. Project impacts would be less than significant.

b) As discussed in Section 5, there are no existing structures within the project site that could be considered to be historically significant based on set forth in PRC Section 5024.1(c). Furthermore, none of the Native American Tribes identified any specific historical or cultural resource that could be deemed significant during the consultation process. The potential for unknown buried tribal cultural resources is considered low in this fully developed urban environment where heavy soil disturbance has occurred. Although unlikely, if any previously unknown subsurface artifacts are encountered during ground-disturbance activities, MM-CUL-1 would be implemented, which requires grading to be halted in the event of an archaeological discovery and the resource to be addressed by a qualified archaeologist in accordance with the City's criteria. Therefore, impacts to unknown Tribal resources would be less than significant with mitigation.

19. UTILITIES AND SERVICE SYSTEMS

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIX. Utilities and Service Systems.				
Would the project:				
a) Require or result in the relocation or construction of construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunication 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 that 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) **Water**: Water service is provided to the project site by the Bellflower Somerset Mutual Water Company (BSMWC) (City of Bellflower 2016). Customer needs are served through local groundwater with supplemental quantities coming from recycled water. BSM owns roughly three quarters of the ground water supplies needed to serve its customers and leases the remainder from the City of Bellflower (BSMWC 2019). Currently, the project site is already entirely disturbed and not used as a local groundwater recharge facility as the area is mostly built out with a relatively high impervious condition. The primary groundwater production wells are several miles away from the City (BSMWC 2011). The proposed project is located on an already developed site and is surrounded by development on all sides.

As discussed under Threshold b, below, BSMWC has the capacity to serve the proposed project. Therefore, the proposed project would not require or result in the relocation or construction of new or expanded water facilities. Impacts would be less than significant.

Sewer: Regarding sewer service, two sanitary systems exist in the City. One of the systems are local lines operated by the City of Bellflower and the other are trunk sewers operated by Los Angeles County Sanitation Districts (LACSD) (City of Bellflower 2014). The City Public Works Department manages the City's sanitation sewer collection system and serves a population of approximately 77,000 people. The collection system consists of about 99 miles of gravity sewer lines. Sewage is collected by City collector facilities and then conveyed to trunk sewers owned and maintained by LACSD District #2, which then treats the sewage at the regional Los Coyotes Water Reclamation Plant (LCWRP) or the Joint Water Pollution Control Plant (JWPCP) in Carson. Wastewater generated by the proposed project would be treated only at the JWPCP (City of Bellflower 2019d). Wastewater generated within the proposed project would flow into local sewer lines, owned by the City and eventually into the regional LASD sewer lines (City of Bellflower 2019d).

The City prepared a Sewer System Management Plan (SSMP) in 2014 to provide a plan and schedule to properly manage, operate, and maintain all parts of the sanitary sewer system (City of Bellflower 2014). The SSMP includes the entire City and therefore the project site. The SSMP performed an evaluation of the existing wastewater collection system within the City, including sewer line and manhole inspections, gas trap manholes, and sewer line cleaning. The proposed project was included in the City of Bellflower Sewer Master Plan (SMP) performed in March 2007. The purpose of the SMP was to evaluate the existing wastewater collection system in the City of Bellflower, which included modeling infrastructure to determine any deficient segments and propose improvements for the future. The SMP noted three tiers of deficiencies for sewer lines across the City, based on depth of flow to diameter of pipe (d/D) ratio. Priority 1 Improvement lines are located along Alondra Boulevard, Clark Avenue and Woodruff Avenue. Priority 2 Improvement lines are on Alondra Boulevard and Clark Avenue (City of Bellflower 2019c). The proposed project is not located within areas of these needed improvements and no new or expanded services would be required as a result of the proposed project. The project would not require or result in the relocation or construction of construction of new or expanded water, wastewater treatment facilities, the construction or relocation of which could cause significant environmental effects. Impacts would be less than significant.

Drainage: The project site is already developed with one existing structure and a graded lot. As such, the project would not result in additional impervious surfaces on site that could drastically alter the drainage pattern of the site. Thus, the project is not expected to require or result in the relocation or construction of new or expanded storm water drainage. Impacts would be less than significant.

Electric and Telecommunications: Electric service is provided by Southern California Edison (SCE); telecommunication service is provided by multiple carriers. The proposed project is located on an already developed site and is surrounded by development on all sides. While on-site utility improvements would be required to service the proposed mixed-use project, such utilities are included in the project and addressed by the environmental analysis included herein. Construction of these utilities would not result in environmental effects aside those outlined in this Initial Study. Impacts would be less than significant.

b) The proposed project would increase the intensity of uses on the project site, resulting in increased water use. CalEEMod default water usage rates were used to estimate the anticipated water demand of the proposed project. Based on the CalEEMod generation rates, water use per day during project operation would be approximately 43,912 gallons per day or 16 million gallons per year (Appendix A).

As discussed under Threshold a, above, the project site is within the water service boundaries of the BSMWC. The BSMWC serves potable water to an area of approximately 2.63 square miles of the City and approximately 46,230 people. According to BSMWC's 2011 Urban Water Management Plan (UWMP), BSMWC would have adequate supplies to serve its service area for a one, two, and three-year period during a single dry year and multiple dry years. With a 50 percent reduction of purchased water, BSMWC would still be able to provide 5,662 acre-feet per year of water or 5.1 million gallons per day to its service area. The water consumption estimated for the proposed project would consist of 0.9 percent of the water supply provided by BSMWC to its service area even with a 50 percent reduction in purchased water. Therefore, because BSMWC has adequate supplies to serve its service area during a single dry year and multiple dry years, and because water consumption estimated to occur as a result of the proposed project would be minimal, impacts would be less than significant.

c) As discussed under threshold a, above, LASD provides wastewater service to the project site. CalEEMod default water usage rates were used to estimate the anticipated water demand of the proposed project. Wastewater generated by the proposed project would be treated only at the JWPCP (City of Bellflower 2019d). Based on the CalEEMod generation rates, wastewater use per day during project operation would be approximately 30,137 gallons per day or 11 million gallons per year (Appendix A). The JWPCP currently has the capacity to handle approximately 100 million gallons of wastewater per day. The proposed project would result in 0.03 percent of JWPCP's current capacity.

Therefore, the increase in wastewater attributed to the project would be nominal and adequate capacity is available to serve the project's projected demand, in addition to the provider's existing commitments. Impacts would be less than significant.

d) The proposed project would generate solid waste and recycling during both the construction and operation of the project. The California Integrated Waste Management Act of 1989 (AB 939) requires the City to divert 50% of its waste from landfills. In an effort to comply with AB 939, on December 8, 2003 the Bellflower City Council adopted Ordinance No. 1055, the C&D Waste Management Plan Ordinance of the City of Bellflower. The ordinance requires diversion, via reuse or recycling of 100% of all inert debris, such as concrete and dirt, and 50% of the remaining C&D debris generated by all construction and renovation projects whose total cost, or projected cost are greater than or equal to $50,000. On September 13, 2010, the City Council amended the C&D Ordinance to include all demolition projects of any valuation. The project applicant would be required to submit a waste management plan (WMP) prior to being issued a building or demolition permit for partial demolition within Parcel A (City of Bellflower 2019c).

   During operations, trash and recycling services are provided by CR&R. According to CR&R, waste generated in Bellflower is sent to the CR Transfer and Material Recovery Facility in Stanton, Southeast Resource Recovery Facility in Long Beach, with most of the loads going to the Downey Area Recycling and Transfer Facility (DART) in Downey (City of Bellflower 2019a). DART is permitted to receive, handle and process up to 5,000 tons per day of waste 24 hours per day, 7 days a week. Residual waste from the facility is transferred to a fully permitted Class III landfill or transformation facility. In 2019, the average annual tonnage was estimated to be 720 tons per day (County Sanitation Districts of Los Angeles County 2017). Impacts would be less than significant, as the proposed project's solid waste generation would not exceed the permitted capacity.

   CalEEMod default water usage rates were used to estimate the anticipated solid waste demand of the proposed project. Based on the CalEEMod generation rates, waste use per day during project operation would be approximately 144 tons per year or 0.4 tons per day (Appendix A). Thus, the proposed project is expected to generate approximately 0.05 percent of the total waste handled at the DART facility. All waste would be disposed of in accordance with AB 939, which mandates that 50% of solid waste generated be diverted from landfill disposal through source reduction, recycling, or composting. Once constructed, solid waste and recycling generated from the project site would be typical of that generated by similar residential and commercial uses, and could potentially include small amounts of hazardous materials. Any hazardous materials would be disposed of in compliance with city requirements. Therefore, due to the nominal increase in solid waste generated for the proposed project, and through compliance with existing regulations, the propose project would not 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. Impacts would be less than significant.

e) As discussed under Threshold d, above, the proposed project would be required to submit a WMP prior to being issued a building or demolition permit for partial demolition within Parcel A, for compliance with the City's C&D Ordinance. During operations, the project would be required to comply with AB 939, which requires that 50% of solid waste generated be diverted from landfill disposal through source reduction, recycling, or composting. Therefore, based on compliance with federal, state, and local regulations, impacts associated with solid waste disposal would be less than significant.

20. WILDFIRE

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XX. Wildfire.				
Is the project located in or near state responsibility areas or lands classified as high fire hazard severity zones?		☐ Yes		☒ No
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☒
c) Require the installation 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) The project site is not located within an area designated by CAL FIRE as a fire hazard severity zone or a local responsibility area (CAL FIRE 2007a; CAL FIRE 2007b). The proposed project would not impair an emergency response or evacuation plan, expose occupants to wildfire related pollutants, require infrastructure that would contribute to wildfire hazard or expose people to significant flooding or landslide risk due to wildfire. No impact would occur.

21. MANDATORY FINDINGS OF SIGNIFICANCE

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XX. Mandatory Findings of Significance.				
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 an endangered, rare, or threatened species, 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 that will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☒	☐	☐

Discussion

a) As discussed in Section 4, Biological Resources, the proposed project does not have the potential to 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, or reduce the number or restrict the range of a rare or endangered plant or animal. Additionally, as addressed in Section 5, Cultural Resources, proposed project does not have the potential to eliminate important examples of the major periods of California history or prehistory. Therefore, impacts would be less than significant.

b) As addressed throughout this Initial Study, both project construction and operations could result in individual-level impacts that could be potentially significant without the incorporation of mitigation. Thus, when coupled with impacts related to the implementation of other related projects located throughout the broader geographic area, the proposed project would potentially result in cumulative-level impacts if these individual-level significant impacts were left unmitigated. (See Section 5, Cultural Resources, Section 7, Soils and Geology, and Section 9, Hazards and Hazardous Materials; for recommended mitigation measures.)

The proposed project is an infill development on a site that is already developed with an existing commercial structure and a graded lot. As a result, the area surrounding the project site is built out; few properties are found in the immediate area with substantial future development potential; and any upcoming development activity in the project area is expected to be limited. As mitigation measures would be required for impacts to Cultural Resources, Hazards and Hazardous Materials, cumulative impacts would be less than significant with mitigation incorporated.

c) As evaluated throughout this document, the proposed project could result in impacts to Cultural Resources, and Hazards and Hazardous Materials. Therefore, effects on human beings would be less than significant with mitigation incorporated.

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Appendix A

Air Quality/Greenhouse Gas Calculations

Bellflower Laemmle Theater

Los Angeles-South Coast County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Enclosed Parking with Elevator	11.70	1000sqft	0.27	11,700.00	0
High Turnover (Sit Down Restaurant)	2.50	1000sqft	0.06	2,500.00	0
Movie Theater (No Matinee)	12.30	1000sqft	0.28	12,300.00	0
Apartments Mid Rise	91.00	Dwelling Unit	0.90	91,000.00	260
Strip Mall	2.50	1000sqft	0.06	2,500.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	33
Climate Zone	9			**Operational Year**	2023
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Dwelling units acreage adjusted based on 4-story building

Construction Phase - Adjusted number of days of construction to meet a total of 515 days

Demolition -

Grading -

Vehicle Trips - 2224 adt

Woodstoves - no woodstoves or fireplaces

Construction Off-road Equipment Mitigation - Rule 403

Bellflower Laemmle Theater - Los Angeles-South Coast County, Annual

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	CleanPavedRoadPercentReduction	0	9
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	10.00	60.00
tblConstructionPhase	NumDays	200.00	380.00
tblConstructionPhase	NumDays	4.00	20.00
tblConstructionPhase	NumDays	10.00	25.00
tblConstructionPhase	NumDays	2.00	10.00
tblFireplaces	NumberGas	77.35	0.00
tblFireplaces	NumberWood	4.55	0.00
tblGrading	MaterialExported	0.00	5,000.00
tblLandUse	LotAcreage	2.39	0.90
tblVehicleTrips	ST_TR	6.39	0.50
tblVehicleTrips	ST_TR	158.37	452.63
tblVehicleTrips	ST_TR	99.28	57.67
tblVehicleTrips	ST_TR	42.04	120.15
tblVehicleTrips	SU_TR	5.86	0.59
tblVehicleTrips	SU_TR	131.84	480.50
tblVehicleTrips	SU_TR	81.90	60.67
tblVehicleTrips	SU_TR	20.43	74.46
tblVehicleTrips	WD_TR	6.65	0.62
tblVehicleTrips	WD_TR	127.15	434.19
tblVehicleTrips	WD_TR	78.06	54.18
tblVehicleTrips	WD_TR	44.32	151.34
tblWoodstoves	NumberCatalytic	4.55	0.00
tblWoodstoves	NumberNoncatalytic	4.55	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.2298	1.8285	1.6487	3.6800e-003	0.1985	0.0796	0.2781	0.0686	0.0760	0.1446	0.0000	320.5475	320.5475	0.0451	0.0000	321.6743
2022	0.3701	1.5848	1.8069	3.8000e-003	0.1021	0.0685	0.1705	0.0273	0.0659	0.0933	0.0000	326.2061	326.2061	0.0426	0.0000	327.2713
2023	0.2244	0.0242	0.0413	8.0000e-005	2.9600e-003	1.3000e-003	4.2600e-003	7.9000e-004	1.3000e-003	2.0800e-003	0.0000	7.0778	7.0778	3.4000e-004	0.0000	7.0863
Maximum	**0.3701**	**1.8285**	**1.8069**	**3.8000e-003**	**0.1985**	**0.0796**	**0.2781**	**0.0686**	**0.0760**	**0.1446**	**0.0000**	**326.2061**	**326.2061**	**0.0451**	**0.0000**	**327.2713**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.2298	1.8285	1.6487	3.6800e-003	0.1287	0.0796	0.2083	0.0412	0.0760	0.1173	0.0000	320.5472	320.5472	0.0451	0.0000	321.6741
2022	0.3701	1.5848	1.8069	3.8000e-003	0.0942	0.0685	0.1627	0.0254	0.0659	0.0913	0.0000	326.2058	326.2058	0.0426	0.0000	327.2710
2023	0.2244	0.0242	0.0413	8.0000e-005	2.7300e-003	1.3000e-003	4.0300e-003	7.3000e-004	1.3000e-003	2.0300e-003	0.0000	7.0778	7.0778	3.4000e-004	0.0000	7.0863
Maximum	**0.3701**	**1.8285**	**1.8069**	**3.8000e-003**	**0.1287**	**0.0796**	**0.2083**	**0.0412**	**0.0760**	**0.1173**	**0.0000**	**326.2058**	**326.2058**	**0.0451**	**0.0000**	**327.2710**

Bellflower Laemmle Theater - Los Angeles-South Coast County, Annual

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**25.66**	**0.00**	**17.19**	**30.34**	**0.00**	**12.22**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**3-2-2021**	**6-1-2021**	0.7166	0.7166
2	**6-2-2021**	**9-1-2021**	0.5720	0.5720
3	**9-2-2021**	**12-1-2021**	0.5671	0.5671
4	**12-2-2021**	**3-1-2022**	0.5312	0.5312
5	**3-2-2022**	**6-1-2022**	0.5263	0.5263
6	**6-2-2022**	**9-1-2022**	0.5257	0.5257
7	**9-2-2022**	**12-1-2022**	0.4127	0.4127
8	**12-2-2022**	**3-1-2023**	0.4010	0.4010
		Highest	0.7166	0.7166

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.4571	0.0108	0.9390	5.0000e-005		5.2000e-003	5.2000e-003		5.2000e-003	5.2000e-003	0.0000	1.5337	1.5337	1.4800e-003	0.0000	1.5706
Energy	0.0109	0.0956	0.0570	5.9000e-004		7.5400e-003	7.5400e-003		7.5400e-003	7.5400e-003	0.0000	336.5729	336.5729	0.0115	3.9300e-003	338.0323
Mobile	0.4782	2.0562	5.1212	0.0177	1.4395	0.0138	1.4533	0.3858	0.0129	0.3987	0.0000	1,637.3831	1,637.3831	0.0863	0.0000	1,639.5416
Waste						0.0000	0.0000		0.0000	0.0000	29.3018	0.0000	29.3018	1.7317	0.0000	72.5938
Water						0.0000	0.0000		0.0000	0.0000	3.7476	63.9292	67.6769	0.3876	9.6300e-003	80.2370
Total	**0.9462**	**2.1625**	**6.1172**	**0.0183**	**1.4395**	**0.0266**	**1.4661**	**0.3858**	**0.0256**	**0.4115**	**33.0494**	**2,039.4189**	**2,072.4683**	**2.2186**	**0.0136**	**2,131.9752**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.4571	0.0108	0.9390	5.0000e-005		5.2000e-003	5.2000e-003		5.2000e-003	5.2000e-003	0.0000	1.5337	1.5337	1.4800e-003	0.0000	1.5706
Energy	0.0109	0.0956	0.0570	5.9000e-004		7.5400e-003	7.5400e-003		7.5400e-003	7.5400e-003	0.0000	336.5729	336.5729	0.0115	3.9300e-003	338.0323
Mobile	0.4782	2.0562	5.1212	0.0177	1.4395	0.0138	1.4533	0.3858	0.0129	0.3987	0.0000	1,637.3831	1,637.3831	0.0863	0.0000	1,639.5416
Waste						0.0000	0.0000		0.0000	0.0000	29.3018	0.0000	29.3018	1.7317	0.0000	72.5938
Water						0.0000	0.0000		0.0000	0.0000	3.7476	63.9292	67.6769	0.3876	9.6300e-003	80.2370
Total	**0.9462**	**2.1625**	**6.1172**	**0.0183**	**1.4395**	**0.0266**	**1.4661**	**0.3858**	**0.0256**	**0.4115**	**33.0494**	**2,039.4189**	**2,072.4683**	**2.2186**	**0.0136**	**2,131.9752**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	3/2/2021	3/29/2021	5	20	
2	Site Preparation	Site Preparation	3/30/2021	4/12/2021	5	10	
3	Grading	Grading	4/13/2021	5/10/2021	5	20	
4	Building Construction	Building Construction	5/11/2021	10/24/2022	5	380	
5	Paving	Paving	10/25/2022	11/28/2022	5	25	
6	Architectural Coating	Architectural Coating	11/29/2022	2/20/2023	5	60	

Acres of Grading (Site Preparation Phase): 5

Acres of Grading (Grading Phase): 7.5

Acres of Paving: 0.27

Residential Indoor: 184,275; Residential Outdoor: 61,425; Non-Residential Indoor: 25,950; Non-Residential Outdoor: 8,650; Striped Parking Area: 702 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Rubber Tired Dozers	1	7.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	6.00	187	0.41
Grading	Rubber Tired Dozers	1	6.00	247	0.40
Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Building Construction	Cranes	1	6.00	231	0.29
Building Construction	Forklifts	1	6.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	3	8.00	46	0.45
Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Paving	Pavers	1	6.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	1	7.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	5	13.00	0.00	297.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	3	8.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	3	8.00	0.00	494.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	7	77.00	14.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	5	13.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Demolition - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0321	0.0000	0.0321	4.8600e-003	0.0000	4.8600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0199	0.1970	0.1449	2.4000e-004		0.0104	0.0104		9.7100e-003	9.7100e-003	0.0000	21.0713	21.0713	5.3900e-003	0.0000	21.2060
Total	**0.0199**	**0.1970**	**0.1449**	**2.4000e-004**	**0.0321**	**0.0104**	**0.0425**	**4.8600e-003**	**9.7100e-003**	**0.0146**	**0.0000**	**21.0713**	**21.0713**	**5.3900e-003**	**0.0000**	**21.2060**

3.2 Demolition - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.2500e-003	0.0411	9.5900e-003	1.2000e-004	2.5500e-003	1.2000e-004	2.6800e-003	7.0000e-004	1.2000e-004	8.2000e-004	0.0000	11.3201	11.3201	7.9000e-004	0.0000	11.3397
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.6000e-004	4.4000e-004	4.9200e-003	1.0000e-005	1.4200e-003	1.0000e-005	1.4400e-003	3.8000e-004	1.0000e-005	3.9000e-004	0.0000	1.2856	1.2856	4.0000e-005	0.0000	1.2865
Total	**1.8100e-003**	**0.0416**	**0.0145**	**1.3000e-004**	**3.9700e-003**	**1.3000e-004**	**4.1200e-003**	**1.0800e-003**	**1.3000e-004**	**1.2100e-003**	**0.0000**	**12.6057**	**12.6057**	**8.3000e-004**	**0.0000**	**12.6263**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0137	0.0000	0.0137	2.0800e-003	0.0000	2.0800e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0199	0.1970	0.1449	2.4000e-004		0.0104	0.0104		9.7100e-003	9.7100e-003	0.0000	21.0713	21.0713	5.3900e-003	0.0000	21.2060
Total	**0.0199**	**0.1970**	**0.1449**	**2.4000e-004**	**0.0137**	**0.0104**	**0.0241**	**2.0800e-003**	**9.7100e-003**	**0.0118**	**0.0000**	**21.0713**	**21.0713**	**5.3900e-003**	**0.0000**	**21.2060**

3.2 Demolition - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.2500e-003	0.0411	9.5900e-003	1.2000e-004	2.3800e-003	1.2000e-004	2.5000e-003	6.6000e-004	1.2000e-004	7.8000e-004	0.0000	11.3201	11.3201	7.9000e-004	0.0000	11.3397
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.6000e-004	4.4000e-004	4.9200e-003	1.0000e-005	1.3100e-003	1.0000e-005	1.3300e-003	3.5000e-004	1.0000e-005	3.6000e-004	0.0000	1.2856	1.2856	4.0000e-005	0.0000	1.2865
Total	**1.8100e-003**	**0.0416**	**0.0145**	**1.3000e-004**	**3.6900e-003**	**1.3000e-004**	**3.8300e-003**	**1.0100e-003**	**1.3000e-004**	**1.1400e-003**	**0.0000**	**12.6057**	**12.6057**	**8.3000e-004**	**0.0000**	**12.6263**

3.3 Site Preparation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0290	0.0000	0.0290	0.0148	0.0000	0.0148	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.7800e-003	0.0871	0.0378	9.0000e-005		3.8300e-003	3.8300e-003		3.5200e-003	3.5200e-003	0.0000	7.5592	7.5592	2.4400e-003	0.0000	7.6203
Total	**7.7800e-003**	**0.0871**	**0.0378**	**9.0000e-005**	**0.0290**	**3.8300e-003**	**0.0328**	**0.0148**	**3.5200e-003**	**0.0183**	**0.0000**	**7.5592**	**7.5592**	**2.4400e-003**	**0.0000**	**7.6203**

3.3 Site Preparation - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.7000e-004	1.3000e-004	1.5100e-003	0.0000	4.4000e-004	0.0000	4.4000e-004	1.2000e-004	0.0000	1.2000e-004	0.0000	0.3956	0.3956	1.0000e-005	0.0000	0.3959
Total	**1.7000e-004**	**1.3000e-004**	**1.5100e-003**	**0.0000**	**4.4000e-004**	**0.0000**	**4.4000e-004**	**1.2000e-004**	**0.0000**	**1.2000e-004**	**0.0000**	**0.3956**	**0.3956**	**1.0000e-005**	**0.0000**	**0.3959**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0124	0.0000	0.0124	6.3100e-003	0.0000	6.3100e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.7800e-003	0.0871	0.0378	9.0000e-005		3.8300e-003	3.8300e-003		3.5200e-003	3.5200e-003	0.0000	7.5592	7.5592	2.4400e-003	0.0000	7.6203
Total	**7.7800e-003**	**0.0871**	**0.0378**	**9.0000e-005**	**0.0124**	**3.8300e-003**	**0.0162**	**6.3100e-003**	**3.5200e-003**	**9.8300e-003**	**0.0000**	**7.5592**	**7.5592**	**2.4400e-003**	**0.0000**	**7.6203**

3.3 Site Preparation - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.7000e-004	1.3000e-004	1.5100e-003	0.0000	4.0000e-004	0.0000	4.1000e-004	1.1000e-004	0.0000	1.1000e-004	0.0000	0.3956	0.3956	1.0000e-005	0.0000	0.3959
Total	**1.7000e-004**	**1.3000e-004**	**1.5100e-003**	**0.0000**	**4.0000e-004**	**0.0000**	**4.1000e-004**	**1.1000e-004**	**0.0000**	**1.1000e-004**	**0.0000**	**0.3956**	**0.3956**	**1.0000e-005**	**0.0000**	**0.3959**

3.4 Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0491	0.0000	0.0491	0.0253	0.0000	0.0253	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0129	0.1433	0.0633	1.4000e-004		6.3800e-003	6.3800e-003		5.8700e-003	5.8700e-003	0.0000	12.3837	12.3837	4.0100e-003	0.0000	12.4838
Total	**0.0129**	**0.1433**	**0.0633**	**1.4000e-004**	**0.0491**	**6.3800e-003**	**0.0555**	**0.0253**	**5.8700e-003**	**0.0311**	**0.0000**	**12.3837**	**12.3837**	**4.0100e-003**	**0.0000**	**12.4838**

3.4 Grading - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0800e-003	0.0684	0.0159	1.9000e-004	4.2500e-003	2.0000e-004	4.4500e-003	1.1700e-003	2.0000e-004	1.3600e-003	0.0000	18.8287	18.8287	1.3100e-003	0.0000	18.8614
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.4000e-004	2.7000e-004	3.0300e-003	1.0000e-005	8.8000e-004	1.0000e-005	8.8000e-004	2.3000e-004	1.0000e-005	2.4000e-004	0.0000	0.7911	0.7911	2.0000e-005	0.0000	0.7917
Total	**2.4200e-003**	**0.0687**	**0.0190**	**2.0000e-004**	**5.1300e-003**	**2.1000e-004**	**5.3300e-003**	**1.4000e-003**	**2.1000e-004**	**1.6000e-003**	**0.0000**	**19.6199**	**19.6199**	**1.3300e-003**	**0.0000**	**19.6531**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0210	0.0000	0.0210	0.0108	0.0000	0.0108	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0129	0.1433	0.0633	1.4000e-004		6.3800e-003	6.3800e-003		5.8700e-003	5.8700e-003	0.0000	12.3836	12.3836	4.0100e-003	0.0000	12.4838
Total	**0.0129**	**0.1433**	**0.0633**	**1.4000e-004**	**0.0210**	**6.3800e-003**	**0.0274**	**0.0108**	**5.8700e-003**	**0.0167**	**0.0000**	**12.3836**	**12.3836**	**4.0100e-003**	**0.0000**	**12.4838**

3.4 Grading - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0800e-003	0.0684	0.0159	1.9000e-004	3.9600e-003	2.0000e-004	4.1600e-003	1.1000e-003	2.0000e-004	1.2900e-003	0.0000	18.8287	18.8287	1.3100e-003	0.0000	18.8614
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.4000e-004	2.7000e-004	3.0300e-003	1.0000e-005	8.1000e-004	1.0000e-005	8.2000e-004	2.2000e-004	1.0000e-005	2.2000e-004	0.0000	0.7911	0.7911	2.0000e-005	0.0000	0.7917
Total	**2.4200e-003**	**0.0687**	**0.0190**	**2.0000e-004**	**4.7700e-003**	**2.1000e-004**	**4.9800e-003**	**1.3200e-003**	**2.1000e-004**	**1.5100e-003**	**0.0000**	**19.6199**	**19.6199**	**1.3300e-003**	**0.0000**	**19.6531**

3.5 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1532	1.1523	1.0900	1.8600e-003		0.0578	0.0578		0.0558	0.0558	0.0000	153.4077	153.4077	0.0274	0.0000	154.0924
Total	**0.1532**	**1.1523**	**1.0900**	**1.8600e-003**		**0.0578**	**0.0578**		**0.0558**	**0.0558**	**0.0000**	**153.4077**	**153.4077**	**0.0274**	**0.0000**	**154.0924**

3.5 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.6700e-003	0.1168	0.0317	3.0000e-004	7.4500e-003	2.4000e-004	7.6900e-003	2.1500e-003	2.3000e-004	2.3800e-003	0.0000	29.1605	29.1605	1.7900e-003	0.0000	29.2053
Worker	0.0280	0.0218	0.2461	7.1000e-004	0.0713	5.9000e-004	0.0719	0.0189	5.4000e-004	0.0195	0.0000	64.3439	64.3439	1.8900e-003	0.0000	64.3912
Total	**0.0317**	**0.1386**	**0.2777**	**1.0100e-003**	**0.0788**	**8.3000e-004**	**0.0796**	**0.0211**	**7.7000e-004**	**0.0219**	**0.0000**	**93.5044**	**93.5044**	**3.6800e-003**	**0.0000**	**93.5965**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1532	1.1523	1.0900	1.8600e-003		0.0578	0.0578		0.0558	0.0558	0.0000	153.4076	153.4076	0.0274	0.0000	154.0922
Total	**0.1532**	**1.1523**	**1.0900**	**1.8600e-003**		**0.0578**	**0.0578**		**0.0558**	**0.0558**	**0.0000**	**153.4076**	**153.4076**	**0.0274**	**0.0000**	**154.0922**

3.5 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.6700e-003	0.1168	0.0317	3.0000e-004	6.9800e-003	2.4000e-004	7.2200e-003	2.0300e-003	2.3000e-004	2.2600e-003	0.0000	29.1605	29.1605	1.7900e-003	0.0000	29.2053
Worker	0.0280	0.0218	0.2461	7.1000e-004	0.0657	5.9000e-004	0.0663	0.0176	5.4000e-004	0.0181	0.0000	64.3439	64.3439	1.8900e-003	0.0000	64.3912
Total	**0.0317**	**0.1386**	**0.2777**	**1.0100e-003**	**0.0727**	**8.3000e-004**	**0.0735**	**0.0196**	**7.7000e-004**	**0.0204**	**0.0000**	**93.5044**	**93.5044**	**3.6800e-003**	**0.0000**	**93.5965**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1739	1.3191	1.3426	2.3300e-003		0.0621	0.0621		0.0600	0.0600	0.0000	191.5636	191.5636	0.0334	0.0000	192.3978
Total	**0.1739**	**1.3191**	**1.3426**	**2.3300e-003**		**0.0621**	**0.0621**		**0.0600**	**0.0600**	**0.0000**	**191.5636**	**191.5636**	**0.0334**	**0.0000**	**192.3978**

3.5 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.3000e-003	0.1385	0.0374	3.7000e-004	9.3000e-003	2.6000e-004	9.5600e-003	2.6900e-003	2.5000e-004	2.9300e-003	0.0000	36.0878	36.0878	2.1600e-003	0.0000	36.1417
Worker	0.0328	0.0246	0.2831	8.6000e-004	0.0890	7.1000e-004	0.0897	0.0236	6.5000e-004	0.0243	0.0000	77.5108	77.5108	2.1300e-003	0.0000	77.5641
Total	**0.0371**	**0.1631**	**0.3204**	**1.2300e-003**	**0.0983**	**9.7000e-004**	**0.0993**	**0.0263**	**9.0000e-004**	**0.0272**	**0.0000**	**113.5985**	**113.5985**	**4.2900e-003**	**0.0000**	**113.7058**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1739	1.3191	1.3426	2.3300e-003		0.0621	0.0621		0.0600	0.0600	0.0000	191.5634	191.5634	0.0334	0.0000	192.3975
Total	**0.1739**	**1.3191**	**1.3426**	**2.3300e-003**		**0.0621**	**0.0621**		**0.0600**	**0.0600**	**0.0000**	**191.5634**	**191.5634**	**0.0334**	**0.0000**	**192.3975**

3.5 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	4.3000e-003	0.1385	0.0374	3.7000e-004	8.7100e-003	2.6000e-004	8.9700e-003	2.5400e-003	2.5000e-004	2.7900e-003	0.0000	36.0878	36.0878	2.1600e-003	0.0000	36.1417
Worker	0.0328	0.0246	0.2831	8.6000e-004	0.0821	7.1000e-004	0.0828	0.0219	6.5000e-004	0.0226	0.0000	77.5108	77.5108	2.1300e-003	0.0000	77.5641
Total	**0.0371**	**0.1631**	**0.3204**	**1.2300e-003**	**0.0908**	**9.7000e-004**	**0.0918**	**0.0245**	**9.0000e-004**	**0.0254**	**0.0000**	**113.5985**	**113.5985**	**4.2900e-003**	**0.0000**	**113.7058**

3.6 Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	8.6000e-003	0.0847	0.1101	1.7000e-004		4.3400e-003	4.3400e-003		4.0100e-003	4.0100e-003	0.0000	14.7120	14.7120	4.6600e-003	0.0000	14.8286
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**8.6000e-003**	**0.0847**	**0.1101**	**1.7000e-004**		**4.3400e-003**	**4.3400e-003**		**4.0100e-003**	**4.0100e-003**	**0.0000**	**14.7120**	**14.7120**	**4.6600e-003**	**0.0000**	**14.8286**

3.6 Paving - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.6000e-004	4.9000e-004	5.6600e-003	2.0000e-005	1.7800e-003	1.0000e-005	1.7900e-003	4.7000e-004	1.0000e-005	4.9000e-004	0.0000	1.5505	1.5505	4.0000e-005	0.0000	1.5516
Total	**6.6000e-004**	**4.9000e-004**	**5.6600e-003**	**2.0000e-005**	**1.7800e-003**	**1.0000e-005**	**1.7900e-003**	**4.7000e-004**	**1.0000e-005**	**4.9000e-004**	**0.0000**	**1.5505**	**1.5505**	**4.0000e-005**	**0.0000**	**1.5516**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	8.6000e-003	0.0847	0.1101	1.7000e-004		4.3400e-003	4.3400e-003		4.0100e-003	4.0100e-003	0.0000	14.7120	14.7120	4.6600e-003	0.0000	14.8286
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**8.6000e-003**	**0.0847**	**0.1101**	**1.7000e-004**		**4.3400e-003**	**4.3400e-003**		**4.0100e-003**	**4.0100e-003**	**0.0000**	**14.7120**	**14.7120**	**4.6600e-003**	**0.0000**	**14.8286**

3.6 Paving - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.6000e-004	4.9000e-004	5.6600e-003	2.0000e-005	1.6400e-003	1.0000e-005	1.6600e-003	4.4000e-004	1.0000e-005	4.5000e-004	0.0000	1.5505	1.5505	4.0000e-005	0.0000	1.5516
Total	**6.6000e-004**	**4.9000e-004**	**5.6600e-003**	**2.0000e-005**	**1.6400e-003**	**1.0000e-005**	**1.6600e-003**	**4.4000e-004**	**1.0000e-005**	**4.5000e-004**	**0.0000**	**1.5505**	**1.5505**	**4.0000e-005**	**0.0000**	**1.5516**

3.7 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1466					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.4500e-003	0.0169	0.0218	4.0000e-005		9.8000e-004	9.8000e-004		9.8000e-004	9.8000e-004	0.0000	3.0639	3.0639	2.0000e-004	0.0000	3.0689
Total	**0.1491**	**0.0169**	**0.0218**	**4.0000e-005**		**9.8000e-004**	**9.8000e-004**		**9.8000e-004**	**9.8000e-004**	**0.0000**	**3.0639**	**3.0639**	**2.0000e-004**	**0.0000**	**3.0689**

3.7 Architectural Coating - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.3000e-004	5.4000e-004	6.2700e-003	2.0000e-005	1.9700e-003	2.0000e-005	1.9900e-003	5.2000e-004	1.0000e-005	5.4000e-004	0.0000	1.7175	1.7175	5.0000e-005	0.0000	1.7187
Total	**7.3000e-004**	**5.4000e-004**	**6.2700e-003**	**2.0000e-005**	**1.9700e-003**	**2.0000e-005**	**1.9900e-003**	**5.2000e-004**	**1.0000e-005**	**5.4000e-004**	**0.0000**	**1.7175**	**1.7175**	**5.0000e-005**	**0.0000**	**1.7187**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.1466					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	2.4500e-003	0.0169	0.0218	4.0000e-005		9.8000e-004	9.8000e-004		9.8000e-004	9.8000e-004	0.0000	3.0639	3.0639	2.0000e-004	0.0000	3.0689
Total	**0.1491**	**0.0169**	**0.0218**	**4.0000e-005**		**9.8000e-004**	**9.8000e-004**		**9.8000e-004**	**9.8000e-004**	**0.0000**	**3.0639**	**3.0639**	**2.0000e-004**	**0.0000**	**3.0689**

3.7 Architectural Coating - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.3000e-004	5.4000e-004	6.2700e-003	2.0000e-005	1.8200e-003	2.0000e-005	1.8300e-003	4.9000e-004	1.0000e-005	5.0000e-004	0.0000	1.7175	1.7175	5.0000e-005	0.0000	1.7187
Total	**7.3000e-004**	**5.4000e-004**	**6.2700e-003**	**2.0000e-005**	**1.8200e-003**	**2.0000e-005**	**1.8300e-003**	**4.9000e-004**	**1.0000e-005**	**5.0000e-004**	**0.0000**	**1.7175**	**1.7175**	**5.0000e-005**	**0.0000**	**1.7187**

3.7 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.2199					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.4500e-003	0.0235	0.0326	5.0000e-005		1.2700e-003	1.2700e-003		1.2700e-003	1.2700e-003	0.0000	4.5959	4.5959	2.7000e-004	0.0000	4.6027
Total	**0.2234**	**0.0235**	**0.0326**	**5.0000e-005**		**1.2700e-003**	**1.2700e-003**		**1.2700e-003**	**1.2700e-003**	**0.0000**	**4.5959**	**4.5959**	**2.7000e-004**	**0.0000**	**4.6027**

3.7 Architectural Coating - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0200e-003	7.4000e-004	8.6500e-003	3.0000e-005	2.9600e-003	2.0000e-005	2.9800e-003	7.9000e-004	2.0000e-005	8.1000e-004	0.0000	2.4820	2.4820	6.0000e-005	0.0000	2.4835
Total	**1.0200e-003**	**7.4000e-004**	**8.6500e-003**	**3.0000e-005**	**2.9600e-003**	**2.0000e-005**	**2.9800e-003**	**7.9000e-004**	**2.0000e-005**	**8.1000e-004**	**0.0000**	**2.4820**	**2.4820**	**6.0000e-005**	**0.0000**	**2.4835**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.2199					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.4500e-003	0.0235	0.0326	5.0000e-005		1.2700e-003	1.2700e-003		1.2700e-003	1.2700e-003	0.0000	4.5959	4.5959	2.7000e-004	0.0000	4.6027
Total	**0.2234**	**0.0235**	**0.0326**	**5.0000e-005**		**1.2700e-003**	**1.2700e-003**		**1.2700e-003**	**1.2700e-003**	**0.0000**	**4.5959**	**4.5959**	**2.7000e-004**	**0.0000**	**4.6027**

3.7 Architectural Coating - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0200e-003	7.4000e-004	8.6500e-003	3.0000e-005	2.7300e-003	2.0000e-005	2.7500e-003	7.3000e-004	2.0000e-005	7.5000e-004	0.0000	2.4820	2.4820	6.0000e-005	0.0000	2.4835
Total	**1.0200e-003**	**7.4000e-004**	**8.6500e-003**	**3.0000e-005**	**2.7300e-003**	**2.0000e-005**	**2.7500e-003**	**7.3000e-004**	**2.0000e-005**	**7.5000e-004**	**0.0000**	**2.4820**	**2.4820**	**6.0000e-005**	**0.0000**	**2.4835**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.4782	2.0562	5.1212	0.0177	1.4395	0.0138	1.4533	0.3858	0.0129	0.3987	0.0000	1,637.3831	1,637.3831	0.0863	0.0000	1,639.5416
Unmitigated	0.4782	2.0562	5.1212	0.0177	1.4395	0.0138	1.4533	0.3858	0.0129	0.3987	0.0000	1,637.3831	1,637.3831	0.0863	0.0000	1,639.5416

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	56.42	45.50	53.69	186,132	186,132
Enclosed Parking with Elevator	0.00	0.00	0.00		
High Turnover (Sit Down Restaurant)	1,085.48	1,131.58	1201.25	1,510,834	1,510,834
Movie Theater (No Matinee)	666.41	709.34	746.24	1,449,303	1,449,303
Strip Mall	378.35	300.38	186.15	646,414	646,414
Total	2,186.66	2,186.79	2,187.33	3,792,682	3,792,682

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3
Enclosed Parking with Elevator	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
High Turnover (Sit Down	16.60	8.40	6.90	8.50	72.50	19.00	37	20	43
Movie Theater (No Matinee)	16.60	8.40	6.90	1.80	79.20	19.00	66	17	17
Strip Mall	16.60	8.40	6.90	16.60	64.40	19.00	45	40	15

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments Mid Rise	0.545842	0.044768	0.205288	0.119317	0.015350	0.006227	0.020460	0.031333	0.002546	0.002133	0.005184	0.000692	0.000862
Enclosed Parking with Elevator	0.545842	0.044768	0.205288	0.119317	0.015350	0.006227	0.020460	0.031333	0.002546	0.002133	0.005184	0.000692	0.000862
High Turnover (Sit Down Restaurant)	0.545842	0.044768	0.205288	0.119317	0.015350	0.006227	0.020460	0.031333	0.002546	0.002133	0.005184	0.000692	0.000862
Movie Theater (No Matinee)	0.545842	0.044768	0.205288	0.119317	0.015350	0.006227	0.020460	0.031333	0.002546	0.002133	0.005184	0.000692	0.000862
Strip Mall	0.545842	0.044768	0.205288	0.119317	0.015350	0.006227	0.020460	0.031333	0.002546	0.002133	0.005184	0.000692	0.000862

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	228.6349	228.6349	9.4400e-003	1.9500e-003	229.4529
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	228.6349	228.6349	9.4400e-003	1.9500e-003	229.4529
NaturalGas Mitigated	0.0109	0.0956	0.0570	5.9000e-004		7.5400e-003	7.5400e-003		7.5400e-003	7.5400e-003	0.0000	107.9380	107.9380	2.0700e-003	1.9800e-003	108.5794
NaturalGas Unmitigated	0.0109	0.0956	0.0570	5.9000e-004		7.5400e-003	7.5400e-003		7.5400e-003	7.5400e-003	0.0000	107.9380	107.9380	2.0700e-003	1.9800e-003	108.5794

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	1.21905e+006	6.5700e-003	0.0562	0.0239	3.6000e-004		4.5400e-003	4.5400e-003		4.5400e-003	4.5400e-003	0.0000	65.0532	65.0532	1.2500e-003	1.1900e-003	65.4398
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
High Turnover (Sit Down Restaurant)	576900	3.1100e-003	0.0283	0.0238	1.7000e-004		2.1500e-003	2.1500e-003		2.1500e-003	2.1500e-003	0.0000	30.7856	30.7856	5.9000e-004	5.6000e-004	30.9685
Movie Theater (No Matinee)	222630	1.2000e-003	0.0109	9.1700e-003	7.0000e-005		8.3000e-004	8.3000e-004		8.3000e-004	8.3000e-004	0.0000	11.8804	11.8804	2.3000e-004	2.2000e-004	11.9510
Strip Mall	4100	2.0000e-005	2.0000e-004	1.7000e-004	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005	0.0000	0.2188	0.2188	0.0000	0.0000	0.2201
Total		**0.0109**	**0.0956**	**0.0570**	**6.0000e-004**		**7.5400e-003**	**7.5400e-003**		**7.5400e-003**	**7.5400e-003**	**0.0000**	**107.9380**	**107.9380**	**2.0700e-003**	**1.9700e-003**	**108.5794**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	1.21905e+006	6.5700e-003	0.0562	0.0239	3.6000e-004		4.5400e-003	4.5400e-003		4.5400e-003	4.5400e-003	0.0000	65.0532	65.0532	1.2500e-003	1.1900e-003	65.4398
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
High Turnover (Sit Down Restaurant)	576900	3.1100e-003	0.0283	0.0238	1.7000e-004		2.1500e-003	2.1500e-003		2.1500e-003	2.1500e-003	0.0000	30.7856	30.7856	5.9000e-004	5.6000e-004	30.9685
Movie Theater (No Matinee)	222630	1.2000e-003	0.0109	9.1700e-003	7.0000e-005		8.3000e-004	8.3000e-004		8.3000e-004	8.3000e-004	0.0000	11.8804	11.8804	2.3000e-004	2.2000e-004	11.9510
Strip Mall	4100	2.0000e-005	2.0000e-004	1.7000e-004	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005	0.0000	0.2188	0.2188	0.0000	0.0000	0.2201
Total		**0.0109**	**0.0956**	**0.0570**	**6.0000e-004**		**7.5400e-003**	**7.5400e-003**		**7.5400e-003**	**7.5400e-003**	**0.0000**	**107.9380**	**107.9380**	**2.0700e-003**	**1.9700e-003**	**108.5794**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	368383	117.3749	4.8500e-003	1.0000e-003	117.7948
Enclosed Parking with Elevator	68562	21.8453	9.0000e-004	1.9000e-004	21.9235
High Turnover (Sit Down Restaurant)	110350	35.1599	1.4500e-003	3.0000e-004	35.2857
Movie Theater (No Matinee)	136530	43.5014	1.8000e-003	3.7000e-004	43.6570
Strip Mall	33750	10.7535	4.4000e-004	9.0000e-005	10.7919
Total		**228.6349**	**9.4400e-003**	**1.9500e-003**	**229.4529**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	368383	117.3749	4.8500e-003	1.0000e-003	117.7948
Enclosed Parking with Elevator	68562	21.8453	9.0000e-004	1.9000e-004	21.9235
High Turnover (Sit Down Restaurant)	110350	35.1599	1.4500e-003	3.0000e-004	35.2857
Movie Theater (No Matinee)	136530	43.5014	1.8000e-003	3.7000e-004	43.6570
Strip Mall	33750	10.7535	4.4000e-004	9.0000e-005	10.7919
Total		**228.6349**	**9.4400e-003**	**1.9500e-003**	**229.4529**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.4571	0.0108	0.9390	5.0000e-005		5.2000e-003	5.2000e-003		5.2000e-003	5.2000e-003	0.0000	1.5337	1.5337	1.4800e-003	0.0000	1.5706
Unmitigated	0.4571	0.0108	0.9390	5.0000e-005		5.2000e-003	5.2000e-003		5.2000e-003	5.2000e-003	0.0000	1.5337	1.5337	1.4800e-003	0.0000	1.5706

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0367					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.3921					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0283	0.0108	0.9390	5.0000e-005		5.2000e-003	5.2000e-003		5.2000e-003	5.2000e-003	0.0000	1.5337	1.5337	1.4800e-003	0.0000	1.5706
Total	**0.4571**	**0.0108**	**0.9390**	**5.0000e-005**		**5.2000e-003**	**5.2000e-003**		**5.2000e-003**	**5.2000e-003**	**0.0000**	**1.5337**	**1.5337**	**1.4800e-003**	**0.0000**	**1.5706**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0367					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.3921					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0283	0.0108	0.9390	5.0000e-005		5.2000e-003	5.2000e-003		5.2000e-003	5.2000e-003	0.0000	1.5337	1.5337	1.4800e-003	0.0000	1.5706
Total	**0.4571**	**0.0108**	**0.9390**	**5.0000e-005**		**5.2000e-003**	**5.2000e-003**		**5.2000e-003**	**5.2000e-003**	**0.0000**	**1.5337**	**1.5337**	**1.4800e-003**	**0.0000**	**1.5706**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	67.6769	0.3876	9.6300e-003	80.2370
Unmitigated	67.6769	0.3876	9.6300e-003	80.2370

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	5.92902 / 3.73786	39.7107	0.1948	4.8800e-003	46.0354
Enclosed Parking with Elevator	0 / 0	0.0000	0.0000	0.0000	0.0000
High Turnover (Sit Down Restaurant)	0.758834 / 0.0484362	3.5604	0.0249	6.1000e-004	4.3645
Movie Theater (No Matinee)	4.9397 / 0.3153	23.1769	0.1619	3.9900e-003	28.4108
Strip Mall	0.185181 / 0.113498	1.2288	6.0800e-003	1.5000e-004	1.4263
Total		**67.6769**	**0.3876**	**9.6300e-003**	**80.2370**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	5.92902 / 3.73786	39.7107	0.1948	4.8800e-003	46.0354
Enclosed Parking with Elevator	0 / 0	0.0000	0.0000	0.0000	0.0000
High Turnover (Sit Down Restaurant)	0.758834 / 0.0484362	3.5604	0.0249	6.1000e-004	4.3645
Movie Theater (No Matinee)	4.9397 / 0.3153	23.1769	0.1619	3.9900e-003	28.4108
Strip Mall	0.185181 / 0.113498	1.2288	6.0800e-003	1.5000e-004	1.4263
Total		**67.6769**	**0.3876**	**9.6300e-003**	**80.2370**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	29.3018	1.7317	0.0000	72.5938
Unmitigated	29.3018	1.7317	0.0000	72.5938

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	41.86	8.4972	0.5022	0.0000	21.0515
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000
High Turnover (Sit Down Restaurant)	29.75	6.0390	0.3569	0.0000	14.9613
Movie Theater (No Matinee)	70.11	14.2317	0.8411	0.0000	35.2584
Strip Mall	2.63	0.5339	0.0316	0.0000	1.3226
Total		**29.3018**	**1.7317**	**0.0000**	**72.5938**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	41.86	8.4972	0.5022	0.0000	21.0515
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000
High Turnover (Sit Down Restaurant)	29.75	6.0390	0.3569	0.0000	14.9613
Movie Theater (No Matinee)	70.11	14.2317	0.8411	0.0000	35.2584
Strip Mall	2.63	0.5339	0.0316	0.0000	1.3226
Total		**29.3018**	**1.7317**	**0.0000**	**72.5938**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Bellflower Laemmle Theater

Los Angeles-South Coast County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Enclosed Parking with Elevator	11.70	1000sqft	0.27	11,700.00	0
High Turnover (Sit Down Restaurant)	2.50	1000sqft	0.06	2,500.00	0
Movie Theater (No Matinee)	12.30	1000sqft	0.28	12,300.00	0
Apartments Mid Rise	91.00	Dwelling Unit	0.90	91,000.00	260
Strip Mall	2.50	1000sqft	0.06	2,500.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	33
Climate Zone	9			**Operational Year**	2023
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Dwelling units acreage adjusted based on 4-story building

Construction Phase - Adjusted number of days of construction to meet a total of 515 days

Demolition -

Grading -

Vehicle Trips - 2224 adt

Woodstoves - no woodstoves or fireplaces

Construction Off-road Equipment Mitigation - Rule 403

Bellflower Laemmle Theater - Los Angeles-South Coast County, Summer

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	CleanPavedRoadPercentReduction	0	9
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	10.00	60.00
tblConstructionPhase	NumDays	200.00	380.00
tblConstructionPhase	NumDays	4.00	20.00
tblConstructionPhase	NumDays	10.00	25.00
tblConstructionPhase	NumDays	2.00	10.00
tblFireplaces	NumberGas	77.35	0.00
tblFireplaces	NumberWood	4.55	0.00
tblGrading	MaterialExported	0.00	5,000.00
tblLandUse	LotAcreage	2.39	0.90
tblVehicleTrips	ST_TR	6.39	0.50
tblVehicleTrips	ST_TR	158.37	452.63
tblVehicleTrips	ST_TR	99.28	57.67
tblVehicleTrips	ST_TR	42.04	120.15
tblVehicleTrips	SU_TR	5.86	0.59
tblVehicleTrips	SU_TR	131.84	480.50
tblVehicleTrips	SU_TR	81.90	60.67
tblVehicleTrips	SU_TR	20.43	74.46
tblVehicleTrips	WD_TR	6.65	0.62
tblVehicleTrips	WD_TR	127.15	434.19
tblVehicleTrips	WD_TR	78.06	54.18
tblVehicleTrips	WD_TR	44.32	151.34
tblWoodstoves	NumberCatalytic	4.55	0.00
tblWoodstoves	NumberNoncatalytic	4.55	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	2.1851	23.7183	16.3561	0.0372	5.8890	1.0543	6.6551	2.9774	0.9843	3.6822	0.0000	3,727.7299	3,727.7299	0.6836	0.0000	3,744.8202
2022	12.4820	14.0006	15.9240	0.0341	0.9503	0.5980	1.5484	0.2541	0.5774	0.8314	0.0000	3,229.0316	3,229.0316	0.4152	0.0000	3,238.8778
2023	12.4655	1.3391	2.3244	4.5600e-003	0.1677	0.0721	0.2398	0.0445	0.0720	0.1165	0.0000	440.2204	440.2204	0.0209	0.0000	440.7438
Maximum	**12.4820**	**23.7183**	**16.3561**	**0.0372**	**5.8890**	**1.0543**	**6.6551**	**2.9774**	**0.9843**	**3.6822**	**0.0000**	**3,727.7299**	**3,727.7299**	**0.6836**	**0.0000**	**3,744.8202**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	2.1851	23.7183	16.3561	0.0372	2.5858	1.0543	3.3278	1.2847	0.9843	1.9895	0.0000	3,727.7299	3,727.7299	0.6836	0.0000	3,744.8202
2022	12.4820	14.0006	15.9240	0.0341	0.8772	0.5980	1.4753	0.2361	0.5774	0.8135	0.0000	3,229.0316	3,229.0316	0.4152	0.0000	3,238.8778
2023	12.4655	1.3391	2.3244	4.5600e-003	0.1546	0.0721	0.2266	0.0413	0.0720	0.1132	0.0000	440.2204	440.2204	0.0209	0.0000	440.7438
Maximum	**12.4820**	**23.7183**	**16.3561**	**0.0372**	**2.5858**	**1.0543**	**3.3278**	**1.2847**	**0.9843**	**1.9895**	**0.0000**	**3,727.7299**	**3,727.7299**	**0.6836**	**0.0000**	**3,744.8202**

Bellflower Laemmle Theater - Los Angeles-South Coast County, Summer

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	48.37	0.00	40.43	52.32	0.00	37.02	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.5758	0.0866	7.5123	4.0000e-004		0.0416	0.0416		0.0416	0.0416	0.0000	13.5246	13.5246	0.0130	0.0000	13.8500
Energy	0.0598	0.5237	0.3123	3.2600e-003		0.0413	0.0413		0.0413	0.0413		651.9521	651.9521	0.0125	0.0120	655.8264
Mobile	3.0565	11.9665	31.1980	0.1098	8.7844	0.0827	8.8670	2.3507	0.0769	2.4276		11,192.3269	11,192.3269	0.5691		11,206.5536
Total	**5.6920**	**12.5767**	**39.0225**	**0.1134**	**8.7844**	**0.1655**	**8.9499**	**2.3507**	**0.1597**	**2.5105**	**0.0000**	**11,857.8037**	**11,857.8037**	**0.5946**	**0.0120**	**11,876.2299**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.5758	0.0866	7.5123	4.0000e-004		0.0416	0.0416		0.0416	0.0416	0.0000	13.5246	13.5246	0.0130	0.0000	13.8500
Energy	0.0598	0.5237	0.3123	3.2600e-003		0.0413	0.0413		0.0413	0.0413		651.9521	651.9521	0.0125	0.0120	655.8264
Mobile	3.0565	11.9665	31.1980	0.1098	8.7844	0.0827	8.8670	2.3507	0.0769	2.4276		11,192.3269	11,192.3269	0.5691		11,206.5536
Total	**5.6920**	**12.5767**	**39.0225**	**0.1134**	**8.7844**	**0.1655**	**8.9499**	**2.3507**	**0.1597**	**2.5105**	**0.0000**	**11,857.8037**	**11,857.8037**	**0.5946**	**0.0120**	**11,876.2299**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	3/2/2021	3/29/2021	5	20	
2	Site Preparation	Site Preparation	3/30/2021	4/12/2021	5	10	
3	Grading	Grading	4/13/2021	5/10/2021	5	20	
4	Building Construction	Building Construction	5/11/2021	10/24/2022	5	380	
5	Paving	Paving	10/25/2022	11/28/2022	5	25	
6	Architectural Coating	Architectural Coating	11/29/2022	2/20/2023	5	60	

Acres of Grading (Site Preparation Phase): 5

Acres of Grading (Grading Phase): 7.5

Acres of Paving: 0.27

Residential Indoor: 184,275; Residential Outdoor: 61,425; Non-Residential Indoor: 25,950; Non-Residential Outdoor: 8,650; Striped Parking Area: 702 (Architectural Coating – sqft)

OffRoad Equipment

Bellflower Laemmle Theater - Los Angeles-South Coast County, Summer

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Rubber Tired Dozers	1	7.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	6.00	187	0.41
Grading	Rubber Tired Dozers	1	6.00	247	0.40
Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Building Construction	Cranes	1	6.00	231	0.29
Building Construction	Forklifts	1	6.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	3	8.00	46	0.45
Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Paving	Pavers	1	6.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	1	7.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	5	13.00	0.00	297.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	3	8.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	3	8.00	0.00	494.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	7	77.00	14.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	5	13.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Demolition - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.2099	0.0000	3.2099	0.4860	0.0000	0.4860			0.0000			0.0000
Off-Road	1.9930	19.6966	14.4925	0.0241		1.0409	1.0409		0.9715	0.9715		2,322.7171	2,322.7171	0.5940		2,337.5658
Total	**1.9930**	**19.6966**	**14.4925**	**0.0241**	**3.2099**	**1.0409**	**4.2508**	**0.4860**	**0.9715**	**1.4575**		**2,322.7171**	**2,322.7171**	**0.5940**		**2,337.5658**

3.2 Demolition - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1238	3.9834	0.9340	0.0116	0.2597	0.0122	0.2719	0.0712	0.0117	0.0829		1,256.9727	1,256.9727	0.0853		1,259.1053
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0557	0.0383	0.5236	1.4900e-003	0.1453	1.1700e-003	0.1465	0.0385	1.0800e-003	0.0396		148.0401	148.0401	4.3600e-003		148.1491
Total	**0.1796**	**4.0217**	**1.4576**	**0.0131**	**0.4050**	**0.0134**	**0.4184**	**0.1097**	**0.0128**	**0.1225**		**1,405.0128**	**1,405.0128**	**0.0897**		**1,407.2544**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.3722	0.0000	1.3722	0.2078	0.0000	0.2078			0.0000			0.0000
Off-Road	1.9930	19.6966	14.4925	0.0241		1.0409	1.0409		0.9715	0.9715	0.0000	2,322.7171	2,322.7171	0.5940		2,337.5658
Total	**1.9930**	**19.6966**	**14.4925**	**0.0241**	**1.3722**	**1.0409**	**2.4131**	**0.2078**	**0.9715**	**1.1792**	**0.0000**	**2,322.7171**	**2,322.7171**	**0.5940**		**2,337.5658**

3.2 Demolition - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1238	3.9834	0.9340	0.0116	0.2420	0.0122	0.2542	0.0668	0.0117	0.0785		1,256.9727	1,256.9727	0.0853		1,259.1053
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0557	0.0383	0.5236	1.4900e-003	0.1339	1.1700e-003	0.1351	0.0358	1.0800e-003	0.0368		148.0401	148.0401	4.3600e-003		148.1491
Total	**0.1796**	**4.0217**	**1.4576**	**0.0131**	**0.3759**	**0.0134**	**0.3893**	**0.1026**	**0.0128**	**0.1154**		**1,405.0128**	**1,405.0128**	**0.0897**		**1,407.2544**

3.3 Site Preparation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.7996	0.0000	5.7996	2.9537	0.0000	2.9537			0.0000			0.0000
Off-Road	1.5558	17.4203	7.5605	0.0172		0.7654	0.7654		0.7041	0.7041		1,666.5174	1,666.5174	0.5390		1,679.9920
Total	**1.5558**	**17.4203**	**7.5605**	**0.0172**	**5.7996**	**0.7654**	**6.5650**	**2.9537**	**0.7041**	**3.6578**		**1,666.5174**	**1,666.5174**	**0.5390**		**1,679.9920**

3.3 Site Preparation - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0343	0.0236	0.3222	9.1000e-004	0.0894	7.2000e-004	0.0901	0.0237	6.7000e-004	0.0244		91.1016	91.1016	2.6800e-003		91.1687
Total	**0.0343**	**0.0236**	**0.3222**	**9.1000e-004**	**0.0894**	**7.2000e-004**	**0.0901**	**0.0237**	**6.7000e-004**	**0.0244**		**91.1016**	**91.1016**	**2.6800e-003**		**91.1687**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.4793	0.0000	2.4793	1.2627	0.0000	1.2627			0.0000			0.0000
Off-Road	1.5558	17.4203	7.5605	0.0172		0.7654	0.7654		0.7041	0.7041	0.0000	1,666.5174	1,666.5174	0.5390		1,679.9920
Total	**1.5558**	**17.4203**	**7.5605**	**0.0172**	**2.4793**	**0.7654**	**3.2447**	**1.2627**	**0.7041**	**1.9669**	**0.0000**	**1,666.5174**	**1,666.5174**	**0.5390**		**1,679.9920**

3.3 Site Preparation - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0343	0.0236	0.3222	9.1000e-004	0.0824	7.2000e-004	0.0832	0.0220	6.7000e-004	0.0227		91.1016	91.1016	2.6800e-003		91.1687
Total	**0.0343**	**0.0236**	**0.3222**	**9.1000e-004**	**0.0824**	**7.2000e-004**	**0.0832**	**0.0220**	**6.7000e-004**	**0.0227**		**91.1016**	**91.1016**	**2.6800e-003**		**91.1687**

3.4 Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9143	0.0000	4.9143	2.5256	0.0000	2.5256			0.0000			0.0000
Off-Road	1.2884	14.3307	6.3314	0.0141		0.6379	0.6379		0.5869	0.5869		1,365.0648	1,365.0648	0.4415		1,376.1020
Total	**1.2884**	**14.3307**	**6.3314**	**0.0141**	**4.9143**	**0.6379**	**5.5522**	**2.5256**	**0.5869**	**3.1125**		**1,365.0648**	**1,365.0648**	**0.4415**		**1,376.1020**

3.4 Grading - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2060	6.6256	1.5535	0.0193	0.4319	0.0203	0.4522	0.1184	0.0195	0.1378		2,090.7223	2,090.7223	0.1419		2,094.2694
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0343	0.0236	0.3222	9.1000e-004	0.0894	7.2000e-004	0.0901	0.0237	6.7000e-004	0.0244		91.1016	91.1016	2.6800e-003		91.1687
Total	**0.2402**	**6.6492**	**1.8757**	**0.0202**	**0.5213**	**0.0211**	**0.5424**	**0.1421**	**0.0201**	**0.1622**		**2,181.8239**	**2,181.8239**	**0.1446**		**2,185.4381**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.1008	0.0000	2.1008	1.0797	0.0000	1.0797			0.0000			0.0000
Off-Road	1.2884	14.3307	6.3314	0.0141		0.6379	0.6379		0.5869	0.5869	0.0000	1,365.0648	1,365.0648	0.4415		1,376.1020
Total	**1.2884**	**14.3307**	**6.3314**	**0.0141**	**2.1008**	**0.6379**	**2.7388**	**1.0797**	**0.5869**	**1.6666**	**0.0000**	**1,365.0648**	**1,365.0648**	**0.4415**		**1,376.1020**

3.4 Grading - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2060	6.6256	1.5535	0.0193	0.4025	0.0203	0.4228	0.1112	0.0195	0.1306		2,090.7223	2,090.7223	0.1419		2,094.2694
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0343	0.0236	0.3222	9.1000e-004	0.0824	7.2000e-004	0.0832	0.0220	6.7000e-004	0.0227		91.1016	91.1016	2.6800e-003		91.1687
Total	**0.2402**	**6.6492**	**1.8757**	**0.0202**	**0.4849**	**0.0211**	**0.5060**	**0.1332**	**0.0201**	**0.1533**		**2,181.8239**	**2,181.8239**	**0.1446**		**2,185.4381**

3.5 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8125	13.6361	12.8994	0.0221		0.6843	0.6843		0.6608	0.6608		2,001.2200	2,001.2200	0.3573		2,010.1517
Total	**1.8125**	**13.6361**	**12.8994**	**0.0221**		**0.6843**	**0.6843**		**0.6608**	**0.6608**		**2,001.2200**	**2,001.2200**	**0.3573**		**2,010.1517**

3.5 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0426	1.3593	0.3553	3.6000e-003	0.0896	2.7800e-003	0.0924	0.0258	2.6600e-003	0.0285		384.8329	384.8329	0.0227		385.3997
Worker	0.3301	0.2269	3.1014	8.8000e-003	0.8607	6.9500e-003	0.8676	0.2283	6.4100e-003	0.2347		876.8528	876.8528	0.0258		877.4987
Total	**0.3726**	**1.5861**	**3.4567**	**0.0124**	**0.9503**	**9.7300e-003**	**0.9600**	**0.2541**	**9.0700e-003**	**0.2631**		**1,261.6857**	**1,261.6857**	**0.0485**		**1,262.8984**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8125	13.6361	12.8994	0.0221		0.6843	0.6843		0.6608	0.6608	0.0000	2,001.2200	2,001.2200	0.3573		2,010.1517
Total	**1.8125**	**13.6361**	**12.8994**	**0.0221**		**0.6843**	**0.6843**		**0.6608**	**0.6608**	**0.0000**	**2,001.2200**	**2,001.2200**	**0.3573**		**2,010.1517**

3.5 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0426	1.3593	0.3553	3.6000e-003	0.0839	2.7800e-003	0.0867	0.0244	2.6600e-003	0.0271		384.8329	384.8329	0.0227		385.3997
Worker	0.3301	0.2269	3.1014	8.8000e-003	0.7933	6.9500e-003	0.8003	0.2117	6.4100e-003	0.2181		876.8528	876.8528	0.0258		877.4987
Total	**0.3726**	**1.5861**	**3.4567**	**0.0124**	**0.8772**	**9.7300e-003**	**0.8870**	**0.2361**	**9.0700e-003**	**0.2452**		**1,261.6857**	**1,261.6857**	**0.0485**		**1,262.8984**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6487	12.5031	12.7264	0.0221		0.5889	0.5889		0.5689	0.5689		2,001.5429	2,001.5429	0.3486		2,010.2581
Total	**1.6487**	**12.5031**	**12.7264**	**0.0221**		**0.5889**	**0.5889**		**0.5689**	**0.5689**		**2,001.5429**	**2,001.5429**	**0.3486**		**2,010.2581**

3.5 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0399	1.2926	0.3362	3.5700e-003	0.0896	2.4300e-003	0.0921	0.0258	2.3200e-003	0.0281		381.4802	381.4802	0.0219		382.0275
Worker	0.3092	0.2049	2.8613	8.4900e-003	0.8607	6.7400e-003	0.8674	0.2283	6.2100e-003	0.2345		846.0085	846.0085	0.0234		846.5922
Total	**0.3491**	**1.4976**	**3.1976**	**0.0121**	**0.9503**	**9.1700e-003**	**0.9595**	**0.2541**	**8.5300e-003**	**0.2626**		**1,227.4887**	**1,227.4887**	**0.0452**		**1,228.6198**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6487	12.5031	12.7264	0.0221		0.5889	0.5889		0.5689	0.5689	0.0000	2,001.5429	2,001.5429	0.3486		2,010.2581
Total	**1.6487**	**12.5031**	**12.7264**	**0.0221**		**0.5889**	**0.5889**		**0.5689**	**0.5689**	**0.0000**	**2,001.5429**	**2,001.5429**	**0.3486**		**2,010.2581**

3.5 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0399	1.2926	0.3362	3.5700e-003	0.0839	2.4300e-003	0.0863	0.0244	2.3200e-003	0.0267		381.4802	381.4802	0.0219		382.0275
Worker	0.3092	0.2049	2.8613	8.4900e-003	0.7933	6.7400e-003	0.8001	0.2117	6.2100e-003	0.2179		846.0085	846.0085	0.0234		846.5922
Total	**0.3491**	**1.4976**	**3.1976**	**0.0121**	**0.8772**	**9.1700e-003**	**0.8864**	**0.2361**	**8.5300e-003**	**0.2447**		**1,227.4887**	**1,227.4887**	**0.0452**		**1,228.6198**

3.6 Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.6877	6.7738	8.8060	0.0135		0.3474	0.3474		0.3205	0.3205		1,297.3789	1,297.3789	0.4113		1,307.6608
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.6877**	**6.7738**	**8.8060**	**0.0135**		**0.3474**	**0.3474**		**0.3205**	**0.3205**		**1,297.3789**	**1,297.3789**	**0.4113**		**1,307.6608**

3.6 Paving - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0522	0.0346	0.4831	1.4300e-003	0.1453	1.1400e-003	0.1465	0.0385	1.0500e-003	0.0396		142.8326	142.8326	3.9400e-003		142.9312
Total	**0.0522**	**0.0346**	**0.4831**	**1.4300e-003**	**0.1453**	**1.1400e-003**	**0.1465**	**0.0385**	**1.0500e-003**	**0.0396**		**142.8326**	**142.8326**	**3.9400e-003**		**142.9312**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.6877	6.7738	8.8060	0.0135		0.3474	0.3474		0.3205	0.3205	0.0000	1,297.3789	1,297.3789	0.4113		1,307.6608
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.6877**	**6.7738**	**8.8060**	**0.0135**		**0.3474**	**0.3474**		**0.3205**	**0.3205**	**0.0000**	**1,297.3789**	**1,297.3789**	**0.4113**		**1,307.6608**

3.6 Paving - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0522	0.0346	0.4831	1.4300e-003	0.1339	1.1400e-003	0.1351	0.0358	1.0500e-003	0.0368		142.8326	142.8326	3.9400e-003		142.9312
Total	**0.0522**	**0.0346**	**0.4831**	**1.4300e-003**	**0.1339**	**1.1400e-003**	**0.1351**	**0.0358**	**1.0500e-003**	**0.0368**		**142.8326**	**142.8326**	**3.9400e-003**		**142.9312**

3.7 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	12.2172					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817		281.4481	281.4481	0.0183		281.9062
Total	**12.4218**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**		**281.4481**	**281.4481**	**0.0183**		**281.9062**

3.7 Architectural Coating - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0602	0.0399	0.5574	1.6500e-003	0.1677	1.3100e-003	0.1690	0.0445	1.2100e-003	0.0457		164.8069	164.8069	4.5500e-003		164.9206
Total	**0.0602**	**0.0399**	**0.5574**	**1.6500e-003**	**0.1677**	**1.3100e-003**	**0.1690**	**0.0445**	**1.2100e-003**	**0.0457**		**164.8069**	**164.8069**	**4.5500e-003**		**164.9206**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	12.2172					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817	0.0000	281.4481	281.4481	0.0183		281.9062
Total	**12.4218**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**	**0.0000**	**281.4481**	**281.4481**	**0.0183**		**281.9062**

3.7 Architectural Coating - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0602	0.0399	0.5574	1.6500e-003	0.1546	1.3100e-003	0.1559	0.0413	1.2100e-003	0.0425		164.8069	164.8069	4.5500e-003		164.9206
Total	**0.0602**	**0.0399**	**0.5574**	**1.6500e-003**	**0.1546**	**1.3100e-003**	**0.1559**	**0.0413**	**1.2100e-003**	**0.0425**		**164.8069**	**164.8069**	**4.5500e-003**		**164.9206**

3.7 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	12.2172					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1917	1.3030	1.8111	2.9700e-003		0.0708	0.0708		0.0708	0.0708		281.4481	281.4481	0.0168		281.8690
Total	**12.4089**	**1.3030**	**1.8111**	**2.9700e-003**		**0.0708**	**0.0708**		**0.0708**	**0.0708**		**281.4481**	**281.4481**	**0.0168**		**281.8690**

3.7 Architectural Coating - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0566	0.0361	0.5133	1.5900e-003	0.1677	1.2800e-003	0.1689	0.0445	1.1700e-003	0.0456		158.7723	158.7723	4.1000e-003		158.8748
Total	**0.0566**	**0.0361**	**0.5133**	**1.5900e-003**	**0.1677**	**1.2800e-003**	**0.1689**	**0.0445**	**1.1700e-003**	**0.0456**		**158.7723**	**158.7723**	**4.1000e-003**		**158.8748**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	12.2172					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1917	1.3030	1.8111	2.9700e-003		0.0708	0.0708		0.0708	0.0708	0.0000	281.4481	281.4481	0.0168		281.8690
Total	**12.4089**	**1.3030**	**1.8111**	**2.9700e-003**		**0.0708**	**0.0708**		**0.0708**	**0.0708**	**0.0000**	**281.4481**	**281.4481**	**0.0168**		**281.8690**

3.7 Architectural Coating - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0566	0.0361	0.5133	1.5900e-003	0.1546	1.2800e-003	0.1558	0.0413	1.1700e-003	0.0424		158.7723	158.7723	4.1000e-003		158.8748
Total	**0.0566**	**0.0361**	**0.5133**	**1.5900e-003**	**0.1546**	**1.2800e-003**	**0.1558**	**0.0413**	**1.1700e-003**	**0.0424**		**158.7723**	**158.7723**	**4.1000e-003**		**158.8748**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	3.0565	11.9665	31.1980	0.1098	8.7844	0.0827	8.8670	2.3507	0.0769	2.4276		11,192.3269	11,192.3269	0.5691		11,206.5536
Unmitigated	3.0565	11.9665	31.1980	0.1098	8.7844	0.0827	8.8670	2.3507	0.0769	2.4276		11,192.3269	11,192.3269	0.5691		11,206.5536

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	56.42	45.50	53.69	186,132	186,132
Enclosed Parking with Elevator	0.00	0.00	0.00		
High Turnover (Sit Down Restaurant)	1,085.48	1,131.58	1201.25	1,510,834	1,510,834
Movie Theater (No Matinee)	666.41	709.34	746.24	1,449,303	1,449,303
Strip Mall	378.35	300.38	186.15	646,414	646,414
Total	2,186.66	2,186.79	2,187.33	3,792,682	3,792,682

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3
Enclosed Parking with Elevator	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
High Turnover (Sit Down	16.60	8.40	6.90	8.50	72.50	19.00	37	20	43
Movie Theater (No Matinee)	16.60	8.40	6.90	1.80	79.20	19.00	66	17	17
Strip Mall	16.60	8.40	6.90	16.60	64.40	19.00	45	40	15

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments Mid Rise	0.545842	0.044768	0.205288	0.119317	0.015350	0.006227	0.020460	0.031333	0.002546	0.002133	0.005184	0.000692	0.000862
Enclosed Parking with Elevator	0.545842	0.044768	0.205288	0.119317	0.015350	0.006227	0.020460	0.031333	0.002546	0.002133	0.005184	0.000692	0.000862
High Turnover (Sit Down Restaurant)	0.545842	0.044768	0.205288	0.119317	0.015350	0.006227	0.020460	0.031333	0.002546	0.002133	0.005184	0.000692	0.000862
Movie Theater (No Matinee)	0.545842	0.044768	0.205288	0.119317	0.015350	0.006227	0.020460	0.031333	0.002546	0.002133	0.005184	0.000692	0.000862
Strip Mall	0.545842	0.044768	0.205288	0.119317	0.015350	0.006227	0.020460	0.031333	0.002546	0.002133	0.005184	0.000692	0.000862

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0598	0.5237	0.3123	3.2600e-003		0.0413	0.0413		0.0413	0.0413		651.9521	651.9521	0.0125	0.0120	655.8264
NaturalGas Unmitigated	0.0598	0.5237	0.3123	3.2600e-003		0.0413	0.0413		0.0413	0.0413		651.9521	651.9521	0.0125	0.0120	655.8264

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	3339.87	0.0360	0.3078	0.1310	1.9600e-003		0.0249	0.0249		0.0249	0.0249		392.9255	392.9255	7.5300e-003	7.2000e-003	395.2605
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
High Turnover (Sit Down Restaurant)	1580.55	0.0171	0.1550	0.1302	9.3000e-004		0.0118	0.0118		0.0118	0.0118		185.9468	185.9468	3.5600e-003	3.4100e-003	187.0518
Movie Theater (No Matinee)	609.945	6.5800e-003	0.0598	0.0502	3.6000e-004		4.5400e-003	4.5400e-003		4.5400e-003	4.5400e-003		71.7583	71.7583	1.3800e-003	1.3200e-003	72.1847
Strip Mall	11.2329	1.2000e-004	1.1000e-003	9.3000e-004	1.0000e-005		8.0000e-005	8.0000e-005		8.0000e-005	8.0000e-005		1.3215	1.3215	3.0000e-005	2.0000e-005	1.3294
Total		**0.0598**	**0.5237**	**0.3123**	**3.2600e-003**		**0.0413**	**0.0413**		**0.0413**	**0.0413**		**651.9521**	**651.9521**	**0.0125**	**0.0120**	**655.8264**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	3.33987	0.0360	0.3078	0.1310	1.9600e-003		0.0249	0.0249		0.0249	0.0249		392.9255	392.9255	7.5300e-003	7.2000e-003	395.2605
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
High Turnover (Sit Down Restaurant)	1.58055	0.0171	0.1550	0.1302	9.3000e-004		0.0118	0.0118		0.0118	0.0118		185.9468	185.9468	3.5600e-003	3.4100e-003	187.0518
Movie Theater (No Matinee)	0.609945	6.5800e-003	0.0598	0.0502	3.6000e-004		4.5400e-003	4.5400e-003		4.5400e-003	4.5400e-003		71.7583	71.7583	1.3800e-003	1.3200e-003	72.1847
Strip Mall	0.0112329	1.2000e-004	1.1000e-003	9.3000e-004	1.0000e-005		8.0000e-005	8.0000e-005		8.0000e-005	8.0000e-005		1.3215	1.3215	3.0000e-005	2.0000e-005	1.3294
Total		**0.0598**	**0.5237**	**0.3123**	**3.2600e-003**		**0.0413**	**0.0413**		**0.0413**	**0.0413**		**651.9521**	**651.9521**	**0.0125**	**0.0120**	**655.8264**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.5758	0.0866	7.5123	4.0000e-004		0.0416	0.0416		0.0416	0.0416	0.0000	13.5246	13.5246	0.0130	0.0000	13.8500
Unmitigated	2.5758	0.0866	7.5123	4.0000e-004		0.0416	0.0416		0.0416	0.0416	0.0000	13.5246	13.5246	0.0130	0.0000	13.8500

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.2008					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	2.1485					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.2265	0.0866	7.5123	4.0000e-004		0.0416	0.0416		0.0416	0.0416		13.5246	13.5246	0.0130		13.8500
Total	**2.5758**	**0.0866**	**7.5123**	**4.0000e-004**		**0.0416**	**0.0416**		**0.0416**	**0.0416**	**0.0000**	**13.5246**	**13.5246**	**0.0130**	**0.0000**	**13.8500**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.2008					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	2.1485					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.2265	0.0866	7.5123	4.0000e-004		0.0416	0.0416		0.0416	0.0416		13.5246	13.5246	0.0130		13.8500
Total	**2.5758**	**0.0866**	**7.5123**	**4.0000e-004**		**0.0416**	**0.0416**		**0.0416**	**0.0416**	**0.0000**	**13.5246**	**13.5246**	**0.0130**	**0.0000**	**13.8500**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Bellflower Laemmle Theater

Los Angeles-South Coast County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Enclosed Parking with Elevator	11.70	1000sqft	0.27	11,700.00	0
High Turnover (Sit Down Restaurant)	2.50	1000sqft	0.06	2,500.00	0
Movie Theater (No Matinee)	12.30	1000sqft	0.28	12,300.00	0
Apartments Mid Rise	91.00	Dwelling Unit	0.90	91,000.00	260
Strip Mall	2.50	1000sqft	0.06	2,500.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	33
Climate Zone	9			**Operational Year**	2023
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Dwelling units acreage adjusted based on 4-story building

Construction Phase - Adjusted number of days of construction to meet a total of 515 days

Demolition -

Grading -

Vehicle Trips - 2224 adt

Woodstoves - no woodstoves or fireplaces

Construction Off-road Equipment Mitigation - Rule 403

Bellflower Laemmle Theater - Los Angeles-South Coast County, Winter

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	CleanPavedRoadPercentReduction	0	9
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	10.00	60.00
tblConstructionPhase	NumDays	200.00	380.00
tblConstructionPhase	NumDays	4.00	20.00
tblConstructionPhase	NumDays	10.00	25.00
tblConstructionPhase	NumDays	2.00	10.00
tblFireplaces	NumberGas	77.35	0.00
tblFireplaces	NumberWood	4.55	0.00
tblGrading	MaterialExported	0.00	5,000.00
tblLandUse	LotAcreage	2.39	0.90
tblVehicleTrips	ST_TR	6.39	0.50
tblVehicleTrips	ST_TR	158.37	452.63
tblVehicleTrips	ST_TR	99.28	57.67
tblVehicleTrips	ST_TR	42.04	120.15
tblVehicleTrips	SU_TR	5.86	0.59
tblVehicleTrips	SU_TR	131.84	480.50
tblVehicleTrips	SU_TR	81.90	60.67
tblVehicleTrips	SU_TR	20.43	74.46
tblVehicleTrips	WD_TR	6.65	0.62
tblVehicleTrips	WD_TR	127.15	434.19
tblVehicleTrips	WD_TR	78.06	54.18
tblVehicleTrips	WD_TR	44.32	151.34
tblWoodstoves	NumberCatalytic	4.55	0.00
tblWoodstoves	NumberNoncatalytic	4.55	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	2.2243	23.7712	16.1280	0.0369	5.8890	1.0545	6.6551	2.9774	0.9844	3.6822	0.0000	3,697.3076	3,697.3076	0.6864	0.0000	3,714.4666
2022	12.4890	14.0190	15.7102	0.0335	0.9503	0.5981	1.5484	0.2541	0.5775	0.8315	0.0000	3,169.1197	3,169.1197	0.4150	0.0000	3,178.9661
2023	12.4722	1.3430	2.2788	4.4700e-003	0.1677	0.0721	0.2398	0.0445	0.0720	0.1165	0.0000	430.9561	430.9561	0.0207	0.0000	431.4733
Maximum	**12.4890**	**23.7712**	**16.1280**	**0.0369**	**5.8890**	**1.0545**	**6.6551**	**2.9774**	**0.9844**	**3.6822**	**0.0000**	**3,697.3076**	**3,697.3076**	**0.6864**	**0.0000**	**3,714.4666**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	2.2243	23.7712	16.1280	0.0369	2.5858	1.0545	3.3278	1.2847	0.9844	1.9895	0.0000	3,697.3076	3,697.3076	0.6864	0.0000	3,714.4666
2022	12.4890	14.0190	15.7102	0.0335	0.8772	0.5981	1.4753	0.2361	0.5775	0.8136	0.0000	3,169.1197	3,169.1197	0.4150	0.0000	3,178.9661
2023	12.4722	1.3430	2.2788	4.4700e-003	0.1546	0.0721	0.2266	0.0413	0.0720	0.1132	0.0000	430.9561	430.9561	0.0207	0.0000	431.4733
Maximum	**12.4890**	**23.7712**	**16.1280**	**0.0369**	**2.5858**	**1.0545**	**3.3278**	**1.2847**	**0.9844**	**1.9895**	**0.0000**	**3,697.3076**	**3,697.3076**	**0.6864**	**0.0000**	**3,714.4666**

Bellflower Laemmle Theater - Los Angeles-South Coast County, Winter

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**48.37**	**0.00**	**40.43**	**52.32**	**0.00**	**37.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.5758	0.0866	7.5123	4.0000e-004		0.0416	0.0416		0.0416	0.0416	0.0000	13.5246	13.5246	0.0130	0.0000	13.8500
Energy	0.0598	0.5237	0.3123	3.2600e-003		0.0413	0.0413		0.0413	0.0413		651.9521	651.9521	0.0125	0.0120	655.8264
Mobile	2.9546	12.1151	30.4142	0.1042	8.7844	0.0833	8.8677	2.3507	0.0775	2.4282		10,631.1276	10,631.1276	0.5748		10,645.4987
Total	**5.5902**	**12.7253**	**38.2388**	**0.1079**	**8.7844**	**0.1662**	**8.9505**	**2.3507**	**0.1603**	**2.5111**	**0.0000**	**11,296.6044**	**11,296.6044**	**0.6004**	**0.0120**	**11,315.1750**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.5758	0.0866	7.5123	4.0000e-004		0.0416	0.0416		0.0416	0.0416	0.0000	13.5246	13.5246	0.0130	0.0000	13.8500
Energy	0.0598	0.5237	0.3123	3.2600e-003		0.0413	0.0413		0.0413	0.0413		651.9521	651.9521	0.0125	0.0120	655.8264
Mobile	2.9546	12.1151	30.4142	0.1042	8.7844	0.0833	8.8677	2.3507	0.0775	2.4282		10,631.1276	10,631.1276	0.5748		10,645.4987
Total	**5.5902**	**12.7253**	**38.2388**	**0.1079**	**8.7844**	**0.1662**	**8.9505**	**2.3507**	**0.1603**	**2.5111**	**0.0000**	**11,296.6044**	**11,296.6044**	**0.6004**	**0.0120**	**11,315.1750**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	3/2/2021	3/29/2021	5	20	
2	Site Preparation	Site Preparation	3/30/2021	4/12/2021	5	10	
3	Grading	Grading	4/13/2021	5/10/2021	5	20	
4	Building Construction	Building Construction	5/11/2021	10/24/2022	5	380	
5	Paving	Paving	10/25/2022	11/28/2022	5	25	
6	Architectural Coating	Architectural Coating	11/29/2022	2/20/2023	5	60	

Acres of Grading (Site Preparation Phase): 5

Acres of Grading (Grading Phase): 7.5

Acres of Paving: 0.27

Residential Indoor: 184,275; Residential Outdoor: 61,425; Non-Residential Indoor: 25,950; Non-Residential Outdoor: 8,650; Striped Parking Area: 702 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Rubber Tired Dozers	1	7.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	6.00	187	0.41
Grading	Rubber Tired Dozers	1	6.00	247	0.40
Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Building Construction	Cranes	1	6.00	231	0.29
Building Construction	Forklifts	1	6.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	3	8.00	46	0.45
Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Paving	Pavers	1	6.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	1	7.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	5	13.00	0.00	297.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	3	8.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	3	8.00	0.00	494.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	7	77.00	14.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	5	13.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Demolition - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.2099	0.0000	3.2099	0.4860	0.0000	0.4860			0.0000			0.0000
Off-Road	1.9930	19.6966	14.4925	0.0241		1.0409	1.0409		0.9715	0.9715		2,322.7171	2,322.7171	0.5940		2,337.5658
Total	**1.9930**	**19.6966**	**14.4925**	**0.0241**	**3.2099**	**1.0409**	**4.2508**	**0.4860**	**0.9715**	**1.4575**		**2,322.7171**	**2,322.7171**	**0.5940**		**2,337.5658**

3.2 Demolition - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1268	4.0322	0.9904	0.0114	0.2597	0.0124	0.2721	0.0712	0.0119	0.0831		1,235.1979	1,235.1979	0.0883		1,237.4057
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0620	0.0424	0.4787	1.4000e-003	0.1453	1.1700e-003	0.1465	0.0385	1.0800e-003	0.0396		139.3926	139.3926	4.1000e-003		139.4952
Total	**0.1888**	**4.0746**	**1.4691**	**0.0128**	**0.4050**	**0.0136**	**0.4186**	**0.1097**	**0.0130**	**0.1227**		**1,374.5905**	**1,374.5905**	**0.0924**		**1,376.9008**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.3722	0.0000	1.3722	0.2078	0.0000	0.2078			0.0000			0.0000
Off-Road	1.9930	19.6966	14.4925	0.0241		1.0409	1.0409		0.9715	0.9715	0.0000	2,322.7171	2,322.7171	0.5940		2,337.5658
Total	**1.9930**	**19.6966**	**14.4925**	**0.0241**	**1.3722**	**1.0409**	**2.4131**	**0.2078**	**0.9715**	**1.1792**	**0.0000**	**2,322.7171**	**2,322.7171**	**0.5940**		**2,337.5658**

3.2 Demolition - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1268	4.0322	0.9904	0.0114	0.2420	0.0124	0.2544	0.0668	0.0119	0.0787		1,235.1979	1,235.1979	0.0883		1,237.4057
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0620	0.0424	0.4787	1.4000e-003	0.1339	1.1700e-003	0.1351	0.0358	1.0800e-003	0.0368		139.3926	139.3926	4.1000e-003		139.4952
Total	**0.1888**	**4.0746**	**1.4691**	**0.0128**	**0.3759**	**0.0136**	**0.3895**	**0.1026**	**0.0130**	**0.1155**		**1,374.5905**	**1,374.5905**	**0.0924**		**1,376.9008**

3.3 Site Preparation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.7996	0.0000	5.7996	2.9537	0.0000	2.9537			0.0000			0.0000
Off-Road	1.5558	17.4203	7.5605	0.0172		0.7654	0.7654		0.7041	0.7041		1,666.5174	1,666.5174	0.5390		1,679.9920
Total	**1.5558**	**17.4203**	**7.5605**	**0.0172**	**5.7996**	**0.7654**	**6.5650**	**2.9537**	**0.7041**	**3.6578**		**1,666.5174**	**1,666.5174**	**0.5390**		**1,679.9920**

3.3 Site Preparation - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0382	0.0261	0.2946	8.6000e-004	0.0894	7.2000e-004	0.0901	0.0237	6.7000e-004	0.0244		85.7801	85.7801	2.5200e-003		85.8432
Total	**0.0382**	**0.0261**	**0.2946**	**8.6000e-004**	**0.0894**	**7.2000e-004**	**0.0901**	**0.0237**	**6.7000e-004**	**0.0244**		**85.7801**	**85.7801**	**2.5200e-003**		**85.8432**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.4793	0.0000	2.4793	1.2627	0.0000	1.2627			0.0000			0.0000
Off-Road	1.5558	17.4203	7.5605	0.0172		0.7654	0.7654		0.7041	0.7041	0.0000	1,666.5174	1,666.5174	0.5390		1,679.9920
Total	**1.5558**	**17.4203**	**7.5605**	**0.0172**	**2.4793**	**0.7654**	**3.2447**	**1.2627**	**0.7041**	**1.9669**	**0.0000**	**1,666.5174**	**1,666.5174**	**0.5390**		**1,679.9920**

3.3 Site Preparation - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0382	0.0261	0.2946	8.6000e-004	0.0824	7.2000e-004	0.0832	0.0220	6.7000e-004	0.0227		85.7801	85.7801	2.5200e-003		85.8432
Total	**0.0382**	**0.0261**	**0.2946**	**8.6000e-004**	**0.0824**	**7.2000e-004**	**0.0832**	**0.0220**	**6.7000e-004**	**0.0227**		**85.7801**	**85.7801**	**2.5200e-003**		**85.8432**

3.4 Grading - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9143	0.0000	4.9143	2.5256	0.0000	2.5256			0.0000			0.0000
Off-Road	1.2884	14.3307	6.3314	0.0141		0.6379	0.6379		0.5869	0.5869		1,365.0648	1,365.0648	0.4415		1,376.1020
Total	**1.2884**	**14.3307**	**6.3314**	**0.0141**	**4.9143**	**0.6379**	**5.5522**	**2.5256**	**0.5869**	**3.1125**		**1,365.0648**	**1,365.0648**	**0.4415**		**1,376.1020**

3.4 Grading - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2109	6.7068	1.6473	0.0189	0.4319	0.0206	0.4525	0.1184	0.0198	0.1381		2,054.5043	2,054.5043	0.1469		2,058.1764
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0382	0.0261	0.2946	8.6000e-004	0.0894	7.2000e-004	0.0901	0.0237	6.7000e-004	0.0244		85.7801	85.7801	2.5200e-003		85.8432
Total	**0.2491**	**6.7329**	**1.9419**	**0.0198**	**0.5213**	**0.0214**	**0.5427**	**0.1421**	**0.0204**	**0.1625**		**2,140.2843**	**2,140.2843**	**0.1494**		**2,144.0196**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.1008	0.0000	2.1008	1.0797	0.0000	1.0797			0.0000			0.0000
Off-Road	1.2884	14.3307	6.3314	0.0141		0.6379	0.6379		0.5869	0.5869	0.0000	1,365.0648	1,365.0648	0.4415		1,376.1020
Total	**1.2884**	**14.3307**	**6.3314**	**0.0141**	**2.1008**	**0.6379**	**2.7388**	**1.0797**	**0.5869**	**1.6666**	**0.0000**	**1,365.0648**	**1,365.0648**	**0.4415**		**1,376.1020**

3.4 Grading - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2109	6.7068	1.6473	0.0189	0.4025	0.0206	0.4231	0.1112	0.0198	0.1309		2,054.5043	2,054.5043	0.1469		2,058.1764
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0382	0.0261	0.2946	8.6000e-004	0.0824	7.2000e-004	0.0832	0.0220	6.7000e-004	0.0227		85.7801	85.7801	2.5200e-003		85.8432
Total	**0.2491**	**6.7329**	**1.9419**	**0.0198**	**0.4849**	**0.0214**	**0.5063**	**0.1332**	**0.0204**	**0.1536**		**2,140.2843**	**2,140.2843**	**0.1494**		**2,144.0196**

3.5 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8125	13.6361	12.8994	0.0221		0.6843	0.6843		0.6608	0.6608		2,001.2200	2,001.2200	0.3573		2,010.1517
Total	**1.8125**	**13.6361**	**12.8994**	**0.0221**		**0.6843**	**0.6843**		**0.6608**	**0.6608**		**2,001.2200**	**2,001.2200**	**0.3573**		**2,010.1517**

3.5 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0447	1.3564	0.3931	3.5000e-003	0.0896	2.8700e-003	0.0925	0.0258	2.7400e-003	0.0286		374.2837	374.2837	0.0242		374.8878
Worker	0.3672	0.2511	2.8356	8.2900e-003	0.8607	6.9500e-003	0.8676	0.2283	6.4100e-003	0.2347		825.6333	825.6333	0.0243		826.2407
Total	**0.4118**	**1.6076**	**3.2287**	**0.0118**	**0.9503**	**9.8200e-003**	**0.9601**	**0.2541**	**9.1500e-003**	**0.2632**		**1,199.9171**	**1,199.9171**	**0.0485**		**1,201.1285**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8125	13.6361	12.8994	0.0221		0.6843	0.6843		0.6608	0.6608	0.0000	2,001.2200	2,001.2200	0.3573		2,010.1517
Total	**1.8125**	**13.6361**	**12.8994**	**0.0221**		**0.6843**	**0.6843**		**0.6608**	**0.6608**	**0.0000**	**2,001.2200**	**2,001.2200**	**0.3573**		**2,010.1517**

3.5 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0447	1.3564	0.3931	3.5000e-003	0.0839	2.8700e-003	0.0868	0.0244	2.7400e-003	0.0271		374.2837	374.2837	0.0242		374.8878
Worker	0.3672	0.2511	2.8356	8.2900e-003	0.7933	6.9500e-003	0.8003	0.2117	6.4100e-003	0.2181		825.6333	825.6333	0.0243		826.2407
Total	**0.4118**	**1.6076**	**3.2287**	**0.0118**	**0.8772**	**9.8200e-003**	**0.8870**	**0.2361**	**9.1500e-003**	**0.2453**		**1,199.9171**	**1,199.9171**	**0.0485**		**1,201.1285**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6487	12.5031	12.7264	0.0221		0.5889	0.5889		0.5689	0.5689		2,001.5429	2,001.5429	0.3486		2,010.2581
Total	**1.6487**	**12.5031**	**12.7264**	**0.0221**		**0.5889**	**0.5889**		**0.5689**	**0.5689**		**2,001.5429**	**2,001.5429**	**0.3486**		**2,010.2581**

3.5 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0419	1.2891	0.3721	3.4700e-003	0.0896	2.5100e-003	0.0921	0.0258	2.4000e-003	0.0282		370.9584	370.9584	0.0233		371.5412
Worker	0.3448	0.2268	2.6117	7.9900e-003	0.8607	6.7400e-003	0.8674	0.2283	6.2100e-003	0.2345		796.6185	796.6185	0.0219		797.1669
Total	**0.3868**	**1.5159**	**2.9837**	**0.0115**	**0.9503**	**9.2500e-003**	**0.9596**	**0.2541**	**8.6100e-003**	**0.2627**		**1,167.5769**	**1,167.5769**	**0.0452**		**1,168.7081**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6487	12.5031	12.7264	0.0221		0.5889	0.5889		0.5689	0.5689	0.0000	2,001.5429	2,001.5429	0.3486		2,010.2581
Total	**1.6487**	**12.5031**	**12.7264**	**0.0221**		**0.5889**	**0.5889**		**0.5689**	**0.5689**	**0.0000**	**2,001.5429**	**2,001.5429**	**0.3486**		**2,010.2581**

3.5 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0419	1.2891	0.3721	3.4700e-003	0.0839	2.5100e-003	0.0864	0.0244	2.4000e-003	0.0268		370.9584	370.9584	0.0233		371.5412
Worker	0.3448	0.2268	2.6117	7.9900e-003	0.7933	6.7400e-003	0.8001	0.2117	6.2100e-003	0.2179		796.6185	796.6185	0.0219		797.1669
Total	**0.3868**	**1.5159**	**2.9837**	**0.0115**	**0.8772**	**9.2500e-003**	**0.8865**	**0.2361**	**8.6100e-003**	**0.2447**		**1,167.5769**	**1,167.5769**	**0.0452**		**1,168.7081**

3.6 Paving - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.6877	6.7738	8.8060	0.0135		0.3474	0.3474		0.3205	0.3205		1,297.3789	1,297.3789	0.4113		1,307.6608
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.6877**	**6.7738**	**8.8060**	**0.0135**		**0.3474**	**0.3474**		**0.3205**	**0.3205**		**1,297.3789**	**1,297.3789**	**0.4113**		**1,307.6608**

3.6 Paving - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0582	0.0383	0.4409	1.3500e-003	0.1453	1.1400e-003	0.1465	0.0385	1.0500e-003	0.0396		134.4940	134.4940	3.7000e-003		134.5866
Total	**0.0582**	**0.0383**	**0.4409**	**1.3500e-003**	**0.1453**	**1.1400e-003**	**0.1465**	**0.0385**	**1.0500e-003**	**0.0396**		**134.4940**	**134.4940**	**3.7000e-003**		**134.5866**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.6877	6.7738	8.8060	0.0135		0.3474	0.3474		0.3205	0.3205	0.0000	1,297.3789	1,297.3789	0.4113		1,307.6608
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.6877**	**6.7738**	**8.8060**	**0.0135**		**0.3474**	**0.3474**		**0.3205**	**0.3205**	**0.0000**	**1,297.3789**	**1,297.3789**	**0.4113**		**1,307.6608**

3.6 Paving - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0582	0.0383	0.4409	1.3500e-003	0.1339	1.1400e-003	0.1351	0.0358	1.0500e-003	0.0368		134.4940	134.4940	3.7000e-003		134.5866
Total	**0.0582**	**0.0383**	**0.4409**	**1.3500e-003**	**0.1339**	**1.1400e-003**	**0.1351**	**0.0358**	**1.0500e-003**	**0.0368**		**134.4940**	**134.4940**	**3.7000e-003**		**134.5866**

3.7 Architectural Coating - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	12.2172					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817		281.4481	281.4481	0.0183		281.9062
Total	**12.4218**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**		**281.4481**	**281.4481**	**0.0183**		**281.9062**

3.7 Architectural Coating - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0672	0.0442	0.5088	1.5600e-003	0.1677	1.3100e-003	0.1690	0.0445	1.2100e-003	0.0457		155.1854	155.1854	4.2700e-003		155.2922
Total	**0.0672**	**0.0442**	**0.5088**	**1.5600e-003**	**0.1677**	**1.3100e-003**	**0.1690**	**0.0445**	**1.2100e-003**	**0.0457**		**155.1854**	**155.1854**	**4.2700e-003**		**155.2922**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	12.2172					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2045	1.4085	1.8136	2.9700e-003		0.0817	0.0817		0.0817	0.0817	0.0000	281.4481	281.4481	0.0183		281.9062
Total	**12.4218**	**1.4085**	**1.8136**	**2.9700e-003**		**0.0817**	**0.0817**		**0.0817**	**0.0817**	**0.0000**	**281.4481**	**281.4481**	**0.0183**		**281.9062**

3.7 Architectural Coating - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0672	0.0442	0.5088	1.5600e-003	0.1546	1.3100e-003	0.1559	0.0413	1.2100e-003	0.0425		155.1854	155.1854	4.2700e-003		155.2922
Total	**0.0672**	**0.0442**	**0.5088**	**1.5600e-003**	**0.1546**	**1.3100e-003**	**0.1559**	**0.0413**	**1.2100e-003**	**0.0425**		**155.1854**	**155.1854**	**4.2700e-003**		**155.2922**

3.7 Architectural Coating - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	12.2172					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1917	1.3030	1.8111	2.9700e-003		0.0708	0.0708		0.0708	0.0708		281.4481	281.4481	0.0168		281.8690
Total	**12.4089**	**1.3030**	**1.8111**	**2.9700e-003**		**0.0708**	**0.0708**		**0.0708**	**0.0708**		**281.4481**	**281.4481**	**0.0168**		**281.8690**

3.7 Architectural Coating - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0633	0.0400	0.4677	1.5000e-003	0.1677	1.2800e-003	0.1689	0.0445	1.1700e-003	0.0456		149.5081	149.5081	3.8500e-003		149.6043
Total	**0.0633**	**0.0400**	**0.4677**	**1.5000e-003**	**0.1677**	**1.2800e-003**	**0.1689**	**0.0445**	**1.1700e-003**	**0.0456**		**149.5081**	**149.5081**	**3.8500e-003**		**149.6043**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	12.2172					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1917	1.3030	1.8111	2.9700e-003		0.0708	0.0708		0.0708	0.0708	0.0000	281.4481	281.4481	0.0168		281.8690
Total	**12.4089**	**1.3030**	**1.8111**	**2.9700e-003**		**0.0708**	**0.0708**		**0.0708**	**0.0708**	**0.0000**	**281.4481**	**281.4481**	**0.0168**		**281.8690**

3.7 Architectural Coating - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0633	0.0400	0.4677	1.5000e-003	0.1546	1.2800e-003	0.1558	0.0413	1.1700e-003	0.0424		149.5081	149.5081	3.8500e-003		149.6043
Total	**0.0633**	**0.0400**	**0.4677**	**1.5000e-003**	**0.1546**	**1.2800e-003**	**0.1558**	**0.0413**	**1.1700e-003**	**0.0424**		**149.5081**	**149.5081**	**3.8500e-003**		**149.6043**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.9546	12.1151	30.4142	0.1042	8.7844	0.0833	8.8677	2.3507	0.0775	2.4282		10,631.1276	10,631.1276	0.5748		10,645.4987
Unmitigated	2.9546	12.1151	30.4142	0.1042	8.7844	0.0833	8.8677	2.3507	0.0775	2.4282		10,631.1276	10,631.1276	0.5748		10,645.4987

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	56.42	45.50	53.69	186,132	186,132
Enclosed Parking with Elevator	0.00	0.00	0.00		
High Turnover (Sit Down Restaurant)	1,085.48	1,131.58	1201.25	1,510,834	1,510,834
Movie Theater (No Matinee)	666.41	709.34	746.24	1,449,303	1,449,303
Strip Mall	378.35	300.38	186.15	646,414	646,414
Total	2,186.66	2,186.79	2,187.33	3,792,682	3,792,682

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3
Enclosed Parking with Elevator	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
High Turnover (Sit Down	16.60	8.40	6.90	8.50	72.50	19.00	37	20	43
Movie Theater (No Matinee)	16.60	8.40	6.90	1.80	79.20	19.00	66	17	17
Strip Mall	16.60	8.40	6.90	16.60	64.40	19.00	45	40	15

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments Mid Rise	0.545842	0.044768	0.205288	0.119317	0.015350	0.006227	0.020460	0.031333	0.002546	0.002133	0.005184	0.000692	0.000862
Enclosed Parking with Elevator	0.545842	0.044768	0.205288	0.119317	0.015350	0.006227	0.020460	0.031333	0.002546	0.002133	0.005184	0.000692	0.000862
High Turnover (Sit Down Restaurant)	0.545842	0.044768	0.205288	0.119317	0.015350	0.006227	0.020460	0.031333	0.002546	0.002133	0.005184	0.000692	0.000862
Movie Theater (No Matinee)	0.545842	0.044768	0.205288	0.119317	0.015350	0.006227	0.020460	0.031333	0.002546	0.002133	0.005184	0.000692	0.000862
Strip Mall	0.545842	0.044768	0.205288	0.119317	0.015350	0.006227	0.020460	0.031333	0.002546	0.002133	0.005184	0.000692	0.000862

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0598	0.5237	0.3123	3.2600e-003		0.0413	0.0413		0.0413	0.0413		651.9521	651.9521	0.0125	0.0120	655.8264
NaturalGas Unmitigated	0.0598	0.5237	0.3123	3.2600e-003		0.0413	0.0413		0.0413	0.0413		651.9521	651.9521	0.0125	0.0120	655.8264

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	3339.87	0.0360	0.3078	0.1310	1.9600e-003		0.0249	0.0249		0.0249	0.0249		392.9255	392.9255	7.5300e-003	7.2000e-003	395.2605
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
High Turnover (Sit Down Restaurant)	1580.55	0.0171	0.1550	0.1302	9.3000e-004		0.0118	0.0118		0.0118	0.0118		185.9468	185.9468	3.5600e-003	3.4100e-003	187.0518
Movie Theater (No Matinee)	609.945	6.5800e-003	0.0598	0.0502	3.6000e-004		4.5400e-003	4.5400e-003		4.5400e-003	4.5400e-003		71.7583	71.7583	1.3800e-003	1.3200e-003	72.1847
Strip Mall	11.2329	1.2000e-004	1.1000e-003	9.3000e-004	1.0000e-005		8.0000e-005	8.0000e-005		8.0000e-005	8.0000e-005		1.3215	1.3215	3.0000e-005	2.0000e-005	1.3294
Total		**0.0598**	**0.5237**	**0.3123**	**3.2600e-003**		**0.0413**	**0.0413**		**0.0413**	**0.0413**		**651.9521**	**651.9521**	**0.0125**	**0.0120**	**655.8264**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Apartments Mid Rise	3.33987	0.0360	0.3078	0.1310	1.9600e-003		0.0249	0.0249		0.0249	0.0249		392.9255	392.9255	7.5300e-003	7.2000e-003	395.2605
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
High Turnover (Sit Down Restaurant)	1.58055	0.0171	0.1550	0.1302	9.3000e-004		0.0118	0.0118		0.0118	0.0118		185.9468	185.9468	3.5600e-003	3.4100e-003	187.0518
Movie Theater (No Matinee)	0.609945	6.5800e-003	0.0598	0.0502	3.6000e-004		4.5400e-003	4.5400e-003		4.5400e-003	4.5400e-003		71.7583	71.7583	1.3800e-003	1.3200e-003	72.1847
Strip Mall	0.0112329	1.2000e-004	1.1000e-003	9.3000e-004	1.0000e-005		8.0000e-005	8.0000e-005		8.0000e-005	8.0000e-005		1.3215	1.3215	3.0000e-005	2.0000e-005	1.3294
Total		**0.0598**	**0.5237**	**0.3123**	**3.2600e-003**		**0.0413**	**0.0413**		**0.0413**	**0.0413**		**651.9521**	**651.9521**	**0.0125**	**0.0120**	**655.8264**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.5758	0.0866	7.5123	4.0000e-004		0.0416	0.0416		0.0416	0.0416	0.0000	13.5246	13.5246	0.0130	0.0000	13.8500
Unmitigated	2.5758	0.0866	7.5123	4.0000e-004		0.0416	0.0416		0.0416	0.0416	0.0000	13.5246	13.5246	0.0130	0.0000	13.8500

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.2008					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	2.1485					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.2265	0.0866	7.5123	4.0000e-004		0.0416	0.0416		0.0416	0.0416		13.5246	13.5246	0.0130		13.8500
Total	**2.5758**	**0.0866**	**7.5123**	**4.0000e-004**		**0.0416**	**0.0416**		**0.0416**	**0.0416**	**0.0000**	**13.5246**	**13.5246**	**0.0130**	**0.0000**	**13.8500**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.2008					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	2.1485					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.2265	0.0866	7.5123	4.0000e-004		0.0416	0.0416		0.0416	0.0416		13.5246	13.5246	0.0130		13.8500
Total	**2.5758**	**0.0866**	**7.5123**	**4.0000e-004**		**0.0416**	**0.0416**		**0.0416**	**0.0416**	**0.0000**	**13.5246**	**13.5246**	**0.0130**	**0.0000**	**13.8500**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Regional Construction Emissions Worksheet - Unmitigated

*CalEEMod, Version 2016.3.2

Demolition

		ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite	**2021 Summer**						
	Fugitive Dust					1.37	0.21
	Off-Road	1.99	19.70	14.49	0.02	1.04	0.97
	Total	**1.99**	**19.70**	**14.49**	**0.02**	**2.41**	**1.18**
Offsite							
	Hauling	0.12	3.98	0.93	0.01	0.25	0.08
	Vendor	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	0.06	0.04	0.52	0.00	0.14	0.04
	Total	**0.18**	**4.02**	**1.46**	**0.01**	**0.39**	**0.12**
TOTAL		***2.17***	***23.72***	***15.95***	***0.04***	***2.80***	***1.29***
Onsite	**2021 Winter**						
	Fugitive Dust					1.37	0.21
	Off-Road	1.99	19.70	14.49	0.02	1.04	0.97
	Total	**1.99**	**19.70**	**14.49**	**0.02**	**2.41**	**1.18**
Offsite							
	Hauling	0.13	4.03	0.99	0.01	0.25	0.08
	Vendor	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	0.06	0.04	0.48	0.00	0.14	0.04
	Total	**0.19**	**4.07**	**1.47**	**0.01**	**0.39**	**0.12**
TOTAL		***2.18***	***23.77***	***15.96***	***0.04***	***2.80***	***1.22***
Onsite	**2021**						
	Fugitive Dust	0.00	0.00	0.00	0.00	1.37	0.21
	Off-Road	1.99	19.70	14.49	0.02	1.04	0.97
	Total	**1.99**	**19.70**	**14.49**	**0.02**	**2.41**	**1.18**
Offsite							
	Hauling	0.13	4.03	0.99	0.01	0.25	0.08
	Vendor	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	0.06	0.04	0.52	0.00	0.14	0.04
	Total	**0.19**	**4.07**	**1.47**	**0.01**	**0.39**	**0.12**
TOTAL		***2.18***	***23.77***	***15.96***	***0.04***	***2.80***	***1.29***

Site Preparation

		ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite	**2021 Summer**						
	Fugitive Dust					2.48	1.26
	Off-Road	1.56	17.42	7.56	0.02	0.77	0.70
	Total	**1.56**	**17.42**	**7.56**	**0.02**	**3.24**	**1.97**
Offsite							
	Hauling	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	0.03	0.02	0.32	0.00	0.08	0.02
	Total	**0.03**	**0.02**	**0.32**	**0.00**	**0.08**	**0.02**
TOTAL		***1.59***	***17.44***	***7.88***	***0.02***	***3.33***	***1.99***
Onsite	**2021 Winter**						
	Fugitive Dust					2.48	1.26
	Off-Road	1.56	17.42	7.56	0.02	0.77	0.70
	Total	**1.56**	**17.42**	**7.56**	**0.02**	**3.24**	**1.97**
Offsite							
	Hauling	0.00	0.00	0.00	0.00	0.00	0.00

	Vendor	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	0.04	0.03	0.29	0.00	0.08	0.02
	Total	**0.04**	**0.03**	**0.29**	**0.00**	**0.08**	**0.02**
TOTAL		***1.59***	***17.45***	***7.86***	***0.02***	***3.33***	***1.99***
Onsite	**2021**						
	Fugitive Dust	0.00	0.00	0.00	0.00	2.48	1.26
	Off-Road	1.56	17.42	7.56	0.02	0.77	0.70
	Total	**1.56**	**17.42**	**7.56**	**0.02**	**3.24**	**1.97**
Offsite							
	Hauling	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	0.04	0.03	0.32	0.00	0.08	0.02
	Total	**0.04**	**0.03**	**0.32**	**0.00**	**0.08**	**0.02**
TOTAL		***1.59***	***17.45***	***7.88***	***0.02***	***3.33***	***1.99***

Grading

		ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite	**2021 Summer**						
	Fugitive Dust					2.10	1.08
	Off-Road	1.29	14.33	6.33	0.01	0.64	0.59
	Total	**1.29**	**14.33**	**6.33**	**0.01**	**2.74**	**1.67**
Offsite							
	Hauling	0.21	6.63	1.55	0.02	0.42	0.13
	Vendor	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	0.03	0.02	0.32	0.00	0.08	0.02
	Total	**0.24**	**6.65**	**1.88**	**0.02**	**0.51**	**0.15**
TOTAL		***1.53***	***20.98***	***8.21***	***0.03***	***3.24***	***1.82***
Onsite	**2021 Winter**						
	Fugitive Dust					2.10	1.08
	Off-Road	1.29	14.33	6.33	0.01	0.64	0.59
	Total	**1.29**	**14.33**	**6.33**	**0.01**	**2.74**	**1.67**
Offsite							
	Hauling	0.21	6.71	1.65	0.02	0.42	0.13
	Vendor	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	0.04	0.03	0.29	0.00	0.08	0.02
	Total	**0.25**	**6.73**	**1.94**	**0.02**	**0.51**	**0.15**
TOTAL		***1.54***	***21.06***	***8.27***	***0.03***	***3.25***	***1.82***
Onsite	**2021**						
	Fugitive Dust	0.00	0.00	0.00	0.00	2.10	1.08
	Off-Road	1.29	14.33	6.33	0.01	0.64	0.59
	Total	**1.29**	**14.33**	**6.33**	**0.01**	**2.74**	**1.67**
Offsite							
	Hauling	0.21	6.71	1.65	0.02	0.42	0.13
	Vendor	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	0.04	0.03	0.32	0.00	0.08	0.02
	Total	**0.25**	**6.73**	**1.94**	**0.02**	**0.51**	**0.15**
TOTAL		***1.54***	***21.06***	***8.27***	***0.03***	***3.25***	***1.82***

Building Construction

		ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite	**2021 Summer**						
	Off-Road	1.81	13.64	12.90	0.02	0.68	0.66
	Total	**1.81**	**13.64**	**12.90**	**0.02**	**0.68**	**0.66**
Offsite							
	Hauling	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	0.04	1.36	0.36	0.00	0.09	0.03
	Worker	0.33	0.23	3.10	0.01	0.80	0.22
	Total	**0.37**	**1.59**	**3.46**	**0.01**	**0.89**	**0.25**
TOTAL		***2.19***	***15.22***	***16.36***	***0.03***	***1.57***	***0.91***
Onsite	**2021 Winter**						
	Off-Road	1.81	13.64	12.90	0.02	0.68	0.66
	Total	**1.81**	**13.64**	**12.90**	**0.02**	**0.68**	**0.66**
Offsite							
	Hauling	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	0.04	1.36	0.39	0.00	0.09	0.03
	Worker	0.37	0.25	2.84	0.01	0.80	0.22
	Total	**0.41**	**1.61**	**3.23**	**0.01**	**0.89**	**0.25**
Onsite	**2022 Summer**						

	Off-Road	1.65	12.50	12.73	0.02	0.59	0.57
	Total	**1.65**	**12.50**	**12.73**	**0.02**	**0.59**	**0.57**
Offsite							
	Hauling	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	0.04	1.29	0.34	0.00	0.09	0.03
	Worker	0.31	0.20	2.86	0.01	0.80	0.22
	Total	**0.35**	**1.50**	**3.20**	**0.01**	**0.89**	**0.24**
TOTAL		***2.00***	***14.00***	***15.92***	***0.03***	***1.48***	***0.81***
Onsite	**2022 Winter**						
	Off-Road	1.65	12.50	12.73	0.02	0.59	0.57
	Total	**1.65**	**12.50**	**12.73**	**0.02**	**0.59**	**0.57**
Offsite							
	Hauling	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	0.04	1.29	0.37	0.00	0.09	0.03
	Worker	0.34	0.23	2.61	0.01	0.80	0.22
	Total	**0.39**	**1.52**	**2.98**	**0.01**	**0.89**	**0.24**
TOTAL		***2.04***	***14.02***	***15.71***	***0.03***	***1.48***	***0.81***
Onsite	**2020-2021**						
	Off-Road	1.81	13.64	12.90	0.02	0.68	0.66
	Total	**1.81**	**13.64**	**12.90**	**0.02**	**0.68**	**0.66**
Offsite							
	Hauling	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	0.04	1.36	0.39	0.00	0.09	0.03
	Worker	0.37	0.25	3.10	0.01	0.80	0.22
	Total	**0.41**	**1.61**	**3.46**	**0.01**	**0.89**	**0.25**
TOTAL		***2.22***	***15.24***	***16.36***	***0.03***	***1.57***	***0.91***

Paving

		ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite	**2022 Summer**						
	Off-Road	0.69	6.77	8.81	0.01	0.35	0.32
	Paving	0.00				**0.00**	0.00
	Total	**0.69**	**6.77**	**8.81**	**0.01**	**0.35**	**0.32**
Offsite							
	Hauling	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	0.05	0.03	0.48	0.00	0.14	0.04
	Total	0.05	0.03	0.48	0.00	0.14	0.04
TOTAL		***0.74***	***6.81***	***9.29***	***0.01***	***0.48***	***0.36***
Onsite	**2022 Winter**						
	Off-Road	0.69	6.77	8.81	0.01	0.35	0.32
	Paving	0.00				**0.00**	0.00
	Total	**0.69**	**6.77**	**8.81**	**0.01**	**0.35**	**0.32**
Offsite							
	Hauling	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	0.06	0.04	0.44	0.00	0.14	0.04
	Total	**0.06**	**0.04**	**0.44**	**0.00**	**0.14**	**0.04**
TOTAL		***0.75***	***6.81***	***9.25***	***0.01***	***0.48***	***0.36***
Onsite	**2022**						
	Off-Road	12.22	6.77	8.81	0.01	0.35	0.32
	Paving	0.20	1.41	1.81	0.00	0.08	0.08
	Total	**0.69**	**6.77**	**8.81**	**0.01**	**0.35**	**0.32**

Offsite							
	Hauling	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	0.06	0.04	0.56	0.00	0.16	0.04
	Total	**0.06**	**0.04**	**0.56**	**0.00**	**0.16**	**0.04**
TOTAL		***0.75***	***6.81***	***9.36***	***0.02***	***0.50***	***0.36***

Architectural Coating

		ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Onsite	**2022 Summer**						
	Archit. Coating	12.22				0.00	0.00
	Off-Road	0.20	1.41	1.81	0.00	0.08	0.08
	Total	**12.42**	**1.41**	**1.81**	**0.00**	**0.08**	**0.08**
Offsite							
	Hauling	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	0.06	0.04	0.56	0.00	0.16	0.04
	Total	**0.06**	**0.04**	**0.56**	**0.00**	**0.16**	**0.04**
TOTAL		***12.48***	***1.45***	***2.37***	***0.00***	***0.24***	***0.12***
Onsite	**2022 Winter**						
	Archit. Coating	12.22				0.00	0.00
	Off-Road	0.20	1.41	1.81	0.00	0.08	0.08
	Total	**12.42**	**1.41**	**1.81**	**0.00**	**0.08**	**0.08**
Offsite							
	Hauling	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	0.07	0.04	0.51	0.00	0.16	0.04
	Total	**0.07**	**0.04**	**0.51**	**0.00**	**0.16**	**0.04**
TOTAL		***12.49***	***1.45***	***2.32***	***0.00***	***0.24***	***0.12***
Onsite	**2023 Summer**						
	Archit. Coating	12.22				0.00	0.00
	Off-Road	0.19	1.30	1.81	0.00	0.07	0.07
	Total	**12.41**	**1.30**	**1.81**	**0.00**	**0.07**	**0.07**
Offsite							
	Hauling	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	0.06	0.04	0.51	0.00	0.16	0.04
	Total	**0.06**	**0.04**	**0.51**	**0.00**	**0.16**	**0.04**
TOTAL		***12.47***	***1.34***	***2.32***	***0.00***	***0.23***	***0.11***
Onsite	**2023 Winter**						
	Archit. Coating	12.22				0.00	0.00
	Off-Road	0.19	1.30	1.81	0.00	0.07	0.07
	Total	**12.41**	**1.30**	**1.81**	**0.00**	**0.07**	**0.07**
Offsite							
	Hauling	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	0.06	0.04	0.47	0.00	0.16	0.04
	Total	**0.06**	**0.04**	**0.47**	**0.00**	**0.16**	**0.04**
TOTAL		***12.47***	***1.34***	***2.28***	***0.00***	***0.23***	***0.11***
Onsite	**2022-2023**						
	Archit. Coating	12.22	0.00	0.00	0.00	0.00	0.00
	Off-Road	0.20	1.41	1.81	0.00	0.08	0.08
	Total	12.42	1.41	1.81	0.00	0.08	0.08
Offsite							
	Hauling	0.00	0.00	0.00	0.00	0.00	0.00
	Vendor	0.00	0.00	0.00	0.00	0.00	0.00
	Worker	0.07	0.04	0.56	0.00	0.16	0.04
	Total	0.07	0.04	0.56	0.00	0.16	0.04
TOTAL		***12.49***	***1.45***	***2.37***	***0.00***	***0.24***	***0.12***

MAX DAILY	12	24	16	0	3	2
Regional Thresholds	**75**	**100**	**550**	**150**	**150**	**55**
Exceeds Thresholds?	No	No	No	No	No	No

Localized Construction Emissions Worksheet - Unmitigated

*CalEEMod, Version 2016.3.2

Demolition			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2020**				
	Fugitive Dust		0.00	0.00	1.37	0.21
	Off-Road		19.70	14.49	1.04	0.97
	Total		19.70	14.49	2.41	1.18
Onsite		**2020**				
	Fugitive Dust		0.00	0.00	1.37	0.21
	Off-Road		19.70	14.49	1.04	0.97
	Total		19.70	14.49	2.41	1.18
Onsite		**2020**				
	Fugitive Dust		0.00	0.00	1.37	0.21
	Off-Road		19.70	14.49	1.04	0.97
	Total		**19.70**	**14.49**	**2.41**	**1.18**
1.56-acres LST			**99**	**733**	**5.68**	**3.56**
Exceed Threshold?			No	No	No	No

Site Preparation			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2020**				
	Fugitive Dust		0.00	0.00	2.48	1.26
	Off-Road		17.42	7.56	0.77	0.70
	Total		17.42	7.56	3.24	1.97
Onsite		**2020**				
	Fugitive Dust		0.00	0.00	2.48	1.26
	Off-Road		17.42	7.56	0.77	0.70
	Total		17.42	7.56	3.24	1.97
Onsite		**2020**				
	Fugitive Dust		0.00	0.00	2.48	1.26
	Off-Road		17.42	7.56	0.77	0.70
	Total		**17.42**	**7.56**	**3.24**	**1.97**
1.44-acres LST			**95**	**698**	**5.31**	**3.44**
Exceed Threshold?			No	No	No	No

Grading			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2020**				
	Fugitive Dust		0.00	0.00	2.10	1.08
	Off-Road		14.33	6.33	0.64	0.59

	Total	14.33	6.33	2.74	1.67

Onsite	**2020**				
	Fugitive Dust	0.00	0.00	2.10	1.08
	Off-Road	14.33	6.33	0.64	0.59
	Total	14.33	6.33	2.74	1.67

Onsite	**2020**				
	Fugitive Dust	0.00	0.00	2.10	1.08
	Off-Road	14.33	6.33	0.64	0.59
	Total	**14.33**	**6.33**	**2.74**	**1.67**
1.19-acres LST		**86**	**625**	**4.56**	**3.19**
Exceed Threshold?		No	No	No	No

Building Construction						
			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2021**				
	Off-Road		13.64	12.90	0.68	0.66
	Total		13.64	12.90	0.68	0.66
Onsite		**2021**				
	Off-Road		13.64	12.90	0.68	0.66
	Total		13.64	12.90	0.68	0.66
Onsite		**2022**				
	Off-Road		12.50	12.73	0.59	0.57
	Total		12.50	12.73	0.59	0.57
Onsite		**2022**				
	Off-Road		12.50	12.73	0.59	0.57
	Total		12.50	12.73	0.59	0.57
Onsite		**2021-2022**				
	Off-Road		13.64	12.90	0.68	0.66
	Total		**13.64**	**12.90**	**0.68**	**0.66**
1.00-acres LST			**80**	**571**	**4.00**	**3.00**
Exceed Threshold?			No	No	No	No

Paving						
			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2022**				
	Off-Road		6.77	8.81	0.35	0.32
	Paving		0.00	0.00	0.00	0.00
	Total		6.77	8.81	0.35	0.32
Onsite		**2022**				
	Off-Road		6.77	8.81	0.35	0.32
	Paving		0.00	0.00	0.00	0.00
	Total		6.77	8.81	0.35	0.32
Onsite		**2022**				
	Off-Road		6.77	8.81	0.35	0.32
	Paving		0.00	0.00	0.00	0.00
	Total		**6.77**	**8.81**	**0.35**	**0.32**
1.00-acres LST			**80**	**571**	**4.00**	**3.00**
Exceed Threshold?			No	No	No	No

Architectural Coating						
			NOx	CO	PM10 Total	PM2.5 Total
Onsite		**2022**				

	Archit. Coating	0.00	0.00	0.00	0.00
	Off-Road	1.41	1.81	0.08	0.08
	Total	1.41	1.81	0.08	0.08
Onsite	**2022**				
	Archit. Coating	0.00	0.00	0.00	0.00
	Off-Road	1.41	1.81	0.08	0.08
	Total	1.41	1.81	0.08	0.08
Onsite	**2023**				
	Archit. Coating	0.00	0.00	0.00	0.00
	Off-Road	1.30	1.81	0.07	0.07
	Total	1.30	1.81	0.07	0.07
Onsite	**2023**				
	Archit. Coating	0.00	0.00	0.00	0.00
	Off-Road	1.30	1.81	0.07	0.07
	Total	1.30	1.81	0.07	0.07
Onsite	**2022-2023**				
	Archit. Coating	0.00	0.00	0.00	0.00
	Off-Road	1.41	1.81	0.08	0.08
	Total	1.41	1.81	0.08	0.08
1.00-acres LST		**80**	**571**	**4.00**	**3.00**
Exceed Threshold?		No	No	No	No

Regional Operation Emissions Worksheet - Unmitigated

*CalEEMod, Version 2016.3.2 and EMFAC2017, Version 1.0.2

Proposed Project - 2022

Summer

	ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Area	2.58	0.09	7.51	0.00	0.04	0.04
Energy	0.06	0.52	0.31	0.00	0.04	0.04
Mobile	3.11	12.17	31.72	0.11	9.02	2.47
Total	**5.74**	**12.78**	**39.55**	**0.12**	**9.10**	**2.55**

Winter

	ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Area	2.58	0.09	7.51	0.00	0.04	0.04
Energy	0.06	0.52	0.31	0.00	0.04	0.04
Mobile	3.00	12.32	30.93	0.11	9.02	2.47
Total	**5.64**	**12.93**	**38.75**	**0.11**	**9.10**	**2.55**

Max Daily

	ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Area	2.58	0.09	7.51	0.00	0.04	0.04
Energy	0.06	0.52	0.31	0.00	0.04	0.04
Mobile	3.11	12.32	31.72	0.11	9.02	2.47
Total	**5.74**	**12.93**	**39.55**	**0.12**	**9.10**	**2.55**

Net Difference

	ROG	NOx	CO	SO2	PM10 Total	PM2.5 Total
Area	2.58	0.09	7.51	0.00	0.04	0.04
Energy	0.06	0.52	0.31	0.00	0.04	0.04
Mobile	3.11	12.32	31.72	0.11	9.02	2.47
Total	**5.74**	**12.93**	**39.55**	**0.12**	**9.10**	**2.55**
Regional Thresholds	**55**	**55**	**550**	**150**	**150**	**55**
Exceeds Thresholds?	No	No	No	No	No	No

Localized Operation Emissions Worksheet - Unmitigated

*CalEEMod, Version 2016.3.2 and EMFAC2017, Version 1.0.2

Proposed Project - 2022

Summer

	NOx	CO	PM10 Total	PM2.5 Total
Area	0.09	7.51	0.04	0.04
Total	**0.09**	**7.51**	**0.04**	**0.04**

Winter

	NOx	CO	PM10 Total	PM2.5 Total
Area	0.09	7.51	0.04	0.04
Total	**0.09**	**7.51**	**0.04**	**0.04**

Max Daily

	NOx	CO	PM10 Total	PM2.5 Total
Area	0.09	7.51	0.04	0.04
Total	**0.09**	**7.51**	**0.04**	**0.04**

Operation 31.56-acres LST	**80**	**571**	**4.00**	**3.00**
Exceeds Thresholds?	No	No	No	No

CalEEMod Inputs (Operation Run)

Name: Bellflower Laemmle Theater

Land Use	Amount	Unit	Building Footprint	Building Footprint (1000sqft)	Acres
Enclosed Parking Structure with Elevator	140	Space	11,700	11.7	0.27
High Turnover Restaurant	2.5	1000sqft	2,500.0	2.5	0.06
Mid-Rise Apartment	91	Dwelling Unit	39,000	39.0	0.90
Theater	12.3	1000sqft	12,300	12.3	0.28
Strip Mall	2.5	1000sqft	2,500.0	2.5	0.06
Total			**68,000**	17,300.0	1.56

CalEEMod Default Trip Rates

Land Use	Weekday	Weekday Proportions	Saturday	Sunday Proportions	Sunday	Saturday Proportions
Enclosed Parking Structure with Elevator	0	0%	0	0%	0	0%
High Turnover Restaurant	127.15	50%	158.37	52%	131.84	55%
Mid-Rise Apartment	6.65	3%	6.39	2%	5.86	2%
Theater	78.06	30%	99.28	32%	81.90	34%
Strip Mall	44.3	17%	42.04	14%	20.4	9%
Total	**256**	**100%**	**306**	**100%**	**240**	**100%**

Adjusted Trips

Ganndini Trip Rates (weekday, Saturday, Sunday) 2,187

Land Use	Weekday Trips	Weekday Trip Rates	Saturday	Saturday Trip Rates	Sunday	Sunday Trip Rates
Enclosed Parking Structure with Elevator	0	0.000	0	0.000	0	0.000
High Turnover Restaurant	1,085	434.190	1,132	452.634	1,201	480.497
Mid-Rise Apartment	57	0.624	46	0.502	53	0.587
Theater	666	54.179	709	57.673	746	60.668
Strip Mall	378	151.343	300	120.154	186	74.458
Total	2,187		2,187		2,187	

Construction Localized Significance Thresholds: Demolition

SRA No.	Acres	Source Receptor Distance (meters)	Source Receptor Distance (Feet)	Project site Acreage Disturbed
5	1.56	25	82	1.56

Source Receptor	Southeast LA County	Equipment	Acres/8-hr Day		Daily hours	Equipment Used	Acres
Distance (meters)	25	Tractors	0.5	0.0625	8	3	1.5
NOx	**99**	Graders	0.5	0.0625	0	0	0
CO	**733**	Dozers	0.5	0.0625	8	1	0.5
PM10	**5.68**	Scrapers	1	0.125	0	0	0
PM2.5	**3.56**					**Acres**	2.00

	Acres	**25**	**50**	**100**	**200**	**500**
NOx	1	80	81	94	123	192
	2	114	111	121	145	205
		99	98	109	135	199
CO	1	571	735	1088	2104	6854
	2	861	1082	1496	2625	7500
		733	929	1316	2396	7216
PM10	1	4	13	30	66	173
	2	7	21	39	74	182
		6	17	35	70	178
PM2.5	1	3	4	8	19	86
	2	4	6	10	22	92
		4	5	9	21	89

Southeast LA County

1.56 Acres

	25	**50**	**100**	**200**	**500**
NOx	99	98	109	135	199
CO	733	929	1316	2396	7216
PM10	6	17	35	70	178
PM2.5	4	5	9	21	89

Acre Below		**Acre Above**	
SRA No.	Acres	SRA No.	Acres
5	1	5	2
Distance Increment Below			
25			
Distance Increment Above			
25			

Updated: 10/21/2009 - Table C-1. 2006 – 2008

Construction Localized Significance Thresholds: Site Preparation

SRA No.	Acres	Source Receptor Distance (meters)	Source Receptor Distance (Feet)	Project site Acreage Disturbed
5	1.44	25	82	1.56

Source Receptor	Southeast LA County	Equipment	Acres/8-hr Day		Daily hours	Equipment Used	Acres
Distance (meters)	25	Tractors	0.5	0.0625	8	1	0.5
NOx	**95**	Graders	0.5	0.0625	8	1	0.5
CO	**698**	Dozers	0.5	0.0625	7	1	0.4375
PM10	**5.31**	Scrapers	1	0.125	0	0	0
PM2.5	**3.44**					**Acres**	1.44

	Acres	**25**	**50**	**100**	**200**	**500**
NOx	1	80	81	94	123	192
	2	114	111	121	145	205
		95	94	106	133	198
CO	1	571	735	1088	2104	6854
	2	861	1082	1496	2625	7500
		698	887	1267	2332	7137
PM10	1	4	13	30	66	173
	2	7	21	39	74	182
		5	17	34	70	177
PM2.5	1	3	4	8	19	86
	2	4	6	10	22	92
		3	5	9	20	89

Southeast LA County

1.44 Acres

	25	**50**	**100**	**200**	**500**
NOx	95	94	106	133	198
CO	698	887	1267	2332	7137
PM10	5	17	34	70	177
PM2.5	3	5	9	20	89

Acre Below		**Acre Above**	
SRA No.	Acres	SRA No.	Acres
5	1	5	2
Distance Increment Below			
25			
Distance Increment Above			
25			

Updated: 10/21/2009 - Table C-1. 2006 – 2008

Construction Localized Significance Thresholds: Grading

SRA No.	Acres	Source Receptor Distance (meters)	Source Receptor Distance (Feet)	Project site Acreage Disturbed
5	1.19	25	82	1.56

Source Receptor	Southeast LA County	Equipment	Acres/8-hr Day		Daily hours	Equipment Used	Acres
Distance (meters)	25	Tractors	0.5	0.0625	7	1	0.4375
NOx	**86**	Graders	0.5	0.0625	6	1	0.375
CO	**625**	Dozers	0.5	0.0625	6	1	0.375
PM10	**4.56**	Scrapers	1	0.125	0	0	0
PM2.5	**3.19**					**Acres**	1.19

	Acres	**25**	**50**	**100**	**200**	**500**
NOx	1	80	81	94	123	192
	2	114	111	121	145	205
		86	87	99	127	194
CO	1	571	735	1088	2104	6854
	2	861	1082	1496	2625	7500
		625	800	1165	2202	6975
PM10	1	4	13	30	66	173
	2	7	21	39	74	182
		5	15	32	68	175
PM2.5	1	3	4	8	19	86
	2	4	6	10	22	92
		3	4	8	20	87

Southeast LA County

1.19 Acres

	25	**50**	**100**	**200**	**500**
NOx	86	87	99	127	194
CO	625	800	1165	2202	6975
PM10	5	15	32	68	175
PM2.5	3	4	8	20	87

Acre Below		**Acre Above**	
SRA No.	Acres	SRA No.	Acres
5	1	5	2
Distance Increment Below			
25			
Distance Increment Above			
25			

Updated: 10/21/2009 - Table C-1. 2006 – 2008

Construction Localized Significance Thresholds: Building Construction

SRA No.	Acres	Source Receptor Distance (meters)	Source Receptor Distance (Feet)	Project site Acreage Disturbed
5	0.38	25	82	1.56

Source Receptor	Southeast LA County	Equipment	Acres/8-hr Day		Daily hours	Equipment Used	Acres
Distance (meters)	25	Tractors	0.5	0.0625	6	1	0.375
NOx	**80**	Graders	0.5	0.0625	0	0	0
CO	**571**	Dozers	0.5	0.0625	0	0	0
PM10	**4.00**	Scrapers	1	0.125	0	0	0
PM2.5	**3.00**					**Acres**	0.38

	Acres	**25**	**50**	**100**	**200**	**500**
NOx	1	80	81	94	123	192
	1	80	81	94	123	192
		80	81	94	123	192
CO	1	571	735	1088	2104	6854
	1	571	735	1088	2104	6854
		571	735	1088	2104	6854
PM10	1	4	13	30	66	173
	1	4	13	30	66	173
		4	13	30	66	173
PM2.5	1	3	4	8	19	86
	1	3	4	8	19	86
		3	4	8	19	86

Southeast LA County

0.38 Acres

	25	**50**	**100**	**200**	**500**
NOx	80	81	94	123	192
CO	571	735	1088	2104	6854
PM10	4	13	30	66	173
PM2.5	3	4	8	19	86

Acre Below		**Acre Above**	
SRA No.	Acres	SRA No.	Acres
5	1	5	1
Distance Increment Below			
25			
Distance Increment Above			
25			

Updated: 10/21/2009 - Table C-1. 2006 – 2008

Construction Localized Significance Thresholds: Paving

SRA No.	Acres	Source Receptor Distance (meters)	Source Receptor Distance (Feet)	Project site Acreage Disturbed
5	0.50	25	82	1.56

Source Receptor	Southeast LA County	Equipment	Acres/8-hr Day		Daily hours	Equipment Used	Acres
Distance (meters)	25	Tractors	0.5	0.0625	8	1	0.5
NOx	**80**	Graders	0.5	0.0625	0	0	0
CO	**571**	Dozers	0.5	0.0625	0	0	0
PM10	**4.00**	Scrapers	1	0.125	0	0	0
PM2.5	**3.00**					**Acres**	0.50

	Acres	**25**	**50**	**100**	**200**	**500**
NOx	1	80	81	94	123	192
	1	80	81	94	123	192
		80	81	94	123	192
CO	1	571	735	1088	2104	6854
	1	571	735	1088	2104	6854
		571	735	1088	2104	6854
PM10	1	4	13	30	66	173
	1	4	13	30	66	173
		4	13	30	66	173
PM2.5	1	3	4	8	19	86
	1	3	4	8	19	86
		3	4	8	19	86

Southeast LA County

0.50 Acres

	25	**50**	**100**	**200**	**500**
NOx	80	81	94	123	192
CO	571	735	1088	2104	6854
PM10	4	13	30	66	173
PM2.5	3	4	8	19	86

Acre Below		**Acre Above**	
SRA No.	Acres	SRA No.	Acres
5	1	5	1
Distance Increment Below			
25			
Distance Increment Above			
25			

Updated: 10/21/2009 - Table C-1. 2006 – 2008

Construction Localized Significance Thresholds: Architectural Coating

SRA No.	Acres	Source Receptor Distance (meters)	Source Receptor Distance (Feet)	Project site Acreage Disturbed
5	0.00	25	82	1.56

Source Receptor	Southeast LA County	Equipment	Acres/8-hr Day		Daily hours	Equipment Used	Acres
Distance (meters)	25	Tractors	0.5	0.0625	0	0	0
NOx	**80**	Graders	0.5	0.0625	0	0	0
CO	**571**	Dozers	0.5	0.0625	0	0	0
PM10	**4.00**	Scrapers	1	0.125	0	0	0
PM2.5	**3.00**					**Acres**	0.00

	Acres	**25**	**50**	**100**	**200**	**500**
NOx	1	80	81	94	123	192
	1	80	81	94	123	192
		80	81	94	123	192
CO	1	571	735	1088	2104	6854
	1	571	735	1088	2104	6854
		571	735	1088	2104	6854
PM10	1	4	13	30	66	173
	1	4	13	30	66	173
		4	13	30	66	173
PM2.5	1	3	4	8	19	86
	1	3	4	8	19	86
		3	4	8	19	86

Southeast LA County

0.00 Acres

	25	**50**	**100**	**200**	**500**
NOx	80	81	94	123	192
CO	571	735	1088	2104	6854
PM10	4	13	30	66	173
PM2.5	3	4	8	19	86

Acre Below		**Acre Above**	
SRA No.	Acres	SRA No.	Acres
5	1	5	1
Distance Increment Below			
25			
Distance Increment Above			
25			

Updated: 10/21/2009 - Table C-1. 2006 – 2008

Construction Localized Significance Thresholds: Operations

SRA No.	Acres	Source Receptor Distance (meters)	Source Receptor Distance (Feet)	Project site Acreage Disturbed
5	0.00	25	82	1.56

Source Receptor	Southeast LA County	Equipment	Acres/8-hr Day		Daily hours	Equipment Used	Acres
Distance (meters)	25	Tractors	0.5	0.0625	0	0	0
NOx	**80**	Graders	0.5	0.0625	0	0	0
CO	**571**	Dozers	0.5	0.0625	0	0	0
PM10	**4.00**	Scrapers	1	0.125	0	0	0
PM2.5	**3.00**					**Acres**	0.00

	Acres	**25**	**50**	**100**	**200**	**500**
NOx	1	80	81	94	123	192
	1	80	81	94	123	192
		80	81	94	123	192
CO	1	571	735	1088	2104	6854
	1	571	735	1088	2104	6854
		571	735	1088	2104	6854
PM10	1	4	13	30	66	173
	1	4	13	30	66	173
		4	13	30	66	173
PM2.5	1	3	4	8	19	86
	1	3	4	8	19	86
		3	4	8	19	86

Southeast LA County

0.00 Acres

	25	**50**	**100**	**200**	**500**
NOx	80	81	94	123	192
CO	571	735	1088	2104	6854
PM10	4	13	30	66	173
PM2.5	3	4	8	19	86

Acre Below		**Acre Above**	
SRA No.	Acres	SRA No.	Acres
5	1	5	1
Distance Increment Below			
25			
Distance Increment Above			
25			

Updated: 10/21/2009 - Table C-1. 2006 – 2008

Appendix B

Energy Calculations

Energy Calculations Summary

Operational Fuel Use Summary

Fuel Type	Fleet Mix (%)	Gallons per Mile	Annual VMT	Gallons
Gasoline	96.33%	0.04	3,792,682	138,832
Diesel	3.67%	0.09		12,857

Notes:

1. Fleet mix calculated from CalEEMod default values.
2. Gallons per mile calculated from EMFAC 2017.
3. Annual VMT obtained from CalEEMod output file.

Energy Calculations Summary

Construction Fuel Usage Summary

Construction Year	Diesel Off-road Equipment (gallons)	Gasoline On-road (gallons)	Diesel On-road (gallons)	Diesel Combined
2021	11,246	142	924	
2022	23,455	9,257	15	
TOTAL	**34,701**	**9,399**	**938**	35,639

Total Gasoline	**9,399**	**gallons**
Total Diesel	**35,639**	**gallons**

Operational Energy Use

Land Use	Natural Gas[1] kBTU/year	Natural Gas[1] therm/year	Electricity[2] kWh/year	Diesel gallons/year
Government Office Building	1,236,310	0.012	2.38E+06	9,537
Total	**1,236,310**	**0.012**	**2,376,820**	**9,537**

btu/therm 1.00E-05

[1] No direct natural gas use. Output from CalEEMod.

[2] Electricity offset by 100% renewable energy.

Equipment	Amount	Usage Hours/yr	Horse Power	Load Factor	Average Daily Factor	Diesel Fuel Usage
Emergency Generator	1	500.00	871	0.73	0.6	9,537

Operational Energy Use

EMFAC2017 (v1.0.2) Emissions Inventory
Region Type: County
Region: LOS ANGELES
Calendar Year: 2023
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	CalYr	VehClass	MdlYr	Speed miles/hr	Fuel	Population vehicles	VMT miles/day	Trips trips/day	Gasoline Fuel Consumption 1,000 gallons/day	Diesel Fuel Consumption 1,000 gallons/day
LOS ANGE	2023	All Other Buses	Aggregate	Aggregate	DSL	2453.780294	150763.0391	20611.75447	14.31029644	14.31029644
LOS ANGE	2023	LDA	Aggregate	Aggregate	GAS	4079718.343	153812691.8	19249547.07	4943.660073	0
LOS ANGE	2023	LDA	Aggregate	Aggregate	DSL	37620.08952	1468847.201	178324.7106	0	30.23068474
LOS ANGE	2023	LDA	Aggregate	Aggregate	ELEC	93246.42895	3877173.285	464969.6401	0	0
LOS ANGE	2023	LDT1	Aggregate	Aggregate	GAS	480759.8328	17733493.57	2225422.937	661.8900744	0.00
LOS ANGE	2023	LDT1	Aggregate	Aggregate	DSL	257.6434833	6250.546569	911.0447198	0	0.282612153
LOS ANGE	2023	LDT1	Aggregate	Aggregate	ELEC	4694.098206	199559.1454	23532.52193	0	0
LOS ANGE	2023	LDT2	Aggregate	Aggregate	GAS	1420577.957	53205335.05	6674512.78	2111.835151	0.00
LOS ANGE	2023	LDT2	Aggregate	Aggregate	DSL	9886.840992	410652.3194	48611.0055	0	11.47875608
LOS ANGE	2023	LDT2	Aggregate	Aggregate	ELEC	18529.7361	593086.5511	93526.44733	0	0
LOS ANGE	2023	LHD1	Aggregate	Aggregate	GAS	107353.7456	3873368.206	1599410.853	366.2400016	0.00
LOS ANGE	2023	LHD1	Aggregate	Aggregate	DSL	71099.52621	2976582.9	894342.5966	0	134.8364525
LOS ANGE	2023	LHD2	Aggregate	Aggregate	GAS	18246.17882	636806.1143	271840.8775	69.11659593	0.00
LOS ANGE	2023	LHD2	Aggregate	Aggregate	DSL	28768.3231	1158887.819	361869.3141	0	58.28800151
LOS ANGE	2023	MCY	Aggregate	Aggregate	GAS	188536.3972	1317299.67	377072.7944	36.84713681	0.00
LOS ANGE	2023	MDV	Aggregate	Aggregate	GAS	951148.1238	33069618.91	4413707.186	1617.672656	0.00
LOS ANGE	2023	MDV	Aggregate	Aggregate	DSL	21713.14607	843603.3965	106464.3245	0	30.49995102
LOS ANGE	2023	MDV	Aggregate	Aggregate	ELEC	10527.8392	347358.5519	53662.76901	0	0.00
LOS ANGE	2023	MH	Aggregate	Aggregate	GAS	19632.08957	198292.6633	1963.994241	38.11803067	0.00
LOS ANGE	2023	MH	Aggregate	Aggregate	DSL	6442.422087	66663.72302	644.2422087	0	6.253802478
LOS ANGE	2023	Motor Coach	Aggregate	Aggregate	DSL	671.8209096	94677.5948	9808.58528	0	14.10776679
LOS ANGE	2023	OBUS	Aggregate	Aggregate	GAS	4020.759353	164000.6212	80447.35314	32.38996349	0.00
LOS ANGE	2023	PTO	Aggregate	Aggregate	DSL	0	79942.02847	0	0	15.4668659
LOS ANGE	2023	SBUS	Aggregate	Aggregate	GAS	1498.084511	60378.45107	5992.338043	6.505272296	0.00
LOS ANGE	2023	SBUS	Aggregate	Aggregate	DSL	3895.844354	123040.6457	44957.50371	0	16.01651846
LOS ANGE	2023	T6 Ag	Aggregate	Aggregate	DSL	11.67476155	97.073849	51.36895084	0	0.011080203
LOS ANGE	2023	T6 CAIRP heavy	Aggregate	Aggregate	DSL	349.6383777	68307.70048	5104.720315	0	5.741529689
LOS ANGE	2023	T6 CAIRP small	Aggregate	Aggregate	DSL	184.7839559	9654.963816	2697.845756	0	0.864549799
LOS ANGE	2023	T6 instate construction he	Aggregate	Aggregate	DSL	2618.326334	172411.6153	11837.35155	0	16.16246622
LOS ANGE	2023	T6 instate construction sm	Aggregate	Aggregate	DSL	8139.325817	456545.5656	36797.57556	0	42.39392411
LOS ANGE	2023	T6 instate heavy	Aggregate	Aggregate	DSL	10786.51244	1499120.793	124474.8581	0	130.4795504
LOS ANGE	2023	T6 instate small	Aggregate	Aggregate	DSL	38175.77868	2025192.578	440543.1931	0	186.7456954
LOS ANGE	2023	T6 OOS heavy	Aggregate	Aggregate	DSL	202.1917854	39591.65831	2952.000067	0	3.325627066
LOS ANGE	2023	T6 OOS small	Aggregate	Aggregate	DSL	105.7912941	5491.948334	1544.552893	0	0.492296399
LOS ANGE	2023	T6 Public	Aggregate	Aggregate	DSL	4562.406266	71552.48965	13839.29899	0	8.604352208
LOS ANGE	2023	T6 utility	Aggregate	Aggregate	DSL	1029.350505	17254.27294	11837.53081	0	1.751558673
LOS ANGE	2023	T6TS	Aggregate	Aggregate	GAS	14791.98296	816335.0055	295957.9951	159.4208227	0
LOS ANGE	2023	T7 Ag	Aggregate	Aggregate	DSL	5.450542727	89.56607012	23.982388	0	0.015745035
LOS ANGE	2023	T7 CAIRP	Aggregate	Aggregate	DSL	6343.347191	1154320.568	92612.86899	0	161.4619094
LOS ANGE	2023	T7 CAIRP construction	Aggregate	Aggregate	DSL	679.1643287	123844.761	3070.475524	0	16.39059596
LOS ANGE	2023	T7 NNOOS	Aggregate	Aggregate	DSL	7121.061939	1407158.417	103967.5043	0	187.176984
LOS ANGE	2023	T7 NOOS	Aggregate	Aggregate	DSL	2513.987908	453542.0471	36704.22346	0	65.04522279
LOS ANGE	2023	T7 POLA	Aggregate	Aggregate	DSL	8519.119436	1135875.96	64745.30772	0	176.1245414
LOS ANGE	2023	T7 Public	Aggregate	Aggregate	DSL	5566.242618	112766.4506	16884.26926	0	19.11724284
LOS ANGE	2023	T7 Single	Aggregate	Aggregate	DSL	6149.267846	402604.0345	70961.69838	0	58.13099302
LOS ANGE	2023	T7 single construction	Aggregate	Aggregate	DSL	4427.380162	307236.0732	20016.01357	0	43.27968855
LOS ANGE	2023	T7 SWCV	Aggregate	Aggregate	DSL	1267.904477	51803.41871	4944.82746	0	25.53003199
LOS ANGE	2023	T7 SWCV	Aggregate	Aggregate	NG	2800.075382	114024.8235	10920.29399	0	0
LOS ANGE	2023	T7 tractor	Aggregate	Aggregate	DSL	12343.86745	1684212.129	156767.1166	0	222.0396063
LOS ANGE	2023	T7 tractor construction	Aggregate	Aggregate	DSL	3720.516306	253442.7111	16820.30957	0	35.83999783
LOS ANGE	2023	T7 utility	Aggregate	Aggregate	DSL	410.896106	8338.939625	4725.305219	0	1.314768721
LOS ANGE	2023	T7IS	Aggregate	Aggregate	GAS	53.11282542	6012.489383	1062.681411	1.428465935	0
LOS ANGE	2023	UBUS	Aggregate	Aggregate	GAS	466.4659792	33779.50019	1865.863917	7.764629988	0
LOS ANGE	2023	UBUS	Aggregate	Aggregate	DSL	37.1389	5105.145298	148.5556		0.807132926
LOS ANGE	2023	UBUS	Aggregate	Aggregate	ELEC	14	1217.553685	56	0	0
LOS ANGE	2023	UBUS	Aggregate	Aggregate	NG	4202.367788	445285.1383	16809.47115	0	0

TOTAL	289,350,589		10067.20	1740.62	24.5	0.04
Total (Gas)	264,927,412				26.3	0.04
Total (Diesel)	18,845,472				10.8	0.09

Annual VMT
3,792,682

	Mix (%)	Miles	Gallons
Gas	96.3%	3,653,483	138,832
Diesel	3.7%	139,207	12,857

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
All	0.545842	0.044768	0.205288	0.119317	0.01535	0.006227	0.02046	0.031333	0.002546	0.002133	0.005184	0.000692	0.000862

Gas	96.3%
Diesel	3.7%

2021-2022 Construction Offroad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor	Number of days	Average Daily Factor	Diesel Fuel Usage
2021								
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73	20	0.6	284
Demolition	Rubber Tired Dozers	1	8.00	247	0.40	20	0.6	474
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37	20	0.6	517
Site Preparation	Graders	1	8	187	0.41	10	0.6	184
Site Preparation	Rubber Tired Dozers	1	7	247	0.4	10	0.6	207
Site Preparation	Tractors/Loaders/Backhoes	1	8	97	0.37	10	0.6	86
Grading	Graders	1	6.00	187	0.41	20	0.6	276
Grading	Rubber Tired Dozers	1	6.00	247	0.40	20	0.6	356
Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37	20	0.6	151
Building Construction	Cranes	1	6.00	231	0.29	169	0.6	2,038
Building Construction	Forklifts	1	6.00	89	0.20	169	0.6	541
Building Construction	Generator Sets	1	8.00	84	0.74	169	0.6	2,521
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37	169	0.6	1,092
Building Construction	Welders	3	8.00	46	0.45	169	0.6	2,519
2022								
Building Construction	Cranes	1	6.00	231	0.29	211	0.6	2,544
Building Construction	Forklifts	1	6.00	89	0.20	211	0.6	676
Building Construction	Generator Sets	1	8.00	84	0.74	211	0.6	3,148
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37	211	0.6	1,363
Building Construction	Welders	3	8.00	46	0.45	211	0.6	3,145
Paving	Cement and Mortar Mixers	1	6.00	9	0.56	25	0.6	23
Paving	Pavers	1	6.00	130	0.42	25	0.6	246
Paving	Paving Equipment	1	8.00	132	0.36	25	0.6	285
Paving	Rollers	1	7.00	80	0.38	25	0.6	160
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37	25	0.6	215
Architectural Coating	Air Compressors	1	6.00	78	0.48	60	0.6	404
						2021	**TOTAL**	**11,246**
						2022	**TOTAL**	**23,455**

	Year	Start Date	End Date	Network Days
Demolition	2021	3/2/2021	3/29/2021	20
Site Preparation	2021	3/30/2021	4/12/2021	10
Grading	2021	4/13/2021	5/10/2021	20
Building Construction	2021	5/11/2021	12/31/2021	169
	2022	1/1/2022	10/24/2022	211
Paving	2022	10/25/2022	11/28/2022	25
Architectural Coating	2022	11/29/2022	2/20/2023	60

Trips and VMT

2021

Phase Name	Daily Worker Trip	Days per Year	Total Worker Trips	Total Vendor Trips	Total Hauling Trips	Worker Trip Length (miles)	Vendor Trip Length (miles)	Haul Trip Length (miles)	Total Worker Trip Length (miles)	Total Vendor Trip Length (miles)	Total Haul Trip Length (miles)	**Total gallons of gasoline**	**Total gallons of diesel**
Demolition	13	20	260	0	297	14.70	6.90	20.00	3822	0	5940	**142**	**924**
Site Preparation	8	10	80	0	0	14.70	6.90	20.00	1176	0	0	**44**	**0**
Grading	8	20	160	0	494	14.70	6.90	20.00	2352	0	9880	**87**	**1,536**
Building Construction	77	169	13013	14	0	14.70	6.90	20.00	191291.1	96.6	0	**7,090**	**15**
											TOTAL	**142**	**924**

Notes: Consistent with CalEEMod, worker vehicles assumed to be gasoline and 50% LDA, 25% LDT1, and 25% LDT2. Vendor and haul trips are assumed to be 100% diesel Heavy-Duty Trucks (T7).

2022

Phase Name	Daily Worker Trip	Days per Year	Total Worker Trips	Total Vendor Trips	Total Hauling Trips	Worker Trip Length (miles)	Vendor Trip Length (miles)	Haul Trip Length (miles)	Total Worker Trip Length (miles)	Total Vendor Trip Length (miles)	Total Haul Trip Length (miles)	**Total gallons of gasoline**	**Total gallons of diesel**
Building Construction	77	211	16247	14	0	14.70	6.90	20.00	238830.9	96.6	0	**8,608**	**15**
Paving	13	25	325	0	0	14.70	6.90	20.00	4777.5	0	0	**172**	**0**
Building Construction	15	60	900	0	0	14.70	6.90	20.00	13230	0	0	**477**	**0**
											TOTAL	**9,257**	**15**

Notes: Consistent with CalEEMod, worker vehicles assumed to be gasoline and 50% LDA, 25% LDT1, and 25% LDT2. Vendor and haul trips are assumed to be 100% diesel Heavy-Duty Trucks (T7).

Construction Energy Use

EMFAC2017 (v1.0.2) Emissions Inventory
Region Type: County
Region: LOS ANGELES
Calendar Year: 2021
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	CalYr	VehClass	MdlYr	Speed miles/hr	Fuel	Population vehicles	VMT miles/day	Trips trips/day	Fuel gas 1,000 gallons/day	Diesel gas 1,000 gallons/day	Miles per gallon	Gasoline miles per gallon	Diesel miles per gallon
LOS ANGE	2021	LDA	Aggregated	Aggregated	GAS	3998082.55	154957028.3	18859046.25	5253.036076	0.00	29.50	26.98	6.43
LOS ANGE	2021	LDT1	Aggregated	Aggregated	GAS	451923.1455	17065391.26	2083892.52	670.3612556	0.00	25.46		
LOS ANGE	2021	LDT2	Aggregated	Aggregated	GAS	1370275.92	52553142.22	6426189.155	2238.862589	0.00	23.47		
LOS ANGE	2021	T7 tractor construction	Aggregated	Aggregated	DSL	3547.888701	246432.0056	16039.86688	0.00	38.32018639	6.43		

Notes: Consistent with CalEEMod, worker vehicles assumed to be gasoline and 50% LDA, 25% LDT1, and 25% LDT2. Vendor and haul trips are assumed to be 100% diesel Heavy-Duty Trucks (T7).

Construction Energy Use

EMFAC2017 (v1.0.2) Emissions Inventory
Region Type: County
Region: LOS ANGELES
Calendar Year: 2022
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	CalYr	VehClass	MdlYr	Speed miles/hr	Fuel	Population vehicles	VMT miles/day	Trips trips/day	Fuel gas 1,000 gallons/day	Diesel gas 1,000 gallons/day	Miles per gallon	Gasoline miles per gallon	Diesel miles per gallon
LOS ANGE	2022	LDA	Aggregated	Aggregated	GAS	4040504.833	154312636.5	19063483.35	5096.55014	0.00	30.28	27.75	6.62
LOS ANGE	2022	LDT1	Aggregated	Aggregated	GAS	466456.294	17402686.02	2155709.822	666.5509097	0.00	26.11		
LOS ANGE	2022	LDT2	Aggregated	Aggregated	GAS	1395327.914	52851239.49	6550846.129	2173.392058	0.00	24.32		
LOS ANGE	2022	T7 tractor construction	Aggregated	Aggregated	DSL	3625.325785	250084.1249	16389.95692	0.00	37.80	6.62		

Notes: Consistent with CalEEMod, worker vehicles assumed to be gasoline and 50% LDA, 25% LDT1, and 25% LDT2. Vendor and haul trips are assumed to be 100% diesel Heavy-Duty Trucks (T7).

Appendix C1

Geotechnical Investigation

GEOTECHNICAL INVESTIGATION

MIXED-USE DEVELOPMENT
16411 BELLFLOWER BOULEVARD &
9742 MAYNE STREET
BELLFLOWER, CALIFORNIA

GEOCON
WEST, INC.
GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR
16411 BELLFLOWER, LLC
GLENDALE, CALIFORNIA

PROJECT NO. A9911-06-01

MARCH 20, 2019

GEOCON
WEST, INC.
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

Project No. A9911-06-01
March 20, 2019

16411 Bellflower, LLC
c/o Serrano Development Group
500 North Brand Boulevard #2120
Glendale, California 91203

Attention: Mr. William Jacobs

Subject: GEOTECHNICAL INVESTIGATION
PROPOSED MIXED-USE DEVELOPMENT
16411 BELLFLOWER BOULEVARD & 9742 MAYNE STREET
BELLFLOWER, CALIFORNIA

Dear Mr. Jacobs:

In accordance with your authorization of our proposal dated January 9, 2019, we have prepared this geotechnical investigation report for the proposed mixed-use development located at 16411 Bellflower Boulevard and 9742 Mayne Street in the City of Bellflower, California. The accompanying report presents the findings of our study, and our conclusions and recommendations pertaining to the geotechnical aspects of proposed design and construction. Based on the results of our investigation, it is our opinion that the site can be developed as proposed, provided the recommendations of this report are followed and implemented during design and construction.

If you have any questions regarding this report, or if we may be of further service, please contact the undersigned.

Very truly yours,

GEOCON WEST, INC.

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STATE OF CALIFORNIA

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STATE OF CALIFORNIA

Petrina Zen
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Jelisa Thomas Adams
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GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of a geotechnical investigation for the proposed mixed-use development located at 16411 Bellflower Boulevard and 9742 Mayne Street in the City of Bellflower, California (see Vicinity Map, Figure 1). The purpose of the investigation was to evaluate subsurface soil and geologic conditions underlying the site and, based on conditions encountered, to provide conclusions and recommendations pertaining to the geotechnical aspects of design and construction.

The scope of this investigation included a site reconnaissance, field exploration, laboratory testing, engineering analysis, and the preparation of this report. The site was explored on February 1, 2019, by excavating two 8-inch diameter borings using a truck-mounted hollow-stem auger drilling machine. The borings were excavated to depths of approximately 61 and 68 feet beneath the existing ground surface. In addition, two Cone Penetrometer Tests (CPTs) were advanced to depths of approximately 61 and 63 feet below the existing ground surface. The approximate locations of the exploratory borings and CPTs are depicted on the Site Plan (Figure 2). A detailed discussion of the field investigation, including logs of the boring and CPT soundings, is presented in Appendix A.

Laboratory tests were performed on selected soil samples obtained during the investigation to determine pertinent physical and chemical soil properties. Appendix B presents a summary of the laboratory test results.

The recommendations presented herein are based on analysis of the data obtained during the investigation and our experience with similar soil and geologic conditions. References reviewed to prepare this report are provided in the *List of References* section.

If project details vary significantly from those described herein, Geocon should be contacted to determine the necessity for review and possible revision of this report.

2. SITE AND PROJECT DESCRIPTION

The subject site is located at 16411 Bellflower Boulevard and 9742 Mayne Street in the City of Bellflower, California. The site is a rectangular-shaped parcel that is currently occupied by an existing development that consists of several single-story commercial structures, which include a warehouse and market structure, and an asphalt paved parking lot. The site is bounded by Mayne Street to the north, by Bellflower Boulevard to the east, Oak Street to the south, and by single-family and multi-family residential structures to the west. The site is relatively level, with no pronounced highs or lows. Surface water drainage at the site appears to be by sheet flow along the existing ground contours to the city streets.

Based on the information provided by the Client, it is our understanding that the proposed mixed-use development will consist of a three-story wood-framed, multi-family housing structure over one level of parking to be constructed at or near present site grade (see Figure 2). It is generally anticipated that

the existing warehouse structure will be demolished for the proposed development. However, the existing market structure may be renovated for the proposed theater, and new foundations may be utilized for support of the proposed improvements.

Based on the preliminary nature of the design at this time, wall and column loads were not available. It is anticipated that column loads for the proposed multi-family structure will be up to 500 kips, and wall loads will be up to 6 kips per linear foot. It is anticipated that column loads for the improvements to the existing structure will be up to 150 kips, and wall loads will be up to 2 kips per linear foot.

Once the design phase and foundation loading configuration proceeds to a more finalized plan, the recommendations within this report should be reviewed and revised, if necessary. Any changes in the design, location or elevation of any structure, as outlined in this report, should be reviewed by this office. Geocon should be contacted to determine the necessity for review and possible revision of this report.

3. GEOLOGIC SETTING

The site is located in the central portion of the Los Angeles Basin, a coastal plain bounded by the Santa Monica Mountains on the north, the Elysian Hills and Repetto Hills on the northeast, the Puente Hills and the Whittier Fault on the east, the Palos Verdes Peninsula and Pacific Ocean on the west and south, and the Santa Ana Mountains and San Joaquin Hills on the southeast. The basin is underlain by a deep structural depression which has been filled by both marine and continental sedimentary deposits underlain by a basement complex of igneous and metamorphic composition. Regionally, the site is located within the northern portion of the Peninsular Ranges geomorphic province. This geomorphic province is characterized by northwest-trending physiographic and geologic features such as the nearby Newport-Inglewood Fault Zone located approximately 5.8 miles to the southwest.

4. SOIL AND GEOLOGIC CONDITIONS

Based on our field investigation and published geologic maps of the area, the site is underlain by Holocene age alluvium consisting clay, silt, and sand (California Geological Survey, 2010; City of Bellflower, 2017). Detailed stratigraphic profiles of the materials encountered at the site are provided on the boring and CPT logs in Appendix A.

4.1 Artificial Fill

Artificial fill was encountered in our field explorations to a maximum depth of 5 feet below existing ground surface. The artificial fill generally consists of brown to grayish brown well-graded sand. The artificial fill is characterized as dry to slightly moist and loose to medium dense. The fill is likely the result of past grading or construction activities at the site. Deeper fill may exist between excavations and in other portions of the site that were not directly explored.

4.2 Alluvium

Holocene age alluvium was encountered beneath the fill. The alluvium generally consists of brown to dark brown, gray to dark gray, or grayish brown interbedded poorly graded and well-graded sand, silty sand, sand with silt, silt with clay, and silt with sand. The alluvial soils are primarily fine- to medium-grained and are characterized as dry to wet and loose to dense or soft to stiff.

5. GROUNDWATER

A review of the Seismic Hazard Zone Report for the South Gate Quadrangle (California Division of Mines and Geology [CDMG], 1998) indicates that the historically highest groundwater level in the area is approximately 9 feet beneath the ground surface. Groundwater information presented in this document is generated from data collected in the early 1900's to the late 1990s. Based on current groundwater basin management practices, it is unlikely that groundwater levels will ever exceed the historic high levels.

Groundwater was encountered in boring B1 and B2 at depths of 37.2 and 42.0 feet below existing ground surface, respectively. Based on the depth to groundwater encountered in our borings, and the depth of proposed construction, groundwater is neither expected to be encountered during construction, nor have a detrimental effect on the project. However, it is not uncommon for groundwater levels to vary seasonally or for groundwater seepage conditions to develop where none previously existed, especially in impermeable fine-grained soils which are heavily irrigated or after seasonal rainfall. In addition, recent requirements for stormwater infiltration could result in shallower seepage conditions in the immediate site vicinity. Proper surface drainage of irrigation and precipitation will be critical for future performance of the project. Recommendations for drainage are provided in the S*urface Drainage* section of this report (see Section 7.21).

6. GEOLOGIC HAZARDS

6.1 Surface Fault Rupture

The numerous faults in Southern California include active, potentially active, and inactive faults. The criteria for these major groups are based on criteria developed by the California Geological Survey (CGS, formerly known as CDMG) for the Alquist-Priolo Earthquake Fault Zone Program (CGS, 2018). By definition, an active fault is one that has had surface displacement within Holocene time (about the last 11,700 years). A potentially active fault has demonstrated surface displacement during Quaternary time (approximately the last 1.6 million years), but has had no known Holocene movement. Faults that have not moved in the last 1.6 million years are considered inactive.

The site is not located within a state-designated Alquist-Priolo Earthquake Fault Zone for surface fault rupture hazards (CGS, 2019a and 2019b). No active or potentially active faults with the potential for surface fault rupture are known to pass directly beneath the site. Therefore, the potential for surface rupture due to faulting occurring beneath the site during the design life of the proposed development is considered low. However, the site is located in the seismically active Southern California region, and could be subjected to moderate to strong ground shaking in the event of an earthquake on one of the many active Southern California faults. The faults in the vicinity of the site are shown in Figure 3, Regional Fault Map.

The closest surface trace of an active fault to the site is the Newport-Inglewood Fault Zone located approximately 5.8 miles to the southwest (Ziony and Jones, 1989). Other nearby active faults are the Whittier Fault, the Palos Verdes Fault, the Raymond Fault, and the Hollywood Fault located approximately 9.1 miles northeast, 11.9 miles southwest, 16.4 miles north, and 18 miles north-northwest of the site, respectively (Ziony and Jones, 1989). The active San Andreas Fault Zone is located approximately 42 miles northeast of the site.

Several buried thrust faults, commonly referred to as blind thrusts, underlie the Los Angeles Basin at depth. These faults are not exposed at the ground surface and are typically identified at depths greater than 3.0 kilometers. The October 1, 1987, M_w 5.9 Whittier Narrows earthquake and the January 17, 1994, M_w 6.7 Northridge earthquake were a result of movement on the Puente Hills Blind Thrust and the Northridge Thrust, respectively. These thrust faults and others in the Los Angeles area are not exposed at the surface and do not present a potential surface fault rupture hazard at the site; however, these deep thrust faults are considered active features capable of generating future earthquakes that could result in moderate to significant ground shaking at the site.

6.2 Seismicity

As with all of Southern California, the site has experienced historic earthquakes from various regional faults. The seismicity of the region surrounding the site was formulated based on research of an electronic database of earthquake data. The epicenters of recorded earthquakes with magnitudes equal to or greater than 5.0 in the site vicinity are depicted on Figure 4, Regional Seismicity Map. A partial list of moderate to major magnitude earthquakes that have occurred in the Southern California area within the last 100 years is included in the following table.

LIST OF HISTORIC EARTHQUAKES

Earthquake (Oldest to Youngest)	Date of Earthquake	Magnitude	Distance to Epicenter (Miles)	Direction to Epicenter
San Jacinto-Hemet area	April 21, 1918	6.8	65	E
Near Redlands	July 23, 1923	6.3	51	E
Long Beach	March 10, 1933	6.4	21	SE
Tehachapi	July 21, 1952	7.5	92	NW
San Fernando	February 9, 1971	6.6	40	NNW
Whittier Narrows	October 1, 1987	5.9	12	NNE
Sierra Madre	June 28, 1991	5.8	27	NNE
Landers	June 28, 1992	7.3	99	ENE
Big Bear	June 28, 1992	6.4	77	ENE
Northridge	January 17, 1994	6.7	33	NW
Hector Mine	October 16, 1999	7.1	117	ENE

The site could be subjected to strong ground shaking in the event of an earthquake. However, this hazard is common in Southern California and the effects of ground shaking can be mitigated if the proposed structures are designed and constructed in conformance with current building codes and engineering practices.

6.3 Seismic Design Criteria

The following table summarizes summarizes site-specific design criteria obtained from the 2016 California Building Code (CBC; Based on the 2015 International Building Code [IBC] and ASCE 7-10), Chapter 16 Structural Design, Section 1613 Earthquake Loads. The data was calculated using the computer program *U.S. Seismic Design Maps*, provided by the USGS. The short spectral response uses a period of 0.2 second. We evaluated the Site Class based on the discussion in Section 1613.3.2 of the 2016 CBC and Table 20.3-1 of ASCE 7-10. The values presented below are for the risk-targeted maximum considered earthquake (MCE_R).

2016 CBC SEISMIC DESIGN PARAMETERS

Parameter	Value	2016 CBC Reference
Site Class	D	Table 1613.3.2
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	1.735g	Figure 1613.3.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.621g	Figure 1613.3.1(2)
Site Coefficient, F_A	1.0	Table 1613.3.3(1)
Site Coefficient, F_V	1.5	Table 1613.3.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	1.735g	Section 1613.3.3 (Eqn 16-37)
Site Class Modified MCE_R Spectral Response Acceleration – (1 sec), S_{M1}	0.931g	Section 1613.3.3 (Eqn 16-38)
5% Damped Design Spectral Response Acceleration (short), S_{DS}	1.157g	Section 1613.3.4 (Eqn 16-39)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.621g	Section 1613.3.4 (Eqn 16-40)

The table below presents the mapped maximum considered geometric mean (MCE_G) seismic design parameters for projects located in Seismic Design Categories of D through F in accordance with ASCE 7-10.

ASCE 7-10 PEAK GROUND ACCELERATION

Parameter	Value	ASCE 7-10 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	0.647g	Figure 22-7
Site Coefficient, F_{PGA}	1.0	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	0.647g	Section 11.8.3 (Eqn 11.8-1)

The Maximum Considered Earthquake Ground Motion (MCE) is the level of ground motion that has a 2 percent chance of exceedance in 50 years, with a statistical return period of 2,475 years. According to the 2016 California Building Code and ASCE 7-10, the MCE is to be utilized for the evaluation of liquefaction, lateral spreading, seismic settlements, and it is our understanding that the intent of the Building code is to maintain "Life Safety" during a MCE event. The Design Earthquake Ground Motion (DE) is the level of ground motion that has a 10 percent chance of exceedance in 50 years, with a statistical return period of 475 years.

Deaggregation of the MCE peak ground acceleration was performed using the USGS online Unified Hazard Tool, 2008 Conterminous U.S. Dynamic edition. The result of the deaggregation analysis indicates that the predominant earthquake contributing to the MCE peak ground acceleration is characterized as a 6.60 magnitude event occurring at a hypocentral distance of 10.57 kilometers from the site.

Deaggregation was also performed for the Design Earthquake (DE) peak ground acceleration, and the result of the analysis indicates that the predominant earthquake contributing to the DE peak ground acceleration is characterized as a 6.62 magnitude occurring at a hypocentral distance of 17.56 kilometers from the site.

Conformance to the criteria in the above tables for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a large earthquake occurs. The primary goal of seismic design is to protect life, not to avoid all damage, since such design may be economically prohibitive.

6.4 Liquefaction Potential

Liquefaction is a phenomenon in which loose, saturated, relatively cohesionless soil deposits lose shear strength during strong ground motions. Primary factors controlling liquefaction include intensity and duration of ground motion, gradation characteristics of the subsurface soils, in-situ stress conditions, and the depth to groundwater. Liquefaction is typified by a loss of shear strength in the liquefied layers due to rapid increases in pore water pressure generated by earthquake accelerations.

The current standard of practice, as outlined in the "Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction in California" and "Special Publication 117A, Guidelines for Evaluating and Mitigating Seismic Hazards in California" requires liquefaction analysis to a depth of 50 feet below the lowest portion of the proposed structure. Liquefaction typically occurs in areas where the soils below the water table are composed of poorly consolidated, fine to medium-grained, primarily sandy soil. In addition to the requisite soil conditions, the ground acceleration and duration of the earthquake must also be of a sufficient level to induce liquefaction.

The State of California Seismic Hazard Zone Map for the South Gate Quadrangle (CDMG, 1999) indicates that the site is located in an area identified as having a potential for liquefaction. Also, the City of Bellflower Safety Element (2017) indicates the site is located within an area with a potential for liquefaction. The historic high groundwater level in the vicinity of the site is reported at a depth of approximately 9 feet beneath the ground surface (CDMG, 1998).

Liquefaction analyses of the CPT soundings were performed using the program CLiq (Version 2.3.1.15). This program utilizes the 2001 NCEER method of analysis. This semi-empirical method is based on correlations with the data collected from the CPT soundings.

Prior to analysis, the Standard Penetration Test (SPT) blow counts were compared with the blow counts estimated from the CPT soundings. SPTs were performed in borings B1 and B2 at intervals of approximately 5 feet. In order to supplement the SPT blow count data, select California Modified Sampler blow count data were converted to equivalent SPT blow counts based on a correlation factor of 0.55 (Rogers, 2006). The field collected blow counts were corrected for hammer efficiency to N60 blow count values. The boring N60 values were compared with the N60 values generated by the program CpetIT (Version 2.3.1.9). The comparisons are shown as Figures 5 and 6. It is our opinion that the boring and CPT N60 values show a reasonable correlation and that analysis of the liquefaction potential may be based on the CPT data.

The liquefaction analysis was performed for a Design Earthquake level by using a historic high groundwater table of 9 feet below the ground surface, a magnitude 6.62 earthquake, and a peak horizontal acceleration of 0.432g ($⅔PGA_M$). The enclosed liquefaction analyses, included herein for CPTs 1 and 2, indicate that the alluvial soils below the historic high groundwater depth could be prone to approximately 1.26 and 1.23 inches, respectively, of total settlement during Design Earthquake ground motion. A summary of the anticipated liquefaction induced settlements is provided as Figure 7; calculations and output from CLiq are provided as Appendix C.

It is our understanding that the intent of the Building Code is to maintain "Life Safety" during Maximum Considered Earthquake level events. Therefore, additional analysis was performed to evaluate the potential for liquefaction during a MCE event. The structural engineer should evaluate the proposed structure for the anticipated MCE liquefaction induced settlements and verify that anticipated deformations would not cause the foundation system to lose the ability to support the gravity loads and/or cause collapse of the structure.

The liquefaction analysis was also performed for the Maximum Considered Earthquake level by using a historic high groundwater table of 9 feet below the ground surface, a magnitude 6.60 earthquake, and a peak horizontal acceleration of 0.647g (PGA_M). The enclosed liquefaction analysis, included herein for CPTs 1 and 2, indicates that the alluvial soils below the historic high groundwater depth could be prone to approximately 2.18 and 1.70 inches, respectively, of total settlement during Maximum Considered Earthquake ground motion. A summary of the anticipated liquefaction induced settlements is provided as Figure 8; calculations and output from CLiq are provided as Appendix C.

6.5 Slope Stability

The topography at the site is relatively level and the topography in the immediate site vicinity slopes gently to the southwest. The City of Bellflower Safety Element (City of Bellflower, 2017) and the County of Los Angeles Safety Element (Leighton, 1990) indicate the site is not located within an area identified as having a potential for slope instability. Additionally, the site is not within an area identified as having a potential for seismic slope instability (CDMG, 1999). There are no known landslides near the site, nor is the site in the path of any known or potential landslides. Therefore, the potential for slope stability hazards to adversely affect the proposed development is considered low.

6.6 Earthquake-Induced Flooding

Earthquake-induced flooding is inundation caused by failure of dams or other water-retaining structures due to earthquakes. Based on a review of the County of Los Angeles Safety Element (Leighton, 1990) and the City of Bellflower Safety Element (City of Bellflower, 2017), the site is located within the Whittier Narrows Dam inundation area. However, this reservoir, as well as others in California, are continually monitored by various governmental agencies (such as the State of California Division of Safety of Dams and the U.S. Army Corps of Engineers) to guard against the threat of dam failure. Current design, construction practices, and ongoing programs of review, modification, or total reconstruction of existing dams are intended to ensure that all dams are capable of withstanding the maximum considered earthquake (MCE) for the site. Therefore, the potential for inundation at the site as a result of an earthquake-induced dam failure is considered low.

6.7 Tsunamis, Seiches, and Flooding

The site is not located within a coastal area. Therefore, tsunamis are not considered a significant hazard at the site.

Seiches are large waves generated in enclosed bodies of water in response to ground shaking. No major water-retaining structures are located immediately up gradient from the project site. Therefore, flooding resulting from a seismically induced seiche is considered unlikely.

The site is within Flood Zone X (0.2% annual flood chance) as defined by the Federal Emergency Management Agency (FEMA, 2019; LACDPW, 2019b; City of Bellflower, 2017).

6.8 Oil Fields & Methane Potential

Based on a review of the California Division of Oil, Gas and Geothermal Resources (DOGGR) Well Finder Website, the site is not located within the limits of an oilfield and oil or gas wells are not located in the immediate site vicinity (DOGGR, 2019). However, due to the voluntary nature of record reporting by the oil well drilling companies, wells may be improperly located or not shown on the location map and undocumented wells could be encountered during construction. Any wells encountered during construction will need to be properly abandoned in accordance with the current requirements of the DOGGR.

Since the site is not located within the boundaries of a known oil field, the potential for the presence of methane or other volatile gases at the site is considered low. However, should it be determined that a methane study is required for the proposed development it is recommended that a qualified methane consultant be retained to perform the study and provide mitigation measures as necessary.

6.9 Subsidence

Subsidence occurs when a large portion of land is displaced vertically, usually due to the withdrawal of groundwater, oil, or natural gas. Soils that are particularly subject to subsidence include those with high silt or clay content. The site is not located within an area of known ground subsidence. No large-scale extraction of groundwater, gas, oil, or geothermal energy is occurring or planned at the site or in the general site vicinity. There appears to be little or no potential for ground subsidence due to withdrawal of fluids or gases at the site.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 General

7.1.1 It is our opinion that neither soil nor geologic conditions were encountered during the investigation that would preclude construction of the proposed project provided the recommendations presented herein are followed and implemented during design and construction.

7.1.2 Up to 5 feet of existing artificial fill was encountered during the site investigation. The existing fill encountered is believed to be the result of past grading and construction activities at the site. Deeper fill may exist in other areas of the site that were not directly explored. It is our opinion that the existing fill, in its present condition, is not suitable for direct support of proposed foundations or slabs. The existing fill and site soils are suitable for re-use as engineered fill provided the recommendations in the Grading section of this report are followed (see Section 7.4).

7.1.3 The enclosed seismically-induced settlement analyses indicate that the site soils could be susceptible to approximately 1.26 inches of total settlement as a result of the Design Earthquake peak ground acceleration ($⅔PGA_M$). Differential settlement at the foundation level is anticipated to be less than 0.63 inches over a distance of 30 feet. The foundation design recommendations presented herein are intended to minimize the effects of settlement on proposed improvements.

7.1.4 The foundation system for the proposed structure must be able to provide sufficient support for the structure and minimize the effects of differential settlement resulting from a liquefaction event. Based on these considerations, it is recommended that the proposed structures be supported on a reinforced concrete mat foundation deriving support on a blanket of newly placed engineered fill.

7.1.5 It is recommended that the upper 5 feet of existing earth materials within the building footprint area be excavated and properly compacted for foundation and slab support. Deeper excavations should be conducted as needed to remove any encountered fill or soft soils as necessary at the direction of the Geotechnical Engineer (a representative of Geocon). Proposed building foundations should be underlain by a minimum of 3 feet of newly placed engineered fill. The excavation should extend laterally a minimum distance of 3 feet beyond the building footprint areas, including building appurtenances, or a distance equal to the depth of fill below the foundation, whichever is greater. The limits of existing fill and/or soft soil removal will be verified by the Geocon representative during site grading activities. Recommendations for earthwork are provided in the *Grading* section of this report (see Section 7.4).

7.1.6 Where new footings are required for support of the proposed improvements within the existing structure, conventional foundations deriving support in the undisturbed, competent alluvium may be used. Based on the two borings performed outside of the footprint of the existing structure, the depth to competent alluvium is anticipated to be 5 feet below the existing ground surface. Additional exploration within the footprint of the existing structure should be considered in order to further evaluate the depth to competent alluvium. Foundations should be deepened as necessary to penetrate through any unsuitable soils and derive support exclusively in competent alluvium. All foundation excavation bottoms must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon) prior to placement of steel or concrete. Recommendations for the design of a conventional foundation system are provided in Section 7.7.

7.1.7 Where new foundations are constructed immediately adjacent to existing foundations, the new foundation should be deepened to match the depth of the existing foundation to prevent a surcharge on the existing foundation.

7.1.8 Where proposed foundations will be deeper than an existing foundation, the new foundation must be designed to resist the surcharge imposed by the existing foundation. The surcharge area may be defined by a 1:1 projection down and away from the bottom of the existing foundation.

7.1.9 It should be noted that implementation of the recommendations presented herein is not intended to completely prevent damage to the structure during the occurrence of strong ground shaking as a result of nearby earthquakes. It is intended that the structure be designed in such a way that the amount of damage incurred as a result of strong ground shaking be minimized.

7.1.10 It is recommended that flexible utility connections be utilized for all rigid utilities to minimize or prevent damage to utilities from minor differential movements.

7.1.11 All excavations must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon). Prior to placing any fill, the excavation bottom must be proof-rolled with heavy equipment in the presence of the Geotechnical Engineer (a representative of Geocon West, Inc.).

7.1.12 Excavations on the order of 5 feet in vertical height may be required for the recommended grading and construction of new foundations for proposed improvements. If excavations in close proximity to an adjacent property line and/or structure are required, special excavation measures may be necessary in order to maintain lateral support of offsite improvements. Performing open excavations adjacent to or deeper than the existing foundation system could

potentially remove lateral support and/or undermine the existing foundation. Excavation for construction of new foundations immediately adjacent to existing foundations may require special excavation measures in order to maintain lateral support of the existing adjacent foundation. Recommendations for *Temporary Excavations* are provided in see Section 7.17.

7.1.13 Foundations for small outlying structures, such as block walls up to 6 feet high, planter walls or trash enclosures, which will not be tied to the proposed structure, may be supported on conventional foundations bearing on a minimum of 12 inches of newly placed engineered fill which extends laterally at least 12 inches beyond the foundation area. Where excavation and proper compaction cannot be performed or is undesirable, foundations may derive support directly in the undisturbed alluvial soils found at or below a depth of 18 inches, and should be deepened as necessary to maintain a minimum 12-inch embedment into the recommended bearing materials. If the soils exposed in the excavation bottom are soft or loose, compaction of the soils will be required prior to placing steel or concrete. Compaction of the foundation excavation bottom is typically accomplished with a compaction wheel or mechanical whacker and must be observed and approved in writing by a Geocon representative.

7.1.14 Where new paving is to be placed, it is recommended that all existing fill soils and soft alluvial soils be excavated and properly compacted for paving support. The client should be aware that excavation and compaction of all existing fill in the area of new paving is not required; however, paving constructed over existing uncertified fill or unsuitable soils may experience increased settlement and/or cracking, and may therefore have a shorter design life and increased maintenance costs. As a minimum, the upper 12 inches of soil should be scarified and properly compacted. Paving recommendations are provided in the *Preliminary Pavement Recommendations* section of this report (see Section 7.12).

7.1.15 Based on the results of percolation testing performed at the site, a stormwater infiltration system is considered feasible for this project. Recommendations for infiltration are provided in the *Stormwater Infiltration* section of this report (see Section 7.20).

7.1.16 Once the design and foundation loading configuration for the proposed structure proceeds to a more finalized plan, the recommendations within this report should be reviewed and revised, if necessary. Based on the final foundation loading configurations, the potential for settlement should be reevaluated by this office.

7.1.17 Any changes in the design, location or elevation of improvements, as outlined in this report, should be reviewed by this office. Geocon should be contacted to determine the necessity for review and possible revision of this report.

7.2 Soil and Excavation Characteristics

7.2.1 The in-situ soils can be excavated with moderate effort using conventional excavation equipment. Caving should be anticipated in unshored excavations, especially where granular soils are present.

7.2.2 It is the responsibility of the contractor to ensure that all excavations and trenches are properly shored and maintained in accordance with applicable OSHA rules and regulations to maintain safety and maintain the stability of existing adjacent improvements.

7.2.3 All onsite excavations must be conducted in such a manner that potential surcharges from existing structures, construction equipment, and vehicle loads are resisted. The surcharge area may be defined by a 1:1 projection down and away from the bottom of an existing foundation or vehicle load. Penetrations below this 1:1 projection will require special excavation measures such as sloping or shoring. Excavation recommendations are provided in the *Temporary Excavations* section of this report (see Section 7.17).

7.2.4 The upper 5 feet of existing site soils encountered during the investigation are considered to have a "very low" expansive potential (EI = 1) and are classified as "non-expansive" in accordance with the 2016 California Building Code (CBC) Section 1803.5.3. The recommendations presented herein assume that the building foundations and slabs will derive support in these materials.

7.3 Minimum Resistivity, pH, and Water-Soluble Sulfate

7.3.1 Potential of Hydrogen (pH) and resistivity testing, as well as chloride content testing, were performed on representative samples of on-site material to generally evaluate the corrosion potential to surface utilities. The tests were performed in accordance with California Test Method Nos. 643 and 422 and indicate that the soils are considered "moderately corrosive" with respect to corrosion of buried ferrous metals on site. The results are presented in Appendix B (Figure B10) and should be considered for design of underground structures.

7.3.2 Laboratory tests were performed on representative samples of the site materials to measure the percentage of water-soluble sulfate content. Results from the laboratory water-soluble sulfate tests are presented in Appendix B (Figure B10) and indicate that the on-site materials possess a sulfate exposure class of "S0" to concrete structures as defined by 2016 CBC Section 1904 and ACI 318-14 Table 19.3.1.1.

7.3.3 Geocon West, Inc. does not practice in the field of corrosion engineering and mitigation. If corrosion sensitive improvements are planned, it is recommended that a corrosion engineer be retained to evaluate corrosion test results and incorporate the necessary precautions to avoid premature corrosion of buried metal pipes and concrete structures in direct contact with the soils.

7.4 Grading

7.4.1 A preconstruction conference should be held at the site prior to the beginning of grading operations with the owner, contractor, civil engineer and soil engineer in attendance. Special soil handling requirements can be discussed at that time.

7.4.2 Earthwork should be observed, and compacted fill tested by representatives of Geocon West, Inc. The existing fill and alluvial soils encountered during exploration are suitable for reuse as engineered fill, provided any encountered oversize material (greater than 6 inches) and any encountered deleterious debris is removed.

7.4.3 Grading should commence with the removal of all existing vegetation and existing improvements from the area to be graded. Deleterious debris such as wood and root structures should be exported from the site and should not be mixed with the fill soils. Asphalt and concrete should not be mixed with the fill soils unless approved by the Geotechnical Engineer. All existing underground improvements planned for removal should be completely excavated and the resulting depressions properly backfilled in accordance with the procedures described herein. Once a clean excavation bottom has been established it must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon West, Inc.).

7.4.4 As a minimum, it is recommended that the upper 5 feet of existing earth materials within the proposed building footprint area be excavated and properly compacted for foundation and slab support. Deeper excavations should be conducted as needed to remove any encountered fill or soft soils as necessary at the direction of the Geotechnical Engineer (a representative of Geocon). Proposed building foundations should be underlain by a minimum of 3 feet of newly placed engineered fill. The excavation should extend laterally a minimum distance of 3 feet beyond the building footprint areas, including building appurtenances, or a distance equal to the depth of fill below the foundation, whichever is greater. The limits of existing fill and/or soft soil removal will be verified by the Geocon representative during site grading activities.

7.4.5 All excavations must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon). Prior to placing any fill, the excavation bottom must be proof-rolled with heavy equipment in the presence of the Geotechnical Engineer (a representative of Geocon West, Inc.).

7.4.6 All fill and backfill soils should be placed in horizontal loose layers approximately 6 to 8 inches thick, moisture conditioned to optimum moisture content, and properly compacted to a minimum of 90 percent of the maximum dry density per ASTM D 1557 (latest edition).

7.4.7 Excavations on the order of 5 feet in vertical height may be required for the recommended grading and construction of new foundations for proposed improvements. If excavations in close proximity to an adjacent property line and/or structure are required, special excavation measures may be necessary in order to maintain lateral support of offsite improvements. Performing open excavations adjacent to or deeper than the existing foundation system could potentially remove lateral support and/or undermine the existing foundation. Excavation for construction of new foundations immediately adjacent to existing foundations may require special excavation measures in order to maintain lateral support of the existing adjacent foundation. Recommendations for *Temporary Excavations* are provided in see Section 7.17.

7.4.8. Where new paving is to be placed, it is recommended that all existing fill and soft alluvium be excavated and properly compacted for paving support. As a minimum, the upper 12 inches of soil should be scarified, moisture conditioned to optimum moisture content, and compacted to at least 95 percent relative compaction, as determined by ASTM Test Method D 1557 (latest edition). Paving recommendations are provided in *Preliminary Pavement Recommendations* section of this report (see Section 7.12).

7.4.9 Foundations for small outlying structures, such as block walls up to 6 feet high, planter walls or trash enclosures, which will not be tied to the proposed structure, may be supported on conventional foundations bearing on a minimum of 12 inches of newly placed engineered fill which extends laterally at least 12 inches beyond the foundation area. Where excavation and proper compaction cannot be performed or is undesirable, foundations may derive support directly in the undisturbed alluvial soils found at or below a depth of 18 inches, and should be deepened as necessary to maintain a minimum 12-inch embedment into the recommended bearing materials. If the soils exposed in the excavation bottom are soft or loose, compaction of the soils will be required prior to placing steel or concrete. Compaction of the foundation excavation bottom is typically accomplished with a compaction wheel or mechanical whacker and must be observed and approved in writing by a Geocon representative.

7.4.10 All imported fill shall be observed, tested, and approved by Geocon West, Inc. prior to bringing soil to the site. Rocks larger than 6 inches in diameter shall not be used in the fill. Import soils used as structural fill should have an expansion index less than 20 and corrosivity properties that are equally or less detrimental to that of the existing onsite soils (see Figure B10). Import soils placed in the building area should be placed uniformly across the building pad or in a manner that is approved by the Geotechnical Engineer (a representative of Geocon).

7.4.11 It is recommended that flexible utility connections be utilized for all rigid utilities to minimize or prevent damage to utilities from minor differential movements. Utility trenches should be properly backfilled in accordance with the requirements of the Green Book (latest edition). The pipe should be bedded with clean sands (Sand Equivalent greater than 30) to a depth of at least 1 foot over the pipe, and the bedding material must be inspected and approved in writing by the Geotechnical Engineer (a representative of Geocon). The use of gravel is not acceptable unless used in conjunction with filter fabric to prevent the gravel from having direct contact with soil. The remainder of the trench backfill may be derived from onsite soil or approved import soil, compacted as necessary, until the required compaction is obtained. The use of minimum 2-sack slurry as backfill is also acceptable. Prior to placing any bedding materials or pipes, the trench excavation bottom must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon).

7.4.12 All trench and foundation excavation bottoms must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon), prior to placing bedding sands, fill, steel, gravel, or concrete.

7.5 Shrinkage

7.5.1 Shrinkage results when a volume of material removed at one density is compacted to a higher density. A shrinkage factor between 10 and 15 percent should be anticipated when excavating and compacting the upper 5 feet of existing earth materials on the site to an average relative compaction of 92 percent.

7.5.2 If import soils will be utilized in the building pad, the soils must be placed uniformly and at equal thickness at the direction of the Geotechnical Engineer (a representative of Geocon West, Inc.). Soils can be borrowed from non-building pad areas and later replaced with imported soils.

7.6 Mat Foundation Design

7.6.1 Subsequent to the recommended grading, it is recommended that a reinforced concrete mat foundation be utilized for support of the proposed structure. The reinforced concrete mat foundation should derive support in the newly placed engineered fill and be underlain by at least 3 feet of newly placed engineered fill.

7.6.2 The recommended maximum allowable bearing value for the design of a reinforced concrete mat foundation is 4,000 pounds per square foot (psf). The allowable bearing pressure may be increased by up to one-third for transient loads due to wind or seismic forces.

7.6.3 It is recommended that a modulus of subgrade reaction of 150 pounds per cubic inch (pci) be utilized for the design of the mat foundation bearing in newly placed engineered fill. This value is a unit value for use with a 1-foot square footing. The modulus should be reduced in accordance with the following equation when used with larger foundations:

$$K_R = K\left[\frac{B+1}{2B}\right]^2$$

where: K_R = reduced subgrade modulus
K = unit subgrade modulus
B = foundation width (in feet)

7.6.4 The thickness of and reinforcement for the mat foundation should be designed by the project structural engineer.

7.6.5 For seismic design purposes, a coefficient of friction of 0.4 may be utilized between concrete slab and new placed engineered fill without a moisture barrier, and 0.15 for slabs underlain by a moisture barrier.

7.6.6 Foundation excavations should be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon West, Inc.), prior to the placement of reinforcing steel and concrete to verify that the exposed soil conditions are consistent with those anticipated. If unanticipated soil conditions are encountered, foundation modifications may be required.

7.6.7 This office should be provided a copy of the final construction plans so that the recommendations presented herein could be properly reviewed and revised if necessary.

7.7 Conventional Foundation Design

7.7.1 Where new foundations are required to support proposed improvements within the existing structure, conventional spread foundations may be used. It is recommended that proposed foundations penetrate through existing fill and derive support in the competent alluvium. Based on the two borings performed outside of the footprint of the existing structure, the depth to competent alluvium is anticipated to be 5 feet below the existing ground surface. Additional exploration within the footprint of the existing structure should be considered in order to further evaluate the depth to competent alluvium. Foundation excavations should be deepened as necessary to penetrate through any encountered artificial fill or soft, unsuitable alluvium at the direction of the Geotechnical Engineer.

7.7.2 Proposed foundations that are situated immediately adjacent to the existing foundations should be deepened as necessary to match the depth of the existing foundation to prevent a surcharge on the existing foundation.

7.7.3 Where proposed foundations will be deeper than the existing foundation, the proposed foundation must be designed to resist the surcharge imposed by the existing foundation. The surcharge area may be defined by a 1:1 projection up and away from the bottom of an existing foundation.

7.7.4 Continuous footings may be designed for an allowable bearing capacity of 1,500 psf, and should be a minimum of 12 inches in width, 18 inches in depth below the lowest adjacent grade, and 12 inches into the recommended bearing material.

7.7.5 Isolated spread foundations may be designed for an allowable bearing capacity of 1,800 psf, and should be a minimum of 24 inches in width, 18 inches in depth below the lowest adjacent grade, and 12 inches into the recommended bearing material.

7.7.6 The soil bearing pressures above may be increased by 250 psf and 500 psf for each additional foot of foundation width and depth, respectively up to a maximum of 2,500 psf.

7.7.7 The allowable bearing pressures may be increased by one-third for transient loads due to wind or seismic forces.

7.7.8 Continuous footings should be reinforced with four No. 4 steel reinforcing bars, two placed near the top of the footing and two near the bottom. Reinforcement for spread footings should be designed by the project structural engineer.

7.7.9 The above foundation dimensions and minimum reinforcement recommendations are based on soil conditions and building code requirements only, and are not intended to be used in lieu of those required for structural purposes.

7.7.10 No special subgrade presaturation is required prior to placement of concrete. However, the moisture in the foundation subgrade should be sprinkled as necessary to maintain a moist condition at the time of concrete placement.

7.7.11 Foundation excavations should be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon West, Inc.), prior to the placement of reinforcing steel and concrete to verify that the excavations and exposed soil conditions are consistent with those anticipated. If unanticipated soil conditions are encountered, foundation modifications may be required.

7.7.12 This office should be provided a copy of the final construction plans so that the excavation recommendations presented herein could be properly reviewed and revised if necessary.

7.8 Foundation Settlement

7.8.1 The enclosed liquefaction and seismically-induced settlement analyses indicate that the site soils could be susceptible to approximately 1.26 inches of total settlement as a result of the Design Earthquake peak ground acceleration ($\frac{2}{3}PGA_M$). The differential settlement at the foundation level is anticipated to be less than 0.63 inches over a distance of 30 feet. These settlements are in addition to the static settlements indicated below and must be considered in the structural design.

7.8.2 The maximum expected static settlement for a mat foundation system deriving support in the newly placed engineered fill with a maximum allowable bearing pressure of 4,000 psf is estimated to be less than 1 inch and occur below the heaviest loaded structural element. Settlement of the foundation system is expected to occur on initial application of loading. Differential settlement is expected to be less than ½ inch between the center and corner of the mat foundation. Based on seismic considerations, the proposed structures supported on a mat foundation system should be designed for a combined static and seismically-induced differential settlement of 1½ inches over a distance of 20 feet.

7.8.3 The maximum expected total settlement for improvements supported on a conventional foundation system designed with the maximum allowable bearing pressure of 2,500 psf and deriving support in the recommended bearing material is estimated to be less than ½ inch and occur below the heaviest loaded structural element. Settlement of the foundation system is expected to occur on initial application of loading. Differential settlement is expected to be ½ inch over a distance of 20 feet. Based on seismic considerations, the proposed structures supported on a mat foundation system should be designed for a combined static and seismically-induced differential settlement of 1 inch over a distance of 20 feet.

7.8.4 Once the design and foundation loading configurations for the proposed structures proceeds to a more finalized plan, the estimated settlements presented in this report should be reviewed and revised, if necessary. If the final foundation loading configurations are greater than the assumed loading conditions, the potential for settlement should be reevaluated by this office.

7.9 Miscellaneous Foundations

7.9.1 Foundations for small outlying structures, such as block walls up to 6 feet in height, planter walls or trash enclosures, which will not be structurally supported by the proposed building, may be supported on conventional foundations deriving support on a minimum of 12 inches of newly placed engineered fill which extends laterally at least 12 inches beyond the foundation area. Where excavation and compaction cannot be performed or is undesirable, such as adjacent to property lines, foundations may derive support in the undisturbed alluvial soils found at or below a depth of 18 inches, and should be deepened as necessary to maintain a minimum 12-inch embedment into the recommended bearing materials.

7.9.2 If the soils exposed in the excavation bottom are loose, compaction of the soils will be required prior to placing steel or concrete. Compaction of the foundation excavation bottom is typically accomplished with a compaction wheel or mechanical whacker and must be observed and approved by a Geocon representative. Miscellaneous foundations may be designed for a bearing value of 1,500 psf, and should be a minimum of 12 inches in width, 18 inches in depth below the lowest adjacent grade and 12 inches into the recommended bearing material. The allowable bearing pressure may be increased by up to one-third for transient loads due to wind or seismic forces.

7.9.3 Foundation excavations should be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon West, Inc.), prior to the placement of reinforcing steel and concrete to verify that the excavations and exposed soil conditions are consistent with those anticipated.

7.10 Lateral Design

7.10.1 Resistance to lateral loading may be provided by friction acting at the base of foundations, slabs and by passive earth pressure. An allowable coefficient of friction of 0.4 may be used with the dead load forces in the undisturbed alluvial soils and newly placed engineered fill.

7.10.2 Passive earth pressure for the sides of foundations and slabs poured against newly placed engineered fill or undisturbed alluvial soils may be computed as an equivalent fluid having a density of 260 pounds per cubic foot (pcf) with a maximum earth pressure of 2,600 psf. When combining passive and friction for lateral resistance, the passive component should be reduced by one-third. A one-third increase in the passive value may be used for wind or seismic loads.

7.11 Concrete Slabs-on-Grade

7.11.1 Concrete slabs-on-grade for structures, not subject to vehicle loading, should be a minimum of 4 inches of concrete reinforced with No. 3 steel reinforcing bars placed 18 inches on center in both horizontal directions and positioned vertically near the slab midpoint. The concrete slab-on-grade should derive support on undisturbed alluvial soils and/or newly placed engineered fill. The finished subgrade must observed and be approved in writing prior to placement of a vapor retarder, reinforcing steel, or concrete.

7.11.2 Slabs-on-grade at the ground surface that may receive moisture-sensitive floor coverings or may be used to store moisture-sensitive materials should be underlain by a vapor retarder placed directly beneath the slab. The vapor retarder and acceptable permeance should be specified by the project architect or developer based on the type of floor covering that will be installed. The vapor retarder design should be consistent with the guidelines presented in Section 9.3 of the American Concrete Institute's (ACI) *Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials* (ACI 302.2R-06) and should be installed in general conformance with ASTM E 1643-11 and the manufacturer's recommendations. A minimum thickness of 15 mils and a permeance of less than 0.01 perms is recommended. The vapor retarder should be installed in direct contact with the concrete slab with proper perimeter seal. If the California Green Building Code requirements apply to this project, the vapor retarder should be underlain by 4 inches of clean aggregate. It is important that the vapor retarder be puncture resistant since it will be in direct contact with angular gravel. As an alternative to the clean aggregate suggested in the California Green Building Code, it is our opinion that the concrete slab-on-grade may be underlain by a vapor retarder over 4-inches of clean sand (sand equivalent greater than 30), since the sand will serve a capillary break and will minimize the potential for punctures and damage to the vapor barrier.

7.11.3 For seismic design purposes, an allowable coefficient of friction of 0.4 may be utilized between concrete slabs and subgrade soils; and 0.15 for slabs underlain by a vapor retarder.

7.11.4 Exterior slabs, not subject to traffic loads, should be at least 4 inches thick and reinforced with No. 3 steel reinforcing bars placed 18 inches on center in both horizontal directions, positioned near the slab midpoint. Prior to construction of slabs, the upper 12 inches of subgrade should be moisture conditioned to optimum moisture content and properly compacted to at least 95 percent relative compaction, as determined by ASTM Test Method D 1557 (latest edition). Crack control joints should be spaced at intervals not greater than 10 feet and should be constructed using saw-cuts or other methods as soon as practical following concrete placement. Crack control joints should extend a minimum depth of one-fourth the slab thickness. The project structural engineer should design construction joints as necessary.

7.11.5 The recommendations of this report are intended to reduce the potential for cracking of slabs due to settlement. However, even with the incorporation of the recommendations presented herein, foundations, stucco walls, and slabs-on-grade may exhibit some cracking due to minor soil movement and/or concrete shrinkage. The occurrence of concrete shrinkage cracks is independent of the supporting soil characteristics. Their occurrence may be reduced and/or controlled by limiting the slump of the concrete, proper concrete placement and curing, and by the placement of crack control joints at periodic intervals, in particular, where re-entrant slab corners occur.

7.12 Preliminary Pavement Recommendations

7.12.1 Where new paving is to be placed, it is recommended that all existing fill and soft alluvium materials be excavated and properly compacted for paving support. The client should be aware that excavation and compaction of all existing artificial fill and soft alluvium in the area of new paving is not required; however, paving constructed over existing uncertified fill or unsuitable alluvium material may experience increased settlement and/or cracking, and may therefore have a shorter design life and increased maintenance costs. As a minimum, the upper 12 inches of paving subgrade should be scarified, moisture conditioned to optimum moisture content, and properly compacted to at least 95 percent relative compaction, as determined by ASTM Test Method D 1557 (latest edition).

7.12.2 The following pavement sections are based on an assumed R-Value of 20. Once site grading activities are complete an R-Value should be obtained by laboratory testing to confirm the properties of the soils serving as paving subgrade, prior to placing pavement.

7.12.3 The Traffic Indices listed below are estimates. Geocon does not practice in the field of traffic engineering. The actual Traffic Index for each area should be determined by the project civil engineer. If pavement sections for Traffic Indices other than those listed below are required, Geocon should be contacted to provide additional recommendations. Pavement thicknesses were determined following procedures outlined in the *California Highway Design Manual* (Caltrans). It is anticipated that the majority of traffic will consist of automobile and large truck traffic.

PRELIMINARY PAVEMENT DESIGN SECTIONS

Location	Estimated Traffic Index (TI)	Asphalt Concrete (inches)	Class 2 Aggregate Base (inches)
Automobile Parking and Driveways	4.0	3.0	4.0
Trash Truck & Fire Lanes	7.0	4.0	12.0

7.12.4 Asphalt concrete should conform to Section 203-6 of the "*Standard Specifications for Public Works Construction"* (Green Book). Class 2 aggregate base materials should conform to Section 26-1.02A of the "*Standard Specifications of the State of California, Department of Transportation"* (Caltrans). The use of Crushed Miscellaneous Base (CMB) in lieu of Class 2 aggregate base is acceptable. Crushed Miscellaneous Base should conform to Section 200-2.4 of the "*Standard Specifications for Public Works Construction"* (Green Book).

7.12.5 Unless specifically designed and evaluated by the project structural engineer, where exterior concrete paving will be utilized for support of vehicles, it is recommended that the concrete be a minimum of 6 inches of concrete reinforced with No. 3 steel reinforcing bars placed 18 inches on center in both horizontal directions. Concrete paving supporting vehicular traffic should be underlain by a minimum of 4 inches of aggregate base and a properly compacted subgrade. The subgrade and base material should be compacted to 95 percent relative compaction, as determined by ASTM Test Method D 1557 (latest edition).

7.12.6 The performance of pavements is highly dependent upon providing positive surface drainage away from the edge of pavements. Ponding of water on or adjacent to the pavement will likely result in saturation of the subgrade materials and subsequent cracking, subsidence and pavement distress. If planters are planned adjacent to paving, it is recommended that the perimeter curb be extended at least 12 inches below the bottom of the aggregate base to minimize the introduction of water beneath the paving.

7.13 Retaining Wall Design

7.13.1 The recommendations presented below are generally applicable to the design of rigid concrete or masonry retaining walls having a maximum height of 5 feet. In the event that walls significantly higher than 5 feet are planned, Geocon should be contacted for additional recommendations.

7.13.2 Retaining wall foundations may be designed in accordance with the recommendations provided in the *Mat Foundation Design* section of this report (see Section 7.6).

7.13.3 Retaining walls with a level backfill surface that are not restrained at the top should be designed utilizing a triangular distribution of pressure (active pressure) of 30 pcf.

7.13.4 Restrained walls are those that are not allowed to rotate more than 0.001H (where H equals the height of the retaining portion of the wall in feet) at the top of the wall. Where walls are restrained from movement at the top, walls may be designed utilizing a triangular distribution of pressure (at-rest pressure) of 61 pcf.

7.13.5 The wall pressures provided above assume that the retaining wall will be properly drained preventing the buildup of hydrostatic pressure. If retaining wall drainage is not implemented, the equivalent fluid pressure to be used in design of undrained walls is 90 pcf. The value includes hydrostatic pressures plus buoyant lateral earth pressures.

7.13.6 The wall pressures provided above also assume that the proposed retaining walls will support relatively undisturbed alluvial soils or engineered fill derived from onsite soils. If import soil will be utilized to backfill proposed retaining walls, revised earth pressures may be required to account for the geotechnical properties of the import soil used as engineered fill. This should be evaluated once the use of import soil is established. All imported fill shall be observed, tested, and approved by Geocon West, Inc. prior to bringing soil to the site.

7.13.7 Additional active pressure should be added for a surcharge condition due to sloping ground, vehicular traffic or adjacent structures and should be designed for each condition as the project progresses.

7.14 Retaining Wall Drainage

7.14.1 Retaining walls should be provided with a drainage system extended at least two-thirds the height of the wall. At the base of the drain system, a subdrain covered with a minimum of 12 inches of gravel should be installed, and a compacted fill blanket or other seal placed at the surface (see Figure 9). The clean bottom and subdrain pipe, behind a retaining wall, should be observed by the Geotechnical Engineer (a representative of Geocon), prior to placement of gravel or compacting backfill.

7.14.2 As an alternative, a plastic drainage composite such as Miradrain or equivalent may be installed in continuous, 4-foot-wide columns along the entire back face of the wall, at 8 feet on center. The top of these drainage composite columns should terminate approximately 18 inches below the ground surface, where either hardscape or a minimum of 18 inches of relatively cohesive material should be placed as a cap (see Figure 10).

7.14.3 Subdrainage pipes at the base of the retaining wall drainage system should outlet to an acceptable location via controlled drainage structures. Drainage should not be allowed to flow uncontrolled over descending slopes.

7.14.4 Moisture affecting below grade walls is one of the most common post-construction complaints. Poorly applied or omitted waterproofing can lead to efflorescence or standing water. Particular care should be taken in the design and installation of waterproofing to avoid moisture problems, or actual water seepage into the structure through any normal shrinkage cracks which may develop in the concrete walls, floor slab, foundations and/or construction

joints. The design and inspection of the waterproofing is not the responsibility of the geotechnical engineer. A waterproofing consultant should be retained in order to recommend a product or method, which would provide protection to subterranean walls, floor slabs and foundations.

7.15 Elevator Pit Design

7.15.1 The elevator pit slab and retaining wall should be designed by the project structural engineer. Elevator pits may be designed in accordance with the recommendations in the *Foundation Design* and *Retaining Wall Design* section of this report (see Sections 7.6 and 7.13).

7.15.2 Additional active pressure should be added for a surcharge condition due to sloping ground, vehicular traffic or adjacent foundations and should be designed for each condition as the project progresses.

7.15.3 If retaining wall drainage is to be provided, the drainage system should be designed in accordance with the *Retaining Wall Drainage* section of this report (see Section 7.14).

7.15.4 It is suggested that the exterior walls and slab of the elevator pit be waterproofed to prevent excessive moisture inside of the elevator pit. Waterproofing design and installation is not the responsibility of the geotechnical engineer.

7.16 Elevator Piston

7.16.1 If a plunger-type elevator piston is installed for this project, a deep drilled excavation will be required. It is important to verify that the drilled excavation is not situated immediately adjacent to a foundation, or the drilled excavation could compromise the existing foundation support.

7.16.2 Casing may be required if caving is experienced in the drilled excavation. The contractor should be prepared to use casing and should have it readily available at the commencement of drilling activities. Continuous observation of the drilling and installation of the elevator piston by the Geotechnical Engineer (a representative of Geocon West, Inc.) is required.

7.16.3 The annular space between the piston casing and drilled excavation wall should be filled with a minimum of 1½-sack slurry pumped from the bottom up. As an alternative, pea gravel may be utilized. The use of soil to backfill the annular space is not acceptable.

7.17 Temporary Excavations

7.17.1 Excavations up to 5 feet in height may be required during grading and construction operations. The excavations are expected to expose artificial fill and alluvial soils, which are suitable for vertical excavations up to 5 feet in height where loose soils or caving sands are not present, and where not surcharged by adjacent traffic or structures.

7.17.2 Vertical excavations greater than 5 feet or where surcharged by existing structures will require sloping or shoring measures in order to provide a stable excavation. Where sufficient space is available, temporary unsurcharged embankments could be sloped back at a uniform 1:1 slope gradient or flatter up to a maximum height of 10 feet. A uniform slope does not have a vertical portion.

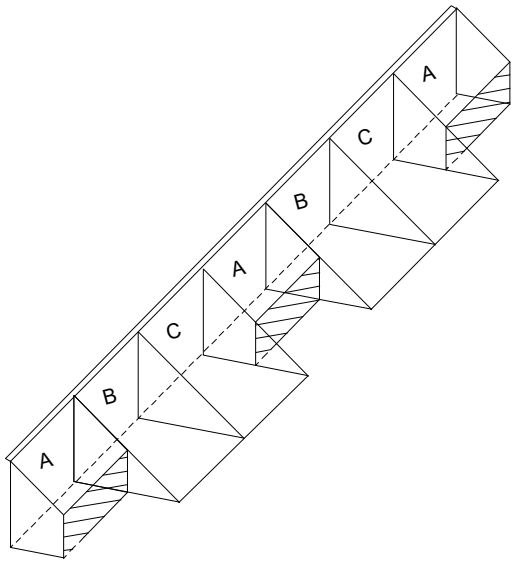
7.17.3 If excavations in close proximity to an adjacent property line and/or structure are required, special excavation measures such as slot-cutting or shoring may be necessary in order to maintain lateral support of offsite improvements. Continuous vertical excavation adjacent to and which extend below existing footings could remove vertical and lateral support from the existing footings and are not permitted. Special excavations measures such as slot-cutting or trench shoring will be required where the proposed excavation will be deeper than an existing adjacent foundation. Recommendations for slot-cutting and shoring are provided in the following sections.

7.17.4 Where sloped embankments are utilized, the top of the slope should be barricaded to prevent vehicles and storage loads at the top of the slope within a horizontal distance equal to the height of the slope. If the temporary construction embankments are to be maintained during the rainy season, berms are suggested along the tops of the slopes where necessary to prevent runoff water from entering the excavation and eroding the slope faces. Geocon personnel should inspect the soils exposed in the cut slopes during excavation so that modifications of the slopes can be made if variations in the soil conditions occur. All excavations should be stabilized within 30 days of initial excavation.

7.18 Slot-Cutting

7.18.1 The slot-cutting method employs the earth as a buttress and allows the earth excavation to proceed in phases. Where slot-cutting is used for foundation construction, the proposed construction techniques should be discussed with the structural engineer so that appropriate modifications can be made to the foundation design; such as additional reinforcing or details for doweling.

7.18.2 It is recommended that the initial temporary excavation along the property line be sloped back at a uniform 1:1 (H:V) slope gradient or flatter for excavation of the existing soils to the necessary depth. The temporary excavation should not extend below the surcharge area of any adjacent foundations. The surcharge area may be defined by a 1:1 projection down and away from the bottom of an existing foundation. The temporary slope may then be excavated using the slot-cutting (see illustration below).



7.18.3 Alternate "A" slots of 4 feet in width may be worked. The remaining earth buttresses ("B" and "C" slots) should also be 4 feet in width. The wall, foundation, or backfill should be completed in the "A" slots to a point where support of the offsite property and/or any existing structures is restored before the "B" slots are excavated. After completing the wall, foundation, or backfill in the "B" slots, finally the "C" slots may be excavated. Slot-cutting is not recommended for vertical excavations greater than 5 feet in height. A surcharge load of 500 pounds per linear foot is included in the slot-cut calculation to account for miscellaneous minor surcharges. The slot-cut calculation should be revised as needed for each surcharge condition as the project progresses. A slot-cut calculation is provided on the following page.

Slot Cut Calculation

Input:

Height of Slots	(H)	5.0	feet
Unit Weight of Soils	(γ)	125.0	pcf
Friction Angle of Soils	(ϕ)	31.0	degrees
Cohesion of Soils	(c)	140.0	psf
Factor of Safety	(FS)	1.25	

Factor of Safety = Resistance Force/Driving Force

Design Equations

$b = H/(\tan \alpha)$

$A = 0.5*H*b$

$W = 0.5*H*b*\gamma$ *(per lineal foot of slot width)*

$F_1 = d*W*(\sin \alpha)$

$R_1 = d*[W*(\cos\alpha)*(\tan \phi)+(c*b)]$

$R_2 = 2*[(0.5*H*b)*c]$

FS = Resistance Force/Driving Force

$FS = (R_1+R_2)/(F_1)$

Surcharge Pressure:

Line Load	(q_L)	500.0	plf
Distance Away from Edge of Excavation	(X)	0.0	feet

Failure Angle (α) degrees	Width of Failure Wedge (b) feet	Area of Failure Wedge (A) feet^2	Weight of Failure Wedge (W) lbs/lineal foot	**Driving Force** Wedge + Surcharge per lineal foot of Slot Wdith	**Resisting Force** Failure Wedge per lineal foot of Slot Width	**Resisting Force** Side Resistance Force lbs	**Allowable Width of Slots*** (d) feet
45	5.0	13	1562.5	1458.4	1866.2	3500.0	8.0
46	4.8	12	1508.9	1445.1	1811.6	3379.9	8.0
47	4.7	12	1457.1	1431.3	1759.1	3263.8	8.0
48	4.5	11	1406.9	1417.1	1708.6	3151.4	8.0
49	4.3	11	1358.3	1402.4	1660.0	3042.5	8.0
50	4.2	10	1311.1	1387.4	1613.3	2936.8	8.0
51	4.0	10	1265.3	1371.9	1568.2	2834.2	8.0
52	3.9	10	1220.8	1356.0	1524.9	2734.5	8.0
53	3.8	9	1177.4	1339.7	1483.1	2637.4	8.0
54	3.6	9	1135.2	1322.9	1442.8	2542.9	8.0
55	3.5	9	1094.1	1305.8	1403.9	2450.7	8.0
56	3.4	8	1053.9	1288.3	1366.5	2360.8	8.0
57	3.2	8	1014.7	1270.3	1330.3	2272.9	8.0
58	3.1	8	976.4	1252.0	1295.5	2187.0	8.0
59	3.0	8	938.8	1233.3	1261.9	2103.0	7.5
60	2.9	7	902.1	1214.3	1229.5	2020.7	7.0
61	2.8	7	866.1	1194.8	1198.3	1940.1	6.6
62	2.7	7	830.8	1175.0	1168.2	1861.0	6.2
63	2.5	6	796.1	1154.9	1139.2	1783.3	5.9
64	2.4	6	762.1	1134.4	1111.3	1707.1	5.6
65	2.3	6	728.6	1113.5	1084.4	1632.1	5.3
66	2.2	6	695.7	1092.3	1058.5	1558.3	5.1
67	2.1	5	663.2	1070.8	1033.6	1485.7	4.9
68	2.0	5	631.3	1048.9	1009.6	1414.1	4.7
69	1.9	5	599.8	1026.7	986.6	1343.5	4.5
70	1.8	5	568.7	1004.3	964.5	1273.9	4.4

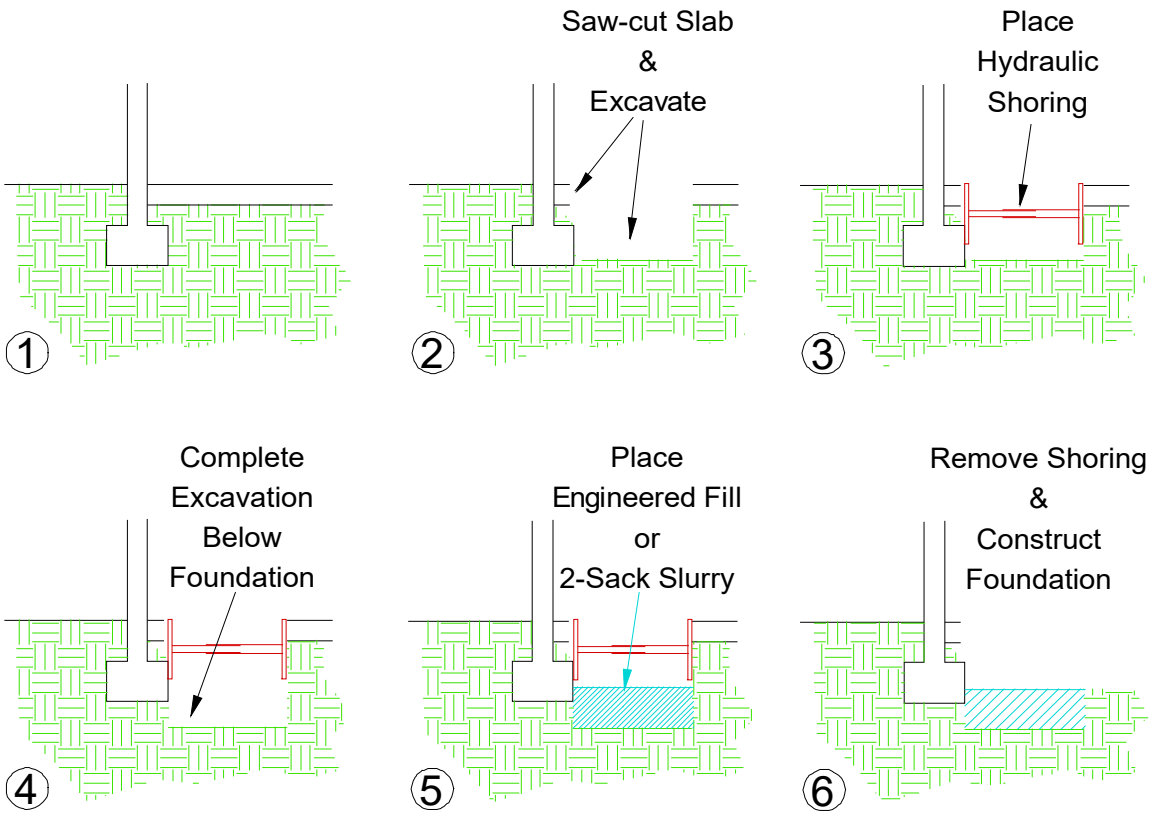
* Width of Slots to achieve a minimum of 1.25 Factor of Safety, with a Maximum Allowable Slot Width of 8-feet.

Critical Slot Width with Factor of Safety equal or exceeding 1.25:

d_{allow} = 4.4 feet

7.19 Trench Shoring

7.19.1 To protect the existing footings, hydraulic trench shoring may be implemented where excavations will extend below existing foundations. The excavation may be conducted adjacent to the foundation but should not extend below the foundation until the shoring is installed. Once shoring is installed the excavation can proceed; the excavation may be backfilled with soil or two-sack slurry, or a new foundation may be constructed directly in the excavation bottom. Once the backfill or footing is placed to an elevation that is slightly above the bottom of the existing adjacent foundation, the shoring may be removed. See illustration below.



7.19.2 It is recommended that an equivalent fluid pressure based on the table below, be utilized for design of hydraulic shoring.

HEIGHT OF SHORED EXCAVATION (FEET)	EQUIVALENT FLUID PRESSURE (Pounds Per Cubic Foot) (ACTIVE PRESSURE)	EQUIVALENT FLUID PRESSURE (Pounds Per Cubic Foot) (AT-REST PRESSURE)
Up to 5	25	61

7.19.3 It is very important to note that active pressures can only be achieved when movement in the soil (earth wall) occurs. If movement in the soil is not acceptable, such as adjacent to an existing structure, the at-rest pressure should be considered for design purposes.

7.19.4 A qualified engineer should be retained to review and prepare a shoring plan in accordance with the shoring manufacture's specifications.

7.19.5 Additional active pressure should be added for a surcharge condition due to adjacent structures and should be designed for each condition as the project progresses.

7.19.6 It is recommended that line-load surcharges from adjacent wall footings, use horizontal pressures generated from NAV-FAC DM 7.2. The governing equations are:

$$For\ {}^{x}/_{H} \leq 0.4$$

$$\sigma_H(z) = \frac{0.20 \times \left(\frac{z}{H}\right)}{\left[0.16 + \left(\frac{z}{H}\right)^2\right]^2} \times \frac{Q_L}{H}$$

and

$$For\ {}^{x}/_{H} > 0.4$$

$$\sigma_H(z) = \frac{1.28 \times \left(\frac{x}{H}\right)^2 \times \left(\frac{z}{H}\right)}{\left[\left(\frac{x}{H}\right)^2 + \left(\frac{z}{H}\right)^2\right]^2} \times \frac{Q_L}{H}$$

where x is the distance from the face of the excavation or wall to the vertical line-load, H is the distance from the bottom of the footing to the bottom of excavation or wall, z is the depth at which the horizontal pressure is desired, Q_L is the vertical line-load and $\sigma_H(z)$ is the horizontal pressure at depth z.

7.19.7 It is recommended that vertical point-loads, from construction equipment outriggers or adjacent building columns use horizontal pressures generated from NAV-FAC DM 7.2. The governing equations are:

$$For\ {}^{x}/_{H} \leq 0.4$$

$$\sigma_H(z) = \frac{0.28 \times \left(\frac{z}{H}\right)^2}{\left[0.16 + \left(\frac{z}{H}\right)^2\right]^3} \times \frac{Q_P}{H^2}$$

and

$$For\ {}^{x}/_{H} > 0.4$$

$$\sigma_H(z) = \frac{1.77 \times \left(\frac{x}{H}\right)^2 \times \left(\frac{z}{H}\right)^2}{\left[\left(\frac{x}{H}\right)^2 + \left(\frac{z}{H}\right)^2\right]^3} \times \frac{Q_P}{H^2}$$

then

$$\sigma'_H(z) = \sigma_H(z) cos^2(1.1\theta)$$

where x is the distance from the face of the excavation/wall to the vertical point-load, H is distance from the outrigger/bottom of column footing to the bottom of excavation, z is the depth at which the horizontal pressure is desired, Q_P is the vertical point-load, $\sigma_H(z)$ is the horizontal pressure at depth z, θ is the angle between a line perpendicular to the excavation/wall and a line from the point-load to location on the excavation/wall where the surcharge is being evaluated, and $\sigma_H(z)$ is the horizontal pressure at depth z.

7.20 Stormwater Infiltration

7.20.1 During the February 1, 2019, site exploration, boring B1 was utilized to perform percolation testing. The boring was extended below the anticipated invert elevation, and then the bottom 45 feet of the boring was backfilled with soil cuttings and grout. Slotted casing was placed in the boring, and the annular space between the casing and excavation was filled with gravel. The boring was then filled with water to pre-saturate the soils. The casing was refilled with water and percolation test readings were performed after repeated flooding of the cased excavation. Based on the test results, the measured percolation rate and design infiltration rate, for the earth materials encountered, are provided in the following table. These values have been calculated in accordance with the Boring Percolation Test Procedure in the County of Los Angeles Department of Public Works GMED *Guidelines for Geotechnical Investigation and Reporting, Low Impact Development Stormwater Infiltration* (June 2017). Percolation test field data and calculation of the measured percolation rate and design infiltration rate are provided on Figure 11.

Boring	Soil Type	Infiltration Depth (ft)	Measured Percolation Rate (in / hour)	Design Infiltration Rate (in / hour)
B1	Silty Sand (SM)	10-15	1.00	0.50

7.20.2 Based on the test method utilized (Boring Percolation Test), the reduction factor RF_t may be taken as 2.0 in the infiltration system design. Based on the number of tests performed and consistency of the soils throughout the site, it is suggested that the reduction factor RF_v be taken as 1.0. In addition, provided proper maintenance is performed to minimize long-term siltation and plugging, the reduction factor RF_s may be taken as 1.0. Additional reduction factors may be required and should be applied by the engineer in responsible charge of the design of the stormwater infiltration system and based on applicable guidelines.

7.20.3 The results of the percolation testing indicate that the soils at depths in the above table are conductive to infiltration. It is our opinion that the soil zone encountered at the depth and location as listed in the table above are suitable for infiltration of stormwater.

7.20.4 It is our further opinion that infiltration of stormwater and will not induce excessive hydro-consolidation (see Figures B3 through B5), will not create a perched groundwater condition, will not affect soil structure interaction of existing or proposed foundations due to expansive soils, will not saturate soils supported by existing or proposed retaining walls, and will not increase the potential for liquefaction. Resulting settlements are anticipated to be less than ¼ inch, if any.

7.20.5 The infiltration system must be located such that the closest distance between an adjacent foundation is at least 10 feet in all directions from the zone of saturation. The zone of saturation may be assumed to project downward from the discharge of the infiltration facility at a gradient of 1:1. Additional property line or foundation setbacks may be required by the governing jurisdiction and should be incorporated into the stormwater infiltration system design as necessary.

7.20.6 Where the 10-foot horizontal setback cannot be maintained between the infiltration system and an adjacent footing, and the infiltration system penetrates below the foundation influence line, the proposed stormwater infiltration system must be designed to resist the surcharge from the adjacent foundation. The foundation surcharge line may be assumed to project down away from the bottom of the foundation at a 1:1 gradient. The stormwater infiltration system must still be sufficiently deep to maintain the 10-foot vertical offset between the bottom of the footing and the zone of saturation.

7.20.7 Subsequent to the placement of the infiltration system, it is acceptable to backfill the resulting void space between the excavation sidewalls and the infiltration system with minimum two-sack slurry provided the slurry is not placed in the infiltration zone. It is recommended that pea gravel be utilized adjacent to the infiltration zone so communication of water to the soil is not hindered.

7.20.8 Due to the preliminary nature of the project at this time, the type of stormwater infiltration system and location of the stormwater infiltration systems has not yet been determined. The design drawings should be reviewed and approved by the Geotechnical Engineer. The installation of the stormwater infiltration system should be observed and approved by the Geotechnical Engineer (a representative of Geocon).

7.21 Surface Drainage

7.21.1 Proper surface drainage is critical to the future performance of the project. Uncontrolled infiltration of irrigation excess and storm runoff into the soils can adversely affect the performance of the planned improvements. Saturation of a soil can cause it to lose internal shear strength and increase its compressibility, resulting in a change in the original designed engineering properties. Proper drainage should be maintained at all times.

7.21.2 All site drainage should be collected and controlled in non-erosive drainage devices. Drainage should not be allowed to pond anywhere on the site, and especially not against any foundation or retaining wall. The site should be graded and maintained such that surface drainage is directed away from structures in accordance with 2016 CBC 1804.4 or other applicable standards. In addition, drainage should not be allowed to flow uncontrolled over any descending slope. Discharge from downspouts, roof drains and scuppers are not recommended onto unprotected soils within 5 feet of the building perimeter. Planters which are located adjacent to foundations should be sealed to prevent moisture intrusion into the soils providing foundation support. Landscape irrigation is not recommended within 5 feet of the building perimeter footings except when enclosed in protected planters.

7.21.3 Positive site drainage should be provided away from structures, pavement, and the tops of slopes to swales or other controlled drainage structures. The building pad and pavement areas should be fine graded such that water is not allowed to pond.

7.21.4 Landscaping planters immediately adjacent to paved areas are not recommended due to the potential for surface or irrigation water to infiltrate the pavement's subgrade and base course. Either a subdrain, which collects excess irrigation water and transmits it to drainage structures, or impervious above-grade planter boxes should be used. In addition, where landscaping is planned adjacent to the pavement, it is recommended that consideration be given to providing a cutoff wall along the edge of the pavement that extends at least 12 inches below the base material.

7.22 Plan Review

7.22.1 Grading, foundation, and shoring plans should be reviewed by the Geotechnical Engineer (a representative of Geocon West, Inc.), prior to finalization to verify that the plans have been prepared in substantial conformance with the recommendations of this report and to provide additional analyses or recommendations.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon West, Inc. should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by Geocon West, Inc.

2. This report is issued with the understanding that it is the responsibility of the owner, or of his representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

3. The findings of this report are valid as of the date of this report. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

4. The firm that performed the geotechnical investigation for the project should be retained to provide testing and observation services during construction to provide continuity of geotechnical interpretation and to check that the recommendations presented for geotechnical aspects of site development are incorporated during site grading, construction of improvements, and excavation of foundations. If another geotechnical firm is selected to perform the testing and observation services during construction operations, that firm should prepare a letter indicating their intent to assume the responsibilities of project geotechnical engineer of record. A copy of the letter should be provided to the regulatory agency for their records. In addition, that firm should provide revised recommendations concerning the geotechnical aspects of the proposed development, or a written acknowledgement of their concurrence with the recommendations presented in our report. They should also perform additional analyses deemed necessary to assume the role of Geotechnical Engineer of Record.

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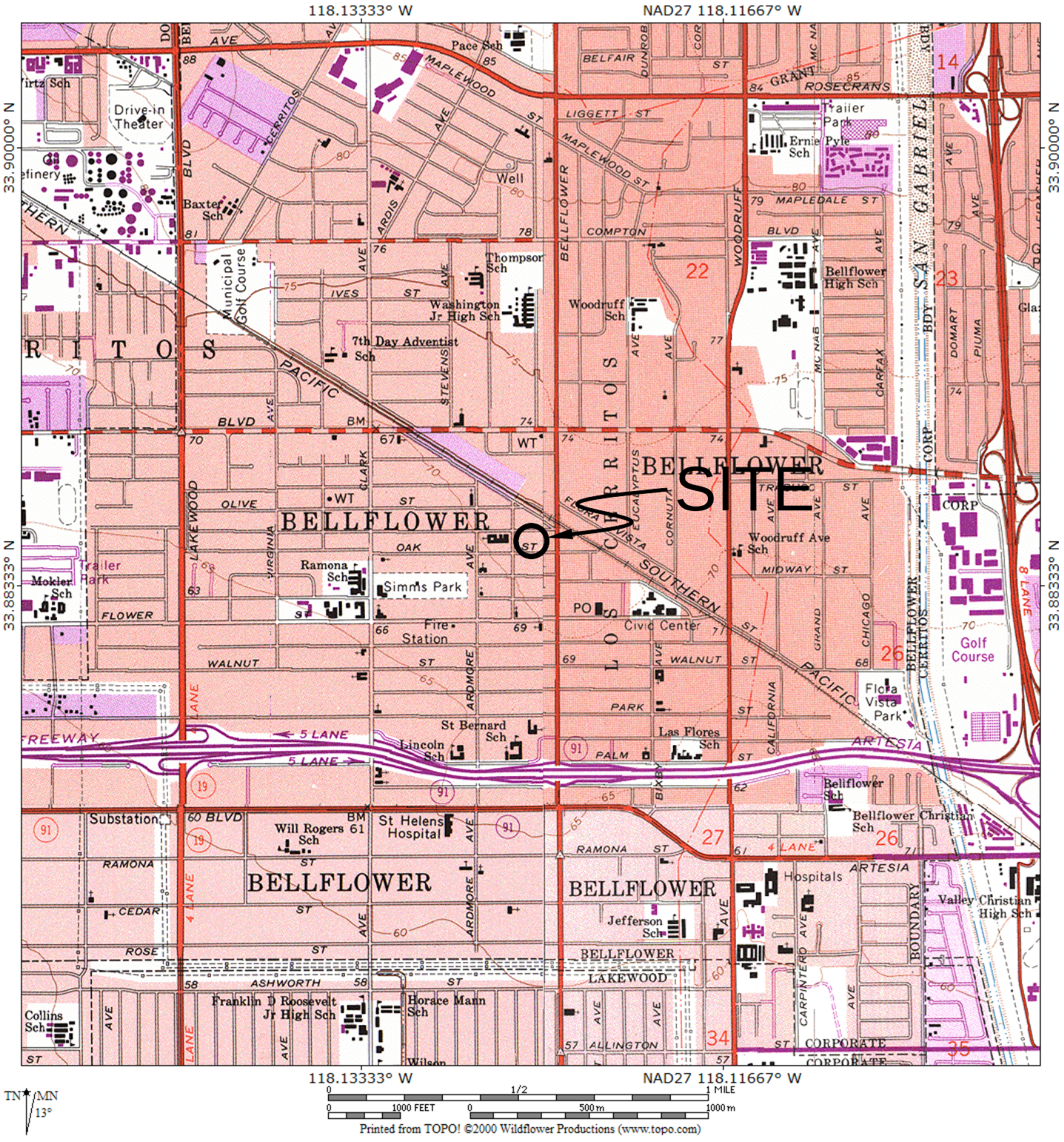

U.S.G.S. TOPOGRAPHIC MAPS, 7.5 MINUTE SERIES, SOUTH GATE, CA QUADRANGLE

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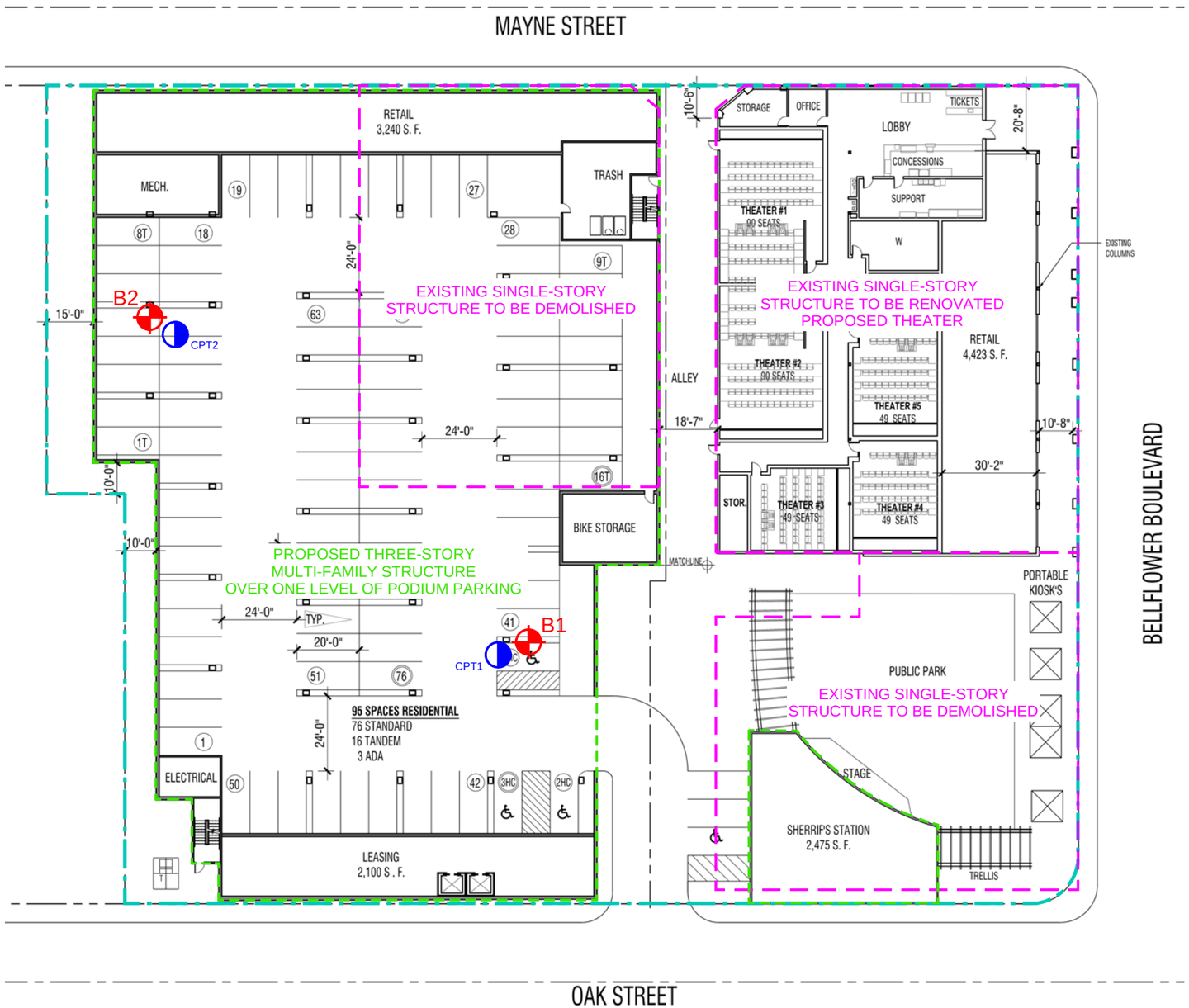
DRAFTED BY: CB | CHECKED BY: SFK

VICINITY MAP

MIXED-USE DEVELOPMENT
16411 BELLFLOWER BOULEVARD
9742 MAYNE STREET
BELLFLOWER, CALIFORNIA

MARCH 2019 | PROJECT NO. A9911-06-01 | FIG. 1



LEGEND

- B2 — Approximate Location of Boring
- CPT2 — Approximate Location of CPT
- Approximate Location of Property Line
- Location of Existing Structure
- Location of Proposed Structure

0 40' 80'

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SITE PLAN

MIXED-USE DEVELOPMENT

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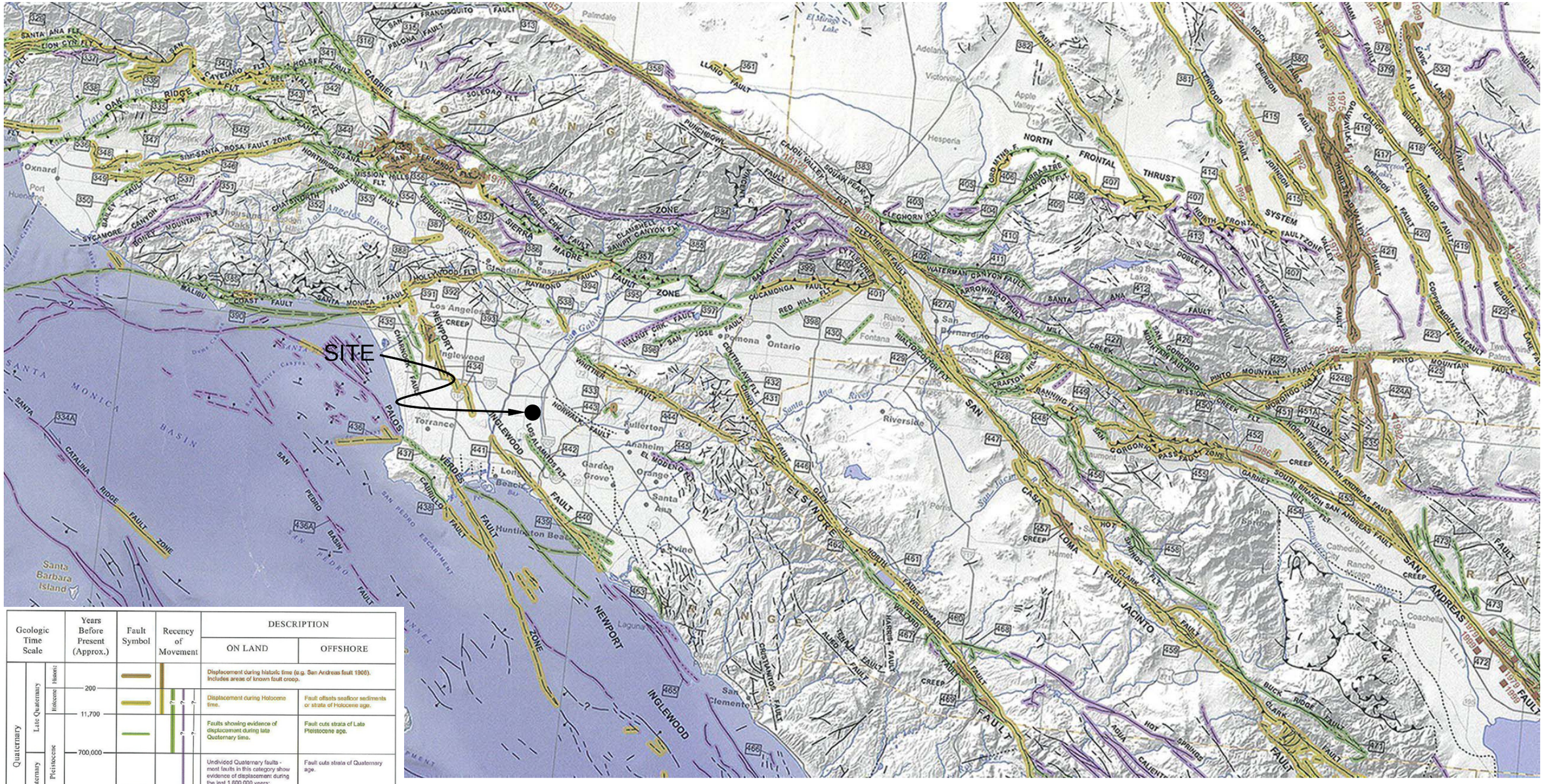
MARCH 2019	PROJECT NO. A9911-06-01	FIG. 2

Reference: Jennings, C.W. and Bryant, W. A., 2010, Fault Activity Map of California, California Geological Survey Geologic Data Map No. 6.



Geologic Time Scale			Years Before Present (Approx.)	Fault Symbol	Recency of Movement	DESCRIPTION	
						ON LAND	OFFSHORE
Quaternary	Late Quaternary	Historic				Displacement during historic time (e.g. San Andreas fault 1906). Includes areas of known fault creep.	
		Holocene	200			Displacement during Holocene time.	Fault offsets seafloor sediments or strata of Holocene age.
			11,700			Faults showing evidence of displacement during late Quaternary time.	Fault cuts strata of Late Pleistocene age.
	Early Quaternary	Pleistocene	700,000			Undivided Quaternary faults - most faults in this category show evidence of displacement during the last 1,600,000 years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age	Fault cuts strata of Quaternary age.
Pre-Quaternary			1,600,000*			Faults without recognized Quaternary displacement or showing evidence of no displacement during Quaternary time. Not necessarily inactive.	Fault cuts strata of Pliocene or older age.
			4.5 billion (Age of Earth)				

* Quaternary now recognized as extending to 2.6 Ma (Walker and Geissman, 2009). Quaternary faults in this map were established using the previous 1.6 Ma criterion.

N

0 12 24 Miles

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REGIONAL FAULT MAP

MIXED-USE DEVELOPMENT
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BELLFLOWER, CALIFORNIA

MARCH 2019 | PROJECT NO. A9911-06-01 | FIG. 3

SANTA BARBARA
VENTURA
LOS ANGELES
ORANGE
RIVERSIDE
IMPERIAL
SAN DIEGO
SITE
120°
33°
119°

EPICENTER MAP LEGEND

Period	1800 - 1868	1869 - 1931	1932 - 1999
≥ 7.0			
6.5 - 6.9			
6.0 - 6.4			
5.5 - 5.9			
5.0 - 5.4			

Magnitude (M)

- Historical Faulting
- Holocene Faulting
- Highways (Major)
- Highways (Minor)
- Lakes
- 65 — Last two digits of M ≥ 6.5 earthquake year

Reference: Toppozada, T., Branum, D., Petersen, M., Hallstrom, C., Cramer, C., and Reichle, M., 2000, Epicenters and Areas Damaged by M>5 California Earthquakes, 1800 - 1999, California Geological Survey, Map Sheet 49.

0 20 40 Miles

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REGIONAL SEISMICITY MAP

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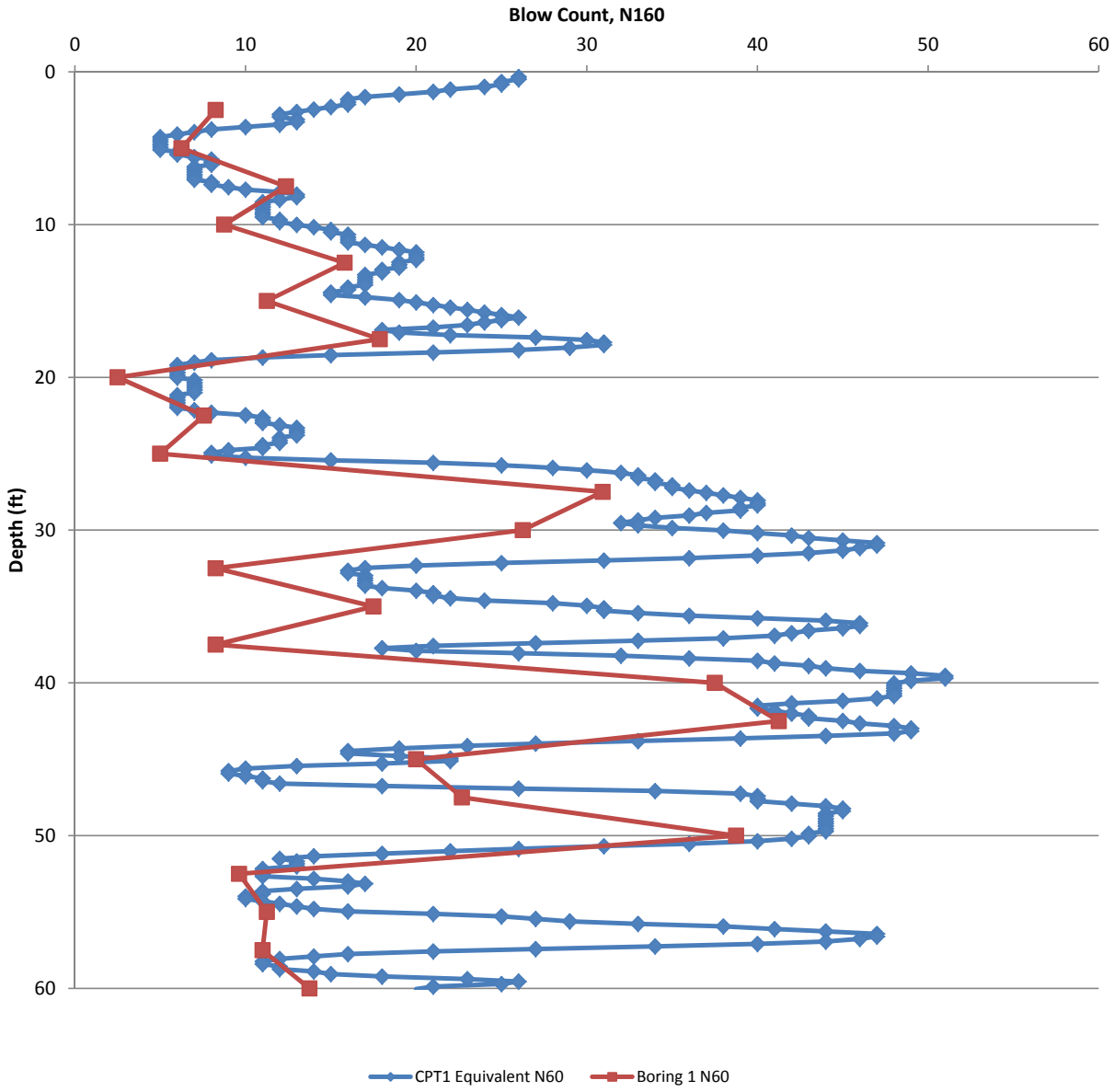
BELLFLOWER, CALIFORNIA

MARCH 2019 | PROJECT NO. A9911-06-01 | FIG. 4

Correlation of Boring and CPT N60 Blow Counts



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CORRELATION OF BORING & CPT N60

MIXED-USE DEVELOPMENT
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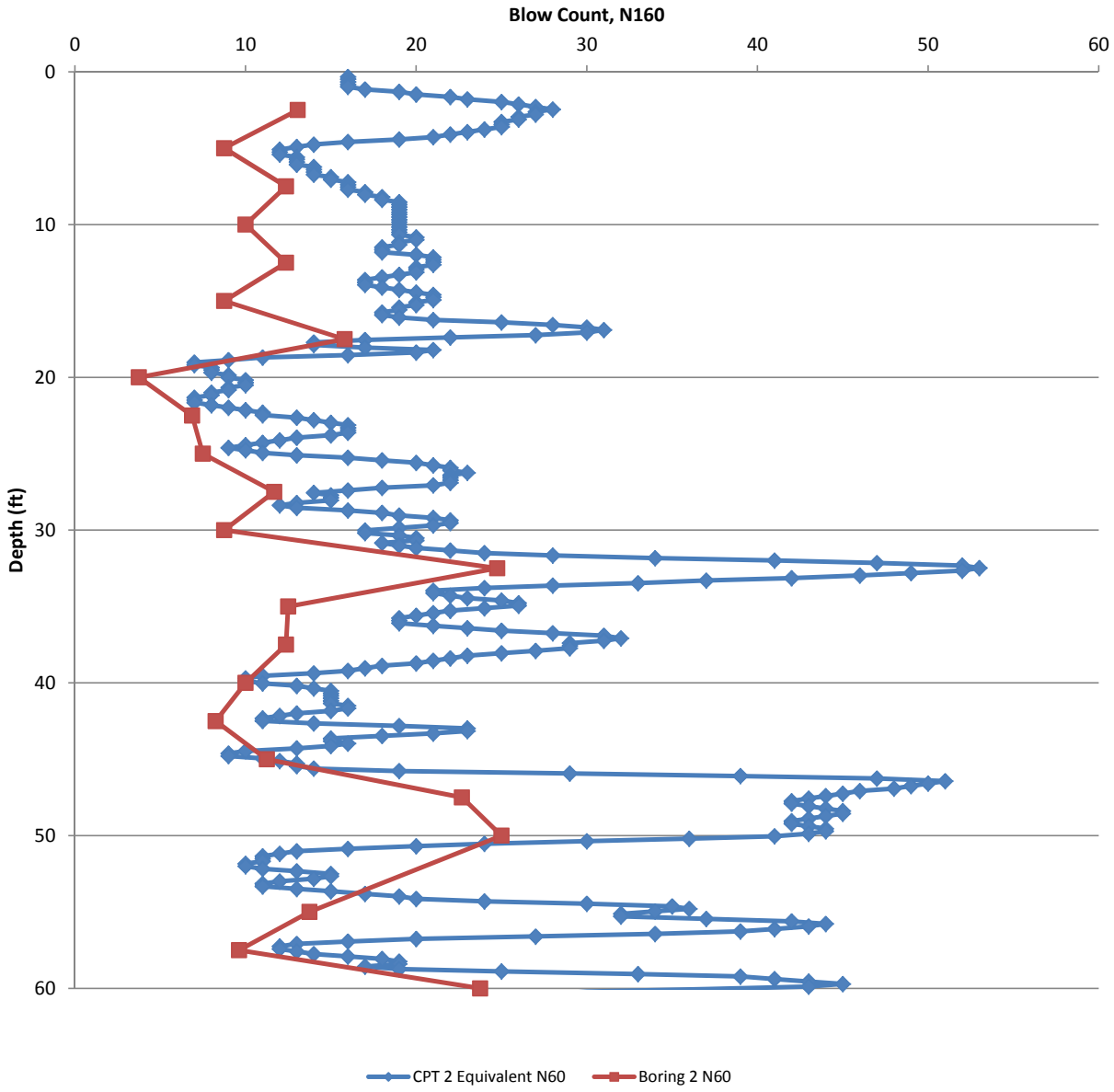
MARCH 2019	PROJECT NO. A9911-06-01	FIG. 5

Correlation of Boring and CPT N60 Blow Counts



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CORRELATION OF BORING & CPT N60

MIXED-USE DEVELOPMENT
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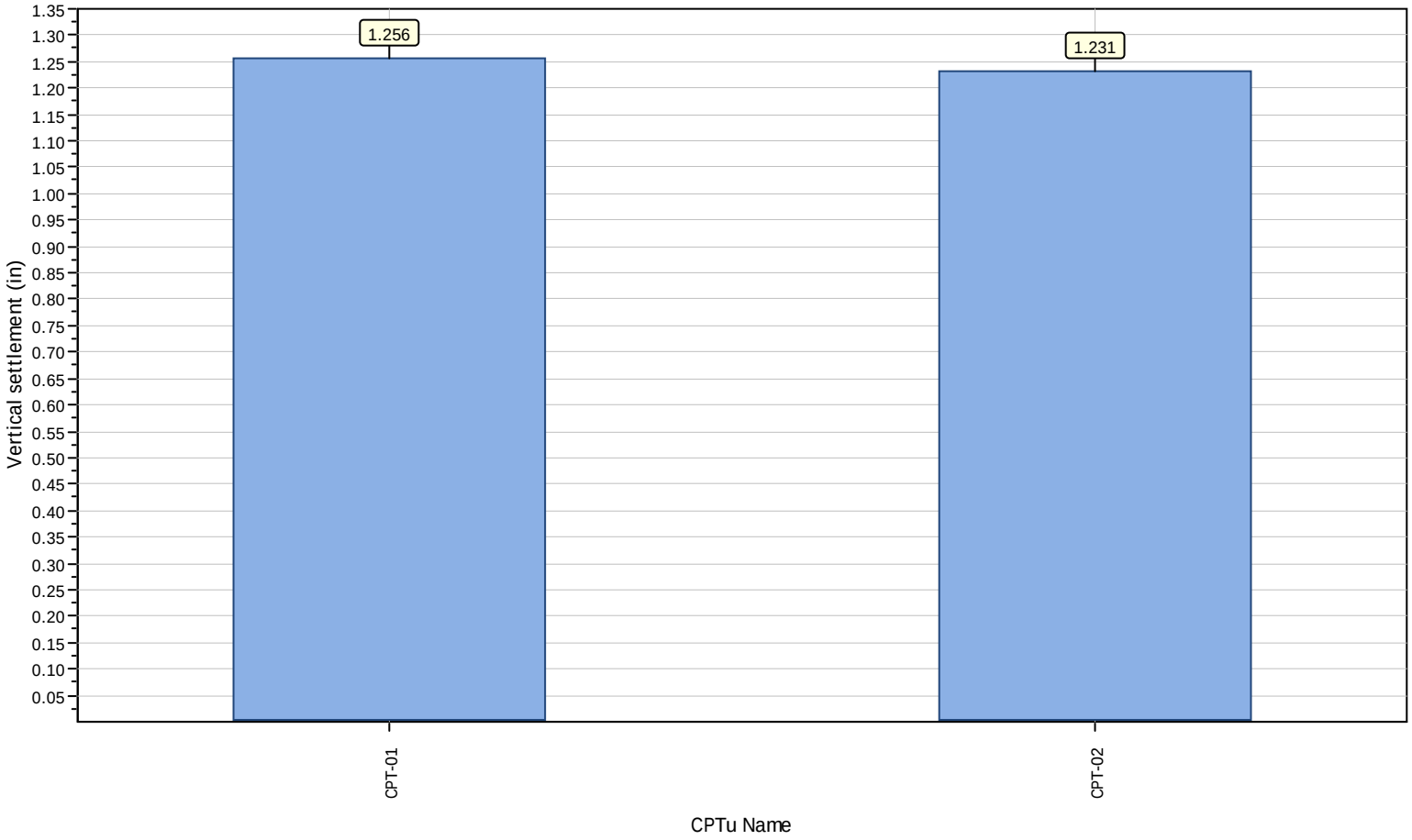
9742 MAYNE STREET
BELLFLOWER, CALIFORNIA

MARCH 2019	PROJECT NO. A9911-06-01	FIG. 6

Project title : A9911-06-01

Location : Bellflower Mixed-Use

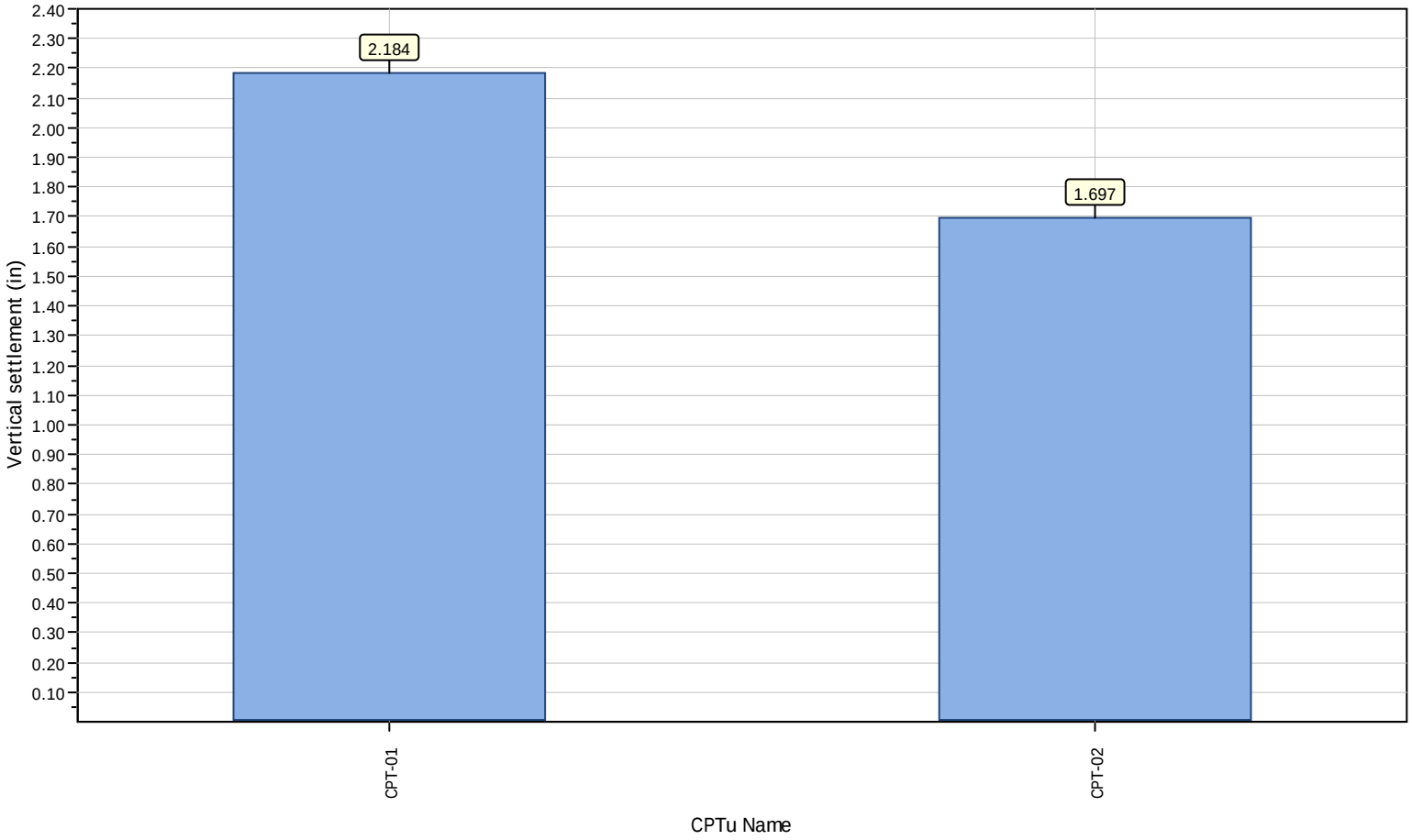
Overall vertical settlements report - Design Earthquake

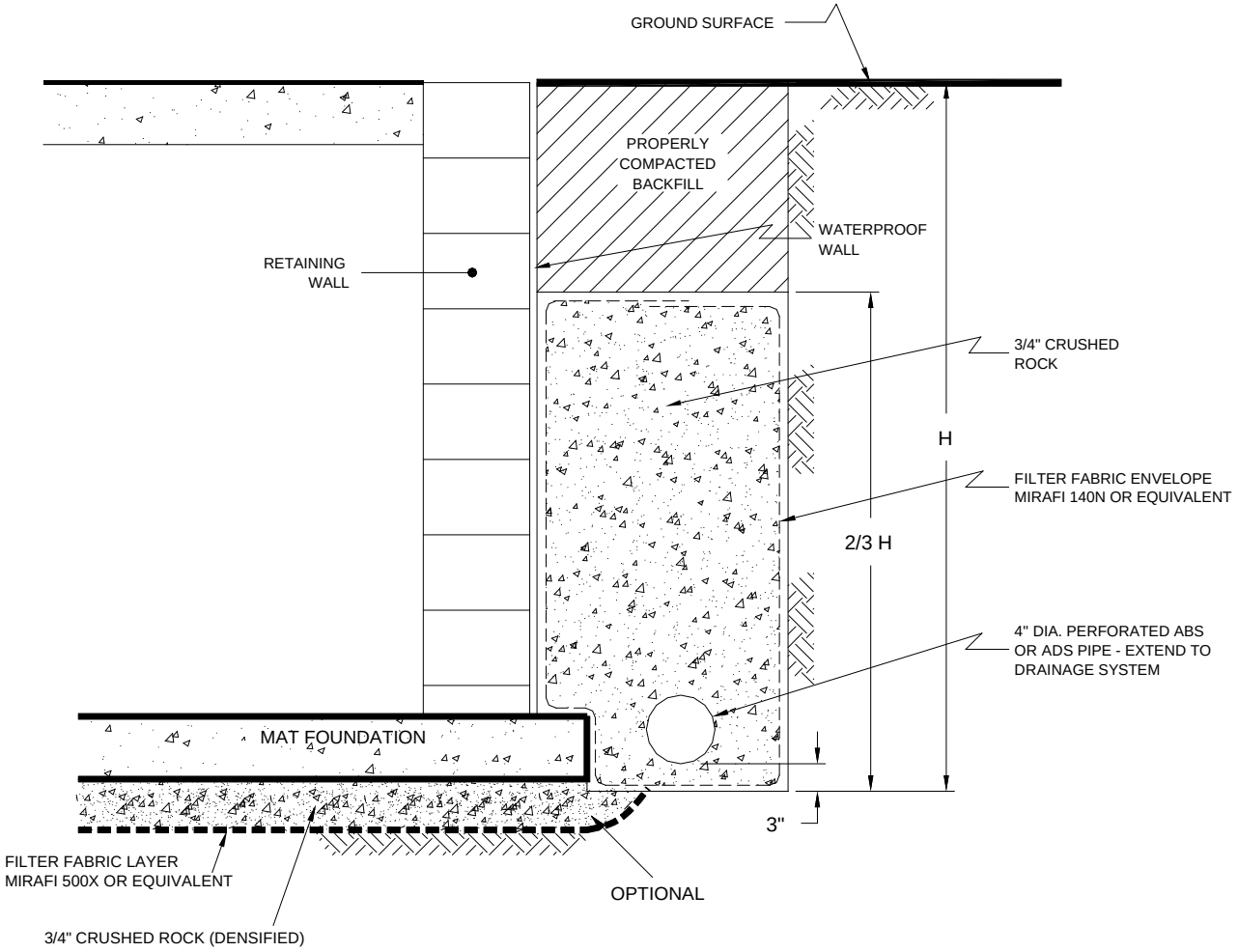


Project title : A9911-06-01

Location : Bellflower Mixed-Use

Overall vertical settlements report - Maximum Considered Earthquake





NO SCALE

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RETAINING WALL DRAIN DETAIL

MIXED-USE DEVELOPMENT

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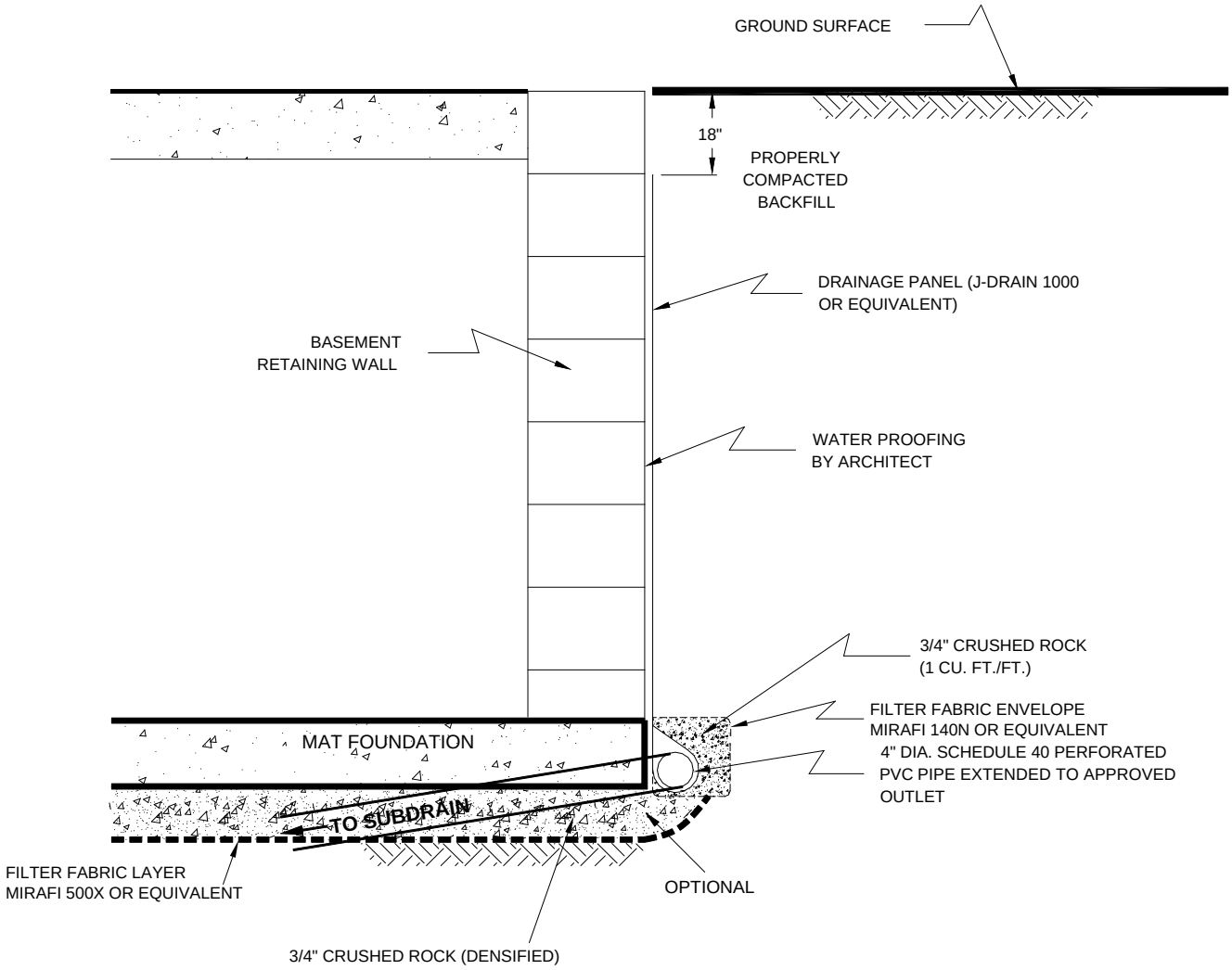
BELLFLOWER, CALIFORNIA

MARCH 2019	PROJECT NO. A9911-06-01	FIG. 9



NOTE: TOP OF DRAINAGE PANEL NOT MORE THAN 18 INCHES FROM GROUND SURFACE

NO SCALE

GEOCON WEST, INC.

ENVIRONMENTAL GEOTECHNICAL MATERIALS
3303 N. SAN FERNANDO BLVD. - SUITE 100 - BURBANK, CA 91504
PHONE (818) 841-8388 - FAX (818) 841-1704

DRAFTED BY: PZ	CHECKED BY: JTA

RETAINING WALL DRAIN DETAIL

MIXED-USE DEVELOPMENT

16411 BELLFLOWER BOULEVARD
9742 MAYNE STREET
BELLFLOWER, CALIFORNIA

MARCH 2019	PROJECT NO. A9911-06-01	FIG. 10

BORING PERCOLATION TEST FIELD LOG

Date:	2/1/2019		**Boring/Test Number:**	B1	
Project Number:	A9911-06-01		**Diameter of Boring:**	8	inches
Project Location:	16411 Bellflower Blvd		**Diameter of Casing:**	2	inches
Earth Description:	SM		**Depth of Boring:**	15	feet
Tested By:	CB		**Depth to Invert of BMP:**	10	feet
Liquid Description:	Clear Clean Tap Water		**Depth to Water Table:**	37	feet
Measurement Method:	Sounder		**Depth to Initial Water Depth (d_1):**	108	inches
Start Time for Pre-Soak:	10:00 AM		**Water Remaining in Boring (Y/N):**	Yes	
Start Time for Standard:	11:00 AM		**Standard Time Interval Between Readings:**	30 min	

Reading Number	Time Start (hh:mm)	Time End (hh:mm)	Elapsed Time Δtime (min)	Water Drop During Standard Time Interval, Δd (in)	Soil Description Notes Comments
1	11:00 AM	11:30 AM	30	21.6	
2	11:33 AM	12:03 PM	30	20.4	
3	12:05 PM	12:35 PM	30	20.4	
4	12:40 PM	1:10 PM	30	20.4	
5	1:15 PM	1:45 PM	30	18.0	
6	1:49 PM	2:19 PM	30	18.0	Stabilized Readings
7	2:26 PM	2:56 PM	30	18.0	Achieved with Readings
8	2:59 PM	3:29 PM	30	18.0	6, 7, and 8

MEASURED PERCOLATION RATE & DESIGN INFILTRATION RATE CALCULATIONS*

* Calculations Below Based on Stabilized Readings Only

Boring Radius, r: 4 inches

Test Section Height, h: 72.0 inches

$$Test\ Section\ Surface\ Area, A = 2\pi rh$$

A = **1810** in^2

$$Discharged\ Water\ Volume, V = \pi r^2 \Delta d$$

$$Percolation\ Rate = \left(\frac{V/A}{\Delta T}\right)$$

Reading 6	V =	**905**	in^3	Percolation Rate =	**1.00**	inches/hour
Reading 7	V =	**905**	in^3	Percolation Rate =	**1.00**	inches/hour
Reading 8	V =	**905**	in^3	Percolation Rate =	**1.00**	inches/hour

Measured Percolation Rate = **1.00** inches/hour

Reduction Factors

Boring Percolation Test, RF_t = 2

Site Variability, RF_v = 1

Long Term Siltation, RF_s = 1

$$Total\ Reduction\ Factor, RF = RF_t \times RF_v \times RF_s$$

Total Reduction Factor = 2

Design Infiltration Rate

$$Design\ Infiltration\ Rate = Measured\ Percolation\ Rate\ /RF$$

Design Infiltration Rate = **0.50** inches/hour

FIGURE 11

APPENDIX A

APPENDIX A

FIELD INVESTIGATION

The site was explored on February 1, 2019, by excavating two 8-inch diameter borings using a truck-mounted hollow-stem auger drilling machine. The borings were excavated to depths between 61 and 68 feet beneath the existing ground surface. In addition, two Cone Penetrometer Tests (CPTs) were advanced to depths of approximately 61 and 63 feet below the existing ground surface. Representative and relatively undisturbed samples were obtained by driving a 3 inch, O. D., California Modified Sampler into the "undisturbed" soil mass with blows from a 40 pound hammer falling 30 inches. The California Modified Sampler was equipped with 1-inch high by $2^{3}/_{8}$-inch diameter brass sampler rings to facilitate soil removal and testing. Standard penetration tests were performed in the borings and bulk samples were also obtained.

The soil conditions encountered in the borings were visually examined, classified and logged in general accordance with the Unified Soil Classification System (USCS). Logs of the borings and CPT soundings are presented in Appendix A. The logs depict the soil and geologic conditions encountered and the depth at which samples were obtained. The logs also include our interpretation of the conditions between sampling intervals. Therefore, the logs contain both observed and interpreted data. We determined the lines designating the interface between soil materials on the logs using visual observations, penetration rates, excavation characteristics and other factors. The transition between materials may be abrupt or gradual. Where applicable, the boring logs were revised based on subsequent laboratory testing. The approximate locations of the exploratory borings and CPTs are depicted on the Site Plan (Figure 2).

PROJECT NO. A9911-06-01

BORING 1

ELEV. (MSL.) -- DATE COMPLETED **2/1/19**

EQUIPMENT **HOLLOW STEM AUGER** BY: **CB**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT)*	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	BULK 0-5'				**AC: 1.5" BASE: 5"** **ARTIFICIAL FILL** Sand, well-graded, loose, slightly moist, grayish brown.			
2	B1@2.5'					12	89.6	15.2
4					**ALLUVIUM** Silty Sand, loose, dry, gray, fine-grained.			
6	B1@5'					5		
8	B1@7.5'			SM		18	96.7	4.9
10	B1@10'				- slightly moist, brown, fine-grained	7		
12	B1@12.5'			ML	Sandy Silt, stiff, dry, brown, fine-grained.	23	91.3	21.5
14	B1@15'			ML	Silt with Sand, firm, dry, brown, fine-grained.	9		
16								
18	B1@17.5'			SM	Silty Sand, medium dense, dry, gray with reddish brown mottles, fine-grained.	26	82.8	6.7
20	B1@20'			ML	Silt with Clay, soft, slightly moist, fine-grained, grayish brown.	2		
22	B1@22.5'			SM	Silty Sand, loose, slightly moist, grayish brown, fine-grained.	11	99.5	27.8
24								
26	B1@25'			ML	Sandy Silt with Clay, soft, slightly moist, grayish brown, fine-grained.	4		
28	B1@27.5'			SW	Sand, well-graded, medium dense, dry, grayish brown with light brown mottles.	45	106.4	5.4

A9911-06-01 BORING LOGS.GPJ

Figure A1,
Log of Boring 1, Page 1 of 3

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. A9911-06-01

BORING 1

ELEV. (MSL.) -- DATE COMPLETED **2/1/19**

EQUIPMENT **HOLLOW STEM AUGER** BY: **CB**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT)*	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	B1@30'			SW		21		
32	B1@32.5'			SW		12	93.8	36.5
34				ML	Sandy Silt, firm, slightly moist, grayish brown, fine-grained.			
	B1@35'			ML		14		
36			▼	ML	Silty Clay, firm, slightly moist, gray with reddish brown mottles, fine-grained.			
38	B1@37.5'			SW	Sand, well-graded, loose, saturated, gray.	12	90.5	35.6
40	B1@40'			SW	- dense	30		
42	B1@42.5'			SW	- dark gray	60	101.3	24.9
44								
46	B1@45'			SM	Silty Sand, medium dense, wet, dark gray, fine-grained, some clay.	16		
48	B1@47.5'			SW	Sand, well-graded, medium dense, wet, gray.	33	104.2	20.8
50	B1@50'			SW	- dense	31		
52	B1@52.5'			ML	Silt with Clay, firm, moist, gray, some sand.	14	80.9	43.4
54				ML	Clayey Silt, firm, moist, gray.			
56	B1@55'			ML		9		
58	B1@57.5'			ML	Silt with Clay, firm, wet, gray.	16	90.3	35.5

A9911-06-01 BORING LOGS.GPJ

Figure A1,
Log of Boring 1, Page 2 of 3

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◥ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. A9911-06-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING 1** ELEV. (MSL.) -- DATE COMPLETED **2/1/19** EQUIPMENT **HOLLOW STEM AUGER** BY: **CB**	PENETRATION RESISTANCE (BLOWS/FT)*	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
60	B1@60'			ML	- poor recovery	11		
					Total depth of boring: 61 feet. Fill to 4 feet. Groundwater encountered at 37.2 feet. Percolation testing perormed on 2/1/19. Backfilled with soil cuttings and tamped. *Penetration resistance for 140-pound hammer falling 30 inches by auto-hammer.			

A9911-06-01 BORING LOGS.GPJ

Figure A1,
Log of Boring 1, Page 3 of 3

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL ◧ ... STANDARD PENETRATION TEST ■ ... DRIVE SAMPLE (UNDISTURBED)

⊠ ... DISTURBED OR BAG SAMPLE ◪ ... CHUNK SAMPLE ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. A9911-06-01

BORING 2

ELEV. (MSL.) -- DATE COMPLETED 2/1/19

EQUIPMENT HOLLOW STEM AUGER BY: CB

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT)*	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	BULK 0-5'				**AC: 2.5" BASE: 3"** **ARTIFICIAL FILL** Sand, well-graded, loose, dry, brown.			
2	B2@2.5'				- medium dense	19	93.3	19.1
4								
6	B2@5'				**ALLUVIUM** Silty Sand, poorly-graded, loose, dry, brown, fine-grained.	7		
8	B2@7.5'			SM		18	98.4	8.0
10	B2@10'			ML	Sandy Silt, firm, loose, dry, brown, fine-grained.	8		
12	B2@12.5'			SW	Sand, well-graded, loose, dry, brown.	18	89.0	15.3
14					Sandy Silt, firm, dry, brown, fine-grained.			
16	B2@15'			ML		7		
18	B2@17.5'			SP	Sand, poorly-graded, medium dense, dry, gray, fine-grained.	23	91.0	9.3
20	B2@20'				Sandy Silt, soft, moist, dark brown, fine-grained, some clay.	3		
22	B2@22.5'					10	98.9	24.2
24				ML				
26	B2@25'				- dry, brown, increase in sand content	6		
					- slightly moist, grayish brown			
28	B2@27.5'					17	103.1	19.2

A9911-06-01 BORING LOGS.GPJ

Figure A2,
Log of Boring 2, Page 1 of 3

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. A9911-06-01

BORING 2

ELEV. (MSL.) -- DATE COMPLETED **2/1/19**

EQUIPMENT **HOLLOW STEM AUGER** BY: **CB**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT)*	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	B2@30'			SM	Silty Sand, poorly-graded, loose, slightly moist, gray, fine-grained.	7		
32					- medium dense, fine- to coarse-grained			
	B2@32.5'					36	102.2	4.4
34								
	B2@35'				- dark gray	10		
36					- wet, dark gray, fine-grained			
38	B2@37.5'					18	95.2	24.6
40	B2@40'		▼			8		
42					Sandy Silt, firm, wet, dark gray, fine- to medium-grained.			
	B2@42.5'			ML		12	82.0	26.4
44								
	B2@45'					9		
46					Silty Sand, medium dense, wet, dark gray, fine- to coarse-grained.			
48	B2@47.5'					33	110.9	18.9
50	B2@50'					20		
52								
	B2@52.5'			SM			107.0	22.5
54								
	B2@55'				- some silt with sand interbeds, firm, wet, gray, fine-grained, trace clay	11		
56								
58	B2@57.5'				- loose	14	94.2	28.8

A9911-06-01 BORING LOGS.GPJ

Figure A2,
Log of Boring 2, Page 2 of 3

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

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GEOCON

PROJECT NO. A9911-06-01

BORING 2

ELEV. (MSL.) -- DATE COMPLETED **2/1/19**

EQUIPMENT **HOLLOW STEM AUGER** BY: **CB**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT)*	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
60	B2@60'			SM		19		
62	B2@62.5'			ML	Silt with Sand, stiff, moist, gray, fine-grained, some clay.	23		
64								
66	B2@65'			SW	Sand, well-graded, dense, saturated, gray.	37		
68	B2@67.5'					39		

Total depth of boring: 68 feet
Fill to 5 feet.
Groundwater encountered at 42 feet.
Backfilled with soil cuttings and tamped.

*Penetration resistance for 140-pound hammer falling 30 inches by auto-hammer.

A9911-06-01 BORING LOGS.GPJ

Figure A2,
Log of Boring 2, Page 3 of 3

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◹ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

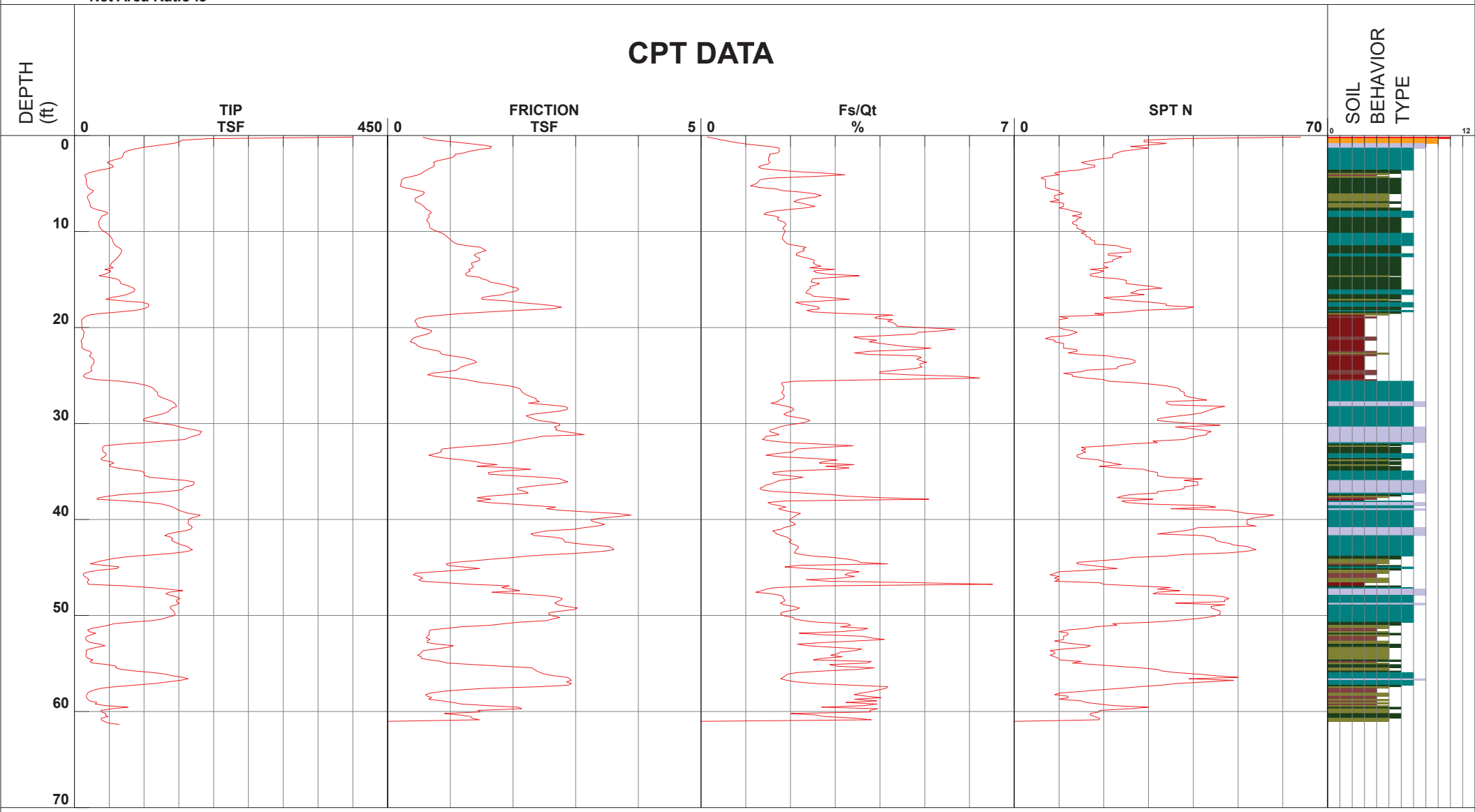
GEOCON

Geocon Inc.

Project	Bellflower Mixed Use	Operator	RC AS	Filename	SDF(402).cpt
Job Number	A9911-06-01	Cone Number	DDG1471	GPS	
Hole Number	CPT-01	Date and Time	2/1/2019 7:28:51 AM	Maximum Depth	61.35 ft
EST GW Depth During Test		39.80 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

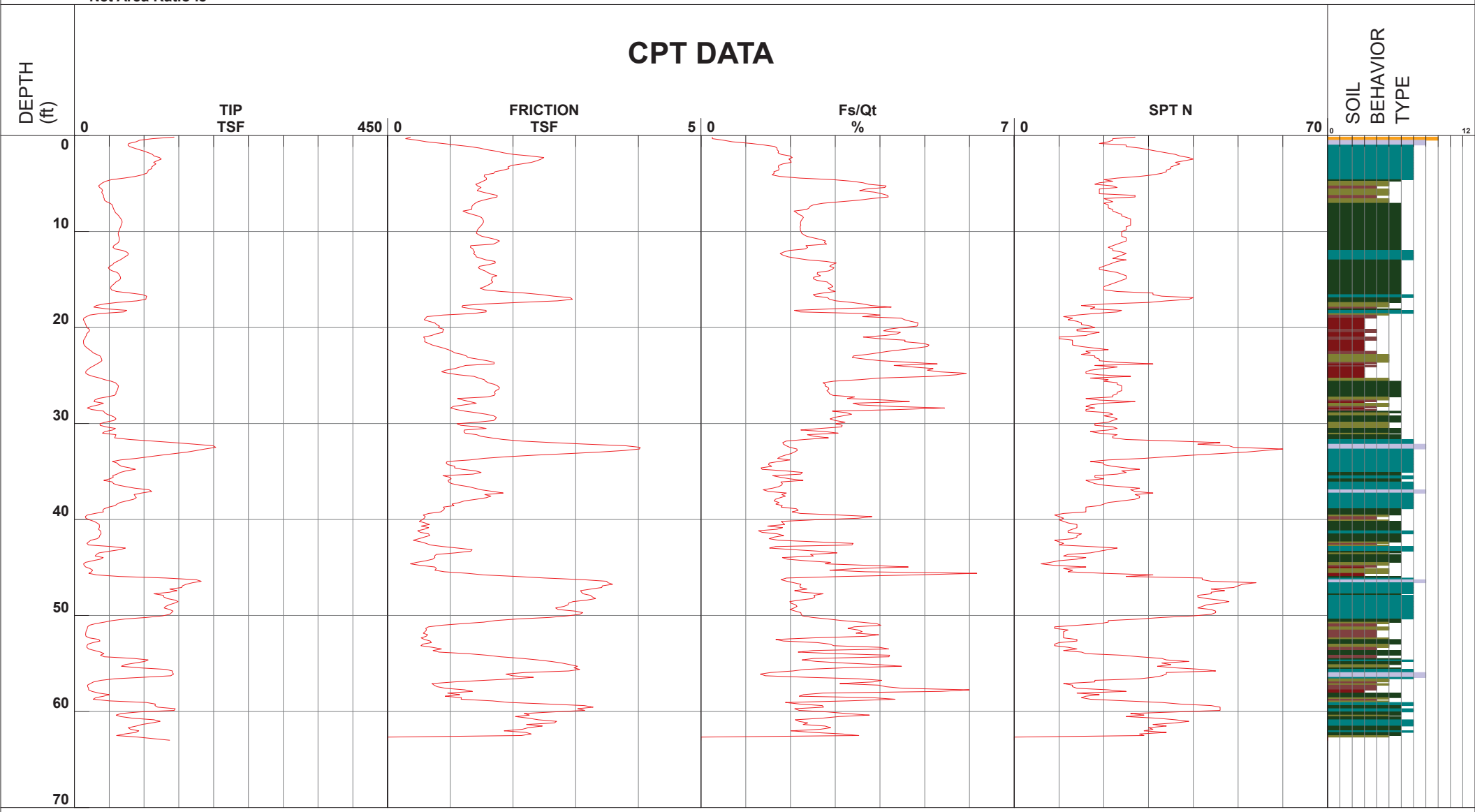
FIGURE A3

Geocon Inc.

Project	Bellflower Mixed Use	Operator	RC AS	Filename	SDF(403).cpt
Job Number	A9911-06-01	Cone Number	DDG1471	GPS	
Hole Number	CPT-02	Date and Time	2/1/2019 8:32:37 AM	Maximum Depth	62.99 ft
EST GW Depth During Test		40.40 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

FIGURE A4

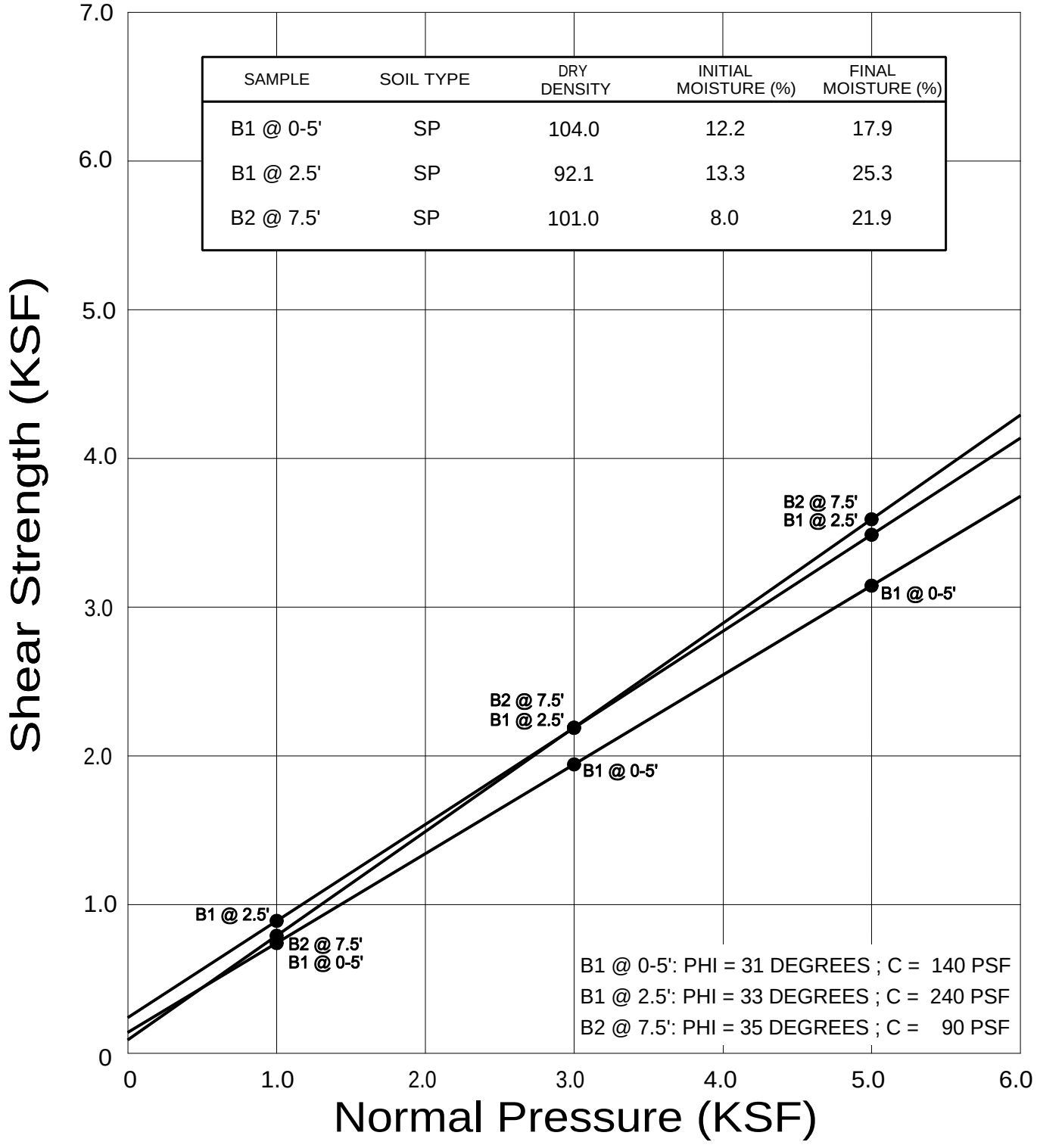
APPENDIX B

APPENDIX B

LABORATORY TESTING

Laboratory tests were performed in accordance with generally accepted test methods of the "American Society for Testing and Materials (ASTM)", or other suggested procedures. Selected samples were tested for direct shear strength, consolidation, plasticity indices, grain size, moisture density relationship, expansion characteristics, corrosivity and in-place dry density and moisture content. The results of the laboratory tests are summarized in Figures B1 through B10. The in-place dry density and moisture content of the samples tested are presented on the boring logs, Appendix A.

SAMPLE	SOIL TYPE	DRY DENSITY	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B1 @ 0-5'	SP	104.0	12.2	17.9
B1 @ 2.5'	SP	92.1	13.3	25.3
B2 @ 7.5'	SP	101.0	8.0	21.9



● Direct Shear, Saturated

GEOCON WEST, INC.

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DRAFTED BY: PZ | CHECKED BY: JTA

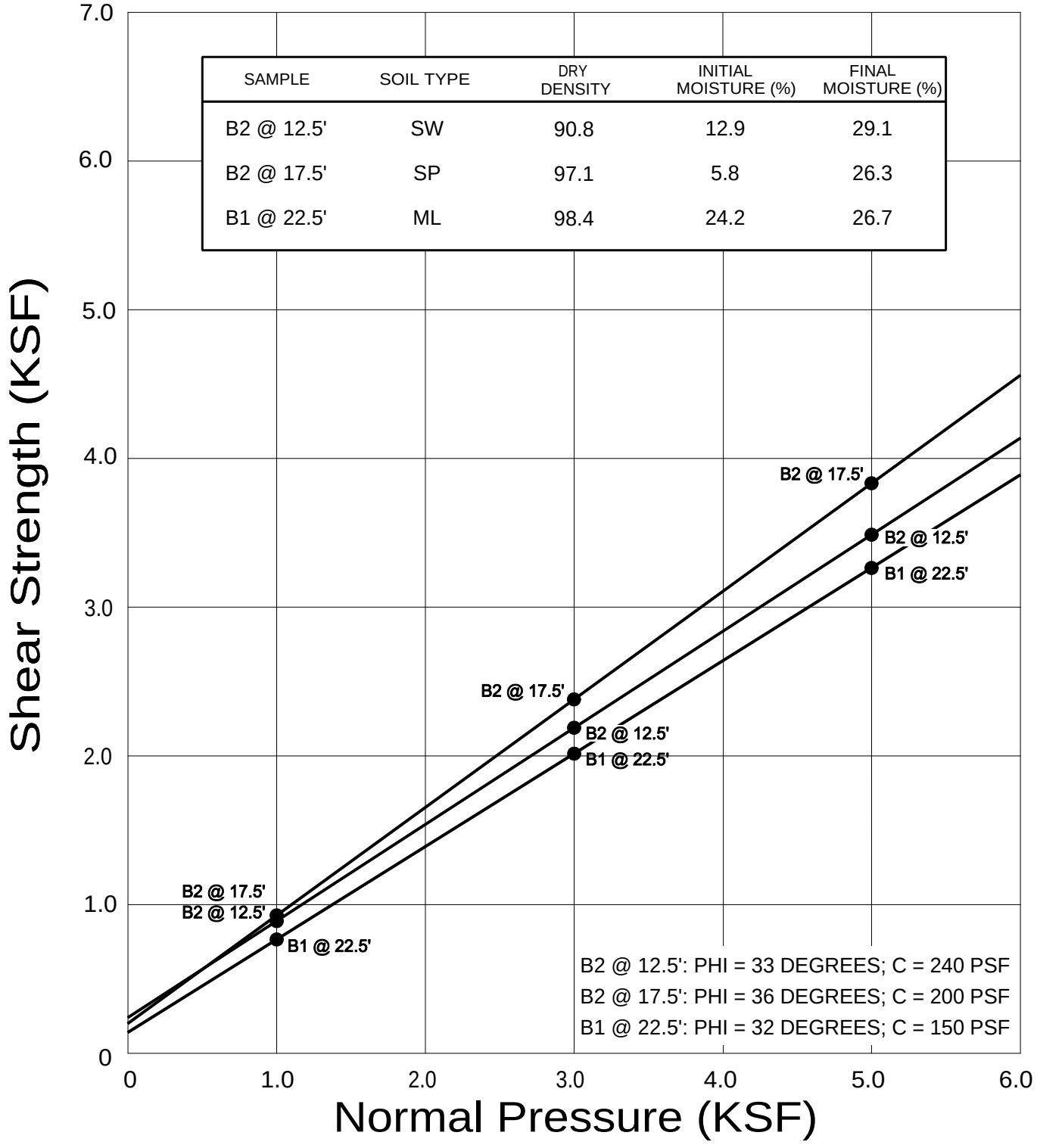
DIRECT SHEAR TEST RESULTS

MIXED-USE DEVELOPMENT

16411 BELLFLOWER BOULEVARD
9742 MAYNE STREET
BELLFLOWER, CALIFORNIA

MARCH 2019 | PROJECT NO. A9911-06-01 | FIG. B1

SAMPLE	SOIL TYPE	DRY DENSITY	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B2 @ 12.5'	SW	90.8	12.9	29.1
B2 @ 17.5'	SP	97.1	5.8	26.3
B1 @ 22.5'	ML	98.4	24.2	26.7



● Direct Shear, Saturated

GEOCON WEST, INC.

ENVIRONMENTAL GEOTECHNICAL MATERIALS
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PHONE (818) 841-8388 - FAX (818) 841-1704

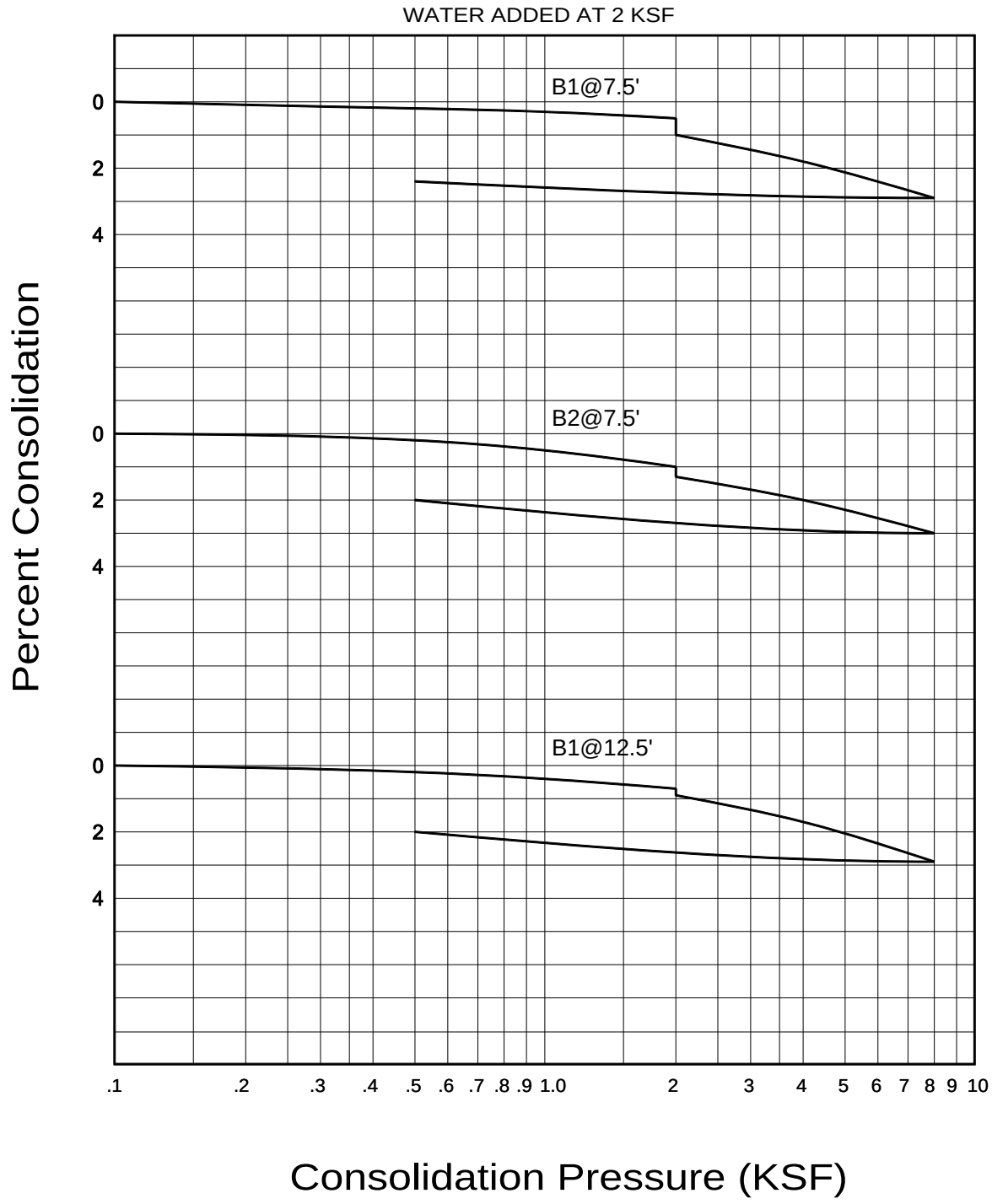
DRAFTED BY: PZ	CHECKED BY: JTA

DIRECT SHEAR TEST RESULTS

MIXED-USE DEVELOPMENT

16411 BELLFLOWER BOULEVARD
9742 MAYNE STREET
BELLFLOWER, CALIFORNIA

MARCH 2019	PROJECT NO. A9911-06-01	FIG. B2



GEOCON
WEST, INC.

ENVIRONMENTAL GEOTECHNICAL MATERIALS
3303 N. SAN FERNANDO BLVD. - SUITE 100 - BURBANK, CA 91504
PHONE (818) 841-8388 - FAX (818) 841-1704

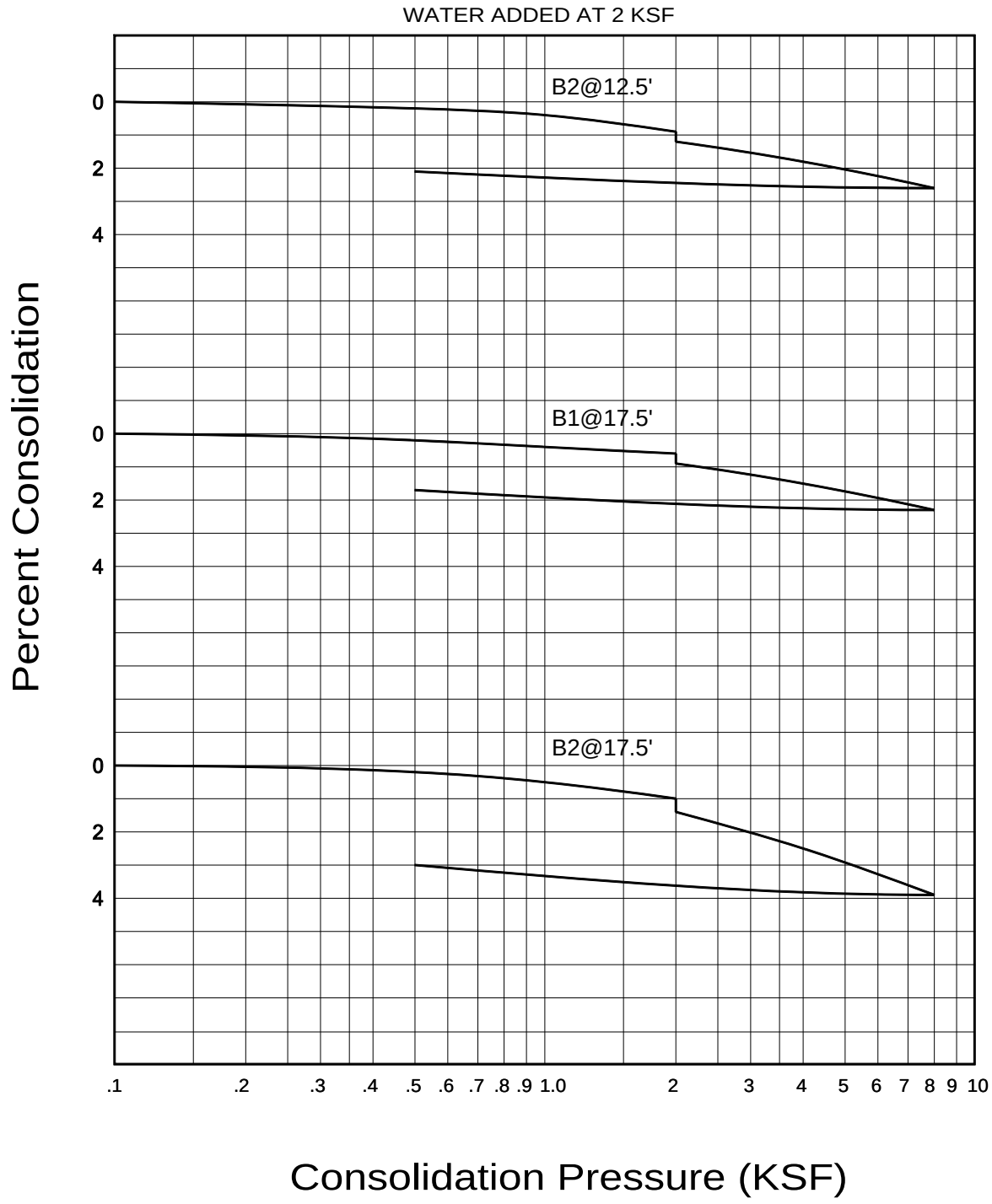
DRAFTED BY: PZ	CHECKED BY: JTA

CONSOLIDATION TEST RESULTS

MIXED-USE DEVELOPMENT

16411 BELLFLOWER BOULEVARD
9742 MAYNE STREET
BELLFLOWER, CALIFORNIA

MARCH 2019	PROJECT NO. A9911-06-01	FIG. B3



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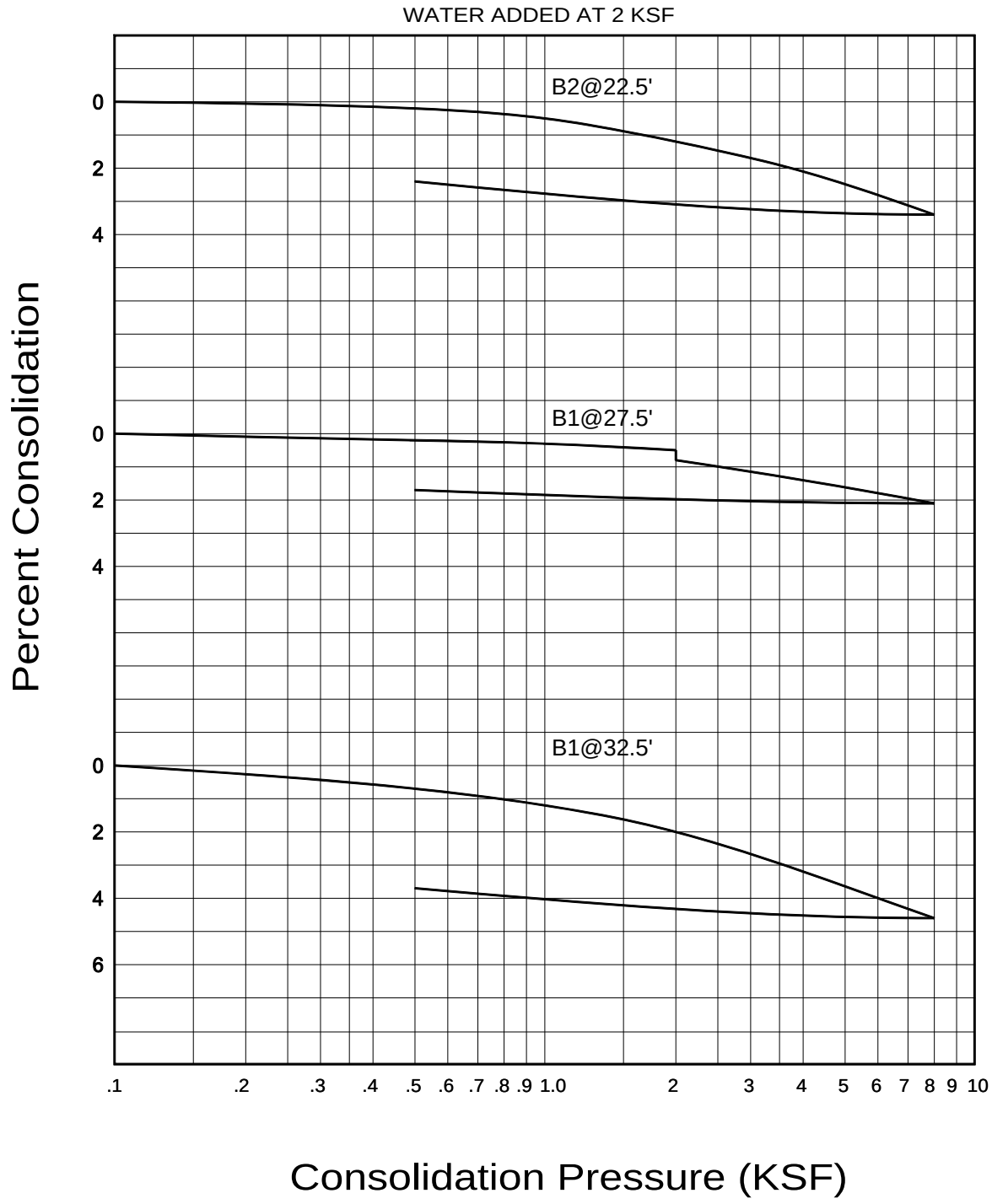
DRAFTED BY: PZ	CHECKED BY: JTA

CONSOLIDATION TEST RESULTS

MIXED-USE DEVELOPMENT

16411 BELLFLOWER BOULEVARD
9742 MAYNE STREET
BELLFLOWER, CALIFORNIA

MARCH 2019	PROJECT NO. A9911-06-01	FIG. B4



GEOCON
WEST, INC.

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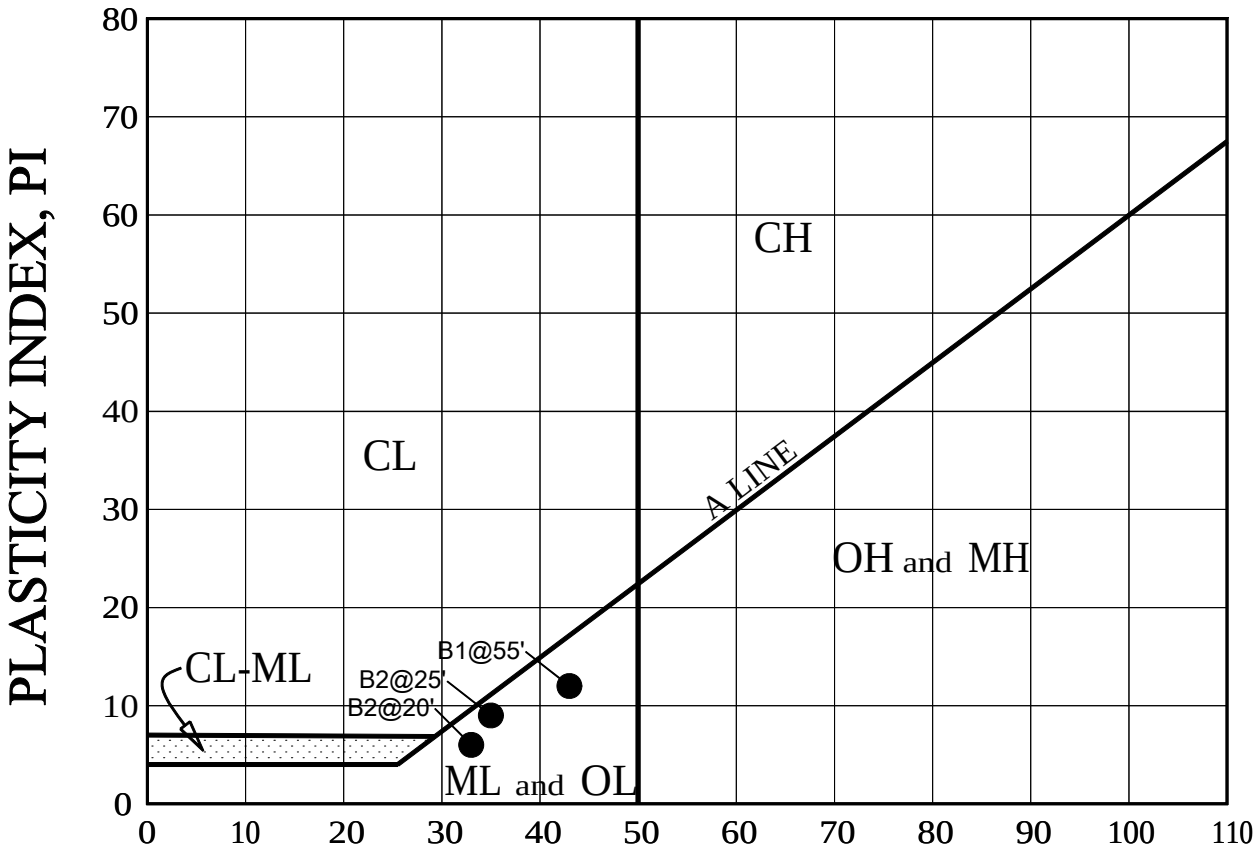
DRAFTED BY: PZ	CHECKED BY: JTA

CONSOLIDATION TEST RESULTS

MIXED-USE DEVELOPMENT

16411 BELLFLOWER BOULEVARD
9742 MAYNE STREET
BELLFLOWER, CALIFORNIA

MARCH 2019	PROJECT NO. A9911-06-01	FIG. B5



BORING NUMBER	DEPTH (FEET)	LL	PL	PI	MOISTURE CONTENT AT SATURATION	SOIL BEHAVIOR
B1	**12.5**	**--**	**--**	**--**	**--**	**NON-PLASTIC**
B1	**25**	**--**	**--**	**--**	**--**	**NON-PLASTIC**
B1	**35**	**--**	**--**	**--**	**--**	**NON-PLASTIC**
B1	**55**	**43**	**31**	**12**	**--**	**ML**
B1	**60**	**--**	**--**	**--**	**--**	**NON-PLASTIC**
B2	**20**	**33**	**27**	**6**	**--**	**ML**
B2	**25**	**35**	**26**	**9**	**--**	**ML**
B2	**62.5**	**--**	**--**	**--**	**--**	**NON-PLASTIC**

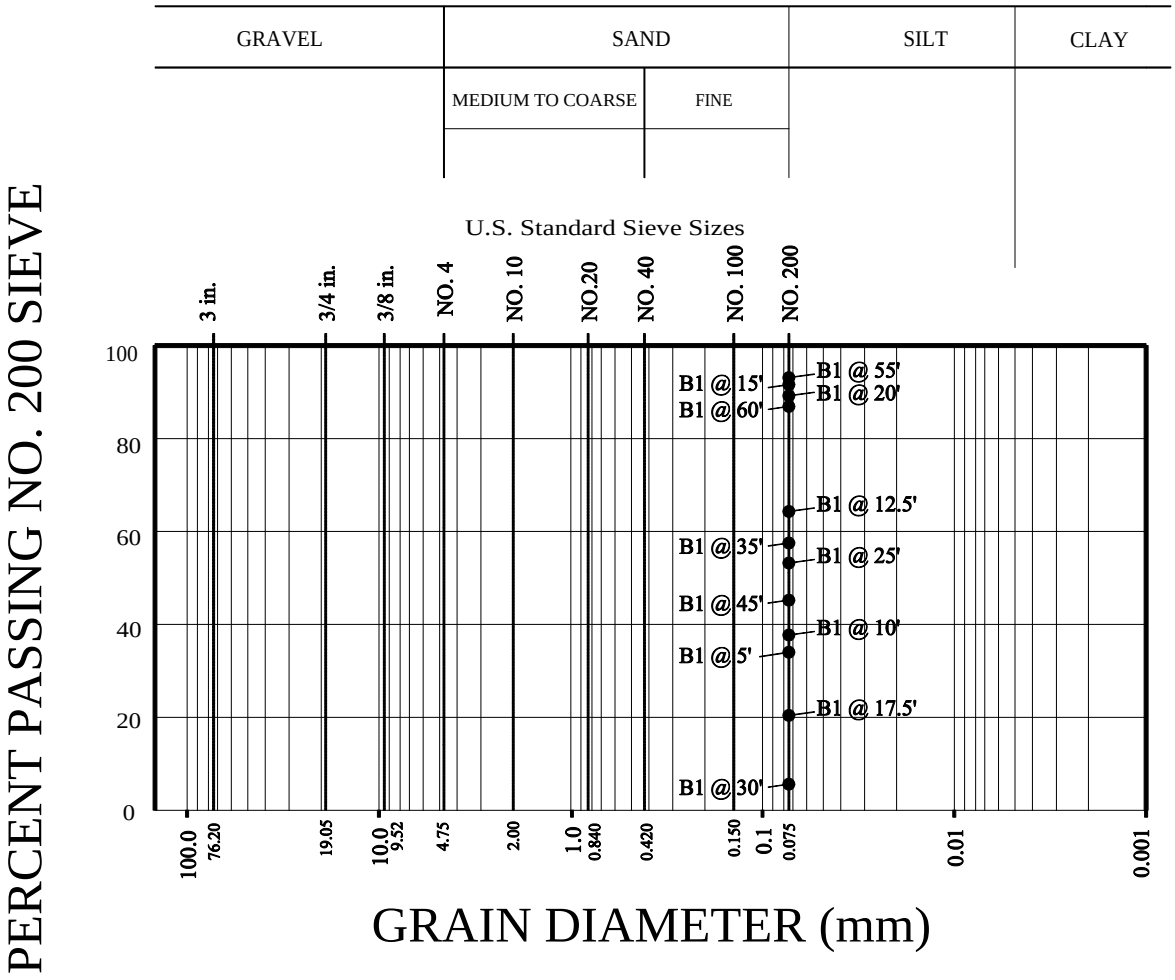
GEOCON WEST, INC.
ENVIRONMENTAL GEOTECHNICAL MATERIALS
3303 N. SAN FERNANDO BLVD. - SUITE 100 - BURBANK, CA 91504
PHONE (818) 841-8388 - FAX (818) 841-1704

DRAFTED BY: PZ | CHECKED BY: JTA

ATTERBERG LIMITS

MIXED-USE DEVELOPMENT
16411 BELLFLOWER BOULEVARD
9742 MAYNE STREET
BELLFLOWER, CALIFORNIA

MARCH 2019 | PROJECT NO. A9911-06-01 | FIG. B6



SAMPLE	PERCENT PASSING NO. 200 SIEVE
B1 @ 5'	34.0
B1 @ 10'	37.7
B1 @ 12.5'	64.3
B1 @ 15'	91.6
B1 @ 17.5'	20.4
B1 @ 20'	89.2
B1 @ 25'	53.2
B1 @ 30'	5.6
B1 @ 35'	57.5
B1 @ 45'	45.2
B1 @ 55'	93.1
B1 @ 60'	86.9

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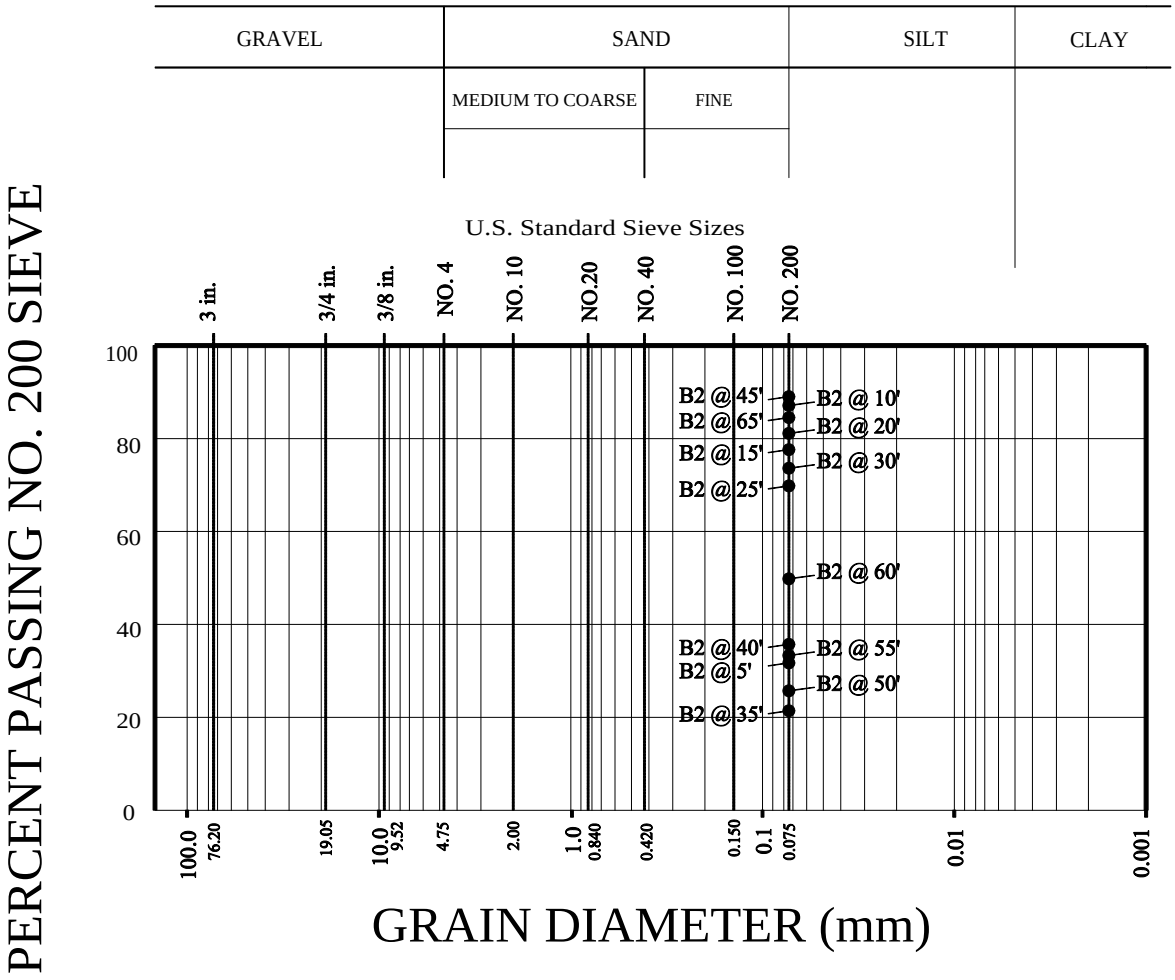
DRAFTED BY: PZ | CHECKED BY: JTA

GRAIN SIZE ANALYSIS

MIXED-USE DEVELOPMENT

16411 BELLFLOWER BOULEVARD
9742 MAYNE STREET
BELLFLOWER, CALIFORNIA

MARCH 2019 | PROJECT NO. A9911-06-01 | FIG. B7



SAMPLE	PERCENT PASSING NO. 200 SIEVE
B2 @ 5'	31.7
B2 @ 10'	87.1
B2 @ 15'	77.6
B2 @ 20'	81.1
B2 @ 25'	69.8
B2 @ 30'	73.6
B2 @ 35'	21.4
B2 @ 40'	35.7
B2 @ 45'	89.0
B2 @ 50'	25.7
B2 @ 55'	33.3
B2 @ 60'	49.8
B2 @ 65'	84.5

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GRAIN SIZE ANALYSIS

MIXED-USE DEVELOPMENT

16411 BELLFLOWER BOULEVARD
9742 MAYNE STREET
BELLFLOWER, CALIFORNIA

MARCH 2019 | PROJECT NO. A9911-06-01 | FIG. B8

SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS
ASTM D 4829-11

Sample No.	Moisture Content (%)		Dry Density (pcf)	Expansion Index	*UBC Classification	**CBC Classification
	Before	After				
B1 @ 0-5'	10.2	17.9	107.9	1	Very Low	Non-Expansive

* Reference: 1997 Uniform Building Code, Table 18-I-B.

** Reference: 2016 California Building Code, Section 1803.5.3

SUMMARY OF LABORATORY MAXIMUM DENSITY AND AND OPTIMUM MOISTURE CONTENT TEST RESULTS
ASTM D 1557-12

Sample No.	Soil Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
B1 @ 0-5'	Grayish Brown Sand	116.0	12.0

GEOCON WEST, INC.

ENVIRONMENTAL GEOTECHNICAL MATERIALS
15520 ROCKFIELD BLVD. - SUITE J - IRVINE, CA 92618
PHONE (949) 491-6570

DRAFTED BY: PZ | CHECKED BY: JTA

LABORATORY TEST RESULTS

MIXED-USE DEVELOPMENT
16411 BELLFLOWER BOULEVARD
9742 MAYNE STREET
BELLFLOWER, CALIFORNIA

MARCH 2019 | PROJECT NO. A9911-06-01 | FIG. B9

SUMMARY OF LABORATORY POTENTIAL OF HYDROGEN (pH) AND RESISTIVITY TEST RESULTS CALIFORNIA TEST NO. 643

Sample No.	pH	Resistivity (ohm centimeters)
B1 @ 0-5'	8.8	7700 (Moderately Corrosive)

SUMMARY OF LABORATORY CHLORIDE CONTENT TEST RESULTS EPA NO. 325.3

Sample No.	Chloride Ion Content (%)
B1 @ 0-5'	0.110

SUMMARY OF LABORATORY WATER SOLUBLE SULFATE TEST RESULTS CALIFORNIA TEST NO. 417

Sample No.	Water Soluble Sulfate (% SO_4)	Sulfate Exposure*
B1 @ 0-5'	0.000	S0

* Reference: 2016 California Building Code, Section 1904.3 and ACI 318 Table 19.3.1.1

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DRAFTED BY: PZ | CHECKED BY: JTA

CORROSIVITY TEST RESULTS

MIXED-USE DEVELOPMENT
16411 BELLFLOWER BOULEVARD
9742 MAYNE STREET
BELLFLOWER, CALIFORNIA

MARCH 2019 | PROJECT NO. A9911-06-01 | FIG. B10

APPENDIX C

APPENDIX C

ANALYSES OF LIQUEFACTION POTENTIAL

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CPT-02 results

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Geocon West, Inc.

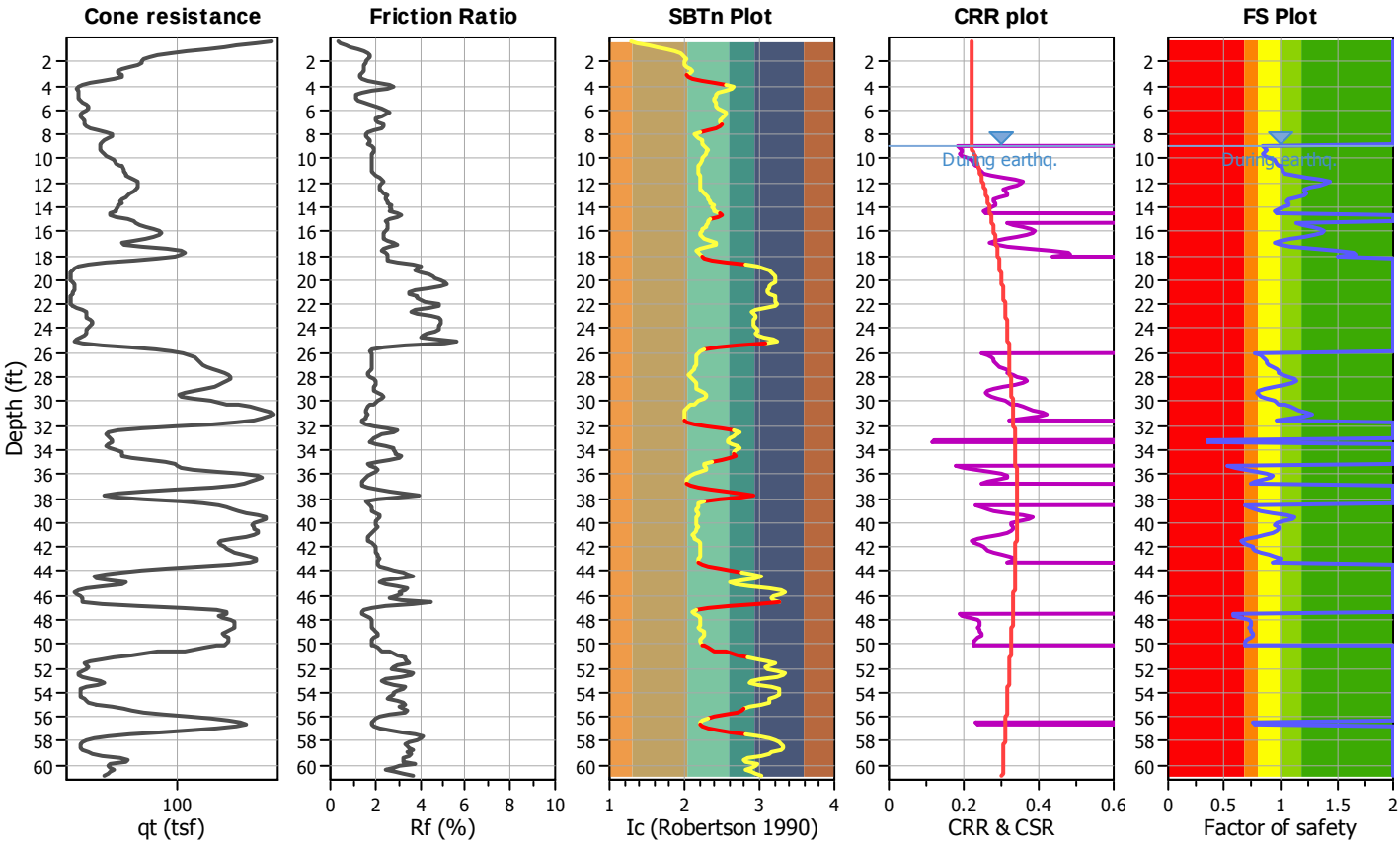
LIQUEFACTION ANALYSIS REPORT

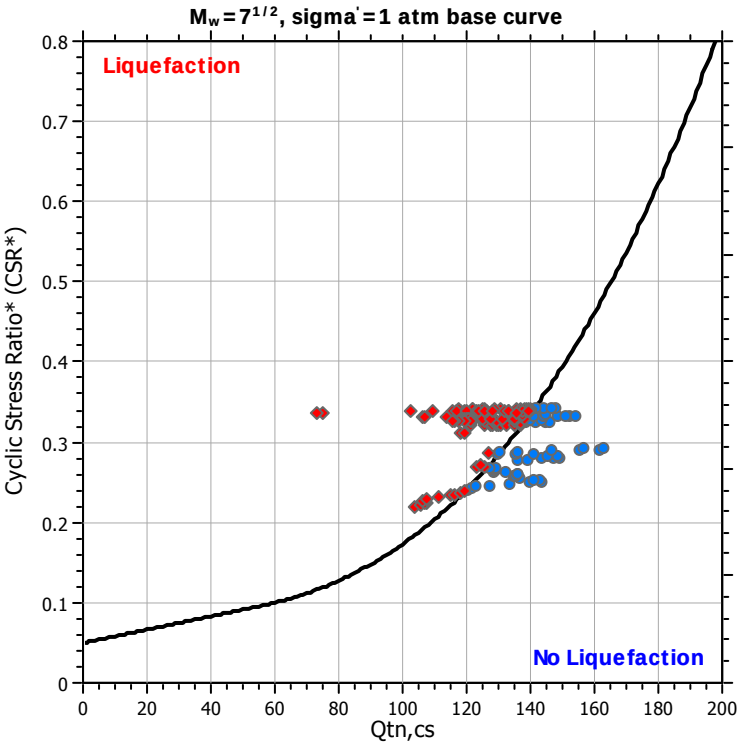
Project title : A9911-06-01 **Location : Bellflower Mixed-Use**

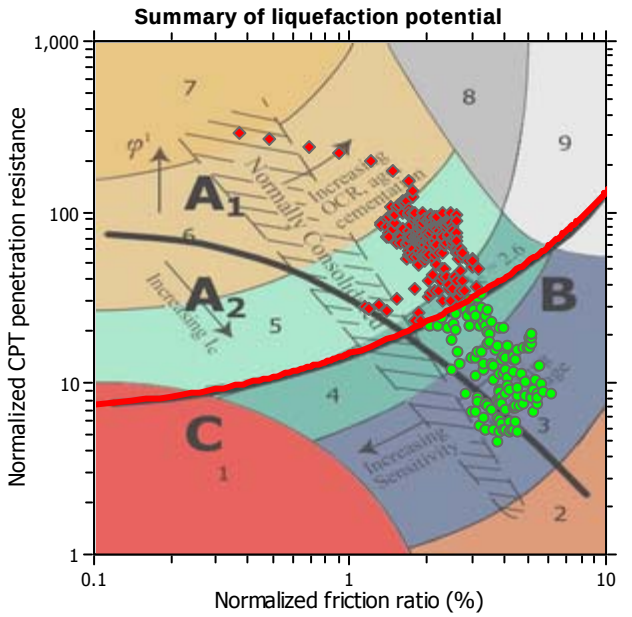
CPT file : CPT-01

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	37.20 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	9.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	60.00 ft
Earthquake magnitude M_w:	6.62	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.43	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

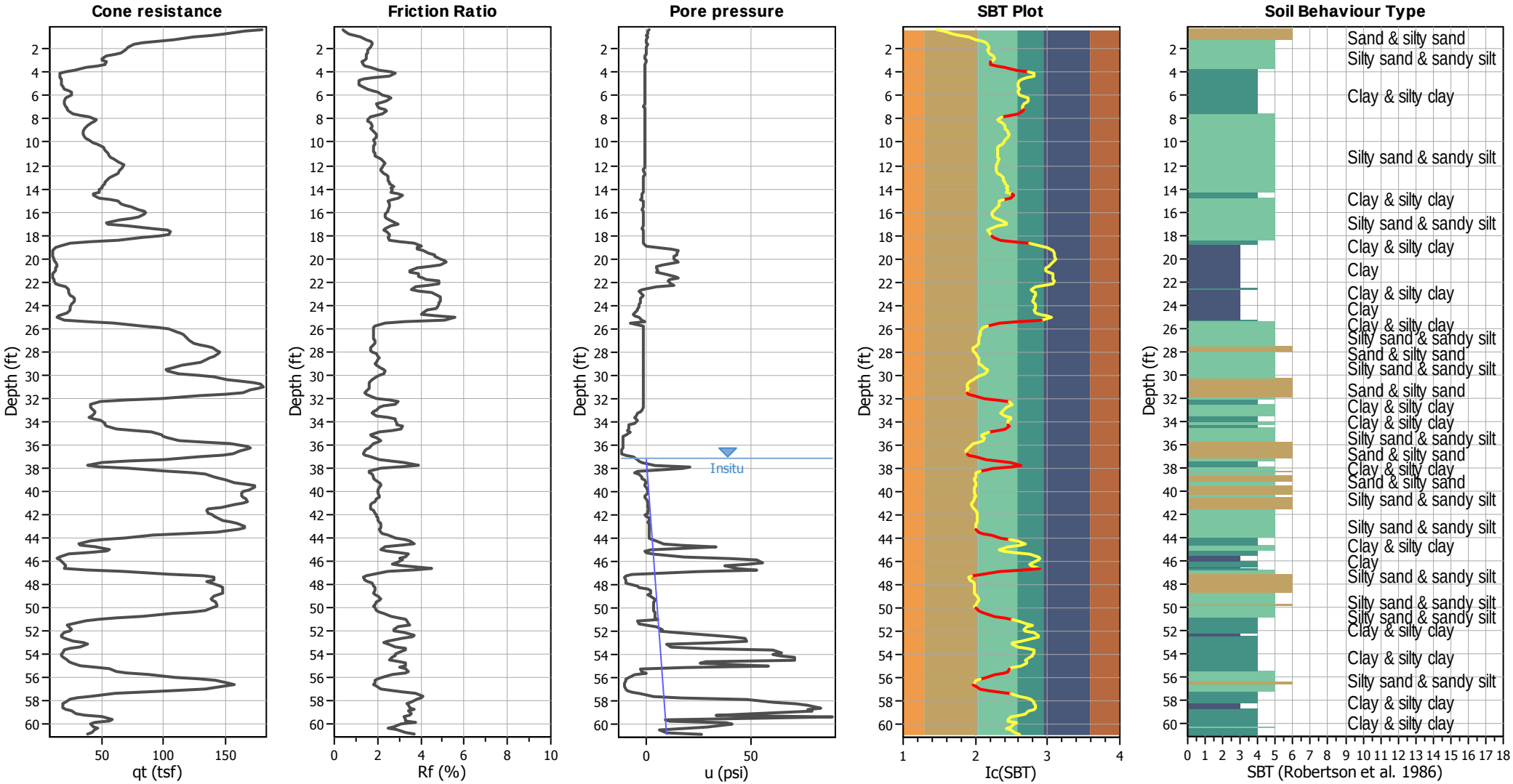






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



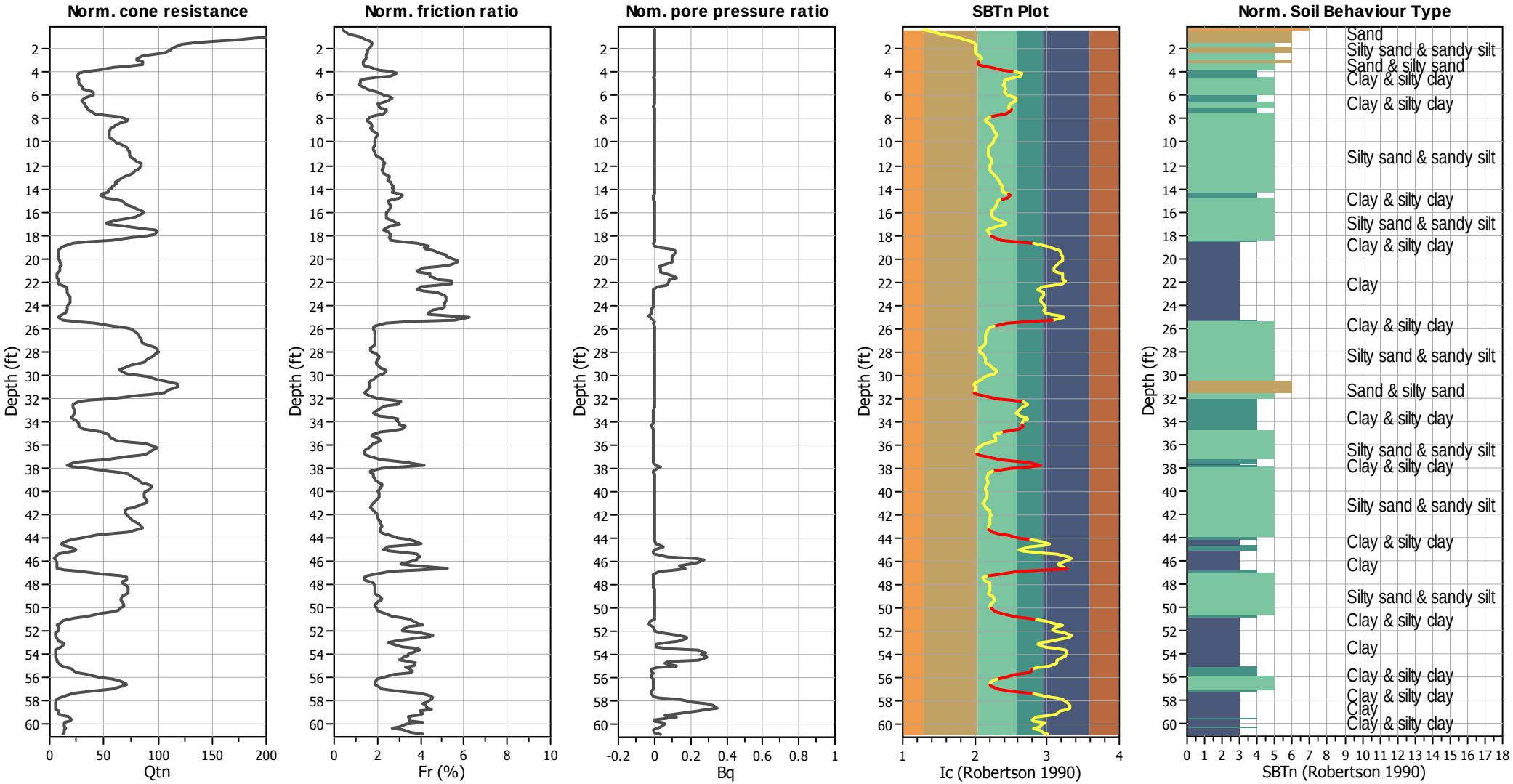
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	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:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.43	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBT 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

CPT basic interpretation plots (normalized)



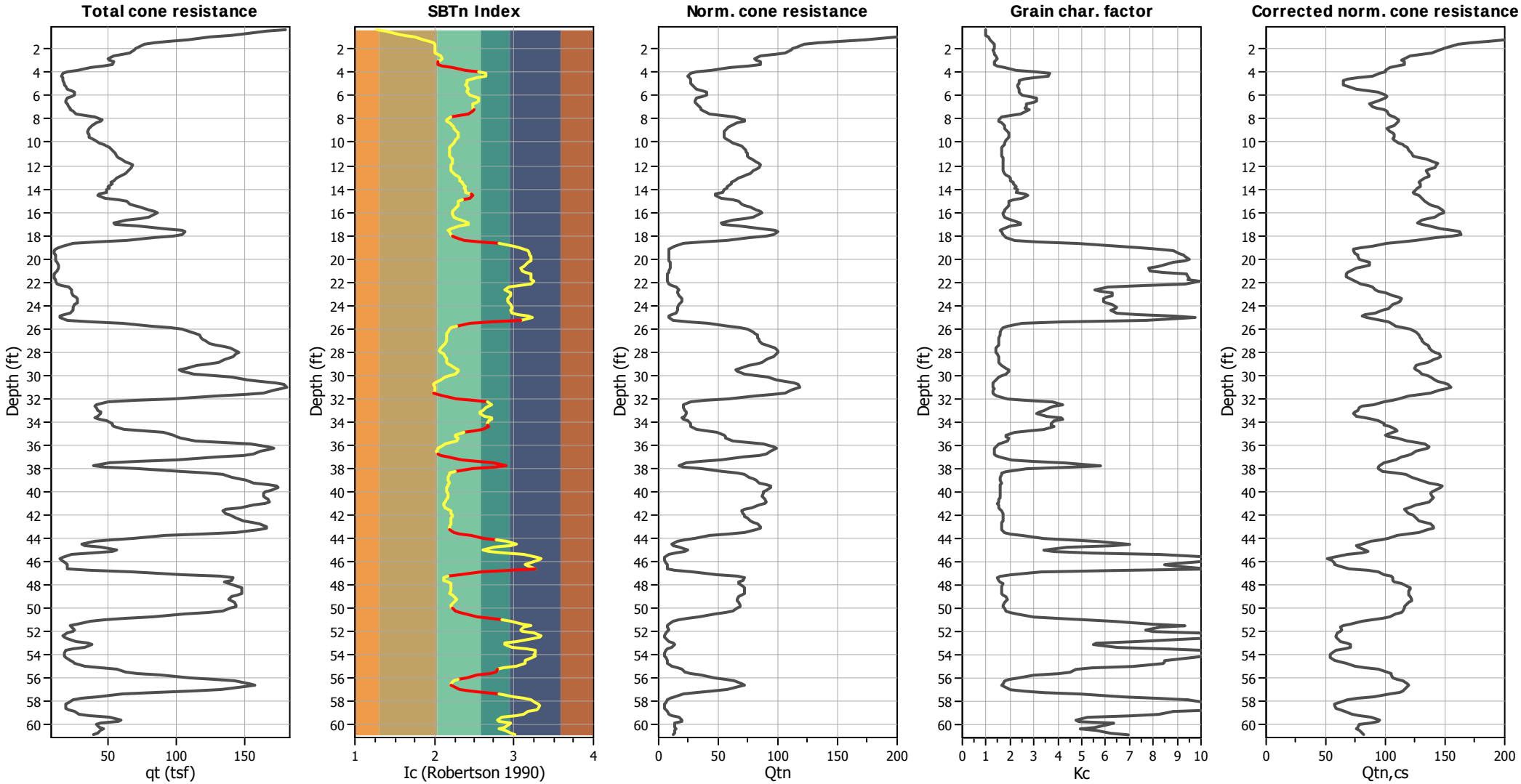
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	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:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.43	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

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

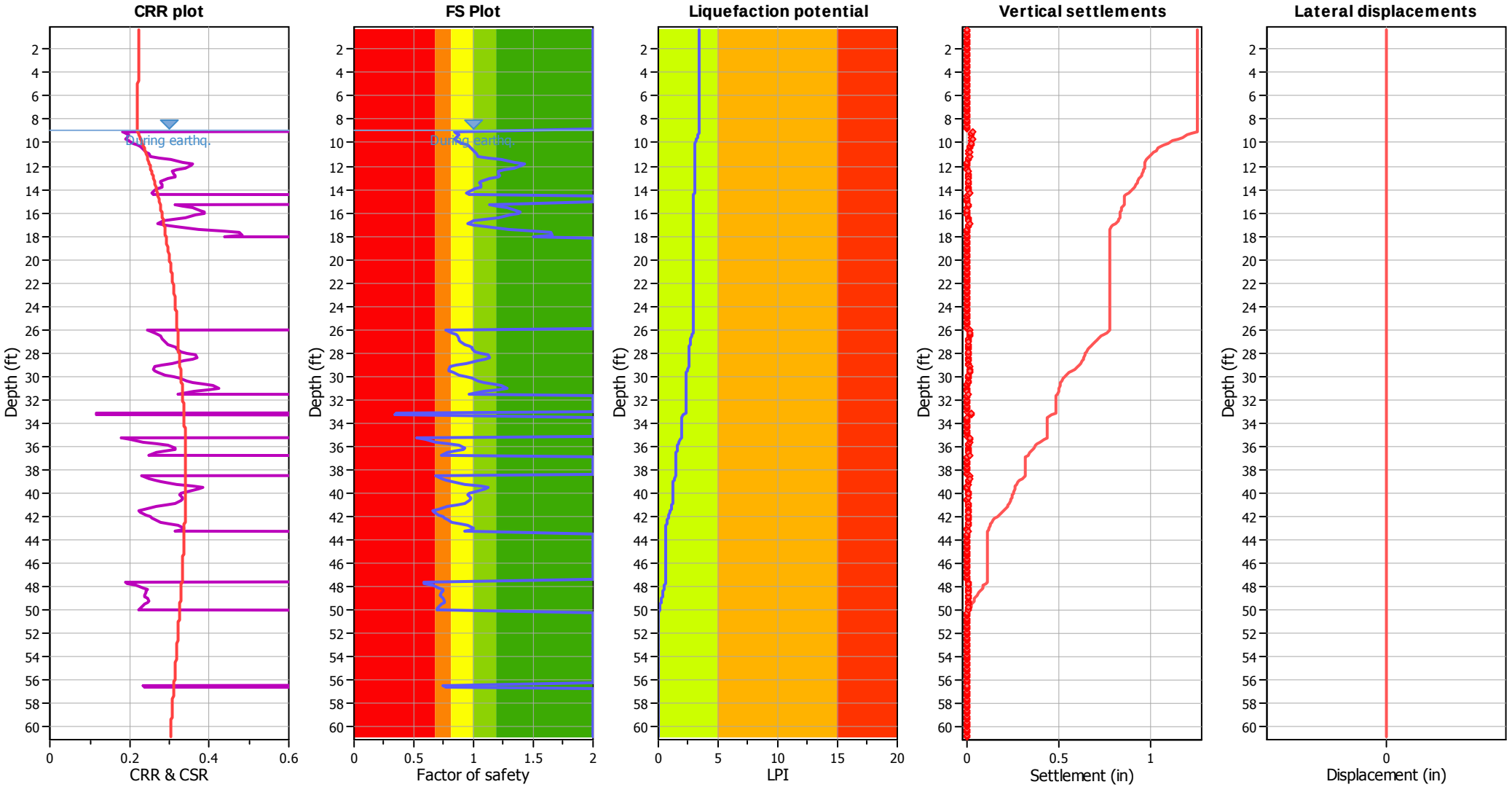
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	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:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.43	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	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:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.43	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

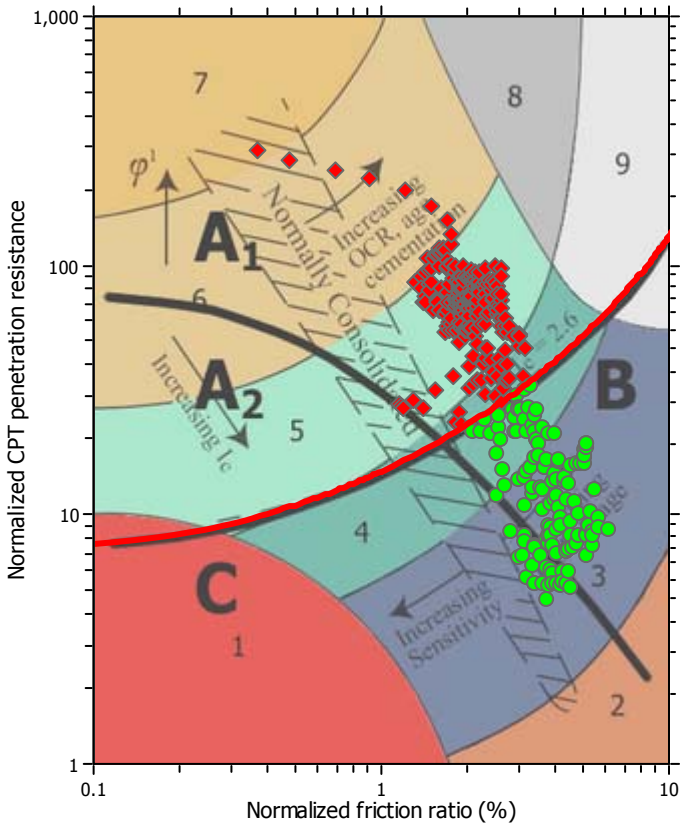
F.S. color scheme

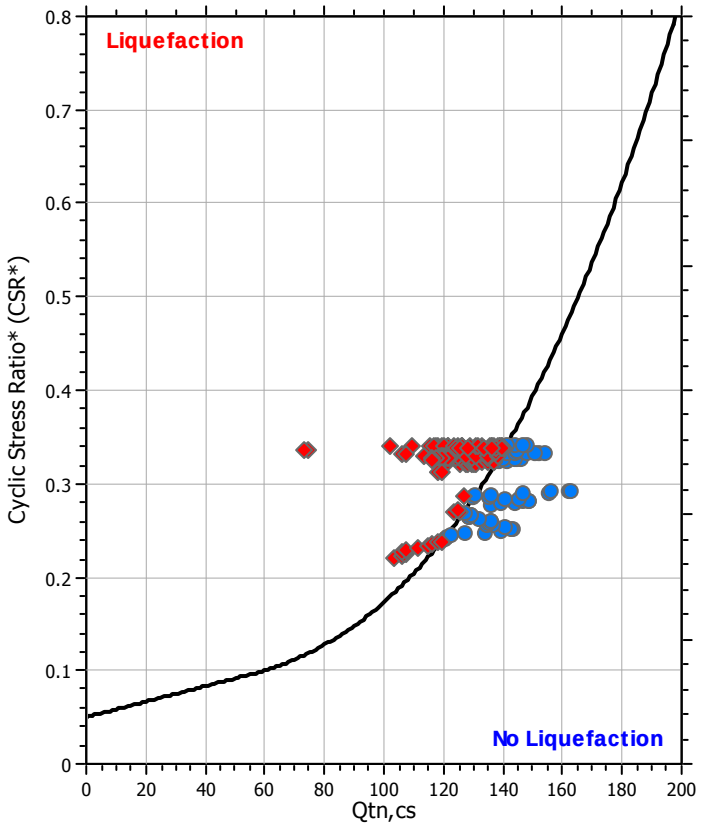
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

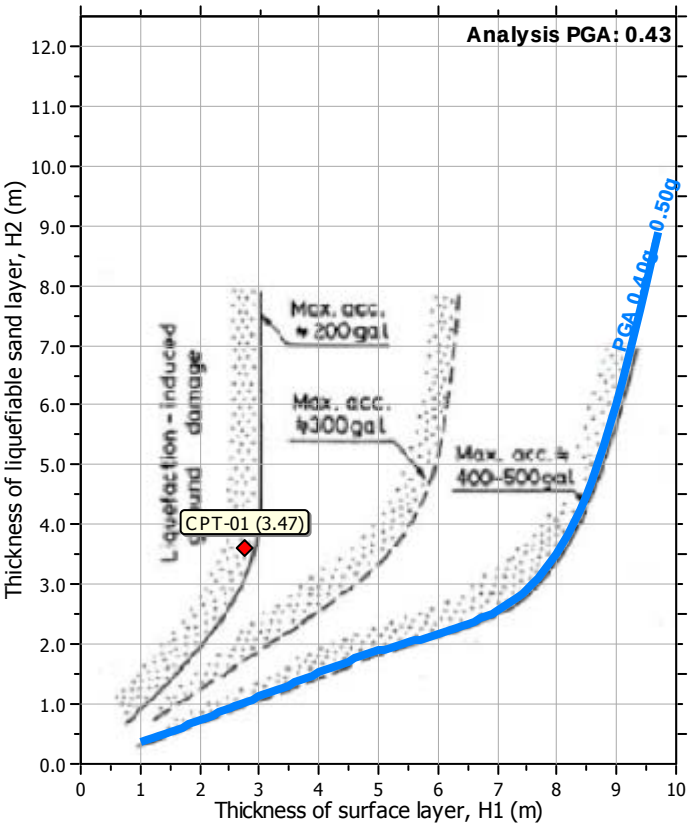
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



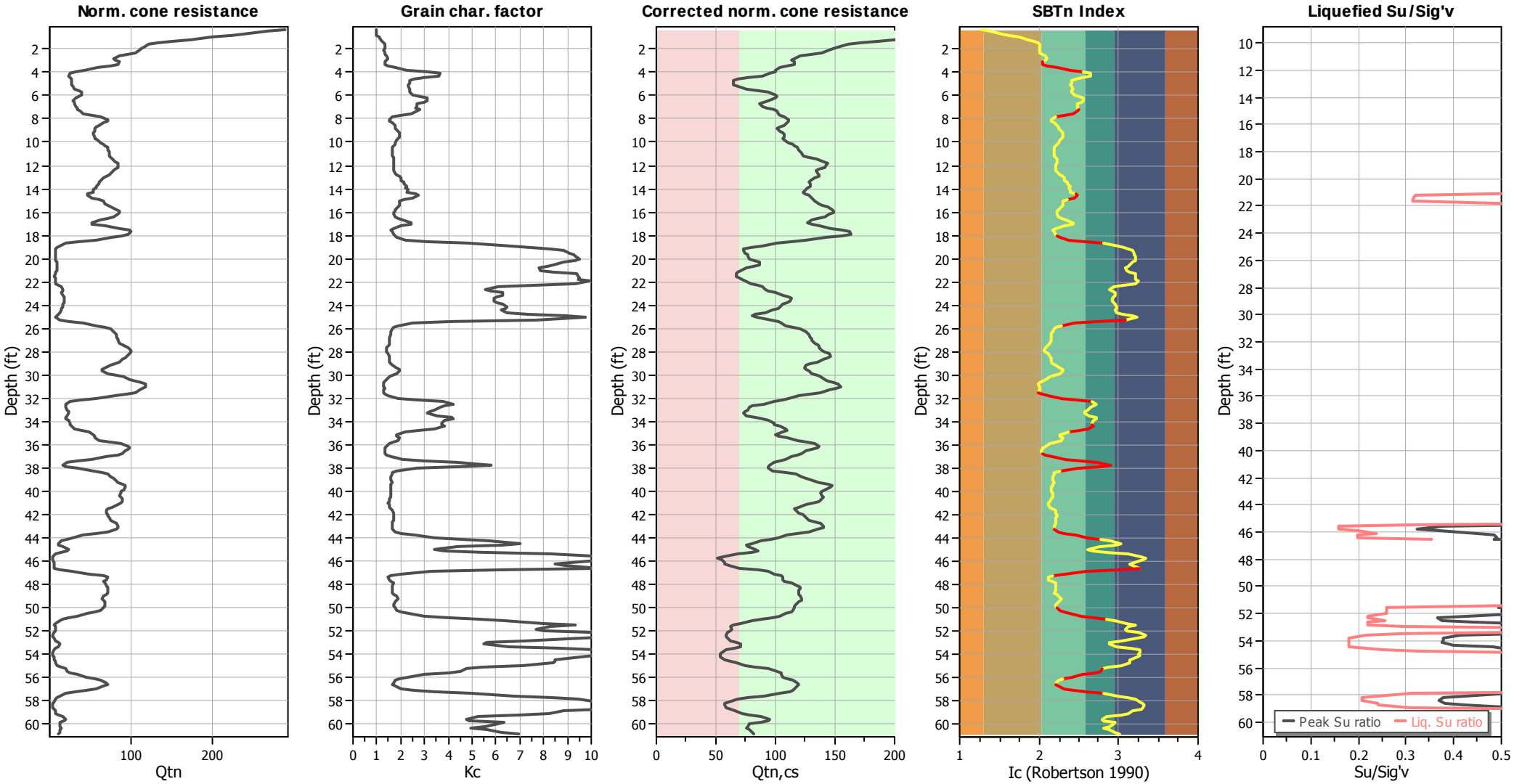




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	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:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.43	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

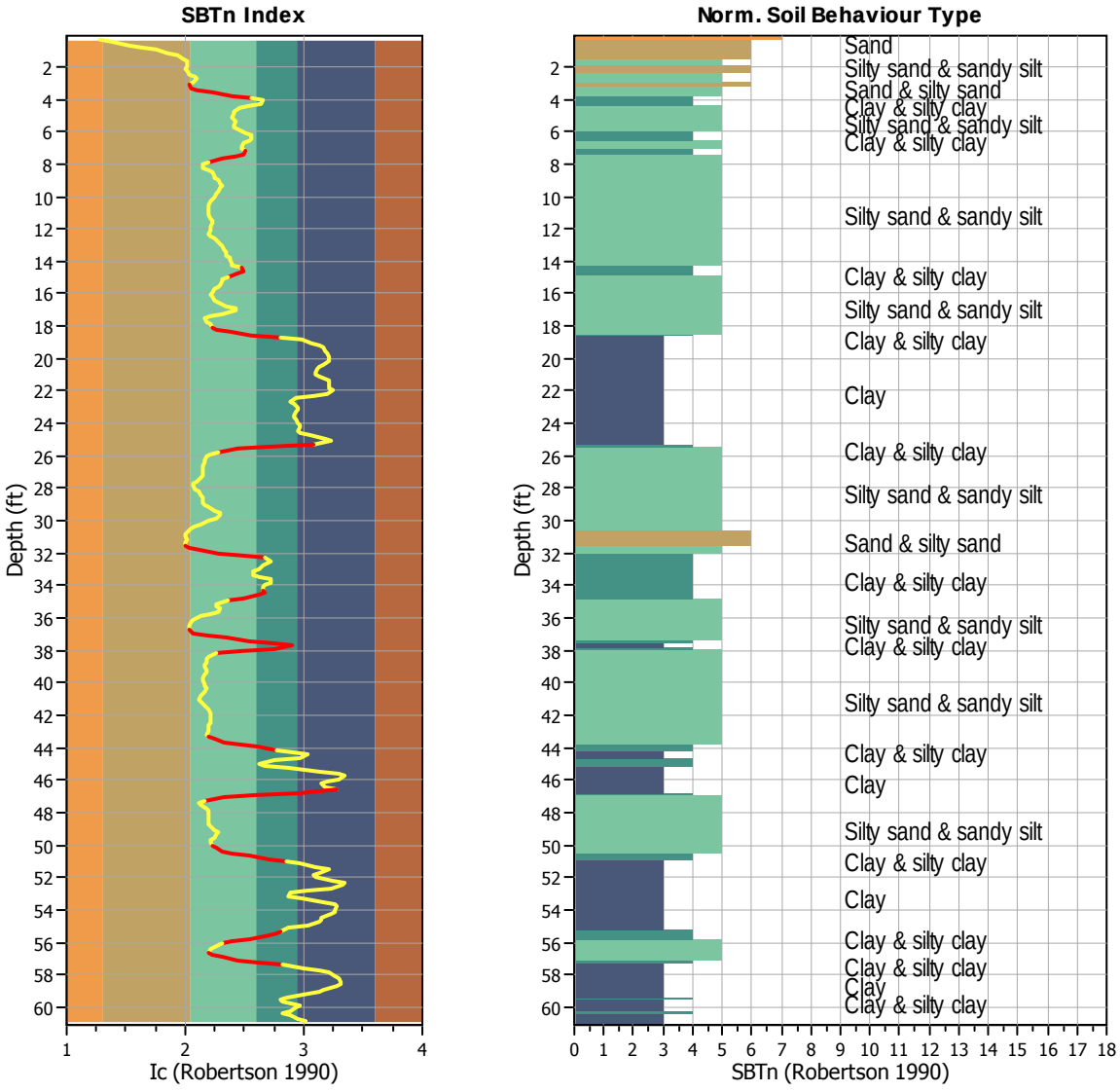
Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.43	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	370
I_c maximum check value:	3.00	Total points excluded:	76
I_c change ratio value:	0.0250	Exclusion percentage:	20.54%
Minimum number of points in layer:	4	Number of layers detected:	14

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	6	Start depth: 3.28 (ft)	5	Silty sand & sandy silt
		End depth: 4.10 (ft)	4	Clay & silty clay
Transition layer 2	5	Start depth: 7.38 (ft)	4	Clay & silty clay
		End depth: 8.04 (ft)	5	Silty sand & sandy silt
Transition layer 3	4	Start depth: 14.60 (ft)	4	Clay & silty clay
		End depth: 15.09 (ft)	5	Silty sand & sandy silt
Transition layer 4	5	Start depth: 18.21 (ft)	5	Silty sand & sandy silt
		End depth: 18.87 (ft)	3	Clay
Transition layer 5	4	Start depth: 25.43 (ft)	4	Clay & silty clay
		End depth: 25.92 (ft)	5	Silty sand & sandy silt
Transition layer 6	6	Start depth: 31.66 (ft)	5	Silty sand & sandy silt
		End depth: 32.48 (ft)	4	Clay & silty clay
Transition layer 7	5	Start depth: 34.45 (ft)	4	Clay & silty clay
		End depth: 35.11 (ft)	5	Silty sand & sandy silt
Transition layer 8	6	Start depth: 36.91 (ft)	5	Silty sand & sandy silt
		End depth: 37.73 (ft)	3	Clay
Transition layer 9	5	Start depth: 37.73 (ft)	3	Clay
		End depth: 38.39 (ft)	5	Silty sand & sandy silt
Transition layer 10	6	Start depth: 43.47 (ft)	5	Silty sand & sandy silt
		End depth: 44.29 (ft)	3	Clay
Transition layer 11	5	Start depth: 46.75 (ft)	3	Clay
		End depth: 47.41 (ft)	5	Silty sand & sandy silt
Transition layer 12	7	Start depth: 50.20 (ft)	5	Silty sand & sandy silt
		End depth: 51.18 (ft)	3	Clay
Transition layer 13	6	Start depth: 55.45 (ft)	4	Clay & silty clay
		End depth: 56.27 (ft)	5	Silty sand & sandy silt
Transition layer 14	6	Start depth: 56.76 (ft)	5	Silty sand & sandy silt
		End depth: 57.58 (ft)	3	Clay

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
1	0.33	192.70	0.60	1.80	0.22	119.97
2	0.49	153.60	0.80	0.90	1.29	121.11
3	0.66	151.70	1.00	1.30	3.15	122.72
4	0.82	141.90	1.30	0.30	4.82	124.04
5	0.98	123.50	1.50	1.10	7.10	125.00
6	1.15	107.20	1.70	0.30	9.37	125.13
7	1.31	93.80	1.60	0.20	11.33	124.81
8	1.48	83.20	1.50	0.00	12.53	123.88
9	1.64	74.70	1.30	0.80	13.29	122.95
10	1.80	71.00	1.20	0.10	13.36	122.04
11	1.97	70.40	1.10	0.00	13.30	121.56
12	2.13	69.40	1.10	0.00	13.02	121.08
13	2.30	68.20	1.00	0.00	13.26	120.50
14	2.46	61.00	0.90	0.00	13.90	119.51
15	2.62	52.60	0.80	-0.10	15.06	118.35
16	2.79	47.30	0.70	-0.10	15.62	117.54
17	2.95	49.90	0.70	0.00	14.95	117.24
18	3.12	54.90	0.70	0.00	13.98	117.37
19	3.28	55.90	0.70	-0.10	14.08	117.36
20	3.45	49.00	0.70	-0.20	15.91	116.70
21	3.61	36.30	0.60	-0.20	20.11	115.75
22	3.77	26.50	0.60	-0.30	26.06	114.19
23	3.94	19.40	0.50	-0.30	33.39	113.02
24	4.10	15.10	0.50	-0.20	37.75	111.55
25	4.27	15.30	0.40	-0.20	37.33	110.29
26	4.43	16.80	0.30	-0.70	32.52	108.28
27	4.59	17.00	0.20	-0.40	28.77	106.53
28	4.76	17.10	0.20	-0.40	27.08	105.41
29	4.92	17.10	0.20	-0.40	26.85	105.44
30	5.09	17.50	0.20	-0.40	26.29	105.49
31	5.25	18.30	0.20	-0.40	26.73	106.73
32	5.41	19.40	0.30	-0.40	27.35	108.75
33	5.58	21.90	0.40	-0.40	26.88	111.20
34	5.74	27.20	0.50	-0.40	27.03	113.05
35	5.91	26.00	0.60	-0.40	28.22	113.99
36	6.07	22.70	0.60	-0.50	31.01	113.74
37	6.23	19.80	0.50	-0.50	33.48	113.03
38	6.40	18.70	0.50	-0.50	33.59	111.90
39	6.56	19.00	0.40	-0.60	32.36	111.38
40	6.73	20.40	0.40	-0.70	30.12	110.90
41	6.89	21.40	0.40	-0.80	29.68	111.62
42	7.05	22.20	0.50	-0.70	29.60	112.24
43	7.22	22.70	0.50	-0.60	30.75	113.26
44	7.38	22.60	0.60	-0.60	30.07	113.84
45	7.55	25.80	0.60	-0.60	27.58	114.54
46	7.71	31.70	0.60	-0.60	22.97	115.46
47	7.87	41.50	0.70	-0.60	19.09	116.32
48	8.04	47.70	0.70	-0.50	17.17	116.96

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
49	8.20	46.80	0.70	-0.50	17.36	116.94
50	8.37	40.20	0.70	-0.60	18.86	116.76
51	8.53	38.10	0.70	-0.60	20.11	116.20
52	8.69	37.00	0.60	-0.60	20.49	115.73
53	8.86	35.60	0.60	-0.50	20.61	115.26
54	9.02	34.90	0.60	-0.70	21.61	115.61
55	9.19	35.10	0.70	-0.60	22.32	115.98
56	9.35	35.30	0.70	-0.60	22.71	116.37
57	9.51	36.10	0.70	-0.60	22.36	116.42
58	9.68	37.60	0.70	-0.60	21.70	116.52
59	9.84	39.60	0.70	-0.60	21.09	117.00
60	10.01	42.80	0.80	-0.60	20.56	117.81
61	10.17	46.70	0.90	-0.50	19.98	118.58
62	10.34	49.30	0.90	-0.60	19.25	119.00
63	10.50	51.60	0.90	-0.60	18.85	119.37
64	10.66	53.30	1.00	-0.60	18.65	119.71
65	10.83	54.40	1.00	-0.60	18.66	120.01
66	10.99	55.10	1.00	-0.60	18.76	120.29
67	11.16	56.00	1.10	-0.60	18.85	120.56
68	11.32	57.10	1.10	-0.60	19.35	121.28
69	11.48	59.10	1.30	-0.60	19.72	122.17
70	11.65	63.00	1.50	-0.50	19.75	123.01
71	11.81	66.80	1.50	-0.50	19.62	123.61
72	11.98	67.90	1.60	-0.50	19.24	123.67
73	12.14	67.80	1.50	-0.70	19.18	123.50
74	12.30	66.20	1.40	-0.80	19.14	123.13
75	12.47	64.80	1.40	-0.80	19.51	122.90
76	12.63	63.00	1.40	-0.70	20.41	123.01
77	12.80	61.00	1.50	-0.70	21.47	123.09
78	12.96	58.60	1.50	-0.80	22.40	123.00
79	13.12	56.20	1.40	-0.80	22.99	122.55
80	13.29	53.40	1.30	-0.90	23.46	122.10
81	13.45	52.10	1.30	-0.80	24.32	122.02
82	13.62	51.10	1.40	-0.90	24.34	122.24
83	13.78	56.00	1.40	-1.10	25.78	122.11
84	13.94	43.50	1.30	-0.80	25.42	121.95
85	14.11	52.30	1.30	-0.90	26.33	121.65
86	14.27	49.40	1.30	-1.00	26.08	121.47
87	14.44	43.90	1.20	-1.50	29.30	121.17
88	14.60	35.70	1.30	-2.10	30.26	121.53
89	14.76	48.60	1.50	-1.90	28.18	122.35
90	14.93	60.00	1.50	-2.40	24.60	123.29
91	15.09	64.40	1.60	-1.00	22.67	123.68
92	15.26	66.40	1.60	-1.00	22.68	124.22
93	15.42	66.60	1.80	-1.00	22.31	124.77
94	15.58	74.40	1.90	-1.10	21.76	125.46
95	15.75	80.40	2.00	-1.50	20.66	126.03
96	15.91	85.10	2.10	-1.10	20.00	126.39

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
97	16.08	87.00	2.10	-1.00	19.68	126.44
98	16.24	85.40	2.00	-1.00	19.78	126.16
99	16.40	80.60	1.90	-1.10	20.37	125.66
100	16.57	74.70	1.80	-1.00	21.60	124.91
101	16.73	65.10	1.60	-1.00	23.99	124.00
102	16.90	52.20	1.50	-1.00	27.47	123.14
103	17.06	45.30	1.50	-0.80	27.77	123.66
104	17.23	68.90	1.90	-0.80	23.24	125.09
105	17.39	98.10	2.10	-2.10	19.40	126.82
106	17.55	106.10	2.40	-0.90	17.86	127.90
107	17.72	107.20	2.60	-1.00	18.44	128.64
108	17.88	105.50	2.80	-0.90	19.22	128.78
109	18.05	99.30	2.60	-1.00	19.97	128.14
110	18.21	87.60	2.10	-1.10	21.40	126.50
111	18.37	64.80	1.60	-1.20	25.26	123.97
112	18.54	37.30	1.20	-1.20	33.67	120.86
113	18.70	20.70	0.90	-1.10	46.20	117.31
114	18.87	15.70	0.60	0.30	57.54	114.13
115	19.03	12.80	0.50	5.70	62.79	111.47
116	19.19	10.50	0.40	12.20	67.19	110.08
117	19.36	10.30	0.40	15.20	70.63	109.93
118	19.52	10.60	0.50	14.80	71.97	110.49
119	19.69	10.70	0.50	14.50	73.02	111.02
120	19.85	10.70	0.50	13.60	73.46	111.01
121	20.01	10.50	0.50	13.50	74.54	111.51
122	20.18	11.00	0.60	14.80	73.44	112.54
123	20.34	13.10	0.70	15.70	70.76	113.55
124	20.51	14.20	0.70	7.90	68.27	113.68
125	20.67	13.30	0.60	4.90	66.83	112.89
126	20.83	12.90	0.50	5.00	64.95	111.49
127	21.00	13.10	0.40	5.60	65.18	110.31
128	21.16	11.20	0.40	4.80	68.13	109.51
129	21.33	9.80	0.40	8.70	73.78	109.26
130	21.49	9.60	0.40	14.30	74.27	109.25
131	21.65	10.90	0.40	15.60	74.31	109.92
132	21.82	10.80	0.50	11.30	73.97	110.55
133	21.98	10.90	0.50	10.70	76.72	111.54
134	22.15	11.10	0.60	11.80	73.37	112.68
135	22.31	14.70	0.70	13.30	63.63	114.44
136	22.47	22.00	0.80	5.10	54.66	115.69
137	22.64	24.50	0.80	-2.00	50.86	116.62
138	22.80	23.40	0.90	-3.10	52.74	117.16
139	22.97	21.50	1.00	-2.30	55.49	118.17
140	23.13	24.40	1.20	-0.90	55.61	119.18
141	23.30	27.20	1.30	-2.10	54.01	120.19
142	23.46	28.30	1.40	-2.80	53.20	120.67
143	23.62	28.10	1.40	-2.40	53.32	120.67
144	23.79	27.30	1.30	-2.60	54.00	120.22

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
145	23.95	25.50	1.20	-3.00	55.53	119.70
146	24.12	23.80	1.20	-3.30	56.68	119.18
147	24.28	23.80	1.10	-3.60	56.49	118.96
148	24.44	25.20	1.10	-4.10	55.33	118.26
149	24.61	23.20	0.90	-5.00	56.76	117.04
150	24.77	17.80	0.70	-5.80	61.76	115.07
151	24.94	13.70	0.60	-5.10	71.06	114.23
152	25.10	13.10	0.80	-3.40	75.69	115.14
153	25.26	16.40	1.00	-1.80	64.02	117.83
154	25.43	31.00	1.30	-0.50	41.52	120.64
155	25.59	65.00	1.40	-7.00	28.37	122.72
156	25.76	84.10	1.50	-1.40	21.49	124.14
157	25.92	96.80	1.70	-1.30	19.16	125.27
158	26.08	105.50	1.90	-1.30	18.36	126.31
159	26.25	111.60	2.10	-1.30	17.93	126.94
160	26.41	114.60	2.10	-1.30	17.65	127.25
161	26.58	116.00	2.10	-1.30	17.40	127.42
162	26.74	119.20	2.20	-1.30	17.31	127.57
163	26.90	119.70	2.20	-1.30	17.27	127.71
164	27.07	120.00	2.20	-1.20	17.24	127.85
165	27.23	123.30	2.30	-1.20	17.05	128.13
166	27.40	129.20	2.40	-1.20	16.56	128.43
167	27.56	135.30	2.40	-1.20	15.86	128.64
168	27.72	140.80	2.40	-1.20	14.94	128.52
169	27.89	143.70	2.20	-1.20	14.78	128.79
170	28.05	145.80	2.60	-1.20	15.07	129.22
171	28.22	146.70	2.80	-1.20	16.12	129.84
172	28.38	140.40	2.90	-1.40	16.91	130.06
173	28.54	137.80	2.90	-1.20	17.37	129.91
174	28.71	135.70	2.70	-1.20	17.36	129.50
175	28.87	131.80	2.50	-1.20	17.30	128.86
176	29.04	124.60	2.30	-1.20	17.80	128.22
177	29.20	114.80	2.20	-1.20	19.10	127.84
178	29.36	106.30	2.30	-1.20	20.84	127.66
179	29.53	99.90	2.30	-1.20	22.46	127.74
180	29.69	98.90	2.40	-1.20	22.50	128.10
181	29.86	112.70	2.60	-1.20	21.13	128.70
182	30.02	127.50	2.70	-1.20	18.75	129.28
183	30.19	144.00	2.70	-1.20	16.90	129.60
184	30.35	150.70	2.70	-1.20	15.40	129.79
185	30.51	160.90	2.70	-1.20	14.22	129.94
186	30.68	173.60	2.70	-1.00	13.17	130.19
187	30.84	183.20	2.80	-1.10	12.84	130.55
188	31.01	181.00	3.00	-1.10	13.10	130.91
189	31.17	179.30	3.10	-1.20	13.27	130.60
190	31.33	170.10	2.50	-1.10	13.13	129.90
191	31.50	163.80	2.30	-1.10	12.85	128.91
192	31.66	158.60	2.20	-1.20	13.88	128.15

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
193	31.83	127.70	2.00	-1.10	16.41	127.44
194	31.99	101.70	2.00	-1.30	21.95	126.29
195	32.15	65.70	1.80	-1.30	30.11	124.80
196	32.32	43.10	1.50	-1.30	38.79	122.60
197	32.48	40.40	1.10	-1.10	41.99	120.48
198	32.65	40.80	0.90	-0.90	39.48	118.80
199	32.81	40.40	0.80	-0.90	38.00	118.29
200	32.97	42.10	0.90	-1.60	36.18	118.09
201	33.14	45.70	0.80	-2.50	34.48	117.88
202	33.30	45.20	0.70	-3.60	33.74	117.59
203	33.47	43.20	0.80	-4.70	36.87	118.07
204	33.63	38.40	1.00	-5.00	41.40	119.28
205	33.79	39.20	1.20	-4.30	41.92	120.77
206	33.96	51.20	1.40	-3.80	39.16	122.05
207	34.12	56.60	1.50	-5.10	38.25	123.08
208	34.29	51.10	1.70	-7.70	38.40	123.07
209	34.45	51.00	1.40	-8.20	39.27	123.89
210	34.61	60.40	2.00	-8.20	36.24	125.04
211	34.78	75.10	2.30	-8.60	30.46	126.05
212	34.94	94.70	1.80	-7.30	25.02	125.94
213	35.11	100.30	1.60	-9.70	21.26	125.20
214	35.27	100.20	1.60	-10.80	21.23	125.54
215	35.43	100.90	2.00	-10.90	22.46	126.77
216	35.60	108.10	2.50	-10.80	22.02	128.21
217	35.76	131.50	2.70	-10.70	19.45	129.37
218	35.93	159.50	2.80	-10.70	16.71	130.09
219	36.09	172.10	2.90	-10.70	15.02	130.30
220	36.26	171.80	2.70	-11.10	14.31	130.08
221	36.42	169.90	2.50	-11.30	13.96	129.36
222	36.58	159.90	2.20	-11.40	13.81	128.67
223	36.75	156.80	2.10	-11.50	13.94	128.14
224	36.91	153.90	2.10	-9.40	15.01	128.01
225	37.08	135.50	2.20	-6.10	18.14	127.79
226	37.24	99.30	2.20	-4.10	24.01	126.95
227	37.40	67.10	1.90	-3.50	32.57	125.40
228	37.57	49.50	1.60	-2.10	42.76	123.43
229	37.73	35.30	1.40	4.70	52.51	122.34
230	37.90	32.20	1.60	21.10	43.22	122.51
231	38.06	75.60	1.40	17.40	29.90	123.81
232	38.22	106.30	1.60	-3.60	20.95	125.31
233	38.39	126.10	2.00	-5.10	18.80	127.06
234	38.55	134.30	2.40	-3.30	18.50	128.52
235	38.72	141.50	2.70	-1.90	18.14	129.14
236	38.88	146.30	2.50	-1.60	17.89	129.60
237	39.04	149.90	2.80	-0.60	17.78	130.13
238	39.21	157.10	3.20	0.30	18.37	131.19
239	39.37	164.30	3.70	-0.30	18.16	132.13
240	39.54	180.60	3.90	-0.50	17.85	132.56

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
241	39.70	176.50	3.70	0.20	17.47	132.37
242	39.86	166.60	3.40	0.90	17.48	131.81
243	40.03	163.90	3.20	1.00	17.62	131.46
244	40.19	163.90	3.30	0.90	17.81	131.44
245	40.36	162.90	3.40	-0.20	18.14	131.66
246	40.52	164.40	3.50	-0.30	17.96	131.68
247	40.68	168.20	3.30	0.30	17.37	131.49
248	40.85	169.30	3.10	0.80	16.74	131.13
249	41.01	166.70	3.00	1.10	16.32	130.52
250	41.18	159.50	2.60	1.20	16.55	129.78
251	41.34	145.10	2.40	1.20	17.13	128.94
252	41.50	135.20	2.30	1.70	18.25	128.47
253	41.67	130.10	2.30	0.90	19.10	128.74
254	41.83	138.50	2.70	1.10	19.50	129.26
255	42.00	141.40	2.80	-0.70	19.68	129.77
256	42.16	139.50	2.80	0.40	19.56	129.88
257	42.32	143.40	2.80	1.40	19.43	130.10
258	42.49	148.90	3.00	1.50	19.21	130.51
259	42.65	153.60	3.20	1.20	19.08	131.16
260	42.82	163.00	3.50	1.40	19.00	131.68
261	42.98	164.80	3.60	1.60	18.71	132.04
262	43.15	169.50	3.60	1.90	18.59	131.98
263	43.31	163.60	3.40	1.90	18.81	131.54
264	43.47	149.00	3.10	1.80	20.37	130.59
265	43.64	119.00	2.70	1.80	23.48	129.11
266	43.80	89.70	2.20	1.80	28.99	127.39
267	43.97	66.80	2.00	2.00	36.01	125.55
268	44.13	51.00	1.70	2.80	44.03	123.82
269	44.29	39.90	1.40	5.00	51.95	121.76
270	44.46	30.10	1.10	8.30	60.25	119.56
271	44.62	22.40	0.90	17.60	55.79	118.77
272	44.79	44.50	1.00	33.80	43.24	119.74
273	44.95	64.10	1.20	2.40	36.23	121.66
274	45.11	61.10	1.50	-0.50	39.21	121.90
275	45.28	35.30	1.20	0.00	50.26	120.35
276	45.44	21.30	0.80	4.00	67.53	116.34
277	45.61	13.60	0.40	18.10	80.52	112.46
278	45.77	12.70	0.40	39.60	84.52	110.62
279	45.93	14.70	0.50	52.90	80.73	111.93
280	46.10	17.90	0.60	55.80	72.50	112.81
281	46.26	21.10	0.50	48.10	68.80	112.98
282	46.43	19.00	0.50	37.50	71.18	114.27
283	46.59	19.00	0.90	43.90	78.99	116.81
284	46.75	20.20	1.30	53.30	55.94	121.39
285	46.92	71.10	1.90	25.10	35.18	124.27
286	47.08	108.90	1.80	-6.70	23.34	126.31
287	47.25	133.30	2.00	-9.50	17.86	127.14
288	47.41	155.70	2.10	-10.10	16.25	127.17

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
289	47.57	135.80	1.70	-9.40	16.52	127.29
290	47.74	131.60	2.10	-9.60	18.20	127.66
291	47.90	137.30	2.50	-9.10	19.15	128.81
292	48.07	147.20	2.70	-3.60	19.06	129.59
293	48.23	151.60	2.80	-3.30	18.98	129.91
294	48.39	146.80	2.80	0.80	19.02	129.91
295	48.56	146.60	2.70	2.60	18.95	129.82
296	48.72	150.70	2.70	2.40	18.87	129.72
297	48.89	146.20	2.70	1.20	19.60	129.86
298	49.05	138.50	2.90	2.70	20.77	130.04
299	49.22	137.70	3.00	4.30	21.56	130.26
300	49.38	140.10	3.00	4.40	21.20	130.20
301	49.54	142.60	2.80	4.00	20.31	129.90
302	49.71	143.80	2.60	3.80	19.52	129.56
303	49.87	144.60	2.60	3.90	19.32	129.37
304	50.04	141.60	2.60	3.80	20.07	129.41
305	50.20	133.50	2.70	3.80	21.22	129.30
306	50.36	125.90	2.60	4.10	23.12	129.01
307	50.53	111.50	2.50	4.20	26.31	128.06
308	50.69	81.70	2.10	4.10	32.52	126.72
309	50.86	56.60	1.90	4.40	40.59	124.92
310	51.02	49.00	1.60	6.00	48.92	122.98
311	51.18	37.10	1.20	-3.90	56.10	120.62
312	51.35	25.10	0.90	-2.90	65.84	117.81
313	51.51	19.10	0.70	1.10	73.51	115.85
314	51.68	21.20	0.70	5.20	67.68	115.37
315	51.84	30.30	0.70	7.70	64.17	115.54
316	52.00	24.20	0.70	7.00	65.78	115.07
317	52.17	17.50	0.60	14.60	76.35	114.18
318	52.33	16.10	0.60	33.10	84.37	113.86
319	52.50	16.50	0.70	41.70	82.79	113.92
320	52.66	18.40	0.60	47.70	75.12	114.24
321	52.82	23.20	0.60	48.00	61.06	115.32
322	52.99	36.80	0.80	31.50	51.56	117.31
323	53.15	43.80	1.00	10.30	50.49	118.64
324	53.32	32.60	1.00	12.40	57.23	118.29
325	53.48	21.70	0.80	28.60	69.70	116.40
326	53.64	16.60	0.60	60.50	77.80	114.15
327	53.81	17.30	0.50	64.60	78.73	112.72
328	53.97	17.30	0.50	60.30	77.62	112.24
329	54.14	16.50	0.50	64.10	77.93	112.23
330	54.30	17.00	0.50	70.90	74.86	112.36
331	54.46	20.10	0.50	70.70	68.62	113.66
332	54.63	26.50	0.70	28.70	68.73	115.38
333	54.79	22.50	0.90	26.20	68.28	116.82
334	54.96	25.50	0.90	58.40	60.78	119.23
335	55.12	47.70	1.40	19.30	50.23	121.83
336	55.28	60.30	1.80	-2.50	45.87	124.52

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
337	55.45	59.50	2.30	-2.00	44.16	125.89
338	55.61	66.80	2.30	0.00	40.49	126.86
339	55.78	86.40	2.40	-5.60	32.69	127.51
340	55.94	112.50	2.40	-8.00	26.39	128.23
341	56.11	130.00	2.50	-9.20	22.65	128.90
342	56.27	140.70	2.70	-9.60	20.62	129.63
343	56.43	156.40	2.90	-9.90	19.35	130.17
344	56.60	163.10	2.90	-9.90	19.03	130.40
345	56.76	152.50	2.90	-9.80	20.24	130.28
346	56.93	133.80	2.90	-9.20	23.24	130.00
347	57.09	114.40	2.90	-8.40	28.52	129.55
348	57.25	85.90	2.90	-6.50	36.18	128.50
349	57.42	58.50	2.40	-2.60	47.06	126.38
350	57.58	38.00	1.60	4.00	58.48	123.42
351	57.75	29.40	1.20	17.20	67.59	120.14
352	57.91	22.90	0.90	47.90	74.00	117.56
353	58.07	19.00	0.70	61.40	78.55	115.40
354	58.24	17.70	0.60	71.90	81.17	114.10
355	58.40	17.10	0.60	77.20	82.56	114.05
356	58.57	17.50	0.70	83.40	82.05	114.49
357	58.73	19.10	0.70	76.90	79.79	115.72
358	58.89	22.10	0.90	79.50	70.64	117.12
359	59.06	32.10	1.00	48.20	67.40	118.71
360	59.22	30.00	1.20	33.80	60.22	120.75
361	59.39	43.80	1.60	89.00	49.03	123.45
362	59.55	77.10	2.10	9.00	45.74	125.04
363	59.71	54.20	2.10	11.60	46.76	124.69
364	59.88	38.10	1.40	38.40	56.18	123.25
365	60.04	39.10	1.50	41.50	54.36	121.08
366	60.21	45.20	0.90	29.70	50.99	120.80
367	60.37	44.70	1.20	17.80	47.12	120.54
368	60.53	48.10	1.30	6.40	51.42	121.23
369	60.70	38.80	1.30	9.90	55.27	121.67
370	60.86	38.40	1.50	26.40	59.61	121.83

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
q_c: Measured cone resistance (tsf)
f_s: Sleeve friction resistance (tsf)
u: Pore pressure (tsf)
Fines content: Percentage of fines in soil (%)
Unit weight: Bulk soil unit weight (pcf)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	0.33	0.02	0.00	0.02	1.00	0.280	1.38	0.203	1.00	1.10	2.000	No
2	0.49	0.03	0.00	0.03	1.00	0.280	1.38	0.203	1.00	1.10	2.000	No
3	0.66	0.04	0.00	0.04	1.00	0.280	1.38	0.203	1.00	1.10	2.000	No
4	0.82	0.05	0.00	0.05	1.00	0.279	1.38	0.203	1.00	1.10	2.000	No
5	0.98	0.06	0.00	0.06	1.00	0.279	1.38	0.203	1.00	1.10	2.000	No
6	1.15	0.07	0.00	0.07	1.00	0.279	1.38	0.203	1.00	1.10	2.000	No
7	1.31	0.08	0.00	0.08	1.00	0.279	1.38	0.203	1.00	1.10	2.000	No
8	1.48	0.09	0.00	0.09	1.00	0.279	1.38	0.203	1.00	1.10	2.000	No
9	1.64	0.10	0.00	0.10	1.00	0.279	1.38	0.203	1.00	1.10	2.000	No
10	1.80	0.11	0.00	0.11	1.00	0.279	1.38	0.203	1.00	1.10	2.000	No
11	1.97	0.12	0.00	0.12	1.00	0.279	1.38	0.203	1.00	1.10	2.000	No
12	2.13	0.13	0.00	0.13	1.00	0.279	1.38	0.203	1.00	1.10	2.000	No
13	2.30	0.14	0.00	0.14	1.00	0.279	1.38	0.202	1.00	1.10	2.000	No
14	2.46	0.15	0.00	0.15	1.00	0.278	1.38	0.202	1.00	1.10	2.000	No
15	2.62	0.16	0.00	0.16	1.00	0.278	1.38	0.202	1.00	1.10	2.000	No
16	2.79	0.17	0.00	0.17	1.00	0.278	1.38	0.202	1.00	1.10	2.000	No
17	2.95	0.18	0.00	0.18	1.00	0.278	1.38	0.202	1.00	1.10	2.000	No
18	3.12	0.19	0.00	0.19	0.99	0.278	1.38	0.202	1.00	1.10	2.000	No
19	3.28	0.20	0.00	0.20	0.99	0.278	1.38	0.202	1.00	1.10	2.000	Yes
20	3.45	0.21	0.00	0.21	0.99	0.278	1.38	0.202	1.00	1.10	2.000	Yes
21	3.61	0.22	0.00	0.22	0.99	0.278	1.38	0.202	1.00	1.10	2.000	Yes
22	3.77	0.23	0.00	0.23	0.99	0.278	1.38	0.202	1.00	1.10	2.000	Yes
23	3.94	0.24	0.00	0.24	0.99	0.277	1.38	0.202	1.00	1.10	2.000	Yes
24	4.10	0.25	0.00	0.25	0.99	0.277	1.38	0.202	1.00	1.10	2.000	Yes
25	4.27	0.25	0.00	0.25	0.99	0.277	1.38	0.201	1.00	1.10	2.000	No
26	4.43	0.26	0.00	0.26	0.99	0.277	1.38	0.201	1.00	1.10	2.000	No
27	4.59	0.27	0.00	0.27	0.99	0.277	1.38	0.201	1.00	1.10	2.000	No
28	4.76	0.28	0.00	0.28	0.99	0.277	1.38	0.201	1.00	1.10	2.000	No
29	4.92	0.29	0.00	0.29	0.99	0.277	1.38	0.201	1.00	1.10	2.000	No
30	5.09	0.30	0.00	0.30	0.99	0.277	1.38	0.201	1.00	1.10	2.000	No
31	5.25	0.31	0.00	0.31	0.99	0.277	1.38	0.201	1.00	1.10	2.000	No
32	5.41	0.32	0.00	0.32	0.99	0.277	1.38	0.201	1.00	1.10	2.000	No
33	5.58	0.33	0.00	0.33	0.99	0.276	1.38	0.201	1.00	1.10	2.000	No
34	5.74	0.33	0.00	0.33	0.99	0.276	1.38	0.201	1.00	1.10	2.000	No
35	5.91	0.34	0.00	0.34	0.99	0.276	1.38	0.201	1.00	1.10	2.000	No
36	6.07	0.35	0.00	0.35	0.99	0.276	1.38	0.201	1.00	1.10	2.000	No
37	6.23	0.36	0.00	0.36	0.99	0.276	1.38	0.201	1.00	1.10	2.000	No
38	6.40	0.37	0.00	0.37	0.99	0.276	1.38	0.200	1.00	1.10	2.000	No
39	6.56	0.38	0.00	0.38	0.99	0.276	1.38	0.200	1.00	1.10	2.000	No
40	6.73	0.39	0.00	0.39	0.99	0.276	1.38	0.200	1.00	1.10	2.000	No
41	6.89	0.40	0.00	0.40	0.99	0.276	1.38	0.200	1.00	1.10	2.000	No
42	7.05	0.41	0.00	0.41	0.99	0.275	1.38	0.200	1.00	1.10	2.000	No
43	7.22	0.42	0.00	0.42	0.99	0.275	1.38	0.200	1.00	1.10	2.000	No
44	7.38	0.43	0.00	0.43	0.98	0.275	1.38	0.200	1.00	1.10	2.000	Yes
45	7.55	0.44	0.00	0.44	0.98	0.275	1.38	0.200	1.00	1.10	2.000	Yes
46	7.71	0.45	0.00	0.45	0.98	0.275	1.38	0.200	1.00	1.10	2.000	Yes
47	7.87	0.45	0.00	0.45	0.98	0.275	1.38	0.200	1.00	1.10	2.000	Yes
48	8.04	0.46	0.00	0.46	0.98	0.275	1.38	0.200	1.00	1.10	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	8.20	0.47	0.00	0.47	0.98	0.275	1.38	0.200	1.00	1.10	2.000	No
50	8.37	0.48	0.00	0.48	0.98	0.275	1.38	0.200	1.00	1.10	2.000	No
51	8.53	0.49	0.00	0.49	0.98	0.275	1.38	0.200	1.00	1.10	2.000	No
52	8.69	0.50	0.00	0.50	0.98	0.274	1.38	0.199	1.00	1.10	2.000	No
53	8.86	0.51	0.00	0.51	0.98	0.274	1.38	0.199	1.00	1.10	2.000	No
54	9.02	0.52	0.00	0.52	0.98	0.275	1.38	0.200	1.00	1.10	0.220	No
55	9.19	0.53	0.01	0.53	0.98	0.277	1.38	0.201	1.00	1.10	0.222	No
56	9.35	0.54	0.01	0.53	0.98	0.280	1.38	0.203	1.00	1.10	0.224	No
57	9.51	0.55	0.02	0.53	0.98	0.282	1.38	0.205	1.00	1.10	0.226	No
58	9.68	0.56	0.02	0.54	0.98	0.285	1.38	0.207	1.00	1.10	0.228	No
59	9.84	0.57	0.03	0.54	0.98	0.287	1.38	0.209	1.00	1.10	0.229	No
60	10.01	0.58	0.03	0.55	0.98	0.289	1.38	0.210	1.00	1.10	0.231	No
61	10.17	0.59	0.04	0.55	0.98	0.292	1.38	0.212	1.00	1.10	0.233	No
62	10.34	0.60	0.04	0.56	0.98	0.294	1.38	0.214	1.00	1.10	0.235	No
63	10.50	0.61	0.05	0.56	0.98	0.296	1.38	0.215	1.00	1.10	0.237	No
64	10.66	0.62	0.05	0.57	0.98	0.298	1.38	0.217	1.00	1.10	0.238	No
65	10.83	0.63	0.06	0.57	0.98	0.300	1.38	0.218	1.00	1.10	0.240	No
66	10.99	0.64	0.06	0.58	0.98	0.303	1.38	0.220	1.00	1.10	0.242	No
67	11.16	0.65	0.07	0.58	0.98	0.305	1.38	0.221	1.00	1.10	0.244	No
68	11.32	0.66	0.07	0.59	0.98	0.307	1.38	0.223	1.00	1.10	0.245	No
69	11.48	0.67	0.08	0.59	0.98	0.309	1.38	0.224	1.00	1.10	0.247	No
70	11.65	0.68	0.08	0.60	0.98	0.311	1.38	0.226	1.00	1.10	0.248	No
71	11.81	0.69	0.09	0.60	0.98	0.312	1.38	0.227	1.00	1.10	0.250	No
72	11.98	0.70	0.09	0.61	0.97	0.314	1.38	0.228	1.00	1.10	0.251	No
73	12.14	0.71	0.10	0.61	0.97	0.316	1.38	0.230	1.00	1.10	0.253	No
74	12.30	0.72	0.10	0.62	0.97	0.318	1.38	0.231	1.00	1.10	0.254	No
75	12.47	0.73	0.11	0.62	0.97	0.320	1.38	0.232	1.00	1.10	0.256	No
76	12.63	0.74	0.11	0.63	0.97	0.321	1.38	0.234	1.00	1.10	0.257	No
77	12.80	0.75	0.12	0.63	0.97	0.323	1.38	0.235	1.00	1.10	0.258	No
78	12.96	0.76	0.12	0.64	0.97	0.325	1.38	0.236	1.00	1.10	0.260	No
79	13.12	0.77	0.13	0.64	0.97	0.326	1.38	0.237	1.00	1.10	0.261	No
80	13.29	0.78	0.13	0.65	0.97	0.328	1.38	0.238	1.00	1.10	0.262	No
81	13.45	0.79	0.14	0.65	0.97	0.330	1.38	0.240	1.00	1.10	0.264	No
82	13.62	0.80	0.14	0.65	0.97	0.331	1.38	0.241	1.00	1.10	0.265	No
83	13.78	0.81	0.15	0.66	0.97	0.333	1.38	0.242	1.00	1.10	0.266	No
84	13.94	0.82	0.15	0.66	0.97	0.334	1.38	0.243	1.00	1.10	0.267	No
85	14.11	0.83	0.16	0.67	0.97	0.336	1.38	0.244	1.00	1.10	0.268	No
86	14.27	0.84	0.16	0.67	0.97	0.337	1.38	0.245	1.00	1.10	0.270	No
87	14.44	0.85	0.17	0.68	0.97	0.339	1.38	0.246	1.00	1.10	0.271	No
88	14.60	0.86	0.17	0.68	0.97	0.340	1.38	0.247	1.00	1.10	2.000	Yes
89	14.76	0.87	0.18	0.69	0.97	0.342	1.38	0.248	1.00	1.10	2.000	Yes
90	14.93	0.88	0.19	0.69	0.97	0.343	1.38	0.249	1.00	1.10	2.000	Yes
91	15.09	0.89	0.19	0.70	0.97	0.344	1.38	0.250	1.00	1.10	2.000	Yes
92	15.26	0.90	0.20	0.70	0.97	0.346	1.38	0.251	1.00	1.10	0.276	No
93	15.42	0.91	0.20	0.71	0.97	0.347	1.38	0.252	1.00	1.10	0.277	No
94	15.58	0.92	0.21	0.71	0.97	0.348	1.38	0.253	1.00	1.10	0.278	No
95	15.75	0.93	0.21	0.72	0.97	0.349	1.38	0.254	1.00	1.10	0.279	No
96	15.91	0.94	0.22	0.72	0.97	0.351	1.38	0.255	1.00	1.10	0.280	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	16.08	0.95	0.22	0.73	0.97	0.352	1.38	0.256	1.00	1.10	0.281	No
98	16.24	0.96	0.23	0.74	0.97	0.353	1.38	0.256	1.00	1.10	0.282	No
99	16.40	0.97	0.23	0.74	0.97	0.354	1.38	0.257	1.00	1.10	0.283	No
100	16.57	0.98	0.24	0.75	0.97	0.355	1.38	0.258	1.00	1.10	0.284	No
101	16.73	0.99	0.24	0.75	0.96	0.356	1.38	0.259	1.00	1.10	0.285	No
102	16.90	1.00	0.25	0.76	0.96	0.357	1.38	0.260	1.00	1.10	0.286	No
103	17.06	1.01	0.25	0.76	0.96	0.359	1.38	0.261	1.00	1.10	0.287	No
104	17.23	1.02	0.26	0.77	0.96	0.360	1.38	0.261	1.00	1.10	0.288	No
105	17.39	1.03	0.26	0.77	0.96	0.361	1.38	0.262	1.00	1.10	0.288	No
106	17.55	1.04	0.27	0.78	0.96	0.362	1.38	0.263	1.00	1.10	0.289	No
107	17.72	1.05	0.27	0.78	0.96	0.363	1.38	0.264	1.00	1.10	0.290	No
108	17.88	1.06	0.28	0.79	0.96	0.364	1.38	0.264	1.00	1.10	0.291	No
109	18.05	1.08	0.28	0.79	0.96	0.365	1.38	0.265	1.00	1.10	0.291	No
110	18.21	1.09	0.29	0.80	0.96	0.365	1.38	0.266	1.00	1.10	2.000	Yes
111	18.37	1.10	0.29	0.80	0.96	0.366	1.38	0.266	1.00	1.10	2.000	Yes
112	18.54	1.11	0.30	0.81	0.96	0.367	1.38	0.267	1.00	1.10	2.000	Yes
113	18.70	1.11	0.30	0.81	0.96	0.368	1.38	0.268	1.00	1.10	2.000	Yes
114	18.87	1.12	0.31	0.82	0.96	0.369	1.38	0.268	1.00	1.10	2.000	Yes
115	19.03	1.13	0.31	0.82	0.96	0.370	1.38	0.269	1.00	1.10	0.296	No
116	19.19	1.14	0.32	0.82	0.96	0.371	1.38	0.270	1.00	1.10	0.297	No
117	19.36	1.15	0.32	0.83	0.96	0.372	1.38	0.271	1.00	1.10	0.298	No
118	19.52	1.16	0.33	0.83	0.96	0.373	1.38	0.271	1.00	1.10	0.299	No
119	19.69	1.17	0.33	0.84	0.96	0.374	1.38	0.272	1.00	1.10	0.299	No
120	19.85	1.18	0.34	0.84	0.96	0.375	1.38	0.273	1.00	1.10	0.300	No
121	20.01	1.19	0.34	0.84	0.96	0.376	1.38	0.273	1.00	1.10	0.301	No
122	20.18	1.20	0.35	0.85	0.96	0.377	1.38	0.274	1.00	1.10	0.302	No
123	20.34	1.21	0.35	0.85	0.96	0.378	1.38	0.275	1.00	1.10	0.302	No
124	20.51	1.22	0.36	0.86	0.96	0.379	1.38	0.275	1.00	1.10	0.303	No
125	20.67	1.23	0.36	0.86	0.96	0.380	1.38	0.276	1.00	1.10	0.304	No
126	20.83	1.23	0.37	0.86	0.95	0.381	1.38	0.277	1.00	1.10	0.304	No
127	21.00	1.24	0.37	0.87	0.95	0.382	1.38	0.277	1.00	1.10	0.305	No
128	21.16	1.25	0.38	0.87	0.95	0.382	1.38	0.278	1.00	1.10	0.306	No
129	21.33	1.26	0.38	0.88	0.95	0.383	1.38	0.279	1.00	1.10	0.306	No
130	21.49	1.27	0.39	0.88	0.95	0.384	1.38	0.279	1.00	1.10	0.307	No
131	21.65	1.28	0.39	0.88	0.95	0.385	1.38	0.280	1.00	1.10	0.308	No
132	21.82	1.29	0.40	0.89	0.95	0.386	1.38	0.280	1.00	1.10	0.308	No
133	21.98	1.30	0.40	0.89	0.95	0.387	1.38	0.281	1.00	1.10	0.309	No
134	22.15	1.31	0.41	0.90	0.95	0.387	1.38	0.282	1.00	1.10	0.310	No
135	22.31	1.32	0.42	0.90	0.95	0.388	1.38	0.282	1.00	1.10	0.310	No
136	22.47	1.33	0.42	0.90	0.95	0.389	1.38	0.283	1.00	1.10	0.311	No
137	22.64	1.34	0.43	0.91	0.95	0.390	1.38	0.283	1.00	1.10	0.311	No
138	22.80	1.34	0.43	0.91	0.95	0.390	1.38	0.284	1.00	1.10	0.312	No
139	22.97	1.35	0.44	0.92	0.95	0.391	1.38	0.284	1.00	1.10	0.312	No
140	23.13	1.36	0.44	0.92	0.95	0.392	1.38	0.285	1.00	1.10	0.313	No
141	23.30	1.37	0.45	0.93	0.95	0.392	1.38	0.285	1.00	1.10	0.313	No
142	23.46	1.38	0.45	0.93	0.95	0.393	1.38	0.285	1.00	1.10	0.314	No
143	23.62	1.39	0.46	0.94	0.95	0.393	1.38	0.286	1.00	1.10	0.314	No
144	23.79	1.40	0.46	0.94	0.95	0.394	1.38	0.286	1.00	1.10	0.315	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
145	23.95	1.41	0.47	0.95	0.95	0.394	1.38	0.287	1.00	1.10	0.315	No
146	24.12	1.42	0.47	0.95	0.94	0.395	1.38	0.287	1.00	1.10	0.316	No
147	24.28	1.43	0.48	0.96	0.94	0.396	1.38	0.287	1.00	1.10	0.316	No
148	24.44	1.44	0.48	0.96	0.94	0.396	1.38	0.288	1.00	1.10	0.317	No
149	24.61	1.45	0.49	0.97	0.94	0.397	1.38	0.288	1.00	1.10	0.317	No
150	24.77	1.46	0.49	0.97	0.94	0.397	1.38	0.289	1.00	1.10	0.318	No
151	24.94	1.47	0.50	0.97	0.94	0.398	1.38	0.289	1.00	1.10	0.318	No
152	25.10	1.48	0.50	0.98	0.94	0.398	1.38	0.289	1.00	1.10	0.318	No
153	25.26	1.49	0.51	0.98	0.94	0.399	1.38	0.290	1.00	1.10	0.319	No
154	25.43	1.50	0.51	0.99	0.94	0.399	1.38	0.290	1.00	1.10	2.000	Yes
155	25.59	1.51	0.52	0.99	0.94	0.400	1.38	0.290	1.00	1.10	2.000	Yes
156	25.76	1.52	0.52	1.00	0.94	0.400	1.38	0.291	1.00	1.10	2.000	Yes
157	25.92	1.53	0.53	1.00	0.94	0.400	1.38	0.291	1.00	1.10	2.000	Yes
158	26.08	1.54	0.53	1.01	0.94	0.401	1.38	0.291	1.00	1.10	0.320	No
159	26.25	1.55	0.54	1.01	0.94	0.401	1.38	0.291	1.00	1.10	0.321	No
160	26.41	1.56	0.54	1.02	0.94	0.401	1.38	0.292	1.00	1.10	0.321	No
161	26.58	1.57	0.55	1.02	0.94	0.402	1.38	0.292	1.00	1.10	0.321	No
162	26.74	1.58	0.55	1.03	0.94	0.402	1.38	0.292	1.00	1.10	0.321	No
163	26.90	1.59	0.56	1.03	0.93	0.402	1.38	0.292	1.00	1.10	0.322	No
164	27.07	1.60	0.56	1.04	0.93	0.403	1.38	0.293	1.00	1.10	0.322	No
165	27.23	1.61	0.57	1.05	0.93	0.403	1.38	0.293	1.00	1.10	0.322	No
166	27.40	1.63	0.57	1.05	0.93	0.403	1.38	0.293	1.00	1.10	0.322	No
167	27.56	1.64	0.58	1.06	0.93	0.403	1.38	0.293	1.00	1.10	0.322	No
168	27.72	1.65	0.58	1.06	0.93	0.403	1.38	0.293	1.00	1.10	0.323	No
169	27.89	1.66	0.59	1.07	0.93	0.404	1.38	0.293	1.00	1.10	0.323	No
170	28.05	1.67	0.59	1.07	0.93	0.404	1.38	0.294	1.00	1.10	0.324	No
171	28.22	1.68	0.60	1.08	0.93	0.404	1.38	0.294	1.00	1.10	0.324	No
172	28.38	1.69	0.60	1.08	0.93	0.404	1.38	0.294	0.99	1.10	0.325	No
173	28.54	1.70	0.61	1.09	0.93	0.404	1.38	0.294	0.99	1.10	0.325	No
174	28.71	1.71	0.61	1.09	0.93	0.405	1.38	0.294	0.99	1.10	0.326	No
175	28.87	1.72	0.62	1.10	0.93	0.405	1.38	0.294	0.99	1.10	0.326	No
176	29.04	1.73	0.63	1.11	0.93	0.405	1.38	0.294	0.99	1.10	0.327	No
177	29.20	1.74	0.63	1.11	0.92	0.405	1.38	0.294	0.99	1.10	0.327	No
178	29.36	1.75	0.64	1.12	0.92	0.405	1.38	0.294	0.99	1.10	0.328	No
179	29.53	1.76	0.64	1.12	0.92	0.405	1.38	0.295	0.99	1.10	0.328	No
180	29.69	1.77	0.65	1.13	0.92	0.405	1.38	0.295	0.99	1.10	0.329	No
181	29.86	1.78	0.65	1.13	0.92	0.405	1.38	0.295	0.98	1.10	0.329	No
182	30.02	1.79	0.66	1.14	0.92	0.406	1.38	0.295	0.98	1.10	0.330	No
183	30.19	1.80	0.66	1.14	0.92	0.406	1.38	0.295	0.98	1.10	0.330	No
184	30.35	1.82	0.67	1.15	0.92	0.406	1.38	0.295	0.98	1.10	0.331	No
185	30.51	1.83	0.67	1.15	0.92	0.406	1.38	0.295	0.98	1.10	0.331	No
186	30.68	1.84	0.68	1.16	0.92	0.406	1.38	0.295	0.98	1.10	0.331	No
187	30.84	1.85	0.68	1.17	0.92	0.406	1.38	0.295	0.98	1.10	0.332	No
188	31.01	1.86	0.69	1.17	0.92	0.406	1.38	0.295	0.98	1.10	0.332	No
189	31.17	1.87	0.69	1.18	0.91	0.406	1.38	0.295	0.98	1.10	0.332	No
190	31.33	1.88	0.70	1.18	0.91	0.406	1.38	0.295	0.97	1.10	0.333	No
191	31.50	1.89	0.70	1.19	0.91	0.406	1.38	0.295	0.97	1.10	0.333	No
192	31.66	1.90	0.71	1.19	0.91	0.406	1.38	0.295	0.97	1.10	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
193	31.83	1.91	0.71	1.20	0.91	0.406	1.38	0.295	0.97	1.10	2.000	Yes
194	31.99	1.92	0.72	1.20	0.91	0.406	1.38	0.295	0.97	1.10	2.000	Yes
195	32.15	1.93	0.72	1.21	0.91	0.406	1.38	0.295	0.97	1.10	2.000	Yes
196	32.32	1.94	0.73	1.21	0.91	0.406	1.38	0.295	0.97	1.10	2.000	Yes
197	32.48	1.95	0.73	1.22	0.91	0.406	1.38	0.295	0.97	1.10	2.000	Yes
198	32.65	1.96	0.74	1.22	0.91	0.406	1.38	0.295	0.97	1.10	0.336	No
199	32.81	1.97	0.74	1.23	0.90	0.406	1.38	0.295	0.97	1.10	0.336	No
200	32.97	1.98	0.75	1.23	0.90	0.406	1.38	0.295	0.97	1.10	0.336	No
201	33.14	1.99	0.75	1.24	0.90	0.406	1.38	0.295	0.96	1.10	0.336	No
202	33.30	2.00	0.76	1.24	0.90	0.406	1.38	0.295	0.96	1.10	0.337	No
203	33.47	2.01	0.76	1.25	0.90	0.406	1.38	0.295	0.96	1.10	0.337	No
204	33.63	2.02	0.77	1.25	0.90	0.406	1.38	0.295	0.96	1.10	0.337	No
205	33.79	2.03	0.77	1.26	0.90	0.406	1.38	0.295	0.96	1.10	0.338	No
206	33.96	2.04	0.78	1.26	0.90	0.406	1.38	0.295	0.96	1.10	0.338	No
207	34.12	2.05	0.78	1.27	0.90	0.406	1.38	0.295	0.96	1.10	0.338	No
208	34.29	2.06	0.79	1.27	0.90	0.406	1.38	0.295	0.96	1.10	0.338	No
209	34.45	2.07	0.79	1.28	0.89	0.406	1.38	0.295	0.96	1.10	2.000	Yes
210	34.61	2.08	0.80	1.28	0.89	0.405	1.38	0.295	0.96	1.10	2.000	Yes
211	34.78	2.09	0.80	1.29	0.89	0.405	1.38	0.295	0.96	1.10	2.000	Yes
212	34.94	2.10	0.81	1.29	0.89	0.405	1.38	0.294	0.96	1.10	2.000	Yes
213	35.11	2.11	0.81	1.30	0.89	0.405	1.38	0.294	0.95	1.10	2.000	Yes
214	35.27	2.12	0.82	1.30	0.89	0.405	1.38	0.294	0.95	1.10	0.339	No
215	35.43	2.13	0.82	1.31	0.89	0.405	1.38	0.294	0.95	1.10	0.340	No
216	35.60	2.14	0.83	1.31	0.89	0.404	1.38	0.294	0.95	1.10	0.340	No
217	35.76	2.15	0.83	1.32	0.89	0.404	1.38	0.294	0.95	1.10	0.340	No
218	35.93	2.16	0.84	1.32	0.88	0.404	1.38	0.294	0.95	1.10	0.340	No
219	36.09	2.17	0.85	1.33	0.88	0.404	1.38	0.293	0.95	1.10	0.340	No
220	36.26	2.18	0.85	1.33	0.88	0.403	1.38	0.293	0.95	1.10	0.340	No
221	36.42	2.20	0.86	1.34	0.88	0.403	1.38	0.293	0.95	1.10	0.340	No
222	36.58	2.21	0.86	1.35	0.88	0.403	1.38	0.293	0.95	1.10	0.340	No
223	36.75	2.22	0.87	1.35	0.88	0.403	1.38	0.293	0.95	1.10	0.340	No
224	36.91	2.23	0.87	1.36	0.88	0.402	1.38	0.292	0.94	1.10	2.000	Yes
225	37.08	2.24	0.88	1.36	0.88	0.402	1.38	0.292	0.94	1.10	2.000	Yes
226	37.24	2.25	0.88	1.37	0.87	0.402	1.38	0.292	0.94	1.10	2.000	Yes
227	37.40	2.26	0.89	1.37	0.87	0.402	1.38	0.292	0.94	1.10	2.000	Yes
228	37.57	2.27	0.89	1.38	0.87	0.401	1.38	0.292	0.94	1.10	2.000	Yes
229	37.73	2.28	0.90	1.38	0.87	0.401	1.38	0.291	0.94	1.10	2.000	Yes
230	37.90	2.29	0.90	1.39	0.87	0.401	1.38	0.291	0.94	1.10	2.000	Yes
231	38.06	2.30	0.91	1.39	0.87	0.400	1.38	0.291	0.94	1.10	2.000	Yes
232	38.22	2.31	0.91	1.40	0.87	0.400	1.38	0.291	0.94	1.10	2.000	Yes
233	38.39	2.32	0.92	1.40	0.86	0.400	1.38	0.291	0.94	1.10	2.000	Yes
234	38.55	2.33	0.92	1.41	0.86	0.399	1.38	0.290	0.94	1.10	0.341	No
235	38.72	2.34	0.93	1.41	0.86	0.399	1.38	0.290	0.94	1.10	0.341	No
236	38.88	2.35	0.93	1.42	0.86	0.399	1.38	0.290	0.93	1.10	0.341	No
237	39.04	2.36	0.94	1.42	0.86	0.398	1.38	0.289	0.93	1.10	0.341	No
238	39.21	2.37	0.94	1.43	0.86	0.398	1.38	0.289	0.93	1.10	0.341	No
239	39.37	2.38	0.95	1.44	0.86	0.397	1.38	0.289	0.93	1.10	0.341	No
240	39.54	2.39	0.95	1.44	0.86	0.397	1.38	0.289	0.93	1.10	0.341	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
241	39.70	2.40	0.96	1.45	0.85	0.397	1.38	0.288	0.93	1.10	0.341	No
242	39.86	2.42	0.96	1.45	0.85	0.396	1.38	0.288	0.93	1.10	0.341	No
243	40.03	2.43	0.97	1.46	0.85	0.396	1.38	0.288	0.93	1.10	0.341	No
244	40.19	2.44	0.97	1.46	0.85	0.395	1.38	0.287	0.93	1.10	0.340	No
245	40.36	2.45	0.98	1.47	0.85	0.395	1.38	0.287	0.93	1.10	0.340	No
246	40.52	2.46	0.98	1.48	0.85	0.394	1.38	0.287	0.93	1.10	0.340	No
247	40.68	2.47	0.99	1.48	0.84	0.394	1.38	0.286	0.93	1.10	0.340	No
248	40.85	2.48	0.99	1.49	0.84	0.393	1.38	0.286	0.92	1.10	0.340	No
249	41.01	2.49	1.00	1.49	0.84	0.393	1.38	0.286	0.92	1.10	0.340	No
250	41.18	2.50	1.00	1.50	0.84	0.392	1.38	0.285	0.92	1.10	0.340	No
251	41.34	2.51	1.01	1.50	0.84	0.392	1.38	0.285	0.92	1.10	0.340	No
252	41.50	2.52	1.01	1.51	0.84	0.391	1.38	0.284	0.92	1.10	0.340	No
253	41.67	2.53	1.02	1.51	0.84	0.391	1.38	0.284	0.92	1.10	0.339	No
254	41.83	2.54	1.02	1.52	0.83	0.390	1.38	0.284	0.92	1.10	0.339	No
255	42.00	2.55	1.03	1.53	0.83	0.390	1.38	0.283	0.92	1.10	0.339	No
256	42.16	2.57	1.03	1.53	0.83	0.389	1.38	0.283	0.92	1.10	0.339	No
257	42.32	2.58	1.04	1.54	0.83	0.389	1.38	0.283	0.92	1.10	0.339	No
258	42.49	2.59	1.04	1.54	0.83	0.388	1.38	0.282	0.92	1.10	0.339	No
259	42.65	2.60	1.05	1.55	0.83	0.388	1.38	0.282	0.92	1.10	0.338	No
260	42.82	2.61	1.06	1.55	0.83	0.387	1.38	0.281	0.92	1.10	0.338	No
261	42.98	2.62	1.06	1.56	0.82	0.387	1.38	0.281	0.91	1.10	0.338	No
262	43.15	2.63	1.07	1.56	0.82	0.386	1.38	0.281	0.91	1.10	0.338	No
263	43.31	2.64	1.07	1.57	0.82	0.386	1.38	0.280	0.91	1.10	0.338	No
264	43.47	2.65	1.08	1.58	0.82	0.385	1.38	0.280	0.91	1.10	2.000	Yes
265	43.64	2.66	1.08	1.58	0.82	0.384	1.38	0.279	0.91	1.10	2.000	Yes
266	43.80	2.67	1.09	1.59	0.82	0.384	1.38	0.279	0.91	1.10	2.000	Yes
267	43.97	2.68	1.09	1.59	0.81	0.383	1.38	0.279	0.91	1.10	2.000	Yes
268	44.13	2.69	1.10	1.60	0.81	0.383	1.38	0.278	0.91	1.10	2.000	Yes
269	44.29	2.70	1.10	1.60	0.81	0.382	1.38	0.278	0.91	1.10	2.000	Yes
270	44.46	2.71	1.11	1.61	0.81	0.382	1.38	0.278	0.91	1.10	0.336	No
271	44.62	2.72	1.11	1.61	0.81	0.381	1.38	0.277	0.91	1.10	0.336	No
272	44.79	2.73	1.12	1.62	0.81	0.381	1.38	0.277	0.91	1.10	0.336	No
273	44.95	2.74	1.12	1.62	0.80	0.380	1.38	0.276	0.91	1.10	0.335	No
274	45.11	2.75	1.13	1.63	0.80	0.380	1.38	0.276	0.91	1.10	0.335	No
275	45.28	2.76	1.13	1.63	0.80	0.379	1.38	0.276	0.91	1.10	0.335	No
276	45.44	2.77	1.14	1.63	0.80	0.379	1.38	0.275	0.90	1.10	0.335	No
277	45.61	2.78	1.14	1.64	0.80	0.378	1.38	0.275	0.90	1.10	0.334	No
278	45.77	2.79	1.15	1.64	0.80	0.378	1.38	0.275	0.90	1.10	0.334	No
279	45.93	2.80	1.15	1.65	0.79	0.377	1.38	0.274	0.90	1.10	0.334	No
280	46.10	2.81	1.16	1.65	0.79	0.377	1.38	0.274	0.90	1.10	0.334	No
281	46.26	2.82	1.16	1.65	0.79	0.376	1.38	0.274	0.90	1.10	0.333	No
282	46.43	2.83	1.17	1.66	0.79	0.376	1.38	0.273	0.90	1.10	0.333	No
283	46.59	2.84	1.17	1.66	0.79	0.375	1.38	0.273	0.90	1.10	0.333	No
284	46.75	2.85	1.18	1.67	0.79	0.375	1.38	0.272	0.90	1.10	2.000	Yes
285	46.92	2.86	1.18	1.67	0.78	0.374	1.38	0.272	0.90	1.10	2.000	Yes
286	47.08	2.87	1.19	1.68	0.78	0.374	1.38	0.271	0.90	1.10	2.000	Yes
287	47.25	2.88	1.19	1.68	0.78	0.373	1.38	0.271	0.90	1.10	2.000	Yes
288	47.41	2.89	1.20	1.69	0.78	0.372	1.38	0.271	0.90	1.10	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
289	47.57	2.90	1.20	1.69	0.78	0.372	1.38	0.270	0.90	1.10	0.331	No
290	47.74	2.91	1.21	1.70	0.78	0.371	1.38	0.270	0.90	1.10	0.331	No
291	47.90	2.92	1.21	1.71	0.77	0.370	1.38	0.269	0.90	1.10	0.330	No
292	48.07	2.93	1.22	1.71	0.77	0.370	1.38	0.269	0.90	1.10	0.330	No
293	48.23	2.94	1.22	1.72	0.77	0.369	1.38	0.268	0.89	1.10	0.330	No
294	48.39	2.95	1.23	1.72	0.77	0.368	1.38	0.268	0.89	1.10	0.329	No
295	48.56	2.96	1.23	1.73	0.77	0.368	1.38	0.267	0.89	1.10	0.329	No
296	48.72	2.97	1.24	1.73	0.77	0.367	1.38	0.267	0.89	1.10	0.329	No
297	48.89	2.98	1.24	1.74	0.76	0.366	1.38	0.266	0.89	1.10	0.328	No
298	49.05	2.99	1.25	1.74	0.76	0.366	1.38	0.266	0.89	1.10	0.328	No
299	49.22	3.00	1.25	1.75	0.76	0.365	1.38	0.265	0.89	1.10	0.328	No
300	49.38	3.02	1.26	1.76	0.76	0.364	1.38	0.265	0.89	1.10	0.327	No
301	49.54	3.03	1.26	1.76	0.76	0.364	1.38	0.264	0.89	1.10	0.327	No
302	49.71	3.04	1.27	1.77	0.76	0.363	1.38	0.264	0.89	1.10	0.327	No
303	49.87	3.05	1.28	1.77	0.75	0.362	1.38	0.263	0.89	1.10	0.326	No
304	50.04	3.06	1.28	1.78	0.75	0.362	1.38	0.263	0.89	1.10	0.326	No
305	50.20	3.07	1.29	1.78	0.75	0.361	1.38	0.262	0.89	1.10	2.000	Yes
306	50.36	3.08	1.29	1.79	0.75	0.360	1.38	0.262	0.89	1.10	2.000	Yes
307	50.53	3.09	1.30	1.79	0.75	0.360	1.38	0.261	0.89	1.10	2.000	Yes
308	50.69	3.10	1.30	1.80	0.75	0.359	1.38	0.261	0.89	1.10	2.000	Yes
309	50.86	3.11	1.31	1.80	0.74	0.358	1.38	0.261	0.88	1.10	2.000	Yes
310	51.02	3.12	1.31	1.81	0.74	0.358	1.38	0.260	0.88	1.10	2.000	Yes
311	51.18	3.13	1.32	1.81	0.74	0.357	1.38	0.260	0.88	1.10	2.000	Yes
312	51.35	3.14	1.32	1.82	0.74	0.357	1.38	0.259	0.88	1.10	0.323	No
313	51.51	3.15	1.33	1.82	0.74	0.356	1.38	0.259	0.88	1.10	0.323	No
314	51.68	3.16	1.33	1.83	0.74	0.355	1.38	0.258	0.88	1.10	0.322	No
315	51.84	3.17	1.34	1.83	0.73	0.355	1.38	0.258	0.88	1.10	0.322	No
316	52.00	3.18	1.34	1.84	0.73	0.354	1.38	0.258	0.88	1.10	0.322	No
317	52.17	3.19	1.35	1.84	0.73	0.354	1.38	0.257	0.88	1.10	0.321	No
318	52.33	3.20	1.35	1.84	0.73	0.353	1.38	0.257	0.88	1.10	0.321	No
319	52.50	3.21	1.36	1.85	0.73	0.353	1.38	0.256	0.88	1.10	0.321	No
320	52.66	3.22	1.36	1.85	0.73	0.352	1.38	0.256	0.88	1.10	0.320	No
321	52.82	3.22	1.37	1.86	0.72	0.352	1.38	0.255	0.88	1.10	0.320	No
322	52.99	3.23	1.37	1.86	0.72	0.351	1.38	0.255	0.88	1.10	0.319	No
323	53.15	3.24	1.38	1.87	0.72	0.350	1.38	0.255	0.88	1.10	0.319	No
324	53.32	3.25	1.38	1.87	0.72	0.350	1.38	0.254	0.88	1.10	0.319	No
325	53.48	3.26	1.39	1.88	0.72	0.349	1.38	0.254	0.88	1.10	0.318	No
326	53.64	3.27	1.39	1.88	0.72	0.349	1.38	0.253	0.88	1.10	0.318	No
327	53.81	3.28	1.40	1.88	0.71	0.348	1.38	0.253	0.88	1.10	0.318	No
328	53.97	3.29	1.40	1.89	0.71	0.347	1.38	0.253	0.88	1.10	0.317	No
329	54.14	3.30	1.41	1.89	0.71	0.347	1.38	0.252	0.87	1.10	0.317	No
330	54.30	3.31	1.41	1.90	0.71	0.346	1.38	0.252	0.87	1.10	0.317	No
331	54.46	3.32	1.42	1.90	0.71	0.346	1.38	0.251	0.87	1.10	0.316	No
332	54.63	3.33	1.42	1.90	0.71	0.345	1.38	0.251	0.87	1.10	0.316	No
333	54.79	3.34	1.43	1.91	0.71	0.345	1.38	0.250	0.87	1.10	0.316	No
334	54.96	3.35	1.43	1.91	0.70	0.344	1.38	0.250	0.87	1.10	0.315	No
335	55.12	3.36	1.44	1.92	0.70	0.343	1.38	0.250	0.87	1.10	0.315	No
336	55.28	3.37	1.44	1.92	0.70	0.343	1.38	0.249	0.87	1.10	0.314	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
337	55.45	3.38	1.45	1.93	0.70	0.342	1.38	0.249	0.87	1.10	2.000	Yes
338	55.61	3.39	1.45	1.93	0.70	0.342	1.38	0.248	0.87	1.10	2.000	Yes
339	55.78	3.40	1.46	1.94	0.70	0.341	1.38	0.248	0.87	1.10	2.000	Yes
340	55.94	3.41	1.46	1.94	0.69	0.340	1.38	0.247	0.87	1.10	2.000	Yes
341	56.11	3.42	1.47	1.95	0.69	0.340	1.38	0.247	0.87	1.10	2.000	Yes
342	56.27	3.43	1.47	1.96	0.69	0.339	1.38	0.246	0.87	1.10	2.000	Yes
343	56.43	3.44	1.48	1.96	0.69	0.338	1.38	0.246	0.87	1.10	0.312	No
344	56.60	3.45	1.49	1.97	0.69	0.338	1.38	0.245	0.87	1.10	0.311	No
345	56.76	3.46	1.49	1.97	0.69	0.337	1.38	0.245	0.87	1.10	2.000	Yes
346	56.93	3.47	1.50	1.98	0.69	0.336	1.38	0.245	0.87	1.10	2.000	Yes
347	57.09	3.48	1.50	1.98	0.68	0.336	1.38	0.244	0.87	1.10	2.000	Yes
348	57.25	3.49	1.51	1.99	0.68	0.335	1.38	0.244	0.86	1.10	2.000	Yes
349	57.42	3.51	1.51	1.99	0.68	0.335	1.38	0.243	0.86	1.10	2.000	Yes
350	57.58	3.51	1.52	2.00	0.68	0.334	1.38	0.243	0.86	1.10	2.000	Yes
351	57.75	3.53	1.52	2.00	0.68	0.333	1.38	0.242	0.86	1.10	0.309	No
352	57.91	3.53	1.53	2.01	0.68	0.333	1.38	0.242	0.86	1.10	0.308	No
353	58.07	3.54	1.53	2.01	0.68	0.332	1.38	0.242	0.86	1.10	0.308	No
354	58.24	3.55	1.54	2.02	0.67	0.332	1.38	0.241	0.86	1.10	0.308	No
355	58.40	3.56	1.54	2.02	0.67	0.331	1.38	0.241	0.86	1.10	0.307	No
356	58.57	3.57	1.55	2.03	0.67	0.331	1.38	0.240	0.86	1.10	0.307	No
357	58.73	3.58	1.55	2.03	0.67	0.330	1.38	0.240	0.86	1.10	0.307	No
358	58.89	3.59	1.56	2.03	0.67	0.330	1.38	0.240	0.86	1.10	0.306	No
359	59.06	3.60	1.56	2.04	0.67	0.329	1.38	0.239	0.86	1.10	0.306	No
360	59.22	3.61	1.57	2.04	0.67	0.329	1.38	0.239	0.86	1.10	0.306	No
361	59.39	3.62	1.57	2.05	0.66	0.328	1.38	0.238	0.86	1.10	0.305	No
362	59.55	3.63	1.58	2.05	0.66	0.328	1.38	0.238	0.86	1.10	0.305	No
363	59.71	3.64	1.58	2.06	0.66	0.327	1.38	0.238	0.86	1.10	0.305	No
364	59.88	3.65	1.59	2.06	0.66	0.326	1.38	0.237	0.86	1.10	0.304	No
365	60.04	3.66	1.59	2.07	0.66	0.326	1.38	0.237	0.86	1.10	2.000	No
366	60.21	3.67	1.60	2.07	0.66	0.325	1.38	0.236	0.86	1.10	2.000	No
367	60.37	3.68	1.60	2.08	0.66	0.325	1.38	0.236	0.86	1.10	2.000	No
368	60.53	3.69	1.61	2.08	0.65	0.324	1.38	0.236	0.86	1.10	2.000	No
369	60.70	3.70	1.61	2.09	0.65	0.324	1.38	0.235	0.86	1.10	2.000	No
370	60.86	3.71	1.62	2.09	0.65	0.323	1.38	0.235	0.85	1.10	2.000	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
σ_v: Total overburden pressure at test point (tsf)
u_0: Water pressure at test point (tsf)
σ_v': Effective overburden pressure based on GWT during earthquake (tsf)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.33	179.69	1.28	0.37	0.50	288.66	1.00	288.66	4.000	No	No	2.00
2	0.49	166.02	1.38	0.48	0.50	266.69	1.00	266.69	4.000	No	No	2.00
3	0.66	149.08	1.52	0.69	0.50	239.45	1.00	239.45	4.000	No	No	2.00
4	0.82	139.05	1.63	0.91	0.50	223.32	1.00	223.32	4.000	No	No	2.00
5	0.98	124.21	1.75	1.21	0.54	199.46	1.07	213.83	4.000	No	No	2.00
6	1.15	108.17	1.86	1.48	0.58	173.68	1.15	199.80	4.000	No	No	2.00
7	1.31	94.74	1.94	1.69	0.61	152.08	1.23	186.56	4.000	No	No	2.00
8	1.48	83.90	1.98	1.75	0.63	134.66	1.28	172.39	4.000	No	No	2.00
9	1.64	76.30	2.01	1.75	0.64	122.43	1.32	161.22	4.000	No	No	2.00
10	1.80	72.04	2.02	1.67	0.64	115.56	1.32	152.56	4.000	No	No	2.00
11	1.97	70.27	2.01	1.62	0.64	112.70	1.32	148.43	4.000	No	No	2.00
12	2.13	69.33	2.00	1.54	0.64	111.18	1.30	144.90	4.000	No	No	2.00
13	2.30	66.20	2.01	1.51	0.64	106.13	1.32	139.58	4.000	No	No	2.00
14	2.46	60.60	2.03	1.49	0.65	97.12	1.35	130.87	4.000	No	No	2.00
15	2.62	53.63	2.07	1.50	0.67	85.91	1.41	121.22	4.000	No	No	2.00
16	2.79	49.93	2.09	1.47	0.67	79.95	1.44	115.41	4.000	No	No	2.00
17	2.95	50.70	2.07	1.39	0.66	81.17	1.40	114.02	4.000	No	No	2.00
18	3.12	53.57	2.04	1.31	0.65	85.76	1.35	115.95	4.000	No	No	2.00
19	3.28	53.27	2.04	1.32	0.65	85.26	1.36	115.73	4.000	Yes	No	2.00
20	3.45	47.06	2.10	1.42	0.68	75.28	1.46	109.98	4.000	Yes	No	2.00
21	3.61	37.26	2.23	1.71	0.73	59.52	1.75	104.20	4.000	Yes	No	2.00
22	3.77	27.40	2.39	2.09	0.79	43.65	2.28	99.40	4.000	Yes	No	2.00
23	3.94	20.33	2.56	2.65	0.85	32.28	3.08	99.58	4.000	Yes	No	2.00
24	4.10	16.60	2.65	2.85	0.88	26.27	3.63	95.46	4.000	Yes	Yes	2.00
25	4.27	15.73	2.64	2.59	0.88	24.86	3.58	88.98	4.000	No	Yes	2.00
26	4.43	16.36	2.54	1.86	0.84	25.86	2.98	77.11	4.000	No	No	2.00
27	4.59	16.96	2.46	1.40	0.81	26.81	2.56	68.56	4.000	No	No	2.00
28	4.76	17.06	2.42	1.19	0.80	26.96	2.38	64.18	4.000	No	No	2.00
29	4.92	17.23	2.41	1.18	0.79	27.21	2.36	64.14	4.000	No	No	2.00
30	5.09	17.63	2.40	1.15	0.79	27.84	2.30	64.05	4.000	No	No	2.00
31	5.25	18.39	2.41	1.29	0.79	29.06	2.34	68.13	4.000	No	No	2.00
32	5.41	19.86	2.42	1.53	0.80	31.40	2.41	75.61	4.000	No	No	2.00
33	5.58	22.83	2.41	1.78	0.79	36.15	2.36	85.33	4.000	No	No	2.00
34	5.74	25.03	2.42	2.02	0.80	39.67	2.37	94.22	4.000	No	No	2.00
35	5.91	25.29	2.44	2.27	0.81	40.09	2.50	100.15	4.000	No	No	2.00
36	6.07	22.83	2.51	2.52	0.83	36.11	2.81	101.32	4.000	No	No	2.00
37	6.23	20.39	2.56	2.66	0.85	32.18	3.10	99.62	4.000	No	No	2.00
38	6.40	19.16	2.56	2.48	0.85	30.18	3.11	93.83	4.000	No	No	2.00
39	6.56	19.36	2.54	2.28	0.84	30.49	2.96	90.30	4.000	No	No	2.00
40	6.73	20.26	2.49	2.01	0.82	31.92	2.71	86.36	4.000	No	No	2.00
41	6.89	21.32	2.48	2.07	0.82	33.62	2.66	89.29	4.000	No	No	2.00
42	7.05	22.09	2.48	2.15	0.82	34.84	2.65	92.25	4.000	No	No	2.00
43	7.22	22.49	2.50	2.42	0.83	35.46	2.78	98.44	4.000	No	No	2.00
44	7.38	23.69	2.49	2.44	0.82	37.38	2.70	100.91	4.000	Yes	No	2.00
45	7.55	26.69	2.43	2.29	0.80	42.18	2.43	102.57	4.000	Yes	No	2.00
46	7.71	32.99	2.31	1.95	0.76	52.29	1.99	103.95	4.000	Yes	No	2.00
47	7.87	40.29	2.20	1.67	0.71	64.00	1.67	107.12	4.000	Yes	No	2.00
48	8.04	45.33	2.14	1.56	0.69	72.08	1.54	111.00	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	8.20	44.89	2.15	1.58	0.69	71.36	1.55	110.82	4.000	No	No	2.00
50	8.37	41.69	2.20	1.70	0.71	66.21	1.66	109.70	4.000	No	No	2.00
51	8.53	38.42	2.23	1.76	0.73	60.94	1.75	106.71	4.000	No	No	2.00
52	8.69	36.89	2.24	1.74	0.73	58.46	1.78	104.10	4.000	No	No	2.00
53	8.86	35.82	2.25	1.70	0.73	56.72	1.79	101.51	4.000	No	No	2.00
54	9.02	35.19	2.28	1.83	0.74	55.39	1.87	103.66	0.184	No	No	0.84
55	9.19	35.09	2.29	1.93	0.75	54.73	1.93	105.71	0.190	No	No	0.86
56	9.35	35.49	2.30	2.00	0.75	54.79	1.96	107.64	0.196	No	No	0.88
57	9.51	36.32	2.30	1.96	0.75	55.24	1.93	106.87	0.194	No	No	0.86
58	9.68	37.76	2.28	1.88	0.74	56.43	1.88	106.01	0.191	No	No	0.84
59	9.84	39.99	2.26	1.86	0.74	58.84	1.83	107.57	0.196	No	No	0.85
60	10.01	43.03	2.25	1.88	0.73	62.30	1.79	111.28	0.208	No	No	0.90
61	10.17	46.26	2.23	1.90	0.72	65.99	1.74	114.90	0.221	No	No	0.95
62	10.34	49.19	2.21	1.85	0.72	69.03	1.69	116.35	0.226	No	No	0.96
63	10.50	51.39	2.20	1.84	0.71	71.15	1.66	117.83	0.232	No	No	0.98
64	10.66	53.09	2.19	1.84	0.71	72.62	1.64	119.24	0.238	No	No	1.00
65	10.83	54.26	2.19	1.86	0.71	73.37	1.64	120.52	0.243	No	No	1.01
66	10.99	55.16	2.19	1.90	0.71	73.83	1.65	121.78	0.248	No	No	1.03
67	11.16	56.06	2.20	1.93	0.71	74.23	1.66	122.96	0.253	No	No	1.04
68	11.32	57.39	2.21	2.06	0.72	75.40	1.69	127.67	0.274	No	No	1.12
69	11.48	59.73	2.22	2.20	0.72	77.82	1.72	133.92	0.303	No	No	1.23
70	11.65	62.96	2.22	2.30	0.72	81.16	1.72	139.84	0.334	No	No	1.35
71	11.81	65.89	2.22	2.35	0.72	84.03	1.71	143.94	0.357	No	No	1.43
72	11.98	67.49	2.21	2.30	0.72	85.00	1.69	143.23	0.353	No	No	1.41
73	12.14	67.29	2.21	2.25	0.72	83.86	1.68	140.95	0.340	No	No	1.35
74	12.30	66.26	2.20	2.19	0.72	81.72	1.68	137.10	0.320	No	No	1.26
75	12.47	64.66	2.22	2.19	0.72	79.01	1.70	134.70	0.307	No	No	1.20
76	12.63	62.92	2.24	2.30	0.73	76.39	1.77	135.51	0.311	No	No	1.21
77	12.80	60.86	2.27	2.44	0.74	73.37	1.86	136.43	0.316	No	No	1.22
78	12.96	58.59	2.30	2.54	0.75	70.14	1.94	135.98	0.314	No	No	1.21
79	13.12	56.05	2.31	2.53	0.76	66.55	1.99	132.41	0.296	No	No	1.13
80	13.29	53.89	2.33	2.51	0.76	63.38	2.03	128.77	0.279	No	No	1.06
81	13.45	52.19	2.35	2.59	0.77	60.91	2.11	128.53	0.277	No	No	1.05
82	13.62	53.05	2.35	2.62	0.77	61.30	2.11	129.46	0.282	No	No	1.06
83	13.78	50.19	2.38	2.77	0.78	57.60	2.25	129.59	0.282	No	No	1.06
84	13.94	50.59	2.38	2.68	0.78	57.46	2.21	127.24	0.272	No	No	1.02
85	14.11	48.39	2.40	2.73	0.79	54.49	2.30	125.56	0.264	No	No	0.98
86	14.27	48.52	2.39	2.66	0.79	54.10	2.28	123.29	0.254	No	No	0.94
87	14.44	42.98	2.47	3.01	0.82	47.65	2.62	124.62	0.260	No	No	0.96
88	14.60	42.71	2.49	3.19	0.82	46.98	2.72	127.83	4.000	Yes	No	2.00
89	14.76	48.07	2.44	3.04	0.81	52.30	2.49	130.46	4.000	Yes	No	2.00
90	14.93	57.64	2.35	2.70	0.77	61.91	2.14	132.27	4.000	Yes	No	2.00
91	15.09	63.58	2.30	2.50	0.75	67.56	1.96	132.50	4.000	Yes	No	2.00
92	15.26	65.79	2.30	2.57	0.75	69.31	1.96	136.05	0.314	No	No	1.14
93	15.42	69.12	2.29	2.59	0.75	72.21	1.93	139.43	0.332	No	No	1.20
94	15.58	73.78	2.28	2.61	0.74	76.44	1.88	144.00	0.358	No	No	1.29
95	15.75	79.95	2.25	2.53	0.73	82.07	1.79	147.23	0.377	No	No	1.35
96	15.91	84.15	2.23	2.48	0.72	85.67	1.74	149.28	0.389	No	No	1.39

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	16.08	85.82	2.22	2.44	0.72	86.62	1.72	148.78	0.386	No	No	1.37
98	16.24	84.32	2.22	2.40	0.72	84.45	1.73	145.70	0.368	No	No	1.30
99	16.40	80.22	2.24	2.40	0.73	79.73	1.77	141.23	0.342	No	No	1.21
100	16.57	73.45	2.27	2.44	0.74	72.40	1.87	135.45	0.311	No	No	1.10
101	16.73	63.99	2.34	2.59	0.77	62.57	2.08	130.13	0.285	No	No	1.00
102	16.90	54.19	2.43	2.88	0.80	52.49	2.42	127.05	0.271	No	No	0.95
103	17.06	55.45	2.43	3.00	0.80	53.32	2.45	130.71	0.288	No	No	1.00
104	17.23	70.75	2.32	2.63	0.76	67.62	2.01	136.03	0.314	No	No	1.09
105	17.39	91.02	2.21	2.37	0.72	86.53	1.70	146.83	0.374	No	No	1.30
106	17.55	103.78	2.17	2.30	0.70	98.07	1.59	155.60	0.430	No	No	1.49
107	17.72	106.25	2.18	2.47	0.71	99.70	1.63	162.17	0.477	No	No	1.64
108	17.88	103.99	2.21	2.59	0.72	96.86	1.68	163.08	0.483	No	No	1.66
109	18.05	97.45	2.23	2.59	0.72	90.03	1.74	156.65	0.437	No	No	1.50
110	18.21	83.88	2.27	2.54	0.74	76.80	1.85	142.35	4.000	Yes	No	2.00
111	18.37	63.22	2.37	2.63	0.78	57.15	2.20	125.69	4.000	Yes	No	2.00
112	18.54	40.92	2.56	3.10	0.85	36.25	3.12	113.03	4.000	Yes	No	2.00
113	18.70	24.56	2.80	3.84	0.94	21.09	4.82	101.55	4.000	Yes	Yes	2.00
114	18.87	16.42	2.99	4.36	1.00	13.60	6.59	89.62	4.000	Yes	Yes	2.00
115	19.03	13.09	3.06	4.18	1.00	10.55	7.47	78.73	4.000	No	Yes	2.00
116	19.19	11.36	3.12	4.24	1.00	8.94	8.22	73.55	4.000	No	Yes	2.00
117	19.36	10.67	3.17	4.55	1.00	8.26	8.83	72.96	4.000	No	Yes	2.00
118	19.52	10.75	3.19	4.87	1.00	8.26	9.07	74.90	4.000	No	Yes	2.00
119	19.69	10.87	3.20	5.15	1.00	8.29	9.25	76.74	4.000	No	Yes	2.00
120	19.85	10.83	3.21	5.18	1.00	8.19	9.33	76.43	4.000	No	Yes	2.00
121	20.01	10.93	3.22	5.47	1.00	8.21	9.53	78.18	4.000	No	Yes	2.00
122	20.18	11.74	3.21	5.69	1.00	8.81	9.33	82.18	4.000	No	Yes	2.00
123	20.34	12.95	3.17	5.68	1.00	9.74	8.85	86.17	4.000	No	Yes	2.00
124	20.51	13.67	3.14	5.35	1.00	10.24	8.41	86.15	4.000	No	Yes	2.00
125	20.67	13.55	3.12	4.87	1.00	10.06	8.16	82.12	4.000	No	Yes	2.00
126	20.83	13.17	3.09	4.19	1.00	9.68	7.83	75.81	4.000	No	Yes	2.00
127	21.00	12.47	3.10	3.86	1.00	9.03	7.87	71.13	4.000	No	Yes	2.00
128	21.16	11.46	3.14	3.92	1.00	8.15	8.39	68.37	4.000	No	Yes	2.00
129	21.33	10.33	3.21	4.41	1.00	7.19	9.39	67.53	4.000	No	Yes	2.00
130	21.49	10.29	3.22	4.44	1.00	7.10	9.48	67.28	4.000	No	Yes	2.00
131	21.65	10.63	3.22	4.63	1.00	7.31	9.49	69.36	4.000	No	Yes	2.00
132	21.82	11.05	3.21	4.78	1.00	7.57	9.42	71.39	4.000	No	Yes	2.00
133	21.98	11.10	3.25	5.44	1.00	7.55	9.92	74.93	4.000	No	Yes	2.00
134	22.15	12.41	3.20	5.41	1.00	8.49	9.32	79.11	4.000	No	Yes	2.00
135	22.31	16.08	3.07	4.74	1.00	11.22	7.61	85.36	4.000	No	Yes	2.00
136	22.47	20.48	2.94	4.00	1.00	14.47	6.12	88.55	4.000	No	Yes	2.00
137	22.64	23.30	2.88	3.79	0.97	16.55	5.52	91.40	4.000	No	Yes	2.00
138	22.80	23.10	2.91	4.14	0.98	16.24	5.81	94.43	4.000	No	Yes	2.00
139	22.97	23.07	2.95	4.76	1.00	16.03	6.25	100.27	4.000	No	Yes	2.00
140	23.13	24.34	2.96	5.08	1.00	16.84	6.27	105.68	4.000	No	Yes	2.00
141	23.30	26.61	2.93	5.15	0.99	18.40	6.02	110.69	4.000	No	Yes	2.00
142	23.46	27.83	2.92	5.17	0.99	19.17	5.89	112.91	4.000	No	Yes	2.00
143	23.62	27.86	2.92	5.16	0.99	19.06	5.91	112.55	4.000	No	Yes	2.00
144	23.79	26.93	2.93	5.09	0.99	18.22	6.02	109.60	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	23.95	25.49	2.96	5.12	1.00	17.03	6.26	106.66	4.000	No	Yes	2.00
146	24.12	24.32	2.97	5.10	1.00	16.08	6.45	103.69	4.000	No	Yes	2.00
147	24.28	24.21	2.97	4.97	1.00	15.90	6.42	102.00	4.000	No	Yes	2.00
148	24.44	24.01	2.95	4.58	1.00	15.64	6.23	97.43	4.000	No	Yes	2.00
149	24.61	22.00	2.97	4.38	1.00	14.14	6.46	91.37	4.000	No	Yes	2.00
150	24.77	18.16	3.05	4.39	1.00	11.42	7.29	83.28	4.000	No	Yes	2.00
151	24.94	14.80	3.17	5.25	1.00	9.06	8.90	80.65	4.000	No	Yes	2.00
152	25.10	14.35	3.23	6.22	1.00	8.69	9.73	84.61	4.000	No	Yes	2.00
153	25.26	20.14	3.08	5.54	1.00	12.52	7.68	96.06	4.000	No	Yes	2.00
154	25.43	37.42	2.72	3.43	0.91	24.69	4.14	102.32	4.000	Yes	Yes	2.00
155	25.59	59.99	2.45	2.39	0.81	41.46	2.52	104.28	4.000	Yes	No	2.00
156	25.76	81.92	2.27	1.91	0.74	58.08	1.86	108.13	4.000	Yes	No	2.00
157	25.92	95.45	2.20	1.81	0.72	68.16	1.68	114.43	4.000	Yes	No	2.00
158	26.08	104.61	2.18	1.84	0.71	74.71	1.62	121.12	0.245	No	No	0.77
159	26.25	110.55	2.17	1.87	0.70	78.76	1.59	125.33	0.263	No	No	0.82
160	26.41	114.05	2.16	1.87	0.70	81.02	1.57	127.38	0.272	No	No	0.85
161	26.58	116.58	2.15	1.85	0.69	82.53	1.56	128.38	0.277	No	No	0.86
162	26.74	118.28	2.15	1.86	0.69	83.41	1.55	129.21	0.281	No	No	0.87
163	26.90	119.62	2.15	1.86	0.69	83.99	1.55	129.94	0.284	No	No	0.88
164	27.07	120.98	2.15	1.87	0.69	84.57	1.54	130.65	0.287	No	No	0.89
165	27.23	124.15	2.14	1.88	0.69	86.51	1.53	132.56	0.297	No	No	0.92
166	27.40	129.25	2.12	1.85	0.68	89.91	1.50	134.95	0.309	No	No	0.96
167	27.56	135.08	2.10	1.80	0.68	93.97	1.46	136.96	0.319	No	No	0.99
168	27.72	139.92	2.07	1.69	0.66	97.45	1.40	136.86	0.318	No	No	0.99
169	27.89	143.42	2.07	1.69	0.66	99.57	1.40	138.91	0.329	No	No	1.02
170	28.05	145.38	2.08	1.76	0.67	100.36	1.41	141.64	0.344	No	No	1.06
171	28.22	144.28	2.11	1.94	0.68	98.53	1.47	145.21	0.365	No	No	1.12
172	28.38	141.62	2.14	2.05	0.69	95.85	1.52	145.97	0.369	No	No	1.14
173	28.54	137.95	2.15	2.08	0.69	92.69	1.55	144.00	0.358	No	No	1.10
174	28.71	135.08	2.15	2.02	0.69	90.33	1.55	140.25	0.337	No	No	1.03
175	28.87	130.68	2.15	1.94	0.69	87.01	1.55	134.77	0.308	No	No	0.94
176	29.04	123.72	2.16	1.91	0.70	81.70	1.58	129.29	0.281	No	No	0.86
177	29.20	115.22	2.20	2.00	0.71	75.13	1.67	125.78	0.265	No	No	0.81
178	29.36	106.98	2.25	2.15	0.73	68.71	1.81	124.28	0.259	No	No	0.79
179	29.53	101.68	2.30	2.34	0.75	64.38	1.94	125.13	0.262	No	No	0.80
180	29.69	103.82	2.30	2.38	0.75	65.45	1.95	127.44	0.272	No	No	0.83
181	29.86	113.02	2.26	2.31	0.74	71.55	1.83	131.08	0.289	No	No	0.88
182	30.02	128.05	2.19	2.11	0.71	82.00	1.65	135.22	0.310	No	No	0.94
183	30.19	140.72	2.14	1.94	0.69	90.88	1.52	138.40	0.327	No	No	0.99
184	30.35	151.85	2.09	1.80	0.67	98.76	1.43	141.29	0.342	No	No	1.04
185	30.51	161.72	2.05	1.69	0.65	105.73	1.36	144.30	0.359	No	No	1.09
186	30.68	172.55	2.01	1.60	0.64	113.34	1.31	148.57	0.385	No	No	1.16
187	30.84	179.25	2.00	1.60	0.64	117.65	1.29	152.35	0.409	No	No	1.23
188	31.01	181.15	2.01	1.65	0.64	118.21	1.31	154.55	0.423	No	No	1.27
189	31.17	176.78	2.01	1.64	0.64	114.76	1.32	150.97	0.400	No	No	1.20
190	31.33	171.05	2.01	1.56	0.64	110.72	1.31	144.92	0.363	No	No	1.09
191	31.50	164.15	2.00	1.44	0.64	106.05	1.30	137.34	0.321	No	No	0.96
192	31.66	150.02	2.03	1.46	0.65	95.66	1.35	128.84	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	31.83	129.32	2.12	1.62	0.68	80.41	1.49	119.95	4.000	Yes	No	2.00
194	31.99	98.35	2.28	2.00	0.75	58.41	1.90	110.97	4.000	Yes	No	2.00
195	32.15	70.15	2.49	2.59	0.82	39.30	2.70	106.26	4.000	Yes	No	2.00
196	32.32	49.72	2.67	3.07	0.89	26.27	3.77	99.04	4.000	Yes	Yes	2.00
197	32.48	41.42	2.73	2.96	0.92	21.30	4.21	89.65	4.000	Yes	Yes	2.00
198	32.65	40.52	2.68	2.42	0.90	20.94	3.86	80.92	4.000	No	Yes	2.00
199	32.81	41.08	2.65	2.22	0.89	21.30	3.67	78.08	4.000	No	Yes	2.00
200	32.97	42.71	2.62	2.05	0.87	22.27	3.43	76.42	4.000	No	Yes	2.00
201	33.14	44.30	2.58	1.89	0.86	23.24	3.22	74.77	0.119	No	No	0.35
202	33.30	44.65	2.57	1.80	0.85	23.42	3.13	73.24	0.117	No	No	0.35
203	33.47	42.20	2.63	2.07	0.88	21.62	3.52	76.10	4.000	No	Yes	2.00
204	33.63	40.20	2.72	2.62	0.91	20.02	4.13	82.63	4.000	No	Yes	2.00
205	33.79	42.87	2.73	2.94	0.91	21.28	4.20	89.35	4.000	No	Yes	2.00
206	33.96	48.94	2.68	2.91	0.90	24.63	3.82	94.11	4.000	No	Yes	2.00
207	34.12	52.89	2.66	3.02	0.89	26.71	3.70	98.79	4.000	No	Yes	2.00
208	34.29	52.80	2.66	3.02	0.89	26.52	3.72	98.61	4.000	No	Yes	2.00
209	34.45	54.05	2.68	3.27	0.90	26.93	3.84	103.31	4.000	Yes	Yes	2.00
210	34.61	62.05	2.62	3.17	0.87	31.41	3.44	108.01	4.000	Yes	Yes	2.00
211	34.78	76.62	2.50	2.73	0.83	40.14	2.74	110.14	4.000	Yes	No	2.00
212	34.94	89.91	2.37	2.16	0.78	48.73	2.18	106.06	4.000	Yes	No	2.00
213	35.11	98.27	2.27	1.73	0.74	54.57	1.84	100.54	4.000	Yes	No	2.00
214	35.27	100.32	2.26	1.77	0.74	55.54	1.84	102.21	0.179	No	No	0.53
215	35.43	102.91	2.30	2.02	0.75	56.30	1.94	109.39	0.202	No	No	0.59
216	35.60	113.34	2.29	2.16	0.75	62.08	1.91	118.32	0.234	No	No	0.69
217	35.76	132.88	2.21	2.04	0.72	74.17	1.70	126.10	0.266	No	No	0.78
218	35.93	154.21	2.13	1.84	0.69	87.94	1.51	132.82	0.298	No	No	0.88
219	36.09	167.64	2.07	1.69	0.67	96.85	1.41	136.46	0.316	No	No	0.93
220	36.26	171.11	2.05	1.60	0.66	99.22	1.37	135.86	0.313	No	No	0.92
221	36.42	167.04	2.04	1.50	0.65	96.85	1.35	130.84	0.288	No	No	0.85
222	36.58	162.04	2.03	1.42	0.65	93.76	1.34	125.91	0.266	No	No	0.78
223	36.75	156.71	2.04	1.38	0.65	90.22	1.35	121.76	0.248	No	No	0.73
224	36.91	148.60	2.07	1.46	0.67	84.33	1.41	118.76	4.000	Yes	No	2.00
225	37.08	129.47	2.17	1.70	0.70	70.99	1.61	113.98	4.000	Yes	No	2.00
226	37.24	100.57	2.34	2.14	0.77	52.17	2.08	108.60	4.000	Yes	No	2.00
227	37.40	71.92	2.54	2.73	0.84	34.82	2.99	104.02	4.000	Yes	No	2.00
228	37.57	50.63	2.74	3.38	0.92	22.76	4.32	98.23	4.000	Yes	Yes	2.00
229	37.73	39.11	2.91	4.16	0.98	16.50	5.78	95.33	4.000	Yes	Yes	2.00
230	37.90	47.91	2.75	3.22	0.92	21.33	4.38	93.45	4.000	Yes	Yes	2.00
231	38.06	71.53	2.48	2.21	0.82	34.94	2.68	93.68	4.000	Yes	No	2.00
232	38.22	102.71	2.26	1.66	0.74	54.02	1.82	98.17	4.000	Yes	No	2.00
233	38.39	122.18	2.19	1.67	0.71	65.57	1.65	108.34	4.000	Yes	No	2.00
234	38.55	133.92	2.19	1.80	0.71	72.06	1.63	117.54	0.231	No	No	0.68
235	38.72	140.67	2.17	1.83	0.70	75.86	1.61	121.80	0.248	No	No	0.73
236	38.88	145.88	2.17	1.86	0.70	78.76	1.59	125.12	0.262	No	No	0.77
237	39.04	151.09	2.16	1.91	0.70	81.56	1.58	128.94	0.279	No	No	0.82
238	39.21	157.10	2.18	2.09	0.71	84.25	1.62	136.63	0.317	No	No	0.93
239	39.37	167.33	2.17	2.18	0.70	89.83	1.61	144.40	0.360	No	No	1.06
240	39.54	173.80	2.17	2.20	0.70	93.45	1.59	148.17	0.383	No	No	1.12

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	39.70	174.57	2.15	2.13	0.70	94.03	1.56	146.71	0.374	No	No	1.10
242	39.86	169.01	2.15	2.06	0.70	90.83	1.56	141.77	0.345	No	No	1.01
243	40.03	164.81	2.16	2.03	0.70	88.26	1.57	138.61	0.328	No	No	0.96
244	40.19	163.57	2.16	2.05	0.70	87.29	1.58	138.18	0.325	No	No	0.96
245	40.36	163.74	2.17	2.11	0.70	86.95	1.61	139.61	0.333	No	No	0.98
246	40.52	165.17	2.17	2.09	0.70	87.71	1.59	139.77	0.334	No	No	0.98
247	40.68	167.30	2.15	2.00	0.69	89.21	1.55	138.59	0.328	No	No	0.96
248	40.85	168.08	2.13	1.89	0.69	90.02	1.51	136.14	0.315	No	No	0.93
249	41.01	165.18	2.12	1.78	0.68	88.67	1.49	131.77	0.293	No	No	0.86
250	41.18	157.12	2.12	1.72	0.68	83.93	1.50	125.93	0.266	No	No	0.78
251	41.34	146.62	2.14	1.69	0.69	77.67	1.54	119.41	0.238	No	No	0.70
252	41.50	136.82	2.18	1.74	0.71	71.49	1.61	115.36	0.223	No	No	0.66
253	41.67	134.62	2.20	1.84	0.71	69.64	1.67	116.61	0.227	No	No	0.67
254	41.83	136.67	2.21	1.94	0.72	70.35	1.70	119.87	0.240	No	No	0.71
255	42.00	139.80	2.22	2.02	0.72	71.74	1.72	123.24	0.254	No	No	0.75
256	42.16	141.44	2.22	2.02	0.72	72.55	1.71	123.99	0.257	No	No	0.76
257	42.32	143.95	2.21	2.03	0.72	73.82	1.70	125.45	0.264	No	No	0.78
258	42.49	148.65	2.21	2.05	0.72	76.30	1.68	128.41	0.277	No	No	0.82
259	42.65	155.19	2.20	2.12	0.71	79.68	1.67	133.30	0.300	No	No	0.89
260	42.82	160.49	2.20	2.17	0.71	82.36	1.67	137.33	0.321	No	No	0.95
261	42.98	165.79	2.19	2.19	0.71	85.22	1.65	140.27	0.337	No	No	1.00
262	43.15	165.99	2.19	2.16	0.71	85.27	1.64	139.65	0.333	No	No	0.99
263	43.31	160.73	2.19	2.13	0.71	82.21	1.65	135.91	0.313	No	No	0.93
264	43.47	143.89	2.24	2.17	0.73	72.26	1.77	128.00	4.000	Yes	No	2.00
265	43.64	119.26	2.33	2.29	0.76	57.95	2.03	117.82	4.000	Yes	No	2.00
266	43.80	91.86	2.46	2.58	0.81	42.36	2.58	109.31	4.000	Yes	No	2.00
267	43.97	69.20	2.61	2.96	0.87	30.02	3.41	102.35	4.000	Yes	Yes	2.00
268	44.13	52.61	2.77	3.41	0.93	21.40	4.50	96.27	4.000	Yes	Yes	2.00
269	44.29	40.41	2.90	3.71	0.98	15.46	5.69	87.96	4.000	Yes	Yes	2.00
270	44.46	30.95	3.03	4.01	1.00	11.36	7.04	79.92	4.000	No	Yes	2.00
271	44.62	32.62	2.96	3.34	1.00	12.00	6.30	75.66	4.000	No	Yes	2.00
272	44.79	43.92	2.75	2.51	0.92	17.61	4.38	77.23	4.000	No	Yes	2.00
273	44.95	56.74	2.62	2.28	0.87	24.09	3.44	82.81	4.000	No	Yes	2.00
274	45.11	53.51	2.68	2.56	0.90	22.18	3.83	84.90	4.000	No	Yes	2.00
275	45.28	39.25	2.87	3.20	0.97	14.92	5.43	80.99	4.000	No	Yes	2.00
276	45.44	23.51	3.13	3.86	1.00	8.25	8.28	68.30	4.000	No	Yes	2.00
277	45.61	16.16	3.29	3.99	1.00	5.31	10.62	56.41	4.000	No	Yes	2.00
278	45.77	14.20	3.34	3.80	1.00	4.52	11.36	51.36	4.000	No	Yes	2.00
279	45.93	15.81	3.30	3.84	1.00	5.15	10.66	54.88	4.000	No	Yes	2.00
280	46.10	18.65	3.19	3.37	1.00	6.26	9.16	57.36	4.000	No	Yes	2.00
281	46.26	20.01	3.15	3.10	1.00	6.78	8.51	57.69	4.000	No	Yes	2.00
282	46.43	20.32	3.18	3.62	1.00	6.89	8.93	61.50	4.000	No	Yes	2.00
283	46.59	20.05	3.27	5.23	1.00	6.77	10.34	69.93	4.000	No	Yes	2.00
284	46.75	37.35	2.96	3.96	1.00	13.54	6.33	85.69	4.000	Yes	Yes	2.00
285	46.92	67.08	2.60	2.60	0.86	28.34	3.30	93.65	4.000	Yes	No	2.00
286	47.08	104.48	2.32	1.87	0.76	49.08	2.02	99.18	4.000	Yes	No	2.00
287	47.25	132.51	2.17	1.52	0.70	65.90	1.59	104.53	4.000	Yes	No	2.00
288	47.41	141.46	2.11	1.40	0.68	71.56	1.48	106.04	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	47.57	140.89	2.12	1.43	0.68	70.95	1.50	106.34	0.192	No	No	0.58
290	47.74	134.77	2.18	1.59	0.70	66.50	1.61	107.08	0.194	No	No	0.59
291	47.90	138.59	2.20	1.79	0.72	67.67	1.68	113.55	0.216	No	No	0.65
292	48.07	145.29	2.20	1.87	0.71	70.95	1.67	118.62	0.235	No	No	0.71
293	48.23	148.50	2.20	1.90	0.71	72.50	1.67	120.75	0.244	No	No	0.74
294	48.39	148.33	2.20	1.90	0.71	72.27	1.67	120.61	0.243	No	No	0.74
295	48.56	148.06	2.20	1.88	0.71	72.07	1.66	119.90	0.240	No	No	0.73
296	48.72	147.86	2.20	1.86	0.71	71.92	1.66	119.21	0.238	No	No	0.72
297	48.89	145.16	2.22	1.95	0.72	69.94	1.71	119.72	0.240	No	No	0.73
298	49.05	140.84	2.25	2.08	0.73	66.93	1.80	120.64	0.243	No	No	0.74
299	49.22	138.82	2.27	2.18	0.74	65.33	1.87	122.00	0.249	No	No	0.76
300	49.38	140.19	2.26	2.14	0.74	66.12	1.84	121.49	0.247	No	No	0.75
301	49.54	142.23	2.24	2.01	0.73	67.58	1.77	119.39	0.238	No	No	0.73
302	49.71	143.72	2.22	1.90	0.72	68.74	1.71	117.27	0.230	No	No	0.70
303	49.87	143.39	2.21	1.85	0.72	68.62	1.69	115.99	0.225	No	No	0.69
304	50.04	139.96	2.23	1.92	0.73	66.32	1.75	115.88	0.225	No	No	0.69
305	50.20	133.72	2.26	2.02	0.74	62.48	1.84	114.91	4.000	Yes	No	2.00
306	50.36	123.69	2.32	2.16	0.76	56.55	2.00	113.16	4.000	Yes	No	2.00
307	50.53	106.43	2.40	2.32	0.79	47.00	2.30	108.20	4.000	Yes	No	2.00
308	50.69	83.33	2.54	2.70	0.84	34.64	2.98	103.28	4.000	Yes	No	2.00
309	50.86	62.50	2.70	3.14	0.90	24.17	4.01	97.04	4.000	Yes	Yes	2.00
310	51.02	47.60	2.85	3.52	0.96	17.15	5.22	89.54	4.000	Yes	Yes	2.00
311	51.18	37.06	2.96	3.63	1.00	12.60	6.35	80.03	4.000	Yes	Yes	2.00
312	51.35	27.07	3.10	3.90	1.00	8.87	7.99	70.86	4.000	No	Yes	2.00
313	51.51	21.82	3.21	4.11	1.00	6.91	9.34	64.53	4.000	No	Yes	2.00
314	51.68	23.60	3.13	3.42	1.00	7.55	8.31	62.74	4.000	No	Yes	2.00
315	51.84	25.33	3.08	3.16	1.00	8.17	7.70	62.95	4.000	No	Yes	2.00
316	52.00	24.14	3.10	3.18	1.00	7.72	7.98	61.59	4.000	No	Yes	2.00
317	52.17	19.53	3.24	3.88	1.00	6.01	9.85	59.20	4.000	No	Yes	2.00
318	52.33	17.13	3.34	4.55	1.00	5.11	11.33	57.94	4.000	No	Yes	2.00
319	52.50	17.59	3.32	4.40	1.00	5.27	11.04	58.17	4.000	No	Yes	2.00
320	52.66	20.03	3.23	3.77	1.00	6.15	9.63	59.25	4.000	No	Yes	2.00
321	52.82	26.74	3.04	2.83	1.00	8.59	7.17	61.64	4.000	No	Yes	2.00
322	52.99	35.03	2.89	2.52	0.98	11.85	5.63	66.70	4.000	No	Yes	2.00
323	53.15	37.99	2.88	2.69	0.97	13.01	5.46	71.07	4.000	No	Yes	2.00
324	53.32	32.95	2.98	3.14	1.00	10.79	6.54	70.56	4.000	No	Yes	2.00
325	53.48	24.12	3.16	3.84	1.00	7.57	8.66	65.58	4.000	No	Yes	2.00
326	53.64	19.27	3.26	3.96	1.00	5.80	10.12	58.66	4.000	No	Yes	2.00
327	53.81	17.96	3.27	3.63	1.00	5.31	10.29	54.63	4.000	No	Yes	2.00
328	53.97	17.94	3.26	3.41	1.00	5.29	10.08	53.38	4.000	No	Yes	2.00
329	54.14	17.87	3.26	3.43	1.00	5.26	10.14	53.31	4.000	No	Yes	2.00
330	54.30	18.85	3.22	3.22	1.00	5.60	9.58	53.67	4.000	No	Yes	2.00
331	54.46	22.02	3.14	3.03	1.00	6.73	8.47	57.00	4.000	No	Yes	2.00
332	54.63	23.64	3.14	3.45	1.00	7.29	8.49	61.94	4.000	No	Yes	2.00
333	54.79	25.38	3.14	3.78	1.00	7.90	8.41	66.49	4.000	No	Yes	2.00
334	54.96	32.40	3.03	3.67	1.00	10.40	7.13	74.11	4.000	No	Yes	2.00
335	55.12	44.86	2.87	3.29	0.97	15.28	5.42	82.85	4.000	No	Yes	2.00
336	55.28	55.90	2.80	3.49	0.94	19.83	4.77	94.51	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
337	55.45	62.18	2.77	3.63	0.93	22.40	4.52	101.18	4.000	Yes	Yes	2.00
338	55.61	70.86	2.70	3.46	0.90	26.33	4.00	105.37	4.000	Yes	Yes	2.00
339	55.78	88.50	2.54	2.78	0.84	35.15	3.00	105.47	4.000	Yes	No	2.00
340	55.94	109.52	2.40	2.29	0.79	46.18	2.31	106.70	4.000	Yes	No	2.00
341	56.11	127.60	2.30	2.04	0.75	55.94	1.96	109.64	4.000	Yes	No	2.00
342	56.27	142.23	2.25	1.95	0.73	63.76	1.79	114.19	4.000	Yes	No	2.00
343	56.43	153.26	2.21	1.89	0.72	69.68	1.69	117.99	0.233	No	No	0.75
344	56.60	157.19	2.20	1.89	0.71	71.66	1.67	119.61	0.239	No	No	0.77
345	56.76	149.66	2.24	1.98	0.73	67.14	1.76	118.24	4.000	Yes	No	2.00
346	56.93	133.44	2.32	2.23	0.76	57.77	2.01	116.22	4.000	Yes	No	2.00
347	57.09	111.25	2.45	2.69	0.81	45.51	2.53	115.17	4.000	Yes	No	2.00
348	57.25	86.18	2.62	3.31	0.87	32.74	3.43	112.30	4.000	Yes	Yes	2.00
349	57.42	60.78	2.82	4.02	0.95	20.95	4.94	103.57	4.000	Yes	Yes	2.00
350	57.58	42.06	3.00	4.50	1.00	13.39	6.74	90.26	4.000	Yes	Yes	2.00
351	57.75	30.43	3.13	4.58	1.00	9.33	8.29	77.37	4.000	No	Yes	2.00
352	57.91	24.37	3.21	4.48	1.00	7.21	9.43	68.04	4.000	No	Yes	2.00
353	58.07	20.74	3.27	4.27	1.00	5.94	10.26	60.95	4.000	No	Yes	2.00
354	58.24	18.94	3.30	4.12	1.00	5.31	10.74	57.03	4.000	No	Yes	2.00
355	58.40	18.55	3.32	4.23	1.00	5.17	10.99	56.78	4.000	No	Yes	2.00
356	58.57	19.04	3.31	4.31	1.00	5.32	10.90	58.01	4.000	No	Yes	2.00
357	58.73	20.72	3.28	4.47	1.00	5.89	10.48	61.73	4.000	No	Yes	2.00
358	58.89	25.42	3.17	3.97	1.00	7.49	8.83	66.13	4.000	No	Yes	2.00
359	59.06	28.84	3.13	4.09	1.00	8.65	8.26	71.42	4.000	No	Yes	2.00
360	59.22	36.12	3.03	3.90	1.00	11.12	7.03	78.20	4.000	No	Yes	2.00
361	59.39	50.93	2.85	3.45	0.96	16.79	5.24	87.95	4.000	No	Yes	2.00
362	59.55	58.89	2.80	3.50	0.94	20.00	4.75	94.95	4.000	No	Yes	2.00
363	59.71	56.75	2.81	3.51	0.95	19.06	4.90	93.35	4.000	No	Yes	2.00
364	59.88	44.24	2.97	4.11	1.00	13.79	6.37	87.76	4.000	No	Yes	2.00
365	60.04	41.33	2.94	3.36	0.99	12.84	6.07	77.96	4.000	No	Yes	2.00
366	60.21	43.43	2.88	3.02	0.97	13.82	5.54	76.57	4.000	No	Yes	2.00
367	60.37	46.26	2.82	2.66	0.95	15.15	4.95	75.01	4.000	No	Yes	2.00
368	60.53	44.03	2.89	3.14	0.98	13.94	5.61	78.19	4.000	No	Yes	2.00
369	60.70	41.97	2.95	3.57	1.00	12.89	6.22	80.18	4.000	No	Yes	2.00
370	60.86	38.83	3.02	4.08	1.00	11.81	6.93	81.89	4.000	No	Yes	2.00

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
0.33	2.00	0.00	9.95	0.16	0.00	0.49	2.00	0.00	9.93	0.16	0.00
0.66	2.00	0.00	9.90	0.17	0.00	0.82	2.00	0.00	9.88	0.16	0.00
0.98	2.00	0.00	9.85	0.16	0.00	1.15	2.00	0.00	9.82	0.17	0.00
1.31	2.00	0.00	9.80	0.16	0.00	1.48	2.00	0.00	9.77	0.17	0.00
1.64	2.00	0.00	9.75	0.16	0.00	1.80	2.00	0.00	9.73	0.16	0.00
1.97	2.00	0.00	9.70	0.17	0.00	2.13	2.00	0.00	9.68	0.16	0.00
2.30	2.00	0.00	9.65	0.17	0.00	2.46	2.00	0.00	9.63	0.16	0.00
2.62	2.00	0.00	9.60	0.16	0.00	2.79	2.00	0.00	9.57	0.17	0.00
2.95	2.00	0.00	9.55	0.16	0.00	3.12	2.00	0.00	9.52	0.17	0.00
3.28	2.00	0.00	9.50	0.16	0.00	3.45	2.00	0.00	9.47	0.17	0.00
3.61	2.00	0.00	9.45	0.16	0.00	3.77	2.00	0.00	9.43	0.16	0.00
3.94	2.00	0.00	9.40	0.17	0.00	4.10	2.00	0.00	9.38	0.16	0.00
4.27	2.00	0.00	9.35	0.17	0.00	4.43	2.00	0.00	9.32	0.16	0.00
4.59	2.00	0.00	9.30	0.16	0.00	4.76	2.00	0.00	9.27	0.17	0.00
4.92	2.00	0.00	9.25	0.16	0.00	5.09	2.00	0.00	9.22	0.17	0.00
5.25	2.00	0.00	9.20	0.16	0.00	5.41	2.00	0.00	9.18	0.16	0.00
5.58	2.00	0.00	9.15	0.17	0.00	5.74	2.00	0.00	9.13	0.16	0.00
5.91	2.00	0.00	9.10	0.17	0.00	6.07	2.00	0.00	9.07	0.16	0.00
6.23	2.00	0.00	9.05	0.16	0.00	6.40	2.00	0.00	9.02	0.17	0.00
6.56	2.00	0.00	9.00	0.16	0.00	6.73	2.00	0.00	8.97	0.17	0.00
6.89	2.00	0.00	8.95	0.16	0.00	7.05	2.00	0.00	8.93	0.16	0.00
7.22	2.00	0.00	8.90	0.17	0.00	7.38	2.00	0.00	8.88	0.16	0.00
7.55	2.00	0.00	8.85	0.17	0.00	7.71	2.00	0.00	8.82	0.16	0.00
7.87	2.00	0.00	8.80	0.16	0.00	8.04	2.00	0.00	8.77	0.17	0.00
8.20	2.00	0.00	8.75	0.16	0.00	8.37	2.00	0.00	8.72	0.17	0.00
8.53	2.00	0.00	8.70	0.16	0.00	8.69	2.00	0.00	8.68	0.16	0.00
8.86	2.00	0.00	8.65	0.17	0.00	9.02	0.84	0.16	8.63	0.16	0.07
9.19	0.86	0.14	8.60	0.17	0.06	9.35	0.88	0.12	8.58	0.16	0.05
9.51	0.86	0.14	8.55	0.16	0.06	9.68	0.84	0.16	8.52	0.17	0.07
9.84	0.85	0.15	8.50	0.16	0.06	10.01	0.90	0.10	8.47	0.17	0.04
10.17	0.95	0.05	8.45	0.16	0.02	10.34	0.96	0.04	8.42	0.17	0.02
10.50	0.98	0.02	8.40	0.16	0.01	10.66	1.00	0.00	8.38	0.16	0.00
10.83	1.01	0.00	8.35	0.17	0.00	10.99	1.03	0.00	8.33	0.16	0.00
11.16	1.04	0.00	8.30	0.17	0.00	11.32	1.12	0.00	8.27	0.16	0.00
11.48	1.23	0.00	8.25	0.16	0.00	11.65	1.35	0.00	8.22	0.17	0.00
11.81	1.43	0.00	8.20	0.16	0.00	11.98	1.41	0.00	8.17	0.17	0.00
12.14	1.35	0.00	8.15	0.16	0.00	12.30	1.26	0.00	8.13	0.16	0.00
12.47	1.20	0.00	8.10	0.17	0.00	12.63	1.21	0.00	8.08	0.16	0.00
12.80	1.22	0.00	8.05	0.17	0.00	12.96	1.21	0.00	8.02	0.16	0.00
13.12	1.13	0.00	8.00	0.16	0.00	13.29	1.06	0.00	7.97	0.17	0.00
13.45	1.05	0.00	7.95	0.16	0.00	13.62	1.06	0.00	7.92	0.17	0.00
13.78	1.06	0.00	7.90	0.16	0.00	13.94	1.02	0.00	7.88	0.16	0.00
14.11	0.98	0.02	7.85	0.17	0.01	14.27	0.94	0.06	7.83	0.16	0.02
14.44	0.96	0.04	7.80	0.17	0.02	14.60	2.00	0.00	7.77	0.16	0.00
14.76	2.00	0.00	7.75	0.16	0.00	14.93	2.00	0.00	7.72	0.17	0.00
15.09	2.00	0.00	7.70	0.16	0.00	15.26	1.14	0.00	7.67	0.17	0.00
15.42	1.20	0.00	7.65	0.16	0.00	15.58	1.29	0.00	7.63	0.16	0.00
15.75	1.35	0.00	7.60	0.17	0.00	15.91	1.39	0.00	7.58	0.16	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
16.08	1.37	0.00	7.55	0.17	0.00	16.24	1.30	0.00	7.53	0.16	0.00
16.40	1.21	0.00	7.50	0.16	0.00	16.57	1.10	0.00	7.47	0.17	0.00
16.73	1.00	0.00	7.45	0.16	0.00	16.90	0.95	0.05	7.42	0.17	0.02
17.06	1.00	0.00	7.40	0.16	0.00	17.23	1.09	0.00	7.37	0.17	0.00
17.39	1.30	0.00	7.35	0.16	0.00	17.55	1.49	0.00	7.33	0.16	0.00
17.72	1.64	0.00	7.30	0.17	0.00	17.88	1.66	0.00	7.28	0.16	0.00
18.05	1.50	0.00	7.25	0.17	0.00	18.21	2.00	0.00	7.22	0.16	0.00
18.37	2.00	0.00	7.20	0.16	0.00	18.54	2.00	0.00	7.17	0.17	0.00
18.70	2.00	0.00	7.15	0.16	0.00	18.87	2.00	0.00	7.12	0.17	0.00
19.03	2.00	0.00	7.10	0.16	0.00	19.19	2.00	0.00	7.08	0.16	0.00
19.36	2.00	0.00	7.05	0.17	0.00	19.52	2.00	0.00	7.03	0.16	0.00
19.69	2.00	0.00	7.00	0.17	0.00	19.85	2.00	0.00	6.97	0.16	0.00
20.01	2.00	0.00	6.95	0.16	0.00	20.18	2.00	0.00	6.92	0.17	0.00
20.34	2.00	0.00	6.90	0.16	0.00	20.51	2.00	0.00	6.87	0.17	0.00
20.67	2.00	0.00	6.85	0.16	0.00	20.83	2.00	0.00	6.83	0.16	0.00
21.00	2.00	0.00	6.80	0.17	0.00	21.16	2.00	0.00	6.78	0.16	0.00
21.33	2.00	0.00	6.75	0.17	0.00	21.49	2.00	0.00	6.72	0.16	0.00
21.65	2.00	0.00	6.70	0.16	0.00	21.82	2.00	0.00	6.67	0.17	0.00
21.98	2.00	0.00	6.65	0.16	0.00	22.15	2.00	0.00	6.62	0.17	0.00
22.31	2.00	0.00	6.60	0.16	0.00	22.47	2.00	0.00	6.58	0.16	0.00
22.64	2.00	0.00	6.55	0.17	0.00	22.80	2.00	0.00	6.53	0.16	0.00
22.97	2.00	0.00	6.50	0.17	0.00	23.13	2.00	0.00	6.47	0.16	0.00
23.30	2.00	0.00	6.45	0.17	0.00	23.46	2.00	0.00	6.42	0.16	0.00
23.62	2.00	0.00	6.40	0.16	0.00	23.79	2.00	0.00	6.37	0.17	0.00
23.95	2.00	0.00	6.35	0.16	0.00	24.12	2.00	0.00	6.32	0.17	0.00
24.28	2.00	0.00	6.30	0.16	0.00	24.44	2.00	0.00	6.28	0.16	0.00
24.61	2.00	0.00	6.25	0.17	0.00	24.77	2.00	0.00	6.23	0.16	0.00
24.94	2.00	0.00	6.20	0.17	0.00	25.10	2.00	0.00	6.17	0.16	0.00
25.26	2.00	0.00	6.15	0.16	0.00	25.43	2.00	0.00	6.12	0.17	0.00
25.59	2.00	0.00	6.10	0.16	0.00	25.76	2.00	0.00	6.07	0.17	0.00
25.92	2.00	0.00	6.05	0.16	0.00	26.08	0.77	0.23	6.03	0.16	0.07
26.25	0.82	0.18	6.00	0.17	0.06	26.41	0.85	0.15	5.98	0.16	0.04
26.58	0.86	0.14	5.95	0.17	0.04	26.74	0.87	0.13	5.92	0.16	0.04
26.90	0.88	0.12	5.90	0.16	0.03	27.07	0.89	0.11	5.87	0.17	0.03
27.23	0.92	0.08	5.85	0.16	0.02	27.40	0.96	0.04	5.82	0.17	0.01
27.56	0.99	0.01	5.80	0.16	0.00	27.72	0.99	0.01	5.78	0.16	0.00
27.89	1.02	0.00	5.75	0.17	0.00	28.05	1.06	0.00	5.73	0.16	0.00
28.22	1.12	0.00	5.70	0.17	0.00	28.38	1.14	0.00	5.67	0.16	0.00
28.54	1.10	0.00	5.65	0.16	0.00	28.71	1.03	0.00	5.62	0.17	0.00
28.87	0.94	0.06	5.60	0.16	0.02	29.04	0.86	0.14	5.57	0.17	0.04
29.20	0.81	0.19	5.55	0.16	0.05	29.36	0.79	0.21	5.53	0.16	0.06
29.53	0.80	0.20	5.50	0.17	0.06	29.69	0.83	0.17	5.48	0.16	0.05
29.86	0.88	0.12	5.45	0.17	0.03	30.02	0.94	0.06	5.42	0.16	0.02
30.19	0.99	0.01	5.40	0.17	0.00	30.35	1.04	0.00	5.37	0.16	0.00
30.51	1.09	0.00	5.35	0.16	0.00	30.68	1.16	0.00	5.32	0.17	0.00
30.84	1.23	0.00	5.30	0.16	0.00	31.01	1.27	0.00	5.27	0.17	0.00
31.17	1.20	0.00	5.25	0.16	0.00	31.33	1.09	0.00	5.23	0.16	0.00
31.50	0.96	0.04	5.20	0.17	0.01	31.66	2.00	0.00	5.18	0.16	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
31.83	2.00	0.00	5.15	0.17	0.00	31.99	2.00	0.00	5.12	0.16	0.00
32.15	2.00	0.00	5.10	0.16	0.00	32.32	2.00	0.00	5.07	0.17	0.00
32.48	2.00	0.00	5.05	0.16	0.00	32.65	2.00	0.00	5.02	0.17	0.00
32.81	2.00	0.00	5.00	0.16	0.00	32.97	2.00	0.00	4.98	0.16	0.00
33.14	0.35	0.65	4.95	0.17	0.17	33.30	0.35	0.65	4.93	0.16	0.16
33.47	2.00	0.00	4.90	0.17	0.00	33.63	2.00	0.00	4.87	0.16	0.00
33.79	2.00	0.00	4.85	0.16	0.00	33.96	2.00	0.00	4.82	0.17	0.00
34.12	2.00	0.00	4.80	0.16	0.00	34.29	2.00	0.00	4.77	0.17	0.00
34.45	2.00	0.00	4.75	0.16	0.00	34.61	2.00	0.00	4.73	0.16	0.00
34.78	2.00	0.00	4.70	0.17	0.00	34.94	2.00	0.00	4.68	0.16	0.00
35.11	2.00	0.00	4.65	0.17	0.00	35.27	0.53	0.47	4.62	0.16	0.11
35.43	0.59	0.41	4.60	0.16	0.09	35.60	0.69	0.31	4.57	0.17	0.07
35.76	0.78	0.22	4.55	0.16	0.05	35.93	0.88	0.12	4.52	0.17	0.03
36.09	0.93	0.07	4.50	0.16	0.02	36.26	0.92	0.08	4.47	0.17	0.02
36.42	0.85	0.15	4.45	0.16	0.03	36.58	0.78	0.22	4.43	0.16	0.05
36.75	0.73	0.27	4.40	0.17	0.06	36.91	2.00	0.00	4.37	0.16	0.00
37.08	2.00	0.00	4.35	0.17	0.00	37.24	2.00	0.00	4.32	0.16	0.00
37.40	2.00	0.00	4.30	0.16	0.00	37.57	2.00	0.00	4.27	0.17	0.00
37.73	2.00	0.00	4.25	0.16	0.00	37.90	2.00	0.00	4.22	0.17	0.00
38.06	2.00	0.00	4.20	0.16	0.00	38.22	2.00	0.00	4.18	0.16	0.00
38.39	2.00	0.00	4.15	0.17	0.00	38.55	0.68	0.32	4.12	0.16	0.06
38.72	0.73	0.27	4.10	0.17	0.06	38.88	0.77	0.23	4.07	0.16	0.05
39.04	0.82	0.18	4.05	0.16	0.04	39.21	0.93	0.07	4.02	0.17	0.01
39.37	1.06	0.00	4.00	0.16	0.00	39.54	1.12	0.00	3.97	0.17	0.00
39.70	1.10	0.00	3.95	0.16	0.00	39.86	1.01	0.00	3.93	0.16	0.00
40.03	0.96	0.04	3.90	0.17	0.01	40.19	0.96	0.04	3.88	0.16	0.01
40.36	0.98	0.02	3.85	0.17	0.00	40.52	0.98	0.02	3.82	0.16	0.00
40.68	0.96	0.04	3.80	0.16	0.01	40.85	0.93	0.07	3.77	0.17	0.01
41.01	0.86	0.14	3.75	0.16	0.03	41.18	0.78	0.22	3.72	0.17	0.04
41.34	0.70	0.30	3.70	0.16	0.05	41.50	0.66	0.34	3.68	0.16	0.06
41.67	0.67	0.33	3.65	0.17	0.06	41.83	0.71	0.29	3.63	0.16	0.05
42.00	0.75	0.25	3.60	0.17	0.05	42.16	0.76	0.24	3.57	0.16	0.04
42.32	0.78	0.22	3.55	0.16	0.04	42.49	0.82	0.18	3.52	0.17	0.03
42.65	0.89	0.11	3.50	0.16	0.02	42.82	0.95	0.05	3.47	0.17	0.01
42.98	1.00	0.00	3.45	0.16	0.00	43.15	0.99	0.01	3.42	0.17	0.00
43.31	0.93	0.07	3.40	0.16	0.01	43.47	2.00	0.00	3.38	0.16	0.00
43.64	2.00	0.00	3.35	0.17	0.00	43.80	2.00	0.00	3.32	0.16	0.00
43.97	2.00	0.00	3.30	0.17	0.00	44.13	2.00	0.00	3.27	0.16	0.00
44.29	2.00	0.00	3.25	0.16	0.00	44.46	2.00	0.00	3.22	0.17	0.00
44.62	2.00	0.00	3.20	0.16	0.00	44.79	2.00	0.00	3.17	0.17	0.00
44.95	2.00	0.00	3.15	0.16	0.00	45.11	2.00	0.00	3.13	0.16	0.00
45.28	2.00	0.00	3.10	0.17	0.00	45.44	2.00	0.00	3.07	0.16	0.00
45.61	2.00	0.00	3.05	0.17	0.00	45.77	2.00	0.00	3.02	0.16	0.00
45.93	2.00	0.00	3.00	0.16	0.00	46.10	2.00	0.00	2.97	0.17	0.00
46.26	2.00	0.00	2.95	0.16	0.00	46.43	2.00	0.00	2.92	0.17	0.00
46.59	2.00	0.00	2.90	0.16	0.00	46.75	2.00	0.00	2.88	0.16	0.00
46.92	2.00	0.00	2.85	0.17	0.00	47.08	2.00	0.00	2.83	0.16	0.00
47.25	2.00	0.00	2.80	0.17	0.00	47.41	2.00	0.00	2.77	0.16	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
47.57	0.58	0.42	2.75	0.16	0.06	47.74	0.59	0.41	2.72	0.17	0.06
47.90	0.65	0.35	2.70	0.16	0.05	48.07	0.71	0.29	2.67	0.17	0.04
48.23	0.74	0.26	2.65	0.16	0.03	48.39	0.74	0.26	2.63	0.16	0.03
48.56	0.73	0.27	2.60	0.17	0.04	48.72	0.72	0.28	2.58	0.16	0.03
48.89	0.73	0.27	2.55	0.17	0.04	49.05	0.74	0.26	2.52	0.16	0.03
49.22	0.76	0.24	2.50	0.17	0.03	49.38	0.75	0.25	2.47	0.16	0.03
49.54	0.73	0.27	2.45	0.16	0.03	49.71	0.70	0.30	2.42	0.17	0.04
49.87	0.69	0.31	2.40	0.16	0.04	50.04	0.69	0.31	2.37	0.17	0.04
50.20	2.00	0.00	2.35	0.16	0.00	50.36	2.00	0.00	2.33	0.16	0.00
50.53	2.00	0.00	2.30	0.17	0.00	50.69	2.00	0.00	2.27	0.16	0.00
50.86	2.00	0.00	2.25	0.17	0.00	51.02	2.00	0.00	2.22	0.16	0.00
51.18	2.00	0.00	2.20	0.16	0.00	51.35	2.00	0.00	2.17	0.17	0.00
51.51	2.00	0.00	2.15	0.16	0.00	51.68	2.00	0.00	2.12	0.17	0.00
51.84	2.00	0.00	2.10	0.16	0.00	52.00	2.00	0.00	2.08	0.16	0.00
52.17	2.00	0.00	2.05	0.17	0.00	52.33	2.00	0.00	2.02	0.16	0.00
52.50	2.00	0.00	2.00	0.17	0.00	52.66	2.00	0.00	1.97	0.16	0.00
52.82	2.00	0.00	1.95	0.16	0.00	52.99	2.00	0.00	1.92	0.17	0.00
53.15	2.00	0.00	1.90	0.16	0.00	53.32	2.00	0.00	1.87	0.17	0.00
53.48	2.00	0.00	1.85	0.16	0.00	53.64	2.00	0.00	1.83	0.16	0.00
53.81	2.00	0.00	1.80	0.17	0.00	53.97	2.00	0.00	1.77	0.16	0.00
54.14	2.00	0.00	1.75	0.17	0.00	54.30	2.00	0.00	1.72	0.16	0.00
54.46	2.00	0.00	1.70	0.16	0.00	54.63	2.00	0.00	1.67	0.17	0.00
54.79	2.00	0.00	1.65	0.16	0.00	54.96	2.00	0.00	1.62	0.17	0.00
55.12	2.00	0.00	1.60	0.16	0.00	55.28	2.00	0.00	1.58	0.16	0.00
55.45	2.00	0.00	1.55	0.17	0.00	55.61	2.00	0.00	1.53	0.16	0.00
55.78	2.00	0.00	1.50	0.17	0.00	55.94	2.00	0.00	1.47	0.16	0.00
56.11	2.00	0.00	1.45	0.17	0.00	56.27	2.00	0.00	1.42	0.16	0.00
56.43	0.75	0.25	1.40	0.16	0.02	56.60	0.77	0.23	1.37	0.17	0.02
56.76	2.00	0.00	1.35	0.16	0.00	56.93	2.00	0.00	1.32	0.17	0.00
57.09	2.00	0.00	1.30	0.16	0.00	57.25	2.00	0.00	1.28	0.16	0.00
57.42	2.00	0.00	1.25	0.17	0.00	57.58	2.00	0.00	1.22	0.16	0.00
57.75	2.00	0.00	1.20	0.17	0.00	57.91	2.00	0.00	1.17	0.16	0.00
58.07	2.00	0.00	1.15	0.16	0.00	58.24	2.00	0.00	1.12	0.17	0.00
58.40	2.00	0.00	1.10	0.16	0.00	58.57	2.00	0.00	1.07	0.17	0.00
58.73	2.00	0.00	1.05	0.16	0.00	58.89	2.00	0.00	1.03	0.16	0.00
59.06	2.00	0.00	1.00	0.17	0.00	59.22	2.00	0.00	0.97	0.16	0.00
59.39	2.00	0.00	0.95	0.17	0.00	59.55	2.00	0.00	0.92	0.16	0.00
59.71	2.00	0.00	0.90	0.16	0.00	59.88	2.00	0.00	0.87	0.17	0.00
60.04	2.00	0.00	0.85	0.16	0.00	60.21	2.00	0.00	0.82	0.17	0.00
60.37	2.00	0.00	0.80	0.16	0.00	60.53	2.00	0.00	0.78	0.16	0.00
60.70	2.00	0.00	0.75	0.17	0.00	60.86	2.00	0.00	0.72	0.16	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI

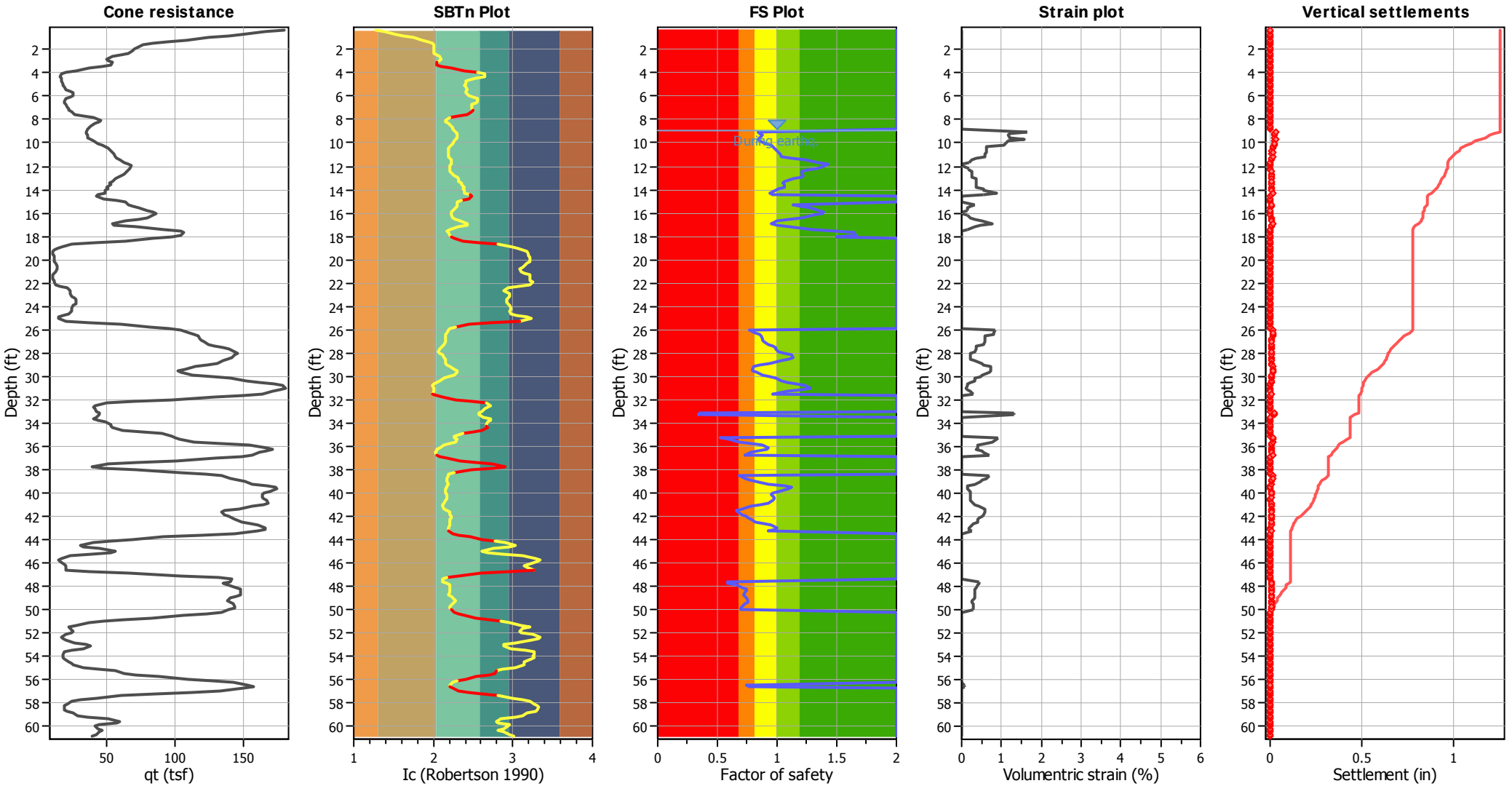
Overall liquefaction potential: 3.47

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (ft)
LPI: Liquefaction potential index value for test point

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 due to soil liquefaction ::

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
9.02	103.66	0.84	1.63	0.85	0.03	9.19	105.71	0.86	1.22	0.84	0.02
9.35	107.64	0.88	1.18	0.84	0.02	9.51	106.87	0.86	1.19	0.84	0.02
9.68	106.01	0.84	1.56	0.84	0.03	9.84	107.57	0.85	1.17	0.83	0.02
10.01	111.28	0.90	1.11	0.83	0.02	10.17	114.90	0.95	1.06	0.83	0.02
10.34	116.35	0.96	0.63	0.82	0.01	10.50	117.83	0.98	0.62	0.82	0.01
10.66	119.24	1.00	0.61	0.82	0.01	10.83	120.52	1.01	0.61	0.82	0.01
10.99	121.78	1.03	0.60	0.81	0.01	11.16	122.96	1.04	0.59	0.81	0.01
11.32	127.67	1.12	0.38	0.81	0.01	11.48	133.92	1.23	0.27	0.81	0.01
11.65	139.84	1.35	0.18	0.80	0.00	11.81	143.94	1.43	0.00	0.80	0.00
11.98	143.23	1.41	0.00	0.80	0.00	12.14	140.95	1.35	0.18	0.79	0.00
12.30	137.10	1.26	0.18	0.79	0.00	12.47	134.70	1.20	0.26	0.79	0.01
12.63	135.51	1.21	0.26	0.79	0.00	12.80	136.43	1.22	0.26	0.78	0.01
12.96	135.98	1.21	0.26	0.78	0.00	13.12	132.41	1.13	0.36	0.78	0.01
13.29	128.77	1.06	0.36	0.77	0.01	13.45	128.53	1.05	0.36	0.77	0.01
13.62	129.46	1.06	0.36	0.77	0.01	13.78	129.59	1.06	0.36	0.77	0.01
13.94	127.24	1.02	0.54	0.76	0.01	14.11	125.56	0.98	0.54	0.76	0.01
14.27	123.29	0.94	0.87	0.76	0.02	14.44	124.62	0.96	0.54	0.76	0.01
14.60	127.83	2.00	0.00	0.75	0.00	14.76	130.46	2.00	0.00	0.75	0.00
14.93	132.27	2.00	0.00	0.75	0.00	15.09	132.50	2.00	0.00	0.74	0.00
15.26	136.05	1.14	0.33	0.74	0.01	15.42	139.43	1.20	0.24	0.74	0.00
15.58	144.00	1.29	0.16	0.74	0.00	15.75	147.23	1.35	0.16	0.73	0.00
15.91	149.28	1.39	0.00	0.73	0.00	16.08	148.78	1.37	0.00	0.73	0.00
16.24	145.70	1.30	0.16	0.72	0.00	16.40	141.23	1.21	0.23	0.72	0.00
16.57	135.45	1.10	0.33	0.72	0.01	16.73	130.13	1.00	0.50	0.72	0.01
16.90	127.05	0.95	0.78	0.71	0.02	17.06	130.71	1.00	0.49	0.71	0.01
17.23	136.03	1.09	0.32	0.71	0.01	17.39	146.83	1.30	0.16	0.71	0.00
17.55	155.60	1.49	0.00	0.70	0.00	17.72	162.17	1.64	0.00	0.70	0.00
17.88	163.08	1.66	0.00	0.70	0.00	18.05	156.65	1.50	0.00	0.69	0.00
18.21	142.35	2.00	0.00	0.69	0.00	18.37	125.69	2.00	0.00	0.69	0.00
18.54	113.03	2.00	0.00	0.69	0.00	18.70	101.55	2.00	0.00	0.68	0.00
18.87	89.62	2.00	0.00	0.68	0.00	19.03	78.73	2.00	0.00	0.68	0.00
19.19	73.55	2.00	0.00	0.67	0.00	19.36	72.96	2.00	0.00	0.67	0.00
19.52	74.90	2.00	0.00	0.67	0.00	19.69	76.74	2.00	0.00	0.67	0.00
19.85	76.43	2.00	0.00	0.66	0.00	20.01	78.18	2.00	0.00	0.66	0.00
20.18	82.18	2.00	0.00	0.66	0.00	20.34	86.17	2.00	0.00	0.66	0.00
20.51	86.15	2.00	0.00	0.65	0.00	20.67	82.12	2.00	0.00	0.65	0.00
20.83	75.81	2.00	0.00	0.65	0.00	21.00	71.13	2.00	0.00	0.64	0.00
21.16	68.37	2.00	0.00	0.64	0.00	21.33	67.53	2.00	0.00	0.64	0.00
21.49	67.28	2.00	0.00	0.64	0.00	21.65	69.36	2.00	0.00	0.63	0.00
21.82	71.39	2.00	0.00	0.63	0.00	21.98	74.93	2.00	0.00	0.63	0.00
22.15	79.11	2.00	0.00	0.62	0.00	22.31	85.36	2.00	0.00	0.62	0.00
22.47	88.55	2.00	0.00	0.62	0.00	22.64	91.40	2.00	0.00	0.62	0.00
22.80	94.43	2.00	0.00	0.61	0.00	22.97	100.27	2.00	0.00	0.61	0.00
23.13	105.68	2.00	0.00	0.61	0.00	23.30	110.69	2.00	0.00	0.61	0.00
23.46	112.91	2.00	0.00	0.60	0.00	23.62	112.55	2.00	0.00	0.60	0.00
23.79	109.60	2.00	0.00	0.60	0.00	23.95	106.66	2.00	0.00	0.59	0.00
24.12	103.69	2.00	0.00	0.59	0.00	24.28	102.00	2.00	0.00	0.59	0.00
24.44	97.43	2.00	0.00	0.59	0.00	24.61	91.37	2.00	0.00	0.58	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
24.77	83.28	2.00	0.00	0.58	0.00	24.94	80.65	2.00	0.00	0.58	0.00
25.10	84.61	2.00	0.00	0.57	0.00	25.26	96.06	2.00	0.00	0.57	0.00
25.43	102.32	2.00	0.00	0.57	0.00	25.59	104.28	2.00	0.00	0.57	0.00
25.76	108.13	2.00	0.00	0.56	0.00	25.92	114.43	2.00	0.00	0.56	0.00
26.08	121.12	0.77	0.86	0.56	0.02	26.25	125.33	0.82	0.81	0.56	0.02
26.41	127.38	0.85	0.79	0.55	0.02	26.58	128.38	0.86	0.60	0.55	0.01
26.74	129.21	0.87	0.59	0.55	0.01	26.90	129.94	0.88	0.58	0.54	0.01
27.07	130.65	0.89	0.57	0.54	0.01	27.23	132.56	0.92	0.56	0.54	0.01
27.40	134.95	0.96	0.36	0.54	0.01	27.56	136.96	0.99	0.35	0.53	0.01
27.72	136.86	0.99	0.35	0.53	0.01	27.89	138.91	1.02	0.34	0.53	0.01
28.05	141.64	1.06	0.23	0.52	0.00	28.22	145.21	1.12	0.23	0.52	0.00
28.38	145.97	1.14	0.22	0.52	0.00	28.54	144.00	1.10	0.22	0.52	0.00
28.71	140.25	1.03	0.33	0.51	0.01	28.87	134.77	0.94	0.51	0.51	0.01
29.04	129.29	0.86	0.54	0.51	0.01	29.20	125.78	0.81	0.73	0.51	0.01
29.36	124.28	0.79	0.74	0.50	0.01	29.53	125.13	0.80	0.73	0.50	0.01
29.69	127.44	0.83	0.71	0.50	0.01	29.86	131.08	0.88	0.52	0.49	0.01
30.02	135.22	0.94	0.49	0.49	0.01	30.19	138.40	0.99	0.32	0.49	0.01
30.35	141.29	1.04	0.31	0.49	0.01	30.51	144.30	1.09	0.21	0.48	0.00
30.68	148.57	1.16	0.15	0.48	0.00	30.84	152.35	1.23	0.14	0.48	0.00
31.01	154.55	1.27	0.10	0.47	0.00	31.17	150.97	1.20	0.14	0.47	0.00
31.33	144.92	1.09	0.20	0.47	0.00	31.50	137.34	0.96	0.31	0.47	0.01
31.66	128.84	2.00	0.00	0.46	0.00	31.83	119.95	2.00	0.00	0.46	0.00
31.99	110.97	2.00	0.00	0.46	0.00	32.15	106.26	2.00	0.00	0.46	0.00
32.32	99.04	2.00	0.00	0.45	0.00	32.48	89.65	2.00	0.00	0.45	0.00
32.65	80.92	2.00	0.00	0.45	0.00	32.81	78.08	2.00	0.00	0.44	0.00
32.97	76.42	2.00	0.00	0.44	0.00	33.14	74.77	0.35	1.30	0.44	0.03
33.30	73.24	0.35	1.31	0.44	0.03	33.47	76.10	2.00	0.00	0.43	0.00
33.63	82.63	2.00	0.00	0.43	0.00	33.79	89.35	2.00	0.00	0.43	0.00
33.96	94.11	2.00	0.00	0.42	0.00	34.12	98.79	2.00	0.00	0.42	0.00
34.29	98.61	2.00	0.00	0.42	0.00	34.45	103.31	2.00	0.00	0.42	0.00
34.61	108.01	2.00	0.00	0.41	0.00	34.78	110.14	2.00	0.00	0.41	0.00
34.94	106.06	2.00	0.00	0.41	0.00	35.11	100.54	2.00	0.00	0.40	0.00
35.27	102.21	0.53	0.92	0.40	0.02	35.43	109.39	0.59	0.87	0.40	0.02
35.60	118.32	0.69	0.77	0.40	0.02	35.76	126.10	0.78	0.57	0.39	0.01
35.93	132.82	0.88	0.40	0.39	0.01	36.09	136.46	0.93	0.38	0.39	0.01
36.26	135.86	0.92	0.38	0.39	0.01	36.42	130.84	0.85	0.53	0.38	0.01
36.58	125.91	0.78	0.55	0.38	0.01	36.75	121.76	0.73	0.70	0.38	0.01
36.91	118.76	2.00	0.00	0.37	0.00	37.08	113.98	2.00	0.00	0.37	0.00
37.24	108.60	2.00	0.00	0.37	0.00	37.40	104.02	2.00	0.00	0.37	0.00
37.57	98.23	2.00	0.00	0.36	0.00	37.73	95.33	2.00	0.00	0.36	0.00
37.90	93.45	2.00	0.00	0.36	0.00	38.06	93.68	2.00	0.00	0.35	0.00
38.22	98.17	2.00	0.00	0.35	0.00	38.39	108.34	2.00	0.00	0.35	0.00
38.55	117.54	0.68	0.68	0.35	0.01	38.72	121.80	0.73	0.64	0.34	0.01
38.88	125.12	0.77	0.50	0.34	0.01	39.04	128.94	0.82	0.47	0.34	0.01
39.21	136.63	0.93	0.33	0.34	0.01	39.37	144.40	1.06	0.14	0.33	0.00
39.54	148.17	1.12	0.14	0.33	0.00	39.70	146.71	1.10	0.14	0.33	0.00
39.86	141.77	1.01	0.21	0.32	0.00	40.03	138.61	0.96	0.21	0.32	0.00
40.19	138.18	0.96	0.21	0.32	0.00	40.36	139.61	0.98	0.20	0.32	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
40.52	139.77	0.98	0.20	0.31	0.00	40.68	138.59	0.96	0.20	0.31	0.00
40.85	136.14	0.93	0.31	0.31	0.01	41.01	131.77	0.86	0.32	0.30	0.01
41.18	125.93	0.78	0.44	0.30	0.01	41.34	119.41	0.70	0.57	0.30	0.01
41.50	115.36	0.66	0.60	0.30	0.01	41.67	116.61	0.67	0.58	0.29	0.01
41.83	119.87	0.71	0.55	0.29	0.01	42.00	123.24	0.75	0.53	0.29	0.01
42.16	123.99	0.76	0.42	0.29	0.01	42.32	125.45	0.78	0.41	0.28	0.01
42.49	128.41	0.82	0.39	0.28	0.01	42.65	133.30	0.89	0.28	0.28	0.01
42.82	137.33	0.95	0.27	0.27	0.01	42.98	140.27	1.00	0.18	0.27	0.00
43.15	139.65	0.99	0.17	0.27	0.00	43.31	135.91	0.93	0.26	0.27	0.01
43.47	128.00	2.00	0.00	0.26	0.00	43.64	117.82	2.00	0.00	0.26	0.00
43.80	109.31	2.00	0.00	0.26	0.00	43.97	102.35	2.00	0.00	0.25	0.00
44.13	96.27	2.00	0.00	0.25	0.00	44.29	87.96	2.00	0.00	0.25	0.00
44.46	79.92	2.00	0.00	0.25	0.00	44.62	75.66	2.00	0.00	0.24	0.00
44.79	77.23	2.00	0.00	0.24	0.00	44.95	82.81	2.00	0.00	0.24	0.00
45.11	84.90	2.00	0.00	0.24	0.00	45.28	80.99	2.00	0.00	0.23	0.00
45.44	68.30	2.00	0.00	0.23	0.00	45.61	56.41	2.00	0.00	0.23	0.00
45.77	51.36	2.00	0.00	0.22	0.00	45.93	54.88	2.00	0.00	0.22	0.00
46.10	57.36	2.00	0.00	0.22	0.00	46.26	57.69	2.00	0.00	0.22	0.00
46.43	61.50	2.00	0.00	0.21	0.00	46.59	69.93	2.00	0.00	0.21	0.00
46.75	85.69	2.00	0.00	0.21	0.00	46.92	93.65	2.00	0.00	0.20	0.00
47.08	99.18	2.00	0.00	0.20	0.00	47.25	104.53	2.00	0.00	0.20	0.00
47.41	106.04	2.00	0.00	0.20	0.00	47.57	106.34	0.58	0.43	0.19	0.01
47.74	107.08	0.59	0.42	0.19	0.01	47.90	113.55	0.65	0.39	0.19	0.01
48.07	118.62	0.71	0.36	0.19	0.01	48.23	120.75	0.74	0.34	0.18	0.01
48.39	120.61	0.74	0.34	0.18	0.01	48.56	119.90	0.73	0.34	0.18	0.01
48.72	119.21	0.72	0.33	0.17	0.01	48.89	119.72	0.73	0.33	0.17	0.01
49.05	120.64	0.74	0.32	0.17	0.01	49.22	122.00	0.76	0.25	0.17	0.01
49.38	121.49	0.75	0.25	0.16	0.00	49.54	119.39	0.73	0.31	0.16	0.01
49.71	117.27	0.70	0.31	0.16	0.01	49.87	115.99	0.69	0.31	0.15	0.01
50.04	115.88	0.69	0.30	0.15	0.01	50.20	114.91	2.00	0.00	0.15	0.00
50.36	113.16	2.00	0.00	0.15	0.00	50.53	108.20	2.00	0.00	0.14	0.00
50.69	103.28	2.00	0.00	0.14	0.00	50.86	97.04	2.00	0.00	0.14	0.00
51.02	89.54	2.00	0.00	0.14	0.00	51.18	80.03	2.00	0.00	0.13	0.00
51.35	70.86	2.00	0.00	0.13	0.00	51.51	64.53	2.00	0.00	0.13	0.00
51.68	62.74	2.00	0.00	0.12	0.00	51.84	62.95	2.00	0.00	0.12	0.00
52.00	61.59	2.00	0.00	0.12	0.00	52.17	59.20	2.00	0.00	0.12	0.00
52.33	57.94	2.00	0.00	0.11	0.00	52.50	58.17	2.00	0.00	0.11	0.00
52.66	59.25	2.00	0.00	0.11	0.00	52.82	61.64	2.00	0.00	0.10	0.00
52.99	66.70	2.00	0.00	0.10	0.00	53.15	71.07	2.00	0.00	0.10	0.00
53.32	70.56	2.00	0.00	0.10	0.00	53.48	65.58	2.00	0.00	0.09	0.00
53.64	58.66	2.00	0.00	0.09	0.00	53.81	54.63	2.00	0.00	0.09	0.00
53.97	53.38	2.00	0.00	0.09	0.00	54.14	53.31	2.00	0.00	0.08	0.00
54.30	53.67	2.00	0.00	0.08	0.00	54.46	57.00	2.00	0.00	0.08	0.00
54.63	61.94	2.00	0.00	0.07	0.00	54.79	66.49	2.00	0.00	0.07	0.00
54.96	74.11	2.00	0.00	0.07	0.00	55.12	82.85	2.00	0.00	0.07	0.00
55.28	94.51	2.00	0.00	0.06	0.00	55.45	101.18	2.00	0.00	0.06	0.00
55.61	105.37	2.00	0.00	0.06	0.00	55.78	105.47	2.00	0.00	0.05	0.00
55.94	106.70	2.00	0.00	0.05	0.00	56.11	109.64	2.00	0.00	0.05	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
56.27	114.19	2.00	0.00	0.05	0.00	56.43	117.99	0.75	0.08	0.04	0.00
56.60	119.61	0.77	0.06	0.04	0.00	56.76	118.24	2.00	0.00	0.04	0.00
56.93	116.22	2.00	0.00	0.04	0.00	57.09	115.17	2.00	0.00	0.03	0.00
57.25	112.30	2.00	0.00	0.03	0.00	57.42	103.57	2.00	0.00	0.03	0.00
57.58	90.26	2.00	0.00	0.02	0.00	57.75	77.37	2.00	0.00	0.02	0.00
57.91	68.04	2.00	0.00	0.02	0.00	58.07	60.95	2.00	0.00	0.02	0.00
58.24	57.03	2.00	0.00	0.01	0.00	58.40	56.78	2.00	0.00	0.01	0.00
58.57	58.01	2.00	0.00	0.01	0.00	58.73	61.73	2.00	0.00	0.00	0.00
58.89	66.13	2.00	0.00	0.00	0.00	59.06	71.42	2.00	0.00	0.00	0.00
59.22	78.20	2.00	0.00	0.00	0.00	59.39	87.95	2.00	0.00	0.00	0.00
59.55	94.95	2.00	0.00	0.00	0.00	59.71	93.35	2.00	0.00	0.00	0.00
59.88	87.76	2.00	0.00	0.00	0.00	60.04	77.96	2.00	0.00	0.00	0.00
60.21	76.57	2.00	0.00	0.00	0.00	60.37	75.01	2.00	0.00	0.00	0.00
60.53	78.19	2.00	0.00	0.00	0.00	60.70	80.18	2.00	0.00	0.00	0.00
60.86	81.89	2.00	0.00	0.00	0.00						

Total estimated settlement: 1.26

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

:: Strength loss calculation (Robertson (2009) ::

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.33	179.69	288.66	1.00	288.66	1.28	N/A	N/A
0.49	166.02	266.69	1.00	266.69	1.38	N/A	N/A
0.66	149.08	239.45	1.00	239.45	1.52	N/A	N/A
0.82	139.05	223.32	1.00	223.32	1.63	N/A	N/A
0.98	124.21	199.46	1.07	213.83	1.75	N/A	N/A
1.15	108.17	173.68	1.15	199.80	1.86	N/A	N/A
1.31	94.74	152.08	1.23	186.56	1.94	N/A	N/A
1.48	83.90	134.66	1.28	172.39	1.98	N/A	N/A
1.64	76.30	122.43	1.32	161.22	2.01	N/A	N/A
1.80	72.04	115.56	1.32	152.56	2.02	N/A	N/A
1.97	70.27	112.70	1.32	148.43	2.01	N/A	N/A
2.13	69.33	111.18	1.30	144.90	2.00	N/A	N/A
2.30	66.20	106.13	1.32	139.58	2.01	N/A	N/A
2.46	60.60	97.12	1.35	130.87	2.03	N/A	N/A
2.62	53.63	85.91	1.41	121.22	2.07	N/A	N/A
2.79	49.93	79.95	1.44	115.41	2.09	N/A	N/A
2.95	50.70	81.17	1.40	114.02	2.07	N/A	N/A
3.12	53.57	85.76	1.35	115.95	2.04	N/A	N/A
3.28	53.27	85.26	1.36	115.73	2.04	N/A	N/A
3.45	47.06	75.28	1.46	109.98	2.10	N/A	N/A
3.61	37.26	59.52	1.75	104.20	2.23	N/A	N/A
3.77	27.40	43.65	2.28	99.40	2.39	N/A	N/A
3.94	20.33	32.28	3.08	99.58	2.56	N/A	N/A
4.10	16.60	26.27	3.63	95.46	2.65	N/A	N/A
4.27	15.73	24.86	3.58	88.98	2.64	N/A	N/A
4.43	16.36	25.86	2.98	77.11	2.54	N/A	N/A
4.59	16.96	26.81	2.56	68.56	2.46	N/A	N/A
4.76	17.06	26.96	2.38	64.18	2.42	N/A	N/A
4.92	17.23	27.21	2.36	64.14	2.41	N/A	N/A
5.09	17.63	27.84	2.30	64.05	2.40	N/A	N/A
5.25	18.39	29.06	2.34	68.13	2.41	N/A	N/A
5.41	19.86	31.40	2.41	75.61	2.42	N/A	N/A
5.58	22.83	36.15	2.36	85.33	2.41	N/A	N/A
5.74	25.03	39.67	2.37	94.22	2.42	N/A	N/A
5.91	25.29	40.09	2.50	100.15	2.44	N/A	N/A
6.07	22.83	36.11	2.81	101.32	2.51	N/A	N/A
6.23	20.39	32.18	3.10	99.62	2.56	N/A	N/A
6.40	19.16	30.18	3.11	93.83	2.56	N/A	N/A
6.56	19.36	30.49	2.96	90.30	2.54	N/A	N/A
6.73	20.26	31.92	2.71	86.36	2.49	N/A	N/A
6.89	21.32	33.62	2.66	89.29	2.48	N/A	N/A
7.05	22.09	34.84	2.65	92.25	2.48	N/A	N/A
7.22	22.49	35.46	2.78	98.44	2.50	N/A	N/A
7.38	23.69	37.38	2.70	100.91	2.49	N/A	N/A
7.55	26.69	42.18	2.43	102.57	2.43	N/A	N/A
7.71	32.99	52.29	1.99	103.95	2.31	N/A	N/A
7.87	40.29	64.00	1.67	107.12	2.20	N/A	N/A
8.04	45.33	72.08	1.54	111.00	2.14	N/A	N/A

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.20	44.89	71.36	1.55	110.82	2.15	N/A	N/A
8.37	41.69	66.21	1.66	109.70	2.20	N/A	N/A
8.53	38.42	60.94	1.75	106.71	2.23	N/A	N/A
8.69	36.89	58.46	1.78	104.10	2.24	N/A	N/A
8.86	35.82	56.72	1.79	101.51	2.25	N/A	N/A
9.02	35.19	55.39	1.87	103.66	2.28	0.75	0.75
9.19	35.09	54.73	1.93	105.71	2.29	0.75	0.75
9.35	35.49	54.79	1.96	107.64	2.30	0.75	0.75
9.51	36.32	55.24	1.93	106.87	2.30	0.75	0.75
9.68	37.76	56.43	1.88	106.01	2.28	0.75	0.75
9.84	39.99	58.84	1.83	107.57	2.26	0.76	0.76
10.01	43.03	62.30	1.79	111.28	2.25	0.76	0.76
10.17	46.26	65.99	1.74	114.90	2.23	0.77	0.77
10.34	49.19	69.03	1.69	116.35	2.21	0.78	0.78
10.50	51.39	71.15	1.66	117.83	2.20	0.78	0.78
10.66	53.09	72.62	1.64	119.24	2.19	0.78	0.78
10.83	54.26	73.37	1.64	120.52	2.19	0.78	0.78
10.99	55.16	73.83	1.65	121.78	2.19	0.79	0.79
11.16	56.06	74.23	1.66	122.96	2.20	0.79	0.79
11.32	57.39	75.40	1.69	127.67	2.21	0.79	0.79
11.48	59.73	77.82	1.72	133.92	2.22	0.79	0.79
11.65	62.96	81.16	1.72	139.84	2.22	0.80	0.80
11.81	65.89	84.03	1.71	143.94	2.22	0.80	0.80
11.98	67.49	85.00	1.69	143.23	2.21	0.80	0.80
12.14	67.29	83.86	1.68	140.95	2.21	0.80	0.80
12.30	66.26	81.72	1.68	137.10	2.20	0.80	0.80
12.47	64.66	79.01	1.70	134.70	2.22	0.79	0.79
12.63	62.92	76.39	1.77	135.51	2.24	0.79	0.79
12.80	60.86	73.37	1.86	136.43	2.27	0.78	0.78
12.96	58.59	70.14	1.94	135.98	2.30	0.78	0.78
13.12	56.05	66.55	1.99	132.41	2.31	0.77	0.77
13.29	53.89	63.38	2.03	128.77	2.33	0.77	0.77
13.45	52.19	60.91	2.11	128.53	2.35	0.76	0.76
13.62	53.05	61.30	2.11	129.46	2.35	0.76	0.76
13.78	50.19	57.60	2.25	129.59	2.38	0.75	0.75
13.94	50.59	57.46	2.21	127.24	2.38	0.75	0.75
14.11	48.39	54.49	2.30	125.56	2.40	0.75	0.75
14.27	48.52	54.10	2.28	123.29	2.39	0.74	0.74
14.44	42.98	47.65	2.62	124.62	2.47	0.73	0.73
14.60	42.71	46.98	2.72	127.83	2.49	0.73	0.73
14.76	48.07	52.30	2.49	130.46	2.44	0.74	0.74
14.93	57.64	61.91	2.14	132.27	2.35	0.76	0.76
15.09	63.58	67.56	1.96	132.50	2.30	0.77	0.77
15.26	65.79	69.31	1.96	136.05	2.30	0.78	0.78
15.42	69.12	72.21	1.93	139.43	2.29	0.78	0.78
15.58	73.78	76.44	1.88	144.00	2.28	0.79	0.79
15.75	79.95	82.07	1.79	147.23	2.25	0.80	0.80
15.91	84.15	85.67	1.74	149.28	2.23	0.81	0.81

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
16.08	85.82	86.62	1.72	148.78	2.22	0.81	0.81
16.24	84.32	84.45	1.73	145.70	2.22	0.80	0.80
16.40	80.22	79.73	1.77	141.23	2.24	0.80	0.80
16.57	73.45	72.40	1.87	135.45	2.27	0.78	0.78
16.73	63.99	62.57	2.08	130.13	2.34	0.76	0.76
16.90	54.19	52.49	2.42	127.05	2.43	0.74	0.74
17.06	55.45	53.32	2.45	130.71	2.43	0.74	0.74
17.23	70.75	67.62	2.01	136.03	2.32	0.77	0.77
17.39	91.02	86.53	1.70	146.83	2.21	0.81	0.81
17.55	103.78	98.07	1.59	155.60	2.17	0.82	0.82
17.72	106.25	99.70	1.63	162.17	2.18	0.83	0.83
17.88	103.99	96.86	1.68	163.08	2.21	0.82	0.82
18.05	97.45	90.03	1.74	156.65	2.23	0.81	0.81
18.21	83.88	76.80	1.85	142.35	2.27	0.79	0.79
18.37	63.22	57.15	2.20	125.69	2.37	0.75	0.75
18.54	40.92	36.25	3.12	113.03	2.56	0.69	0.69
18.70	24.56	21.09	4.82	101.55	2.80	1.50	1.50
18.87	16.42	13.60	6.59	89.62	2.99	0.97	0.97
19.03	13.09	10.55	7.47	78.73	3.06	0.75	0.75
19.19	11.36	8.94	8.22	73.55	3.12	0.64	0.64
19.36	10.67	8.26	8.83	72.96	3.17	0.59	0.59
19.52	10.75	8.26	9.07	74.90	3.19	0.59	0.59
19.69	10.87	8.29	9.25	76.74	3.20	0.59	0.59
19.85	10.83	8.19	9.33	76.43	3.21	0.58	0.58
20.01	10.93	8.21	9.53	78.18	3.22	0.59	0.59
20.18	11.74	8.81	9.33	82.18	3.21	0.63	0.63
20.34	12.95	9.74	8.85	86.17	3.17	0.70	0.70
20.51	13.67	10.24	8.41	86.15	3.14	0.73	0.73
20.67	13.55	10.06	8.16	82.12	3.12	0.72	0.72
20.83	13.17	9.68	7.83	75.81	3.09	0.69	0.69
21.00	12.47	9.03	7.87	71.13	3.10	0.65	0.65
21.16	11.46	8.15	8.39	68.37	3.14	0.32	0.58
21.33	10.33	7.19	9.39	67.53	3.21	0.32	0.51
21.49	10.29	7.10	9.48	67.28	3.22	0.31	0.51
21.65	10.63	7.31	9.49	69.36	3.22	0.31	0.52
21.82	11.05	7.57	9.42	71.39	3.21	0.54	0.54
21.98	11.10	7.55	9.92	74.93	3.25	0.54	0.54
22.15	12.41	8.49	9.32	79.11	3.20	0.61	0.61
22.31	16.08	11.22	7.61	85.36	3.07	0.80	0.80
22.47	20.48	14.47	6.12	88.55	2.94	1.03	1.03
22.64	23.30	16.55	5.52	91.40	2.88	1.18	1.18
22.80	23.10	16.24	5.81	94.43	2.91	1.16	1.16
22.97	23.07	16.03	6.25	100.27	2.95	1.15	1.15
23.13	24.34	16.84	6.27	105.68	2.96	1.20	1.20
23.30	26.61	18.40	6.02	110.69	2.93	1.31	1.31
23.46	27.83	19.17	5.89	112.91	2.92	1.36	1.36
23.62	27.86	19.06	5.91	112.55	2.92	1.36	1.36
23.79	26.93	18.22	6.02	109.60	2.93	1.30	1.30

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
23.95	25.49	17.03	6.26	106.66	2.96	1.22	1.22
24.12	24.32	16.08	6.45	103.69	2.97	1.15	1.15
24.28	24.21	15.90	6.42	102.00	2.97	1.14	1.14
24.44	24.01	15.64	6.23	97.43	2.95	1.12	1.12
24.61	22.00	14.14	6.46	91.37	2.97	1.01	1.01
24.77	18.16	11.42	7.29	83.28	3.05	0.82	0.82
24.94	14.80	9.06	8.90	80.65	3.17	0.65	0.65
25.10	14.35	8.69	9.73	84.61	3.23	0.62	0.62
25.26	20.14	12.52	7.68	96.06	3.08	0.89	0.89
25.43	37.42	24.69	4.14	102.32	2.72	1.71	1.71
25.59	59.99	41.46	2.52	104.28	2.45	0.71	0.71
25.76	81.92	58.08	1.86	108.13	2.27	0.75	0.75
25.92	95.45	68.16	1.68	114.43	2.20	0.77	0.77
26.08	104.61	74.71	1.62	121.12	2.18	0.79	0.79
26.25	110.55	78.76	1.59	125.33	2.17	0.79	0.79
26.41	114.05	81.02	1.57	127.38	2.16	0.80	0.80
26.58	116.58	82.53	1.56	128.38	2.15	0.80	0.80
26.74	118.28	83.41	1.55	129.21	2.15	0.80	0.80
26.90	119.62	83.99	1.55	129.94	2.15	0.80	0.80
27.07	120.98	84.57	1.54	130.65	2.15	0.80	0.80
27.23	124.15	86.51	1.53	132.56	2.14	0.81	0.81
27.40	129.25	89.91	1.50	134.95	2.12	0.81	0.81
27.56	135.08	93.97	1.46	136.96	2.10	0.82	0.82
27.72	139.92	97.45	1.40	136.86	2.07	0.82	0.82
27.89	143.42	99.57	1.40	138.91	2.07	0.83	0.83
28.05	145.38	100.36	1.41	141.64	2.08	0.83	0.83
28.22	144.28	98.53	1.47	145.21	2.11	0.83	0.83
28.38	141.62	95.85	1.52	145.97	2.14	0.82	0.82
28.54	137.95	92.69	1.55	144.00	2.15	0.82	0.82
28.71	135.08	90.33	1.55	140.25	2.15	0.81	0.81
28.87	130.68	87.01	1.55	134.77	2.15	0.81	0.81
29.04	123.72	81.70	1.58	129.29	2.16	0.80	0.80
29.20	115.22	75.13	1.67	125.78	2.20	0.79	0.79
29.36	106.98	68.71	1.81	124.28	2.25	0.78	0.78
29.53	101.68	64.38	1.94	125.13	2.30	0.77	0.77
29.69	103.82	65.45	1.95	127.44	2.30	0.77	0.77
29.86	113.02	71.55	1.83	131.08	2.26	0.78	0.78
30.02	128.05	82.00	1.65	135.22	2.19	0.80	0.80
30.19	140.72	90.88	1.52	138.40	2.14	0.81	0.81
30.35	151.85	98.76	1.43	141.29	2.09	0.83	0.83
30.51	161.72	105.73	1.36	144.30	2.05	0.84	0.84
30.68	172.55	113.34	1.31	148.57	2.01	0.85	0.85
30.84	179.25	117.65	1.29	152.35	2.00	0.85	0.85
31.01	181.15	118.21	1.31	154.55	2.01	0.85	0.85
31.17	176.78	114.76	1.32	150.97	2.01	0.85	0.85
31.33	171.05	110.72	1.31	144.92	2.01	0.84	0.84
31.50	164.15	106.05	1.30	137.34	2.00	0.84	0.84
31.66	150.02	95.66	1.35	128.84	2.03	0.82	0.82

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
31.83	129.32	80.41	1.49	119.95	2.12	0.80	0.80
31.99	98.35	58.41	1.90	110.97	2.28	0.75	0.75
32.15	70.15	39.30	2.70	106.26	2.49	0.70	0.70
32.32	49.72	26.27	3.77	99.04	2.67	1.76	1.76
32.48	41.42	21.30	4.21	89.65	2.73	1.44	1.44
32.65	40.52	20.94	3.86	80.92	2.68	1.40	1.40
32.81	41.08	21.30	3.67	78.08	2.65	1.42	1.42
32.97	42.71	22.27	3.43	76.42	2.62	1.47	1.47
33.14	44.30	23.24	3.22	74.77	2.58	0.64	0.64
33.30	44.65	23.42	3.13	73.24	2.57	0.64	0.64
33.47	42.20	21.62	3.52	76.10	2.63	1.43	1.43
33.63	40.20	20.02	4.13	82.63	2.72	1.35	1.35
33.79	42.87	21.28	4.20	89.35	2.73	1.44	1.44
33.96	48.94	24.63	3.82	94.11	2.68	1.64	1.64
34.12	52.89	26.71	3.70	98.79	2.66	1.77	1.77
34.29	52.80	26.52	3.72	98.61	2.66	1.76	1.76
34.45	54.05	26.93	3.84	103.31	2.68	1.79	1.79
34.61	62.05	31.41	3.44	108.01	2.62	2.06	2.06
34.78	76.62	40.14	2.74	110.14	2.50	0.71	0.71
34.94	89.91	48.73	2.18	106.06	2.37	0.73	0.73
35.11	98.27	54.57	1.84	100.54	2.27	0.75	0.75
35.27	100.32	55.54	1.84	102.21	2.26	0.75	0.75
35.43	102.91	56.30	1.94	109.39	2.30	0.75	0.75
35.60	113.34	62.08	1.91	118.32	2.29	0.76	0.76
35.76	132.88	74.17	1.70	126.10	2.21	0.79	0.79
35.93	154.21	87.94	1.51	132.82	2.13	0.81	0.81
36.09	167.64	96.85	1.41	136.46	2.07	0.82	0.82
36.26	171.11	99.22	1.37	135.86	2.05	0.83	0.83
36.42	167.04	96.85	1.35	130.84	2.04	0.82	0.82
36.58	162.04	93.76	1.34	125.91	2.03	0.82	0.82
36.75	156.71	90.22	1.35	121.76	2.04	0.81	0.81
36.91	148.60	84.33	1.41	118.76	2.07	0.80	0.80
37.08	129.47	70.99	1.61	113.98	2.17	0.78	0.78
37.24	100.57	52.17	2.08	108.60	2.34	0.74	0.74
37.40	71.92	34.82	2.99	104.02	2.54	0.69	0.69
37.57	50.63	22.76	4.32	98.23	2.74	1.53	1.53
37.73	39.11	16.50	5.78	95.33	2.91	1.16	1.16
37.90	47.91	21.33	4.38	93.45	2.75	1.44	1.44
38.06	71.53	34.94	2.68	93.68	2.48	0.69	0.69
38.22	102.71	54.02	1.82	98.17	2.26	0.74	0.74
38.39	122.18	65.57	1.65	108.34	2.19	0.77	0.77
38.55	133.92	72.06	1.63	117.54	2.19	0.78	0.78
38.72	140.67	75.86	1.61	121.80	2.17	0.79	0.79
38.88	145.88	78.76	1.59	125.12	2.17	0.79	0.79
39.04	151.09	81.56	1.58	128.94	2.16	0.80	0.80
39.21	157.10	84.25	1.62	136.63	2.18	0.80	0.80
39.37	167.33	89.83	1.61	144.40	2.17	0.81	0.81
39.54	173.80	93.45	1.59	148.17	2.17	0.82	0.82

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
39.70	174.57	94.03	1.56	146.71	2.15	0.82	0.82
39.86	169.01	90.83	1.56	141.77	2.15	0.81	0.81
40.03	164.81	88.26	1.57	138.61	2.16	0.81	0.81
40.19	163.57	87.29	1.58	138.18	2.16	0.81	0.81
40.36	163.74	86.95	1.61	139.61	2.17	0.81	0.81
40.52	165.17	87.71	1.59	139.77	2.17	0.81	0.81
40.68	167.30	89.21	1.55	138.59	2.15	0.81	0.81
40.85	168.08	90.02	1.51	136.14	2.13	0.81	0.81
41.01	165.18	88.67	1.49	131.77	2.12	0.81	0.81
41.18	157.12	83.93	1.50	125.93	2.12	0.80	0.80
41.34	146.62	77.67	1.54	119.41	2.14	0.79	0.79
41.50	136.82	71.49	1.61	115.36	2.18	0.78	0.78
41.67	134.62	69.64	1.67	116.61	2.20	0.78	0.78
41.83	136.67	70.35	1.70	119.87	2.21	0.78	0.78
42.00	139.80	71.74	1.72	123.24	2.22	0.78	0.78
42.16	141.44	72.55	1.71	123.99	2.22	0.78	0.78
42.32	143.95	73.82	1.70	125.45	2.21	0.79	0.79
42.49	148.65	76.30	1.68	128.41	2.21	0.79	0.79
42.65	155.19	79.68	1.67	133.30	2.20	0.80	0.80
42.82	160.49	82.36	1.67	137.33	2.20	0.80	0.80
42.98	165.79	85.22	1.65	140.27	2.19	0.81	0.81
43.15	165.99	85.27	1.64	139.65	2.19	0.81	0.81
43.31	160.73	82.21	1.65	135.91	2.19	0.80	0.80
43.47	143.89	72.26	1.77	128.00	2.24	0.78	0.78
43.64	119.26	57.95	2.03	117.82	2.33	0.75	0.75
43.80	91.86	42.36	2.58	109.31	2.46	0.71	0.71
43.97	69.20	30.02	3.41	102.35	2.61	1.92	1.92
44.13	52.61	21.40	4.50	96.27	2.77	1.44	1.44
44.29	40.41	15.46	5.69	87.96	2.90	1.09	1.09
44.46	30.95	11.36	7.04	79.92	3.03	0.81	0.81
44.62	32.62	12.00	6.30	75.66	2.96	0.86	0.86
44.79	43.92	17.61	4.38	77.23	2.75	1.18	1.18
44.95	56.74	24.09	3.44	82.81	2.62	1.54	1.54
45.11	53.51	22.18	3.83	84.90	2.68	1.45	1.45
45.28	39.25	14.92	5.43	80.99	2.87	1.04	1.04
45.44	23.51	8.25	8.28	68.30	3.13	0.32	0.59
45.61	16.16	5.31	10.62	56.41	3.29	0.16	0.38
45.77	14.20	4.52	11.36	51.36	3.34	0.16	0.32
45.93	15.81	5.15	10.66	54.88	3.30	0.20	0.37
46.10	18.65	6.26	9.16	57.36	3.19	0.24	0.45
46.26	20.01	6.78	8.51	57.69	3.15	0.20	0.48
46.43	20.32	6.89	8.93	61.50	3.18	0.20	0.49
46.59	20.05	6.77	10.34	69.93	3.27	0.35	0.48
46.75	37.35	13.54	6.33	85.69	2.96	0.97	0.97
46.92	67.08	28.34	3.30	93.65	2.60	0.66	0.66
47.08	104.48	49.08	2.02	99.18	2.32	0.73	0.73
47.25	132.51	65.90	1.59	104.53	2.17	0.77	0.77
47.41	141.46	71.56	1.48	106.04	2.11	0.78	0.78

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
47.57	140.89	70.95	1.50	106.34	2.12	0.78	0.78
47.74	134.77	66.50	1.61	107.08	2.18	0.77	0.77
47.90	138.59	67.67	1.68	113.55	2.20	0.77	0.77
48.07	145.29	70.95	1.67	118.62	2.20	0.78	0.78
48.23	148.50	72.50	1.67	120.75	2.20	0.78	0.78
48.39	148.33	72.27	1.67	120.61	2.20	0.78	0.78
48.56	148.06	72.07	1.66	119.90	2.20	0.78	0.78
48.72	147.86	71.92	1.66	119.21	2.20	0.78	0.78
48.89	145.16	69.94	1.71	119.72	2.22	0.78	0.78
49.05	140.84	66.93	1.80	120.64	2.25	0.77	0.77
49.22	138.82	65.33	1.87	122.00	2.27	0.77	0.77
49.38	140.19	66.12	1.84	121.49	2.26	0.77	0.77
49.54	142.23	67.58	1.77	119.39	2.24	0.77	0.77
49.71	143.72	68.74	1.71	117.27	2.22	0.78	0.78
49.87	143.39	68.62	1.69	115.99	2.21	0.78	0.78
50.04	139.96	66.32	1.75	115.88	2.23	0.77	0.77
50.20	133.72	62.48	1.84	114.91	2.26	0.76	0.76
50.36	123.69	56.55	2.00	113.16	2.32	0.75	0.75
50.53	106.43	47.00	2.30	108.20	2.40	0.73	0.73
50.69	83.33	34.64	2.98	103.28	2.54	0.69	0.69
50.86	62.50	24.17	4.01	97.04	2.70	1.58	1.58
51.02	47.60	17.15	5.22	89.54	2.85	1.18	1.18
51.18	37.06	12.60	6.35	80.03	2.96	0.90	0.90
51.35	27.07	8.87	7.99	70.86	3.10	0.63	0.63
51.51	21.82	6.91	9.34	64.53	3.21	0.26	0.49
51.68	23.60	7.55	8.31	62.74	3.13	0.26	0.54
51.84	25.33	8.17	7.70	62.95	3.08	0.26	0.58
52.00	24.14	7.72	7.98	61.59	3.10	0.26	0.55
52.17	19.53	6.01	9.85	59.20	3.24	0.22	0.43
52.33	17.13	5.11	11.33	57.94	3.34	0.22	0.37
52.50	17.59	5.27	11.04	58.17	3.32	0.26	0.38
52.66	20.03	6.15	9.63	59.25	3.23	0.22	0.44
52.82	26.74	8.59	7.17	61.64	3.04	0.22	0.61
52.99	35.03	11.85	5.63	66.70	2.89	0.29	0.83
53.15	37.99	13.01	5.46	71.07	2.88	0.90	0.90
53.32	32.95	10.79	6.54	70.56	2.98	0.77	0.77
53.48	24.12	7.57	8.66	65.58	3.16	0.29	0.54
53.64	19.27	5.80	10.12	58.66	3.26	0.22	0.41
53.81	17.96	5.31	10.29	54.63	3.27	0.18	0.38
53.97	17.94	5.29	10.08	53.38	3.26	0.18	0.38
54.14	17.87	5.26	10.14	53.31	3.26	0.18	0.38
54.30	18.85	5.60	9.58	53.67	3.22	0.18	0.40
54.46	22.02	6.73	8.47	57.00	3.14	0.18	0.48
54.63	23.64	7.29	8.49	61.94	3.14	0.25	0.52
54.79	25.38	7.90	8.41	66.49	3.14	0.32	0.56
54.96	32.40	10.40	7.13	74.11	3.03	0.74	0.74
55.12	44.86	15.28	5.42	82.85	2.87	1.06	1.06
55.28	55.90	19.83	4.77	94.51	2.80	1.34	1.34

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
55.45	62.18	22.40	4.52	101.18	2.77	1.50	1.50
55.61	70.86	26.33	4.00	105.37	2.70	1.71	1.71
55.78	88.50	35.15	3.00	105.47	2.54	0.69	0.69
55.94	109.52	46.18	2.31	106.70	2.40	0.72	0.72
56.11	127.60	55.94	1.96	109.64	2.30	0.75	0.75
56.27	142.23	63.76	1.79	114.19	2.25	0.77	0.77
56.43	153.26	69.68	1.69	117.99	2.21	0.78	0.78
56.60	157.19	71.66	1.67	119.61	2.20	0.78	0.78
56.76	149.66	67.14	1.76	118.24	2.24	0.77	0.77
56.93	133.44	57.77	2.01	116.22	2.32	0.75	0.75
57.09	111.25	45.51	2.53	115.17	2.45	0.72	0.72
57.25	86.18	32.74	3.43	112.30	2.62	2.06	2.06
57.42	60.78	20.95	4.94	103.57	2.82	1.42	1.42
57.58	42.06	13.39	6.74	90.26	3.00	0.96	0.96
57.75	30.43	9.33	8.29	77.37	3.13	0.67	0.67
57.91	24.37	7.21	9.43	68.04	3.21	0.31	0.52
58.07	20.74	5.94	10.26	60.95	3.27	0.24	0.42
58.24	18.94	5.31	10.74	57.03	3.30	0.21	0.38
58.40	18.55	5.17	10.99	56.78	3.32	0.21	0.37
58.57	19.04	5.32	10.90	58.01	3.31	0.24	0.38
58.73	20.72	5.89	10.48	61.73	3.28	0.24	0.42
58.89	25.42	7.49	8.83	66.13	3.17	0.31	0.53
59.06	28.84	8.65	8.26	71.42	3.13	0.62	0.62
59.22	36.12	11.12	7.03	78.20	3.03	0.79	0.79
59.39	50.93	16.79	5.24	87.95	2.85	1.15	1.15
59.55	58.89	20.00	4.75	94.95	2.80	1.35	1.35
59.71	56.75	19.06	4.90	93.35	2.81	1.29	1.29
59.88	44.24	13.79	6.37	87.76	2.97	0.98	0.98
60.04	41.33	12.84	6.07	77.96	2.94	0.91	0.91
60.21	43.43	13.82	5.54	76.57	2.88	0.96	0.96
60.37	46.26	15.15	4.95	75.01	2.82	1.03	1.03
60.53	44.03	13.94	5.61	78.19	2.89	0.97	0.97
60.70	41.97	12.89	6.22	80.18	2.95	0.92	0.92
60.86	38.83	11.81	6.93	81.89	3.02	0.84	0.84

Abbreviations

q_t:	Total cone resistance
K_c:	Cone resistance correction factor due to fines
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
I_c:	Soil behavior type index
$S_{u(liq)}/\sigma'_v$:	Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$:	Calculated peak undrained strength ratio

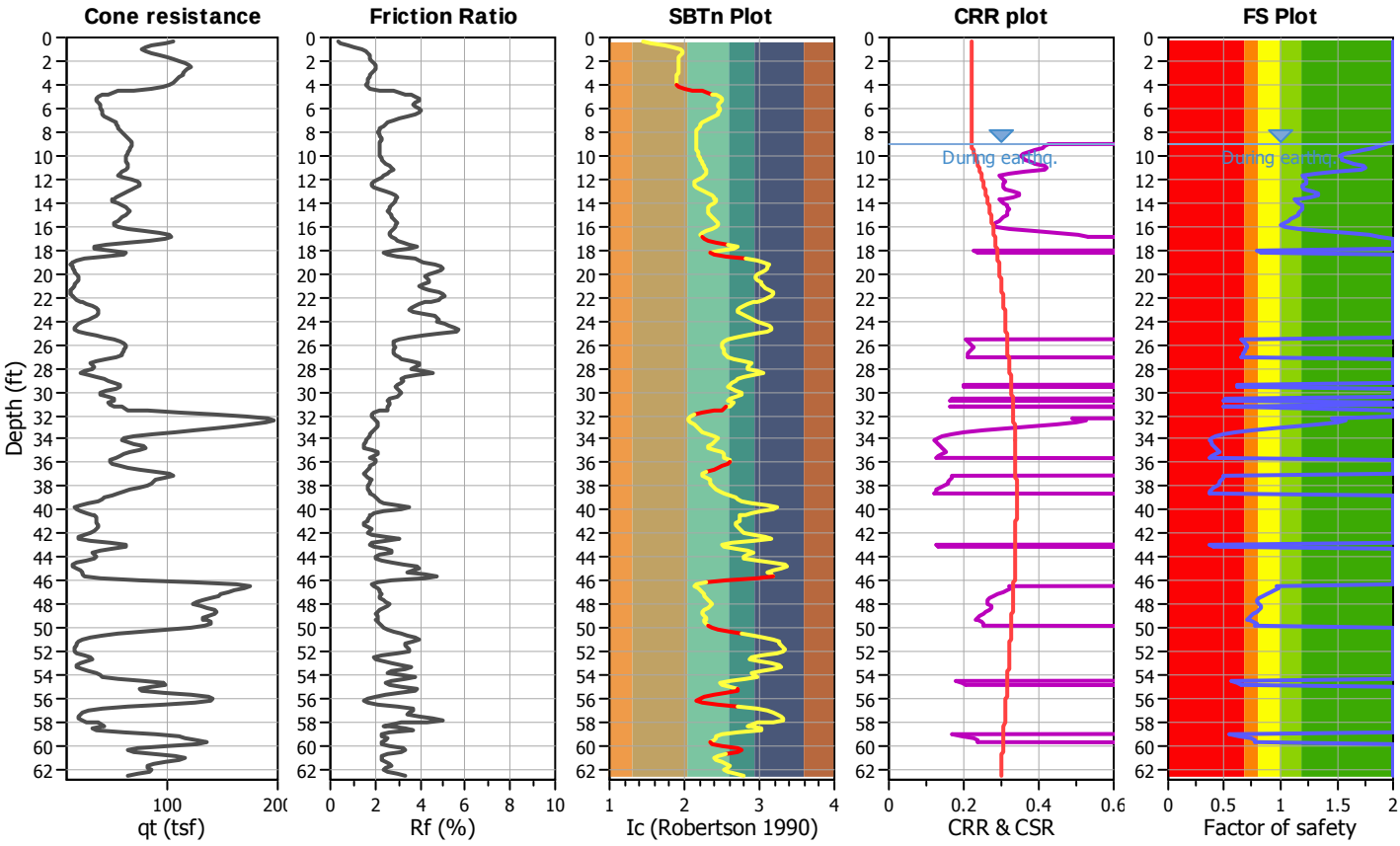
LIQUEFACTION ANALYSIS REPORT

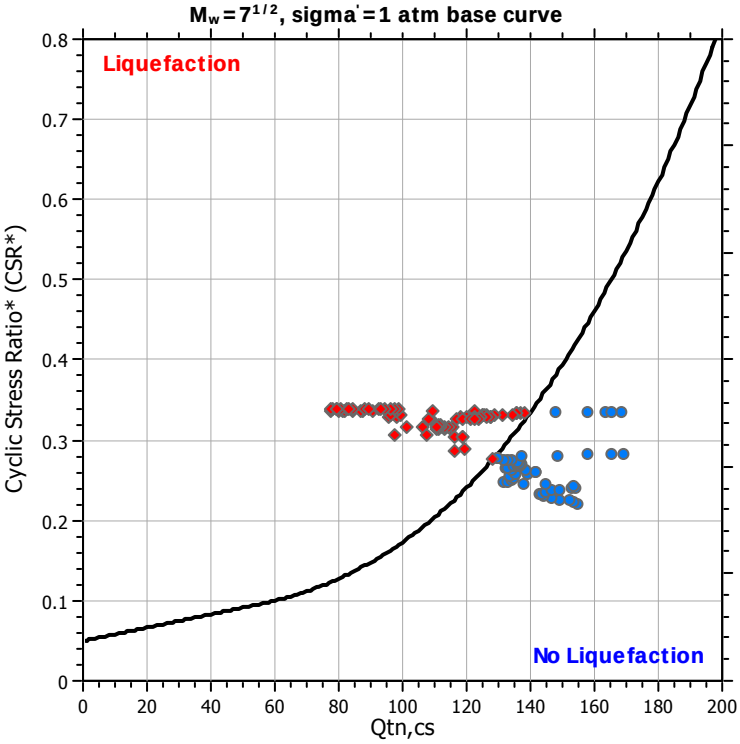
Project title : A9911-06-01 **Location : Bellflower Mixed-Use**

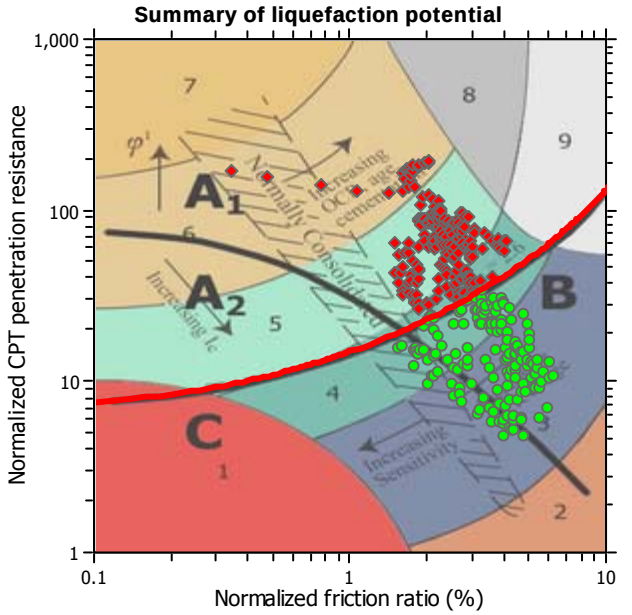
CPT file : CPT-02

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	37.20 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	9.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	60.00 ft
Earthquake magnitude M_w:	6.62	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.43	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

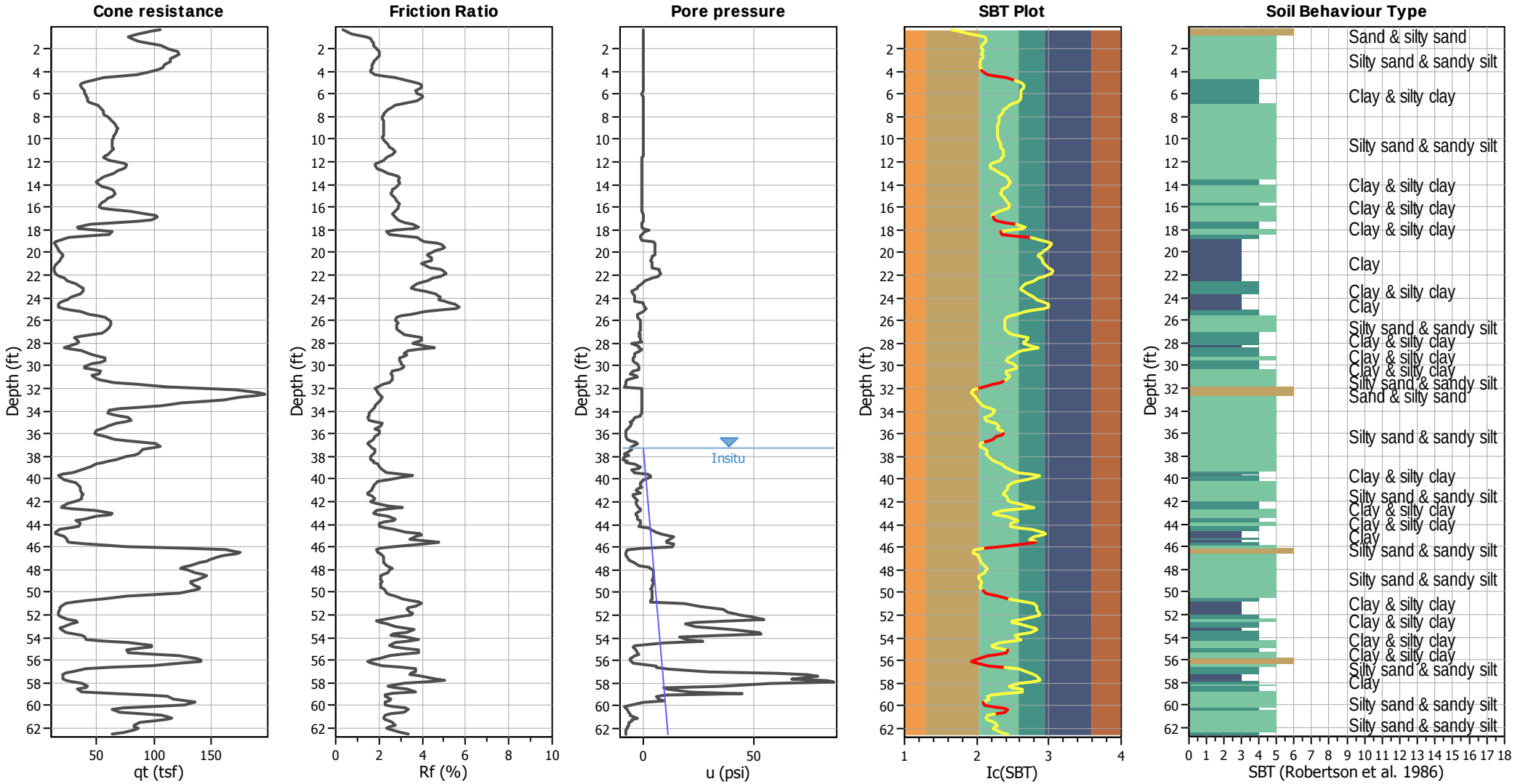






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



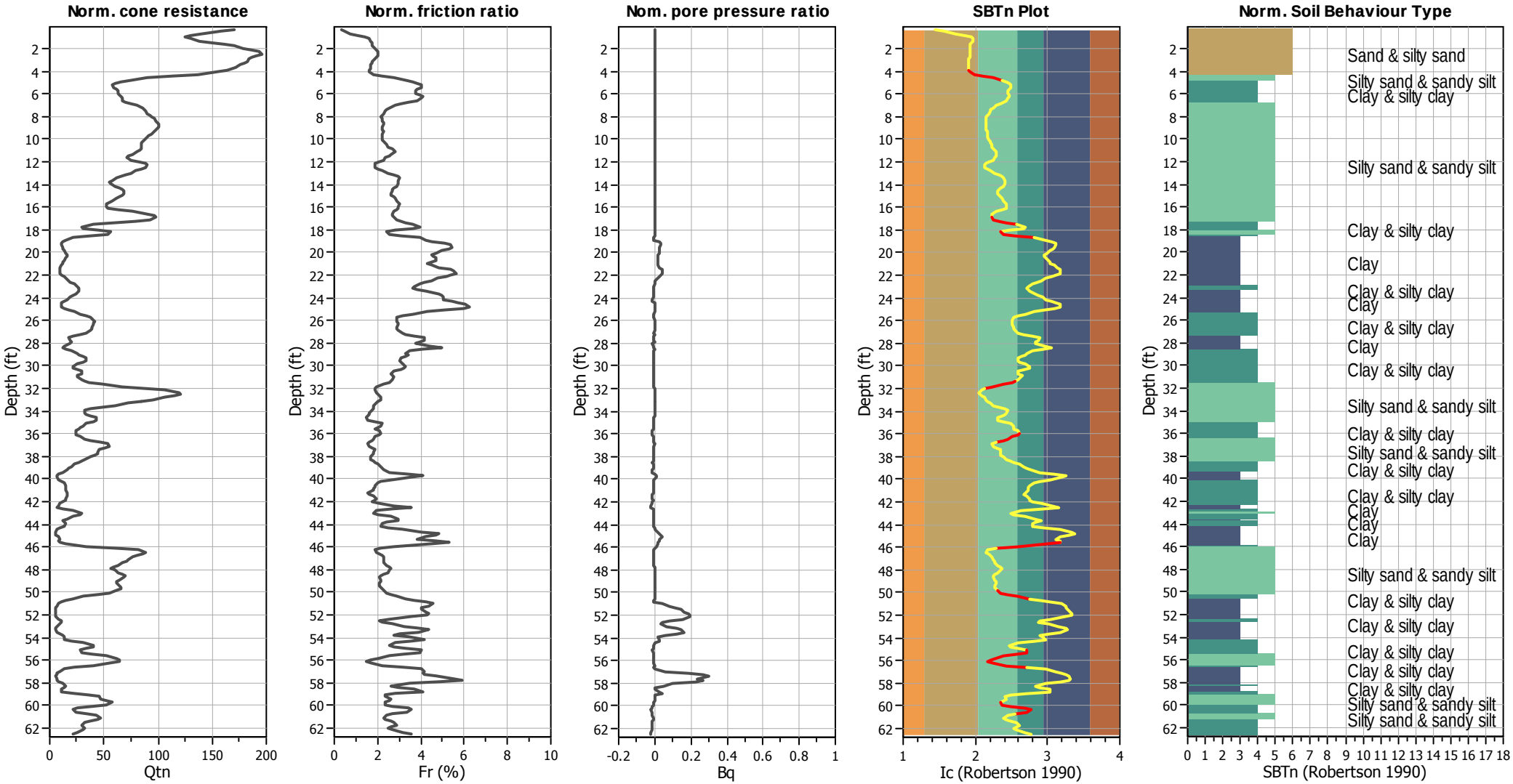
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	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:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.43	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBT 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

CPT basic interpretation plots (normalized)



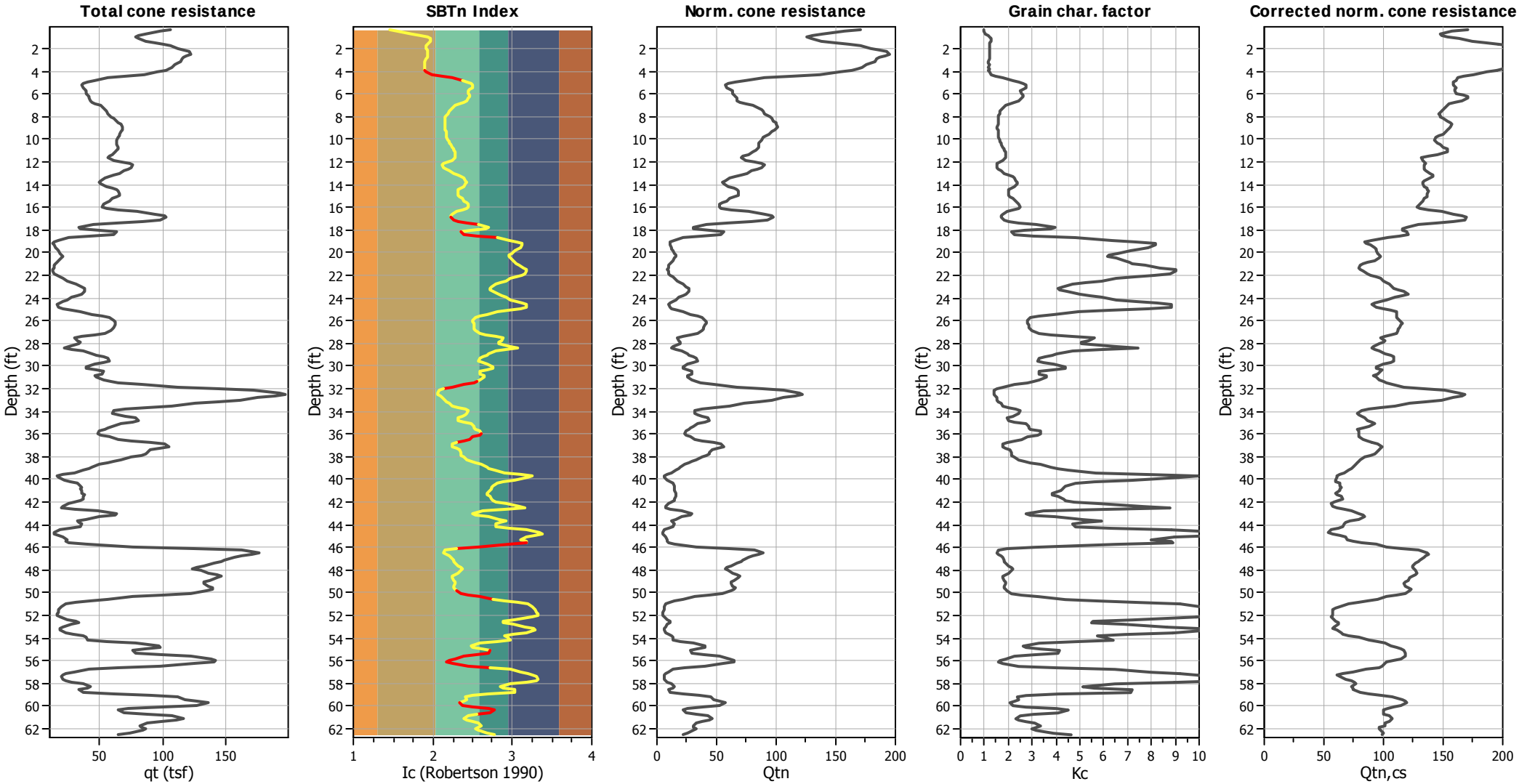
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	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:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.43	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

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

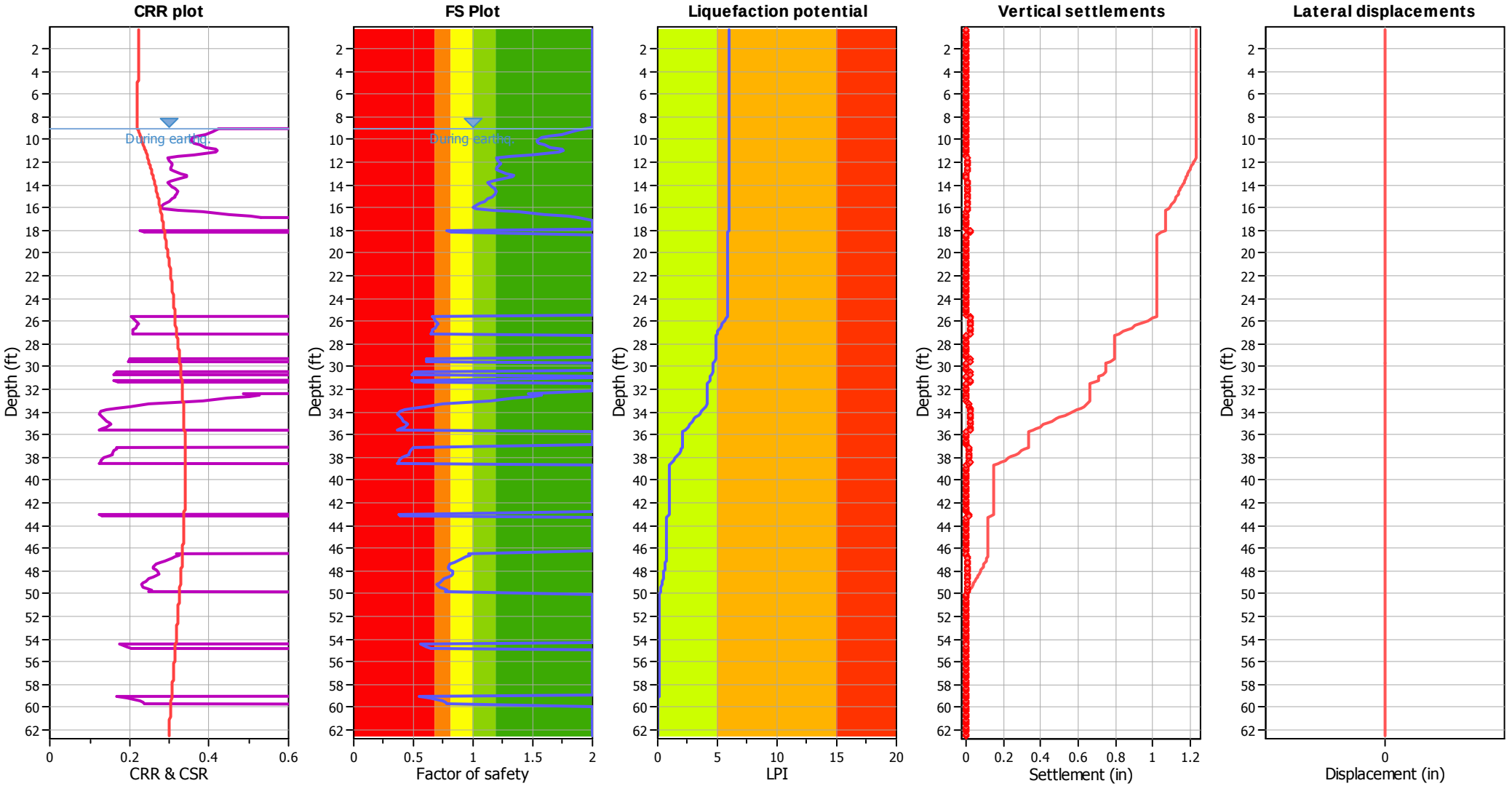
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	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:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.43	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	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:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.43	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

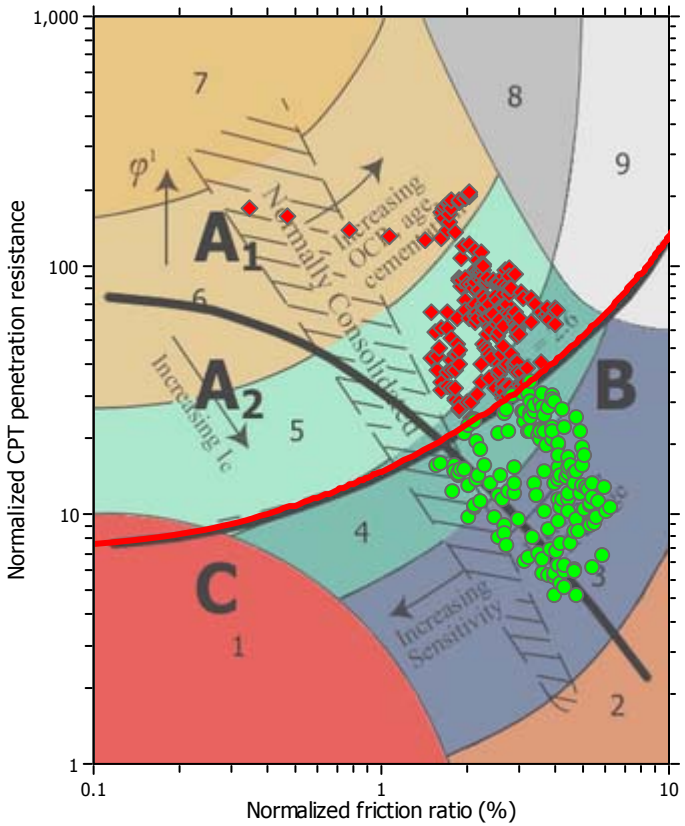
F.S. color scheme

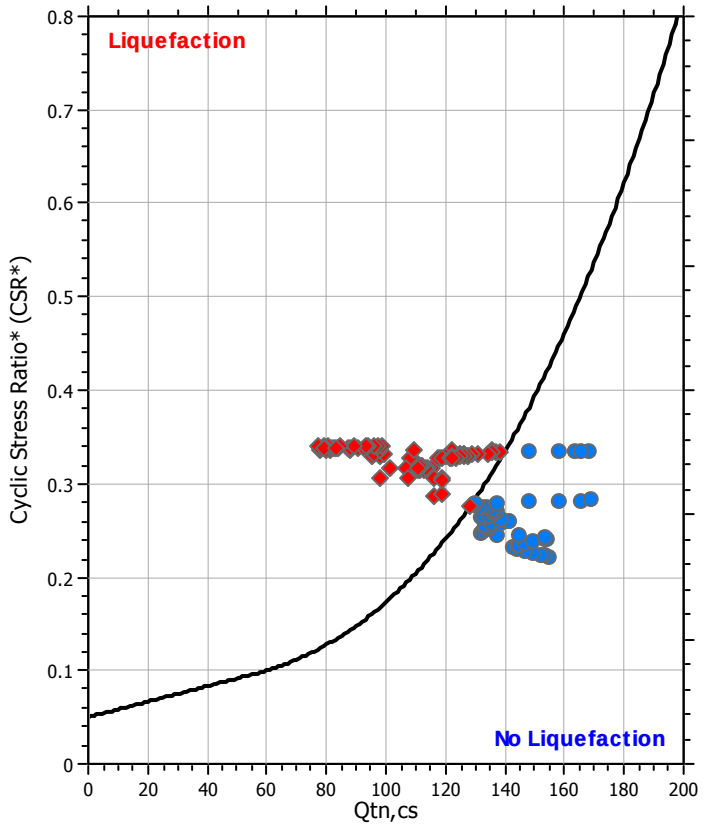
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

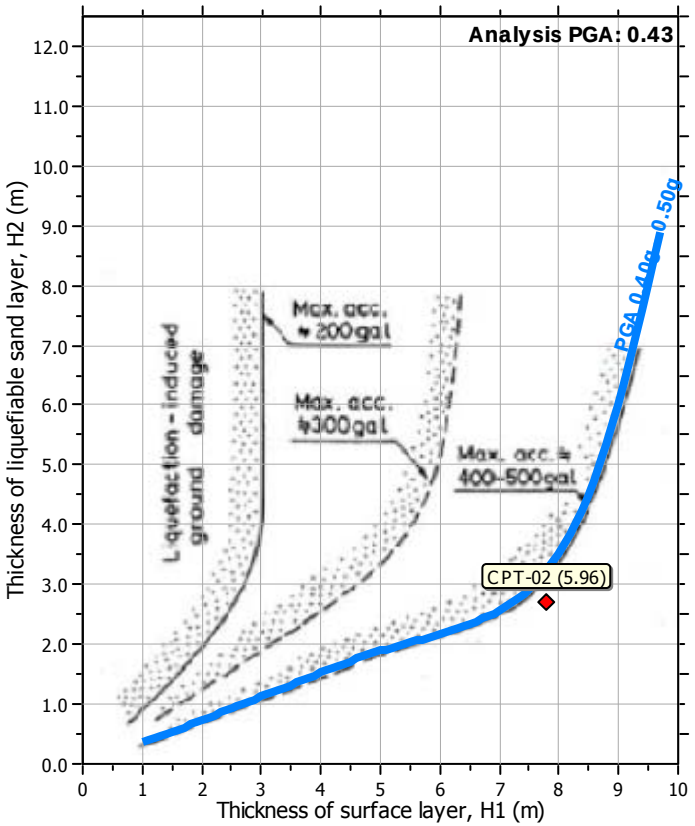
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



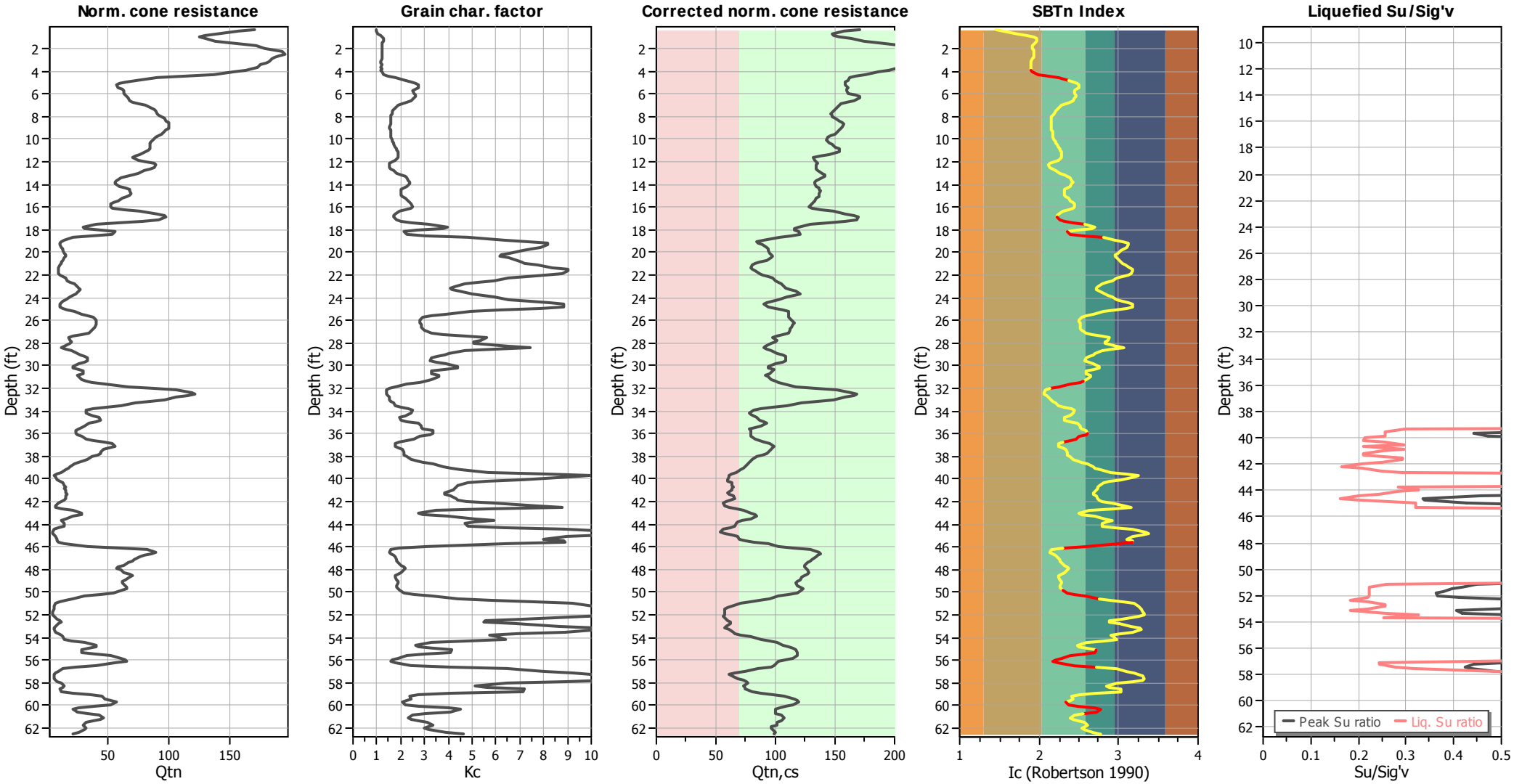




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	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:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.43	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

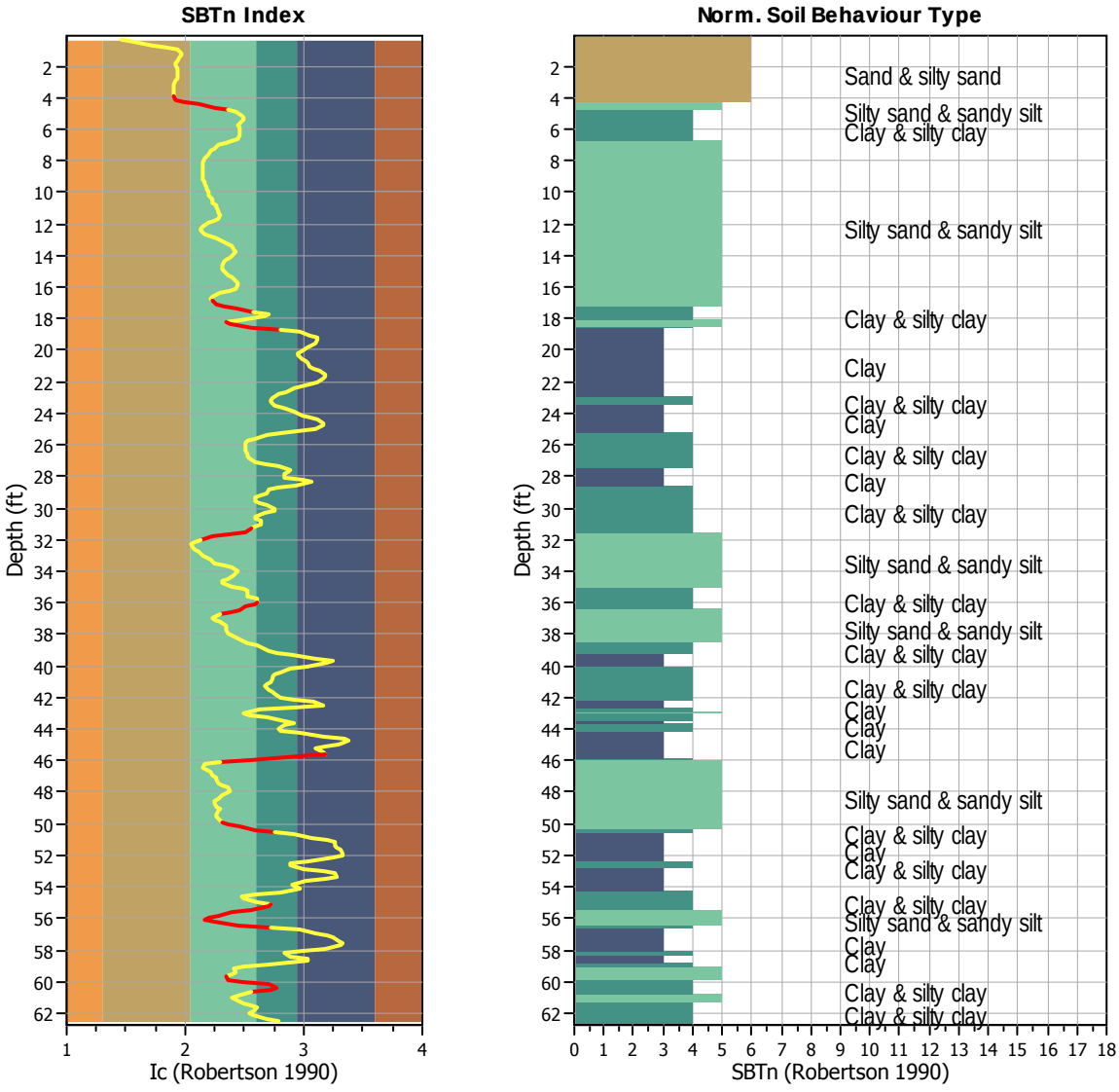
Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.62	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.43	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties	
I_c minimum check value:	1.70
I_c maximum check value:	3.00
I_c change ratio value:	0.0250
Minimum number of points in layer:	4

General statistics	
Total points in CPT file:	380
Total points excluded:	53
Exclusion percentage:	13.95%
Number of layers detected:	11

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	6	Start depth: 4.10 (ft)	6	Sand & silty sand
		End depth: 4.92 (ft)	4	Clay & silty clay
Transition layer 2	5	Start depth: 17.06 (ft)	5	Silty sand & sandy silt
		End depth: 17.72 (ft)	4	Clay & silty clay
Transition layer 3	4	Start depth: 18.37 (ft)	5	Silty sand & sandy silt
		End depth: 18.87 (ft)	3	Clay
Transition layer 4	5	Start depth: 31.50 (ft)	4	Clay & silty clay
		End depth: 32.15 (ft)	5	Silty sand & sandy silt
Transition layer 5	6	Start depth: 36.09 (ft)	4	Clay & silty clay
		End depth: 36.91 (ft)	5	Silty sand & sandy silt
Transition layer 6	4	Start depth: 45.77 (ft)	3	Clay
		End depth: 46.26 (ft)	5	Silty sand & sandy silt
Transition layer 7	5	Start depth: 50.04 (ft)	5	Silty sand & sandy silt
		End depth: 50.69 (ft)	3	Clay
Transition layer 8	5	Start depth: 55.28 (ft)	4	Clay & silty clay
		End depth: 55.94 (ft)	5	Silty sand & sandy silt
Transition layer 9	5	Start depth: 56.11 (ft)	5	Silty sand & sandy silt
		End depth: 56.76 (ft)	3	Clay
Transition layer 10	4	Start depth: 59.88 (ft)	5	Silty sand & sandy silt
		End depth: 60.37 (ft)	4	Clay & silty clay
Transition layer 11	4	Start depth: 60.37 (ft)	4	Clay & silty clay
		End depth: 60.86 (ft)	5	Silty sand & sandy silt

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
1	0.33	112.30	0.30	0.00	2.18	114.31
2	0.49	93.80	0.50	0.00	3.67	115.88
3	0.66	88.50	0.60	0.20	6.62	118.19
4	0.82	78.10	0.90	0.10	9.06	119.95
5	0.98	76.90	1.10	0.10	11.34	121.60
6	1.15	79.10	1.30	0.00	12.14	122.90
7	1.31	86.30	1.50	0.10	12.12	123.94
8	1.48	92.70	1.60	0.10	11.60	124.77
9	1.64	100.20	1.70	0.10	11.13	125.53
10	1.80	107.50	1.90	0.10	10.79	126.23
11	1.97	112.10	2.00	0.00	10.97	127.08
12	2.13	114.40	2.30	0.00	11.10	127.86
13	2.30	122.10	2.50	-0.10	11.17	128.46
14	2.46	124.70	2.50	-0.10	11.10	128.59
15	2.62	118.70	2.40	0.00	11.22	128.33
16	2.79	113.80	2.30	0.10	11.07	127.86
17	2.95	117.00	2.10	0.10	10.76	127.39
18	3.12	114.00	2.00	0.10	10.36	126.89
19	3.28	111.00	1.90	0.10	10.35	126.60
20	3.45	111.00	1.90	0.20	10.42	126.29
21	3.61	106.10	1.80	0.20	10.39	125.98
22	3.77	105.40	1.70	0.20	10.43	125.65
23	3.94	103.70	1.70	0.20	10.38	125.14
24	4.10	97.30	1.50	0.20	10.95	124.69
25	4.27	87.50	1.50	0.20	12.66	124.25
26	4.43	71.40	1.60	0.20	16.17	123.95
27	4.59	53.40	1.60	0.10	20.69	123.40
28	4.76	45.10	1.50	0.10	25.04	122.76
29	4.92	40.60	1.50	0.00	27.50	122.14
30	5.09	37.60	1.40	0.00	29.52	121.75
31	5.25	34.70	1.40	0.00	30.59	121.66
32	5.41	36.30	1.50	0.00	30.50	121.87
33	5.58	39.30	1.50	-0.10	29.16	121.99
34	5.74	40.30	1.40	-0.20	28.48	122.05
35	5.91	39.30	1.50	-0.40	28.58	122.23
36	6.07	40.30	1.60	-0.40	29.12	122.74
37	6.23	41.90	1.70	-0.30	29.17	123.08
38	6.40	41.70	1.70	-0.20	28.64	123.13
39	6.56	42.80	1.60	-0.20	27.84	122.86
40	6.73	43.10	1.50	-0.20	26.14	122.47
41	6.89	46.00	1.40	-0.20	24.05	122.29
42	7.05	51.30	1.40	-0.20	21.99	122.30
43	7.22	54.30	1.40	-0.20	20.43	122.27
44	7.38	55.10	1.30	-0.20	19.60	122.15
45	7.55	55.60	1.30	-0.20	19.03	122.00
46	7.71	56.70	1.30	-0.20	18.44	121.85
47	7.87	57.80	1.20	-0.20	18.01	121.90
48	8.04	59.20	1.30	-0.10	17.49	121.97

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
49	8.20	61.60	1.30	-0.10	17.51	122.42
50	8.37	63.60	1.40	-0.30	17.48	122.86
51	8.53	65.40	1.50	-0.30	17.54	123.27
52	8.69	66.90	1.50	-0.30	17.44	123.49
53	8.86	68.20	1.50	-0.30	17.27	123.53
54	9.02	68.60	1.50	-0.30	17.28	123.54
55	9.19	68.10	1.50	-0.30	17.49	123.53
56	9.35	67.10	1.50	-0.30	17.80	123.50
57	9.51	66.50	1.50	-0.30	17.95	123.30
58	9.68	65.30	1.40	-0.30	18.10	123.10
59	9.84	64.50	1.40	-0.30	18.26	122.90
60	10.01	63.70	1.40	-0.30	18.61	122.87
61	10.17	62.90	1.40	-0.30	19.10	123.02
62	10.34	63.10	1.50	-0.30	19.44	123.19
63	10.50	63.70	1.50	-0.30	19.84	123.53
64	10.66	64.50	1.60	-0.30	20.23	123.86
65	10.83	64.60	1.70	-0.20	20.93	124.31
66	10.99	64.20	1.80	-0.20	21.41	124.44
67	11.16	63.10	1.70	-0.20	22.04	124.38
68	11.32	60.10	1.70	-0.20	21.95	123.54
69	11.48	56.50	1.30	-0.20	22.05	122.78
70	11.65	55.40	1.30	-0.40	21.64	122.22
71	11.81	58.20	1.40	-0.40	20.45	122.58
72	11.98	69.50	1.40	-0.60	18.72	123.01
73	12.14	75.10	1.40	-0.60	17.05	123.23
74	12.30	77.60	1.40	-0.60	16.56	123.31
75	12.47	76.50	1.40	-0.50	16.86	123.28
76	12.63	72.50	1.40	-0.50	17.89	123.36
77	12.80	69.20	1.50	-0.50	19.42	123.57
78	12.96	65.90	1.60	-0.50	21.36	123.91
79	13.12	61.20	1.70	-0.50	23.36	124.05
80	13.29	56.90	1.70	-0.50	24.90	123.90
81	13.45	55.00	1.60	-0.50	25.99	123.45
82	13.62	51.00	1.50	-0.50	26.61	122.85
83	13.78	48.70	1.40	-0.50	27.18	122.62
84	13.94	50.60	1.50	-0.50	26.98	122.84
85	14.11	54.60	1.60	-0.50	25.69	123.35
86	14.27	61.20	1.60	-0.50	24.46	123.84
87	14.44	63.70	1.70	-0.60	23.45	124.13
88	14.60	65.30	1.70	-0.60	23.19	124.34
89	14.76	66.10	1.70	-0.60	22.98	124.37
90	14.93	66.30	1.70	-0.60	23.25	124.35
91	15.09	63.90	1.70	-0.50	24.15	124.27
92	15.26	59.50	1.70	-0.60	25.15	124.01
93	15.42	57.60	1.60	-0.60	26.27	123.74
94	15.58	54.90	1.60	-0.60	27.16	123.49
95	15.75	52.60	1.60	-0.60	27.90	123.25
96	15.91	52.00	1.50	-0.60	27.99	123.07

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
97	16.08	53.40	1.50	-0.60	27.40	123.49
98	16.24	60.30	1.80	-0.50	25.21	124.87
99	16.40	80.30	2.20	-0.40	22.40	126.60
100	16.57	97.70	2.50	-0.30	20.23	127.96
101	16.73	103.80	2.70	-0.30	19.65	128.81
102	16.90	103.10	2.90	-0.30	19.92	129.20
103	17.06	102.60	2.90	-0.30	21.01	129.09
104	17.23	89.70	2.70	-0.30	23.32	128.00
105	17.39	62.20	2.10	-0.50	27.61	125.87
106	17.55	42.30	1.50	-0.60	34.03	123.01
107	17.72	31.40	1.20	-0.40	40.34	120.78
108	17.88	27.90	1.20	-0.20	38.72	120.47
109	18.05	45.20	1.30	2.60	29.70	122.07
110	18.21	75.20	1.60	0.60	24.33	123.37
111	18.37	70.80	1.60	-0.40	25.68	123.43
112	18.54	37.70	1.40	-1.00	33.04	121.39
113	18.70	22.10	0.90	-1.00	46.35	117.94
114	18.87	17.40	0.60	-0.90	56.12	114.67
115	19.03	13.50	0.60	4.40	62.03	113.07
116	19.19	12.80	0.60	5.10	66.91	113.28
117	19.36	14.10	0.70	5.40	66.76	114.13
118	19.52	15.50	0.80	5.50	65.18	114.98
119	19.69	16.10	0.80	5.40	63.15	115.45
120	19.85	17.20	0.80	5.50	60.88	115.58
121	20.01	18.20	0.80	5.40	57.50	116.12
122	20.18	21.40	0.90	5.20	55.23	116.59
123	20.34	21.60	0.90	4.20	55.08	116.92
124	20.51	19.70	0.90	4.10	57.28	116.49
125	20.67	17.60	0.80	3.60	59.49	115.71
126	20.83	17.10	0.70	3.80	60.55	114.56
127	21.00	15.80	0.60	3.70	61.32	113.69
128	21.16	15.00	0.60	3.90	64.58	113.09
129	21.33	13.10	0.60	4.10	67.96	112.93
130	21.49	13.00	0.60	7.30	71.59	113.21
131	21.65	13.10	0.70	7.30	71.75	113.64
132	21.82	13.90	0.70	7.60	70.47	114.50
133	21.98	15.80	0.80	7.50	66.45	115.43
134	22.15	18.60	0.90	6.80	62.03	116.65
135	22.31	21.60	1.00	3.80	57.20	117.52
136	22.47	24.50	1.00	0.60	53.30	118.31
137	22.64	27.20	1.10	-0.30	49.19	119.08
138	22.80	31.90	1.20	-0.90	45.48	120.05
139	22.97	36.80	1.30	-2.60	42.56	120.71
140	23.13	38.00	1.30	-2.90	41.18	121.24
141	23.30	39.10	1.40	-4.00	41.65	121.83
142	23.46	39.50	1.60	-5.00	43.75	122.45
143	23.62	36.40	1.70	-4.80	47.32	122.75
144	23.79	32.20	1.70	-4.00	50.07	121.89

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
145	23.95	28.90	1.20	-3.80	53.56	120.72
146	24.12	24.40	1.20	-3.90	56.98	119.21
147	24.28	20.70	1.10	-3.70	62.32	118.18
148	24.44	18.30	0.90	-0.10	67.09	117.12
149	24.61	16.20	0.90	0.00	70.66	116.67
150	24.77	16.30	1.00	0.60	70.70	117.25
151	24.94	19.90	1.10	1.00	65.14	118.82
152	25.10	26.60	1.40	0.80	55.38	120.48
153	25.26	36.50	1.50	0.20	46.95	121.78
154	25.43	43.30	1.50	-2.40	39.69	122.64
155	25.59	52.70	1.60	-2.90	34.89	123.17
156	25.76	58.90	1.60	-2.70	32.15	123.75
157	25.92	61.20	1.70	-1.60	30.99	124.18
158	26.08	63.30	1.80	-1.20	30.99	124.52
159	26.25	62.70	1.80	-1.20	31.20	124.66
160	26.41	62.10	1.80	-1.60	31.33	124.50
161	26.58	61.40	1.70	-1.30	31.64	124.32
162	26.74	59.70	1.70	-1.50	31.86	124.15
163	26.90	59.70	1.70	-1.60	32.58	124.10
164	27.07	57.70	1.70	-2.10	34.86	123.76
165	27.23	46.40	1.60	-1.50	38.73	122.41
166	27.40	34.10	1.10	-1.80	45.37	120.97
167	27.56	29.30	1.20	-1.50	51.48	119.94
168	27.72	28.20	1.30	-1.60	49.69	120.72
169	27.89	41.70	1.40	-0.40	47.75	120.85
170	28.05	34.50	1.20	-5.00	47.95	120.17
171	28.22	24.50	1.00	-2.00	57.21	118.67
172	28.38	18.50	1.00	-1.70	62.62	118.12
173	28.54	25.00	1.10	-0.40	53.77	119.13
174	28.71	41.90	1.20	-1.50	45.23	120.60
175	28.87	43.50	1.40	-4.10	40.60	121.97
176	29.04	46.90	1.60	-3.80	39.53	122.99
177	29.20	53.30	1.70	-3.90	37.20	123.68
178	29.36	58.20	1.70	-4.80	35.00	124.01
179	29.53	59.60	1.70	-4.90	34.49	124.06
180	29.69	56.50	1.70	-3.70	36.36	123.42
181	29.86	44.60	1.40	-2.70	39.73	122.07
182	30.02	36.80	1.10	-2.10	43.46	120.77
183	30.19	37.00	1.20	-2.20	43.28	120.79
184	30.35	45.50	1.40	-2.30	39.10	122.13
185	30.51	59.00	1.60	-4.90	35.11	122.42
186	30.68	54.90	1.20	-5.90	34.85	122.04
187	30.84	43.80	1.20	-3.10	37.69	120.96
188	31.01	40.30	1.20	-2.80	37.39	121.44
189	31.17	59.80	1.40	-7.10	35.23	122.24
190	31.33	58.80	1.50	-7.70	33.22	123.17
191	31.50	57.80	1.60	-7.90	31.15	124.05
192	31.66	79.60	1.80	-7.80	25.72	125.49

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
193	31.83	112.40	2.10	-8.40	20.24	127.43
194	31.99	143.70	2.60	-0.80	16.91	129.46
195	32.15	172.70	3.20	-0.80	15.15	131.34
196	32.32	199.40	3.80	-0.70	14.41	132.60
197	32.48	203.00	4.00	-0.80	14.65	133.17
198	32.65	187.60	4.00	-0.70	15.49	133.07
199	32.81	175.80	3.80	-0.70	16.49	132.51
200	32.97	162.50	3.40	-0.70	17.23	131.54
201	33.14	144.10	2.90	-0.80	18.08	130.18
202	33.30	125.00	2.40	-0.80	19.20	128.46
203	33.47	106.20	1.90	-0.70	20.57	126.49
204	33.63	89.30	1.50	-0.70	23.30	124.46
205	33.79	66.30	1.30	-0.70	26.44	122.17
206	33.96	54.80	0.90	-0.70	28.47	120.53
207	34.12	61.40	0.90	-0.80	27.77	119.75
208	34.29	63.50	1.00	-1.60	26.64	120.42
209	34.45	67.80	1.10	-1.40	24.94	121.11
210	34.61	79.60	1.10	-3.90	22.82	121.82
211	34.78	87.50	1.20	-4.30	23.10	122.51
212	34.94	74.30	1.40	-6.20	25.92	123.11
213	35.11	65.80	1.50	-5.10	30.21	123.16
214	35.27	61.10	1.40	-5.90	31.76	122.01
215	35.43	55.10	0.90	-6.60	31.74	120.84
216	35.60	55.90	1.00	-7.30	32.07	119.75
217	35.76	51.00	1.00	-7.80	35.37	119.79
218	35.93	42.20	1.00	-7.90	35.76	119.77
219	36.09	54.60	1.00	-7.70	34.65	119.86
220	36.26	56.20	1.00	-7.90	30.93	120.41
221	36.42	63.30	1.10	-7.50	28.75	121.36
222	36.58	75.00	1.30	-5.80	25.88	122.53
223	36.75	87.00	1.40	-3.40	22.30	123.70
224	36.91	107.20	1.50	-2.70	20.20	124.67
225	37.08	111.20	1.70	-5.20	20.38	125.36
226	37.24	96.70	1.80	-5.80	22.17	125.19
227	37.40	85.80	1.50	-5.30	24.18	124.83
228	37.57	87.40	1.60	-7.00	24.51	124.46
229	37.73	88.90	1.60	-8.50	24.37	124.29
230	37.90	85.00	1.40	-6.80	24.68	123.50
231	38.06	74.80	1.20	-8.30	25.95	122.34
232	38.22	65.60	1.10	-9.20	27.79	121.23
233	38.39	61.50	1.00	-7.40	30.03	120.80
234	38.55	58.30	1.10	-7.70	32.09	120.11
235	38.72	49.60	0.90	-4.20	35.63	119.57
236	38.88	42.70	0.90	-1.40	39.08	118.75
237	39.04	40.80	0.90	-2.20	40.97	118.32
238	39.21	41.50	0.80	-5.40	44.22	117.46
239	39.37	29.50	0.70	-4.00	51.68	115.94
240	39.54	18.50	0.60	2.20	65.75	114.38

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
241	39.70	15.70	0.60	3.10	76.69	113.44
242	39.86	16.60	0.60	3.10	72.43	113.16
243	40.03	21.60	0.50	0.10	61.01	113.23
244	40.19	28.20	0.50	-0.80	51.26	113.75
245	40.36	32.50	0.60	-1.40	46.27	114.99
246	40.52	35.60	0.70	-1.30	43.10	115.18
247	40.68	36.00	0.50	-0.70	42.66	115.66
248	40.85	35.90	0.70	-2.80	42.35	115.24
249	41.01	34.50	0.60	-3.30	41.92	115.26
250	41.18	37.30	0.50	-1.60	39.49	114.45
251	41.34	38.20	0.50	-4.70	39.11	114.98
252	41.50	38.20	0.70	-4.40	41.07	115.77
253	41.67	36.30	0.70	-3.60	42.71	116.09
254	41.83	35.80	0.60	-2.60	43.22	115.20
255	42.00	32.80	0.50	-3.00	45.89	113.55
256	42.16	23.70	0.40	-3.30	52.95	112.61
257	42.32	20.60	0.50	-2.80	64.04	112.59
258	42.49	18.00	0.60	-2.30	70.24	113.79
259	42.65	20.20	0.70	-1.60	52.98	116.32
260	42.82	52.60	0.90	-1.50	36.67	118.97
261	42.98	73.10	1.10	-3.00	30.30	121.10
262	43.15	65.40	1.30	-3.30	32.23	121.91
263	43.31	50.40	1.30	-2.90	40.18	121.36
264	43.47	35.40	1.10	-2.50	48.12	119.69
265	43.64	31.70	0.80	-1.30	53.20	117.70
266	43.80	29.90	0.70	-1.00	48.41	116.95
267	43.97	41.40	0.80	-1.00	45.43	116.76
268	44.13	37.40	0.70	-1.70	46.07	116.34
269	44.29	26.50	0.60	2.50	56.18	114.54
270	44.46	15.90	0.50	3.00	70.70	112.32
271	44.62	13.10	0.40	5.60	84.31	111.20
272	44.79	13.90	0.50	8.10	87.86	112.64
273	44.95	16.20	0.80	10.80	80.33	114.66
274	45.11	22.30	0.80	13.80	71.28	116.15
275	45.28	26.20	0.80	12.10	65.90	116.74
276	45.44	24.60	0.90	10.20	70.59	118.02
277	45.61	20.70	1.30	10.40	70.88	119.74
278	45.77	31.90	1.50	13.50	56.68	122.81
279	45.93	64.30	2.10	12.80	33.64	126.02
280	46.10	131.20	2.50	-0.50	22.38	128.91
281	46.26	174.80	3.10	-7.10	17.65	130.81
282	46.43	182.20	3.50	-8.00	17.11	131.76
283	46.59	169.90	3.50	-8.00	18.27	132.04
284	46.75	160.60	3.60	-7.80	19.44	131.84
285	46.92	155.20	3.40	-7.30	20.15	131.69
286	47.08	154.00	3.40	-6.90	20.97	131.28
287	47.25	136.90	3.20	-5.30	21.07	131.01
288	47.41	147.20	3.10	-3.80	21.72	130.68

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
289	47.57	136.70	3.10	-2.20	23.03	130.47
290	47.74	114.30	3.10	2.50	24.52	130.43
291	47.90	128.00	3.20	3.60	25.42	130.53
292	48.07	128.50	3.30	4.50	24.31	130.81
293	48.23	133.70	3.30	4.80	23.21	130.91
294	48.39	144.60	3.20	4.80	21.57	130.80
295	48.56	149.00	3.00	4.60	20.50	130.54
296	48.72	143.70	2.90	4.40	20.62	130.25
297	48.89	136.00	2.90	4.20	21.44	129.98
298	49.05	131.10	2.80	4.30	22.12	129.72
299	49.22	128.90	2.70	4.30	21.80	129.54
300	49.38	136.80	2.70	4.20	21.43	129.79
301	49.54	141.80	3.00	3.90	21.36	130.19
302	49.71	139.50	3.10	3.60	21.91	130.51
303	49.87	136.90	3.10	3.80	22.79	130.34
304	50.04	126.20	2.90	3.90	24.64	129.70
305	50.20	103.30	2.60	3.80	28.63	128.32
306	50.36	72.40	2.10	3.80	35.01	126.40
307	50.53	54.50	1.70	3.80	43.48	124.28
308	50.69	42.90	1.50	3.00	52.72	122.22
309	50.86	30.00	1.20	3.60	62.85	120.02
310	51.02	21.30	0.90	18.70	72.68	117.48
311	51.18	19.00	0.70	25.30	77.49	115.30
312	51.35	18.50	0.60	31.10	78.01	114.09
313	51.51	17.70	0.60	35.80	79.39	113.60
314	51.68	16.60	0.60	37.90	81.70	113.51
315	51.84	16.40	0.60	41.40	83.57	113.44
316	52.00	16.10	0.60	44.00	83.34	113.45
317	52.17	16.70	0.60	48.60	76.33	113.27
318	52.33	21.50	0.50	54.80	61.11	113.98
319	52.50	35.20	0.60	38.30	51.19	114.97
320	52.66	36.80	0.70	22.90	50.68	115.86
321	52.82	26.80	0.70	18.90	58.90	115.43
322	52.99	19.40	0.60	23.90	69.70	114.04
323	53.15	17.90	0.50	32.90	77.80	113.69
324	53.32	17.80	0.70	40.50	79.38	114.89
325	53.48	20.50	0.90	52.30	71.14	115.99
326	53.64	28.90	0.70	53.00	59.47	116.91
327	53.81	37.60	0.80	33.80	52.16	118.56
328	53.97	42.40	1.30	16.60	53.95	120.77
329	54.14	37.50	1.60	20.30	56.41	122.63
330	54.30	42.90	1.80	26.60	46.18	124.64
331	54.46	85.50	2.20	9.80	35.10	126.45
332	54.63	105.90	2.40	-4.00	29.56	127.85
333	54.79	100.90	2.60	-4.80	30.61	128.44
334	54.96	86.90	2.80	-4.20	35.60	128.61
335	55.12	73.10	2.90	-3.50	41.57	128.62
336	55.28	67.60	3.00	-2.80	40.91	128.85

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
337	55.45	93.40	3.00	-1.90	33.16	129.56
338	55.61	131.80	3.10	-4.10	26.03	130.03
339	55.78	140.80	2.90	-5.80	21.55	129.64
340	55.94	140.70	2.20	-5.90	19.12	128.55
341	56.11	142.50	1.90	-5.40	17.81	127.52
342	56.27	138.40	2.00	-4.90	20.63	127.38
343	56.43	97.20	2.30	5.70	27.92	126.88
344	56.60	57.60	2.00	5.90	41.32	125.25
345	56.76	38.10	1.50	10.90	56.81	122.48
346	56.93	27.60	1.10	29.70	65.86	119.26
347	57.09	22.80	0.70	60.30	72.70	116.67
348	57.25	18.70	0.70	73.90	76.80	115.45
349	57.42	19.10	0.80	78.60	80.74	116.00
350	57.58	20.50	0.90	66.70	82.94	117.46
351	57.75	20.50	1.20	82.50	81.35	119.07
352	57.91	25.30	1.40	86.00	71.27	119.74
353	58.07	35.20	1.00	57.50	56.92	120.46
354	58.24	50.20	1.20	34.60	48.32	119.68
355	58.40	41.80	0.90	8.90	51.33	120.04
356	58.57	30.80	1.20	11.40	61.17	119.53
357	58.73	27.00	1.20	21.80	60.69	121.34
358	58.89	51.20	1.70	44.70	40.97	123.73
359	59.06	103.10	1.90	9.60	30.55	126.57
360	59.22	116.30	2.60	6.20	26.80	128.58
361	59.39	115.70	3.10	7.50	27.70	129.93
362	59.55	119.70	3.30	9.10	26.01	130.44
363	59.71	144.90	3.00	-0.10	24.05	130.61
364	59.88	143.40	3.10	-5.70	24.99	129.88
365	60.04	92.90	2.60	-8.60	30.63	128.61
366	60.21	67.20	2.20	-8.10	40.49	127.05
367	60.37	60.10	2.30	-7.30	44.28	126.09
368	60.53	66.10	2.00	-6.50	41.22	126.40
369	60.70	83.60	2.30	-6.20	32.96	127.07
370	60.86	114.30	2.40	-6.20	28.06	128.27
371	61.03	123.00	2.70	-2.70	26.29	128.86
372	61.19	111.40	2.70	-5.50	27.47	128.55
373	61.35	97.20	2.20	-5.40	30.53	128.09
374	61.52	89.00	2.50	-6.40	33.63	127.28
375	61.68	77.30	2.20	-6.90	35.76	127.01
376	61.85	80.60	2.10	-7.20	33.87	126.37
377	62.01	92.40	1.90	-7.30	32.45	126.47
378	62.17	88.00	2.20	-7.70	34.08	126.63
379	62.34	72.30	2.30	-7.90	39.63	126.52
380	62.50	60.50	2.10	-7.70	44.86	126.08

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (ft)
q_c:	Measured cone resistance (tsf)
f_s:	Sleeve friction resistance (tsf)
u:	Pore pressure (tsf)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (pcf)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	0.33	0.02	0.00	0.02	1.00	0.280	1.38	0.203	1.00	1.10	2.000	No
2	0.49	0.03	0.00	0.03	1.00	0.280	1.38	0.203	1.00	1.10	2.000	No
3	0.66	0.04	0.00	0.04	1.00	0.280	1.38	0.203	1.00	1.10	2.000	No
4	0.82	0.05	0.00	0.05	1.00	0.279	1.38	0.203	1.00	1.10	2.000	No
5	0.98	0.06	0.00	0.06	1.00	0.279	1.38	0.203	1.00	1.10	2.000	No
6	1.15	0.07	0.00	0.07	1.00	0.279	1.38	0.203	1.00	1.10	2.000	No
7	1.31	0.08	0.00	0.08	1.00	0.279	1.38	0.203	1.00	1.10	2.000	No
8	1.48	0.09	0.00	0.09	1.00	0.279	1.38	0.203	1.00	1.10	2.000	No
9	1.64	0.10	0.00	0.10	1.00	0.279	1.38	0.203	1.00	1.10	2.000	No
10	1.80	0.11	0.00	0.11	1.00	0.279	1.38	0.203	1.00	1.10	2.000	No
11	1.97	0.12	0.00	0.12	1.00	0.279	1.38	0.203	1.00	1.10	2.000	No
12	2.13	0.13	0.00	0.13	1.00	0.279	1.38	0.203	1.00	1.10	2.000	No
13	2.30	0.14	0.00	0.14	1.00	0.279	1.38	0.202	1.00	1.10	2.000	No
14	2.46	0.15	0.00	0.15	1.00	0.278	1.38	0.202	1.00	1.10	2.000	No
15	2.62	0.16	0.00	0.16	1.00	0.278	1.38	0.202	1.00	1.10	2.000	No
16	2.79	0.17	0.00	0.17	1.00	0.278	1.38	0.202	1.00	1.10	2.000	No
17	2.95	0.18	0.00	0.18	1.00	0.278	1.38	0.202	1.00	1.10	2.000	No
18	3.12	0.19	0.00	0.19	0.99	0.278	1.38	0.202	1.00	1.10	2.000	No
19	3.28	0.20	0.00	0.20	0.99	0.278	1.38	0.202	1.00	1.10	2.000	No
20	3.45	0.21	0.00	0.21	0.99	0.278	1.38	0.202	1.00	1.10	2.000	No
21	3.61	0.22	0.00	0.22	0.99	0.278	1.38	0.202	1.00	1.10	2.000	No
22	3.77	0.23	0.00	0.23	0.99	0.278	1.38	0.202	1.00	1.10	2.000	No
23	3.94	0.24	0.00	0.24	0.99	0.277	1.38	0.202	1.00	1.10	2.000	No
24	4.10	0.25	0.00	0.25	0.99	0.277	1.38	0.202	1.00	1.10	2.000	Yes
25	4.27	0.27	0.00	0.27	0.99	0.277	1.38	0.201	1.00	1.10	2.000	Yes
26	4.43	0.28	0.00	0.28	0.99	0.277	1.38	0.201	1.00	1.10	2.000	Yes
27	4.59	0.28	0.00	0.28	0.99	0.277	1.38	0.201	1.00	1.10	2.000	Yes
28	4.76	0.30	0.00	0.30	0.99	0.277	1.38	0.201	1.00	1.10	2.000	Yes
29	4.92	0.31	0.00	0.31	0.99	0.277	1.38	0.201	1.00	1.10	2.000	Yes
30	5.09	0.32	0.00	0.32	0.99	0.277	1.38	0.201	1.00	1.10	2.000	No
31	5.25	0.33	0.00	0.33	0.99	0.277	1.38	0.201	1.00	1.10	2.000	No
32	5.41	0.33	0.00	0.33	0.99	0.277	1.38	0.201	1.00	1.10	2.000	No
33	5.58	0.35	0.00	0.35	0.99	0.276	1.38	0.201	1.00	1.10	2.000	No
34	5.74	0.36	0.00	0.36	0.99	0.276	1.38	0.201	1.00	1.10	2.000	No
35	5.91	0.37	0.00	0.37	0.99	0.276	1.38	0.201	1.00	1.10	2.000	No
36	6.07	0.38	0.00	0.38	0.99	0.276	1.38	0.201	1.00	1.10	2.000	No
37	6.23	0.39	0.00	0.39	0.99	0.276	1.38	0.201	1.00	1.10	2.000	No
38	6.40	0.40	0.00	0.40	0.99	0.276	1.38	0.200	1.00	1.10	2.000	No
39	6.56	0.41	0.00	0.41	0.99	0.276	1.38	0.200	1.00	1.10	2.000	No
40	6.73	0.42	0.00	0.42	0.99	0.276	1.38	0.200	1.00	1.10	2.000	No
41	6.89	0.43	0.00	0.43	0.99	0.276	1.38	0.200	1.00	1.10	2.000	No
42	7.05	0.44	0.00	0.44	0.99	0.275	1.38	0.200	1.00	1.10	2.000	No
43	7.22	0.45	0.00	0.45	0.99	0.275	1.38	0.200	1.00	1.10	2.000	No
44	7.38	0.46	0.00	0.46	0.98	0.275	1.38	0.200	1.00	1.10	2.000	No
45	7.55	0.47	0.00	0.47	0.98	0.275	1.38	0.200	1.00	1.10	2.000	No
46	7.71	0.48	0.00	0.48	0.98	0.275	1.38	0.200	1.00	1.10	2.000	No
47	7.87	0.49	0.00	0.49	0.98	0.275	1.38	0.200	1.00	1.10	2.000	No
48	8.04	0.50	0.00	0.50	0.98	0.275	1.38	0.200	1.00	1.10	2.000	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	8.20	0.51	0.00	0.51	0.98	0.275	1.38	0.200	1.00	1.10	2.000	No
50	8.37	0.52	0.00	0.52	0.98	0.275	1.38	0.200	1.00	1.10	2.000	No
51	8.53	0.53	0.00	0.53	0.98	0.275	1.38	0.200	1.00	1.10	2.000	No
52	8.69	0.54	0.00	0.54	0.98	0.274	1.38	0.199	1.00	1.10	2.000	No
53	8.86	0.55	0.00	0.55	0.98	0.274	1.38	0.199	1.00	1.10	2.000	No
54	9.02	0.56	0.00	0.56	0.98	0.275	1.38	0.200	1.00	1.10	0.219	No
55	9.19	0.57	0.01	0.56	0.98	0.277	1.38	0.201	1.00	1.10	0.221	No
56	9.35	0.58	0.01	0.57	0.98	0.279	1.38	0.203	1.00	1.10	0.223	No
57	9.51	0.59	0.02	0.57	0.98	0.282	1.38	0.205	1.00	1.10	0.225	No
58	9.68	0.60	0.02	0.58	0.98	0.284	1.38	0.206	1.00	1.10	0.227	No
59	9.84	0.61	0.03	0.58	0.98	0.286	1.38	0.208	1.00	1.10	0.229	No
60	10.01	0.62	0.03	0.59	0.98	0.288	1.38	0.210	1.00	1.10	0.231	No
61	10.17	0.63	0.04	0.59	0.98	0.290	1.38	0.211	1.00	1.10	0.232	No
62	10.34	0.64	0.04	0.60	0.98	0.293	1.38	0.213	1.00	1.10	0.234	No
63	10.50	0.65	0.05	0.60	0.98	0.295	1.38	0.214	1.00	1.10	0.236	No
64	10.66	0.66	0.05	0.61	0.98	0.297	1.38	0.216	1.00	1.10	0.237	No
65	10.83	0.67	0.06	0.61	0.98	0.299	1.38	0.217	1.00	1.10	0.239	No
66	10.99	0.68	0.06	0.62	0.98	0.301	1.38	0.218	1.00	1.10	0.240	No
67	11.16	0.69	0.07	0.62	0.98	0.303	1.38	0.220	1.00	1.10	0.242	No
68	11.32	0.70	0.07	0.63	0.98	0.304	1.38	0.221	1.00	1.10	0.243	No
69	11.48	0.71	0.08	0.63	0.98	0.306	1.38	0.223	1.00	1.10	0.245	No
70	11.65	0.72	0.08	0.64	0.98	0.308	1.38	0.224	1.00	1.10	0.246	No
71	11.81	0.73	0.09	0.64	0.98	0.310	1.38	0.225	1.00	1.10	0.248	No
72	11.98	0.74	0.09	0.65	0.97	0.312	1.38	0.227	1.00	1.10	0.249	No
73	12.14	0.75	0.10	0.65	0.97	0.313	1.38	0.228	1.00	1.10	0.251	No
74	12.30	0.76	0.10	0.66	0.97	0.315	1.38	0.229	1.00	1.10	0.252	No
75	12.47	0.77	0.11	0.66	0.97	0.317	1.38	0.230	1.00	1.10	0.253	No
76	12.63	0.78	0.11	0.67	0.97	0.318	1.38	0.231	1.00	1.10	0.255	No
77	12.80	0.79	0.12	0.67	0.97	0.320	1.38	0.233	1.00	1.10	0.256	No
78	12.96	0.80	0.12	0.68	0.97	0.322	1.38	0.234	1.00	1.10	0.257	No
79	13.12	0.81	0.13	0.68	0.97	0.323	1.38	0.235	1.00	1.10	0.258	No
80	13.29	0.82	0.13	0.69	0.97	0.325	1.38	0.236	1.00	1.10	0.260	No
81	13.45	0.83	0.14	0.69	0.97	0.326	1.38	0.237	1.00	1.10	0.261	No
82	13.62	0.84	0.14	0.70	0.97	0.328	1.38	0.238	1.00	1.10	0.262	No
83	13.78	0.85	0.15	0.70	0.97	0.329	1.38	0.239	1.00	1.10	0.263	No
84	13.94	0.86	0.15	0.71	0.97	0.331	1.38	0.240	1.00	1.10	0.264	No
85	14.11	0.87	0.16	0.71	0.97	0.332	1.38	0.241	1.00	1.10	0.265	No
86	14.27	0.88	0.16	0.72	0.97	0.333	1.38	0.242	1.00	1.10	0.267	No
87	14.44	0.89	0.17	0.72	0.97	0.335	1.38	0.243	1.00	1.10	0.268	No
88	14.60	0.90	0.17	0.73	0.97	0.336	1.38	0.244	1.00	1.10	0.269	No
89	14.76	0.91	0.18	0.73	0.97	0.337	1.38	0.245	1.00	1.10	0.270	No
90	14.93	0.92	0.19	0.74	0.97	0.339	1.38	0.246	1.00	1.10	0.271	No
91	15.09	0.93	0.19	0.74	0.97	0.340	1.38	0.247	1.00	1.10	0.272	No
92	15.26	0.94	0.20	0.75	0.97	0.341	1.38	0.248	1.00	1.10	0.273	No
93	15.42	0.95	0.20	0.75	0.97	0.343	1.38	0.249	1.00	1.10	0.274	No
94	15.58	0.96	0.21	0.76	0.97	0.344	1.38	0.250	1.00	1.10	0.275	No
95	15.75	0.97	0.21	0.76	0.97	0.345	1.38	0.251	1.00	1.10	0.276	No
96	15.91	0.98	0.22	0.77	0.97	0.346	1.38	0.252	1.00	1.10	0.277	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	16.08	0.99	0.22	0.77	0.97	0.347	1.38	0.252	1.00	1.10	0.278	No
98	16.24	1.00	0.23	0.78	0.97	0.349	1.38	0.253	1.00	1.10	0.279	No
99	16.40	1.01	0.23	0.78	0.97	0.350	1.38	0.254	1.00	1.10	0.279	No
100	16.57	1.02	0.24	0.79	0.97	0.351	1.38	0.255	1.00	1.10	0.280	No
101	16.73	1.03	0.24	0.79	0.96	0.352	1.38	0.256	1.00	1.10	0.281	No
102	16.90	1.04	0.25	0.80	0.96	0.353	1.38	0.256	1.00	1.10	0.282	No
103	17.06	1.05	0.25	0.80	0.96	0.354	1.38	0.257	1.00	1.10	2.000	Yes
104	17.23	1.07	0.26	0.81	0.96	0.355	1.38	0.258	1.00	1.10	2.000	Yes
105	17.39	1.08	0.26	0.81	0.96	0.356	1.38	0.259	1.00	1.10	2.000	Yes
106	17.55	1.09	0.27	0.82	0.96	0.357	1.38	0.259	1.00	1.10	2.000	Yes
107	17.72	1.10	0.27	0.82	0.96	0.358	1.38	0.260	1.00	1.10	2.000	Yes
108	17.88	1.11	0.28	0.83	0.96	0.359	1.38	0.261	1.00	1.10	0.287	No
109	18.05	1.12	0.28	0.83	0.96	0.360	1.38	0.262	1.00	1.10	0.288	No
110	18.21	1.13	0.29	0.84	0.96	0.361	1.38	0.262	1.00	1.10	0.288	No
111	18.37	1.14	0.29	0.84	0.96	0.362	1.38	0.263	1.00	1.10	2.000	Yes
112	18.54	1.15	0.30	0.85	0.96	0.363	1.38	0.264	1.00	1.10	2.000	Yes
113	18.70	1.16	0.30	0.85	0.96	0.364	1.38	0.264	1.00	1.10	2.000	Yes
114	18.87	1.17	0.31	0.86	0.96	0.365	1.38	0.265	1.00	1.10	2.000	Yes
115	19.03	1.17	0.31	0.86	0.96	0.366	1.38	0.266	1.00	1.10	0.292	No
116	19.19	1.18	0.32	0.87	0.96	0.367	1.38	0.266	1.00	1.10	0.293	No
117	19.36	1.19	0.32	0.87	0.96	0.367	1.38	0.267	1.00	1.10	0.294	No
118	19.52	1.20	0.33	0.87	0.96	0.368	1.38	0.268	1.00	1.10	0.295	No
119	19.69	1.21	0.33	0.88	0.96	0.369	1.38	0.268	1.00	1.10	0.295	No
120	19.85	1.22	0.34	0.88	0.96	0.370	1.38	0.269	1.00	1.10	0.296	No
121	20.01	1.23	0.34	0.89	0.96	0.371	1.38	0.270	1.00	1.10	0.297	No
122	20.18	1.24	0.35	0.89	0.96	0.372	1.38	0.270	1.00	1.10	0.297	No
123	20.34	1.25	0.35	0.90	0.96	0.373	1.38	0.271	1.00	1.10	0.298	No
124	20.51	1.26	0.36	0.90	0.96	0.374	1.38	0.272	1.00	1.10	0.299	No
125	20.67	1.27	0.36	0.90	0.96	0.374	1.38	0.272	1.00	1.10	0.299	No
126	20.83	1.28	0.37	0.91	0.95	0.375	1.38	0.273	1.00	1.10	0.300	No
127	21.00	1.29	0.37	0.91	0.95	0.376	1.38	0.273	1.00	1.10	0.301	No
128	21.16	1.30	0.38	0.92	0.95	0.377	1.38	0.274	1.00	1.10	0.301	No
129	21.33	1.31	0.38	0.92	0.95	0.378	1.38	0.274	1.00	1.10	0.302	No
130	21.49	1.32	0.39	0.93	0.95	0.378	1.38	0.275	1.00	1.10	0.303	No
131	21.65	1.32	0.39	0.93	0.95	0.379	1.38	0.276	1.00	1.10	0.303	No
132	21.82	1.33	0.40	0.93	0.95	0.380	1.38	0.276	1.00	1.10	0.304	No
133	21.98	1.34	0.40	0.94	0.95	0.381	1.38	0.277	1.00	1.10	0.304	No
134	22.15	1.35	0.41	0.94	0.95	0.381	1.38	0.277	1.00	1.10	0.305	No
135	22.31	1.36	0.42	0.95	0.95	0.382	1.38	0.278	1.00	1.10	0.305	No
136	22.47	1.37	0.42	0.95	0.95	0.383	1.38	0.278	1.00	1.10	0.306	No
137	22.64	1.38	0.43	0.96	0.95	0.383	1.38	0.279	1.00	1.10	0.307	No
138	22.80	1.39	0.43	0.96	0.95	0.384	1.38	0.279	1.00	1.10	0.307	No
139	22.97	1.40	0.44	0.97	0.95	0.385	1.38	0.280	1.00	1.10	0.308	No
140	23.13	1.41	0.44	0.97	0.95	0.385	1.38	0.280	1.00	1.10	0.308	No
141	23.30	1.42	0.45	0.98	0.95	0.386	1.38	0.280	1.00	1.10	0.308	No
142	23.46	1.43	0.45	0.98	0.95	0.386	1.38	0.281	1.00	1.10	0.309	No
143	23.62	1.44	0.46	0.99	0.95	0.387	1.38	0.281	1.00	1.10	0.309	No
144	23.79	1.45	0.46	0.99	0.95	0.388	1.38	0.282	1.00	1.10	0.310	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
145	23.95	1.46	0.47	1.00	0.95	0.388	1.38	0.282	1.00	1.10	0.310	No
146	24.12	1.47	0.47	1.00	0.94	0.389	1.38	0.282	1.00	1.10	0.311	No
147	24.28	1.48	0.48	1.00	0.94	0.389	1.38	0.283	1.00	1.10	0.311	No
148	24.44	1.49	0.48	1.01	0.94	0.390	1.38	0.283	1.00	1.10	0.312	No
149	24.61	1.50	0.49	1.01	0.94	0.390	1.38	0.284	1.00	1.10	0.312	No
150	24.77	1.51	0.49	1.02	0.94	0.391	1.38	0.284	1.00	1.10	0.312	No
151	24.94	1.52	0.50	1.02	0.94	0.391	1.38	0.284	1.00	1.10	0.313	No
152	25.10	1.53	0.50	1.03	0.94	0.392	1.38	0.285	1.00	1.10	0.313	No
153	25.26	1.54	0.51	1.03	0.94	0.392	1.38	0.285	1.00	1.10	0.314	No
154	25.43	1.55	0.51	1.04	0.94	0.393	1.38	0.285	1.00	1.10	0.314	No
155	25.59	1.56	0.52	1.04	0.94	0.393	1.38	0.286	1.00	1.10	0.314	No
156	25.76	1.57	0.52	1.05	0.94	0.394	1.38	0.286	1.00	1.10	0.315	No
157	25.92	1.58	0.53	1.05	0.94	0.394	1.38	0.286	1.00	1.10	0.315	No
158	26.08	1.59	0.53	1.06	0.94	0.394	1.38	0.287	1.00	1.10	0.315	No
159	26.25	1.60	0.54	1.06	0.94	0.395	1.38	0.287	1.00	1.10	0.316	No
160	26.41	1.61	0.54	1.07	0.94	0.395	1.38	0.287	1.00	1.10	0.316	No
161	26.58	1.62	0.55	1.07	0.94	0.395	1.38	0.287	1.00	1.10	0.317	No
162	26.74	1.63	0.55	1.08	0.94	0.396	1.38	0.288	1.00	1.10	0.318	No
163	26.90	1.64	0.56	1.08	0.93	0.396	1.38	0.288	0.99	1.10	0.318	No
164	27.07	1.65	0.56	1.09	0.93	0.396	1.38	0.288	0.99	1.10	0.319	No
165	27.23	1.66	0.57	1.09	0.93	0.397	1.38	0.288	0.99	1.10	0.319	No
166	27.40	1.67	0.57	1.10	0.93	0.397	1.38	0.289	0.99	1.10	0.320	No
167	27.56	1.68	0.58	1.10	0.93	0.397	1.38	0.289	0.99	1.10	0.321	No
168	27.72	1.69	0.58	1.11	0.93	0.398	1.38	0.289	0.99	1.10	0.321	No
169	27.89	1.70	0.59	1.11	0.93	0.398	1.38	0.289	0.99	1.10	0.322	No
170	28.05	1.71	0.59	1.12	0.93	0.398	1.38	0.289	0.99	1.10	0.322	No
171	28.22	1.72	0.60	1.12	0.93	0.399	1.38	0.290	0.99	1.10	0.323	No
172	28.38	1.73	0.60	1.13	0.93	0.399	1.38	0.290	0.99	1.10	0.323	No
173	28.54	1.74	0.61	1.13	0.93	0.399	1.38	0.290	0.98	1.10	0.324	No
174	28.71	1.75	0.61	1.14	0.93	0.399	1.38	0.290	0.98	1.10	0.324	No
175	28.87	1.76	0.62	1.14	0.93	0.400	1.38	0.290	0.98	1.10	0.325	No
176	29.04	1.77	0.63	1.15	0.93	0.400	1.38	0.291	0.98	1.10	0.325	No
177	29.20	1.78	0.63	1.15	0.92	0.400	1.38	0.291	0.98	1.10	0.326	No
178	29.36	1.79	0.64	1.16	0.92	0.400	1.38	0.291	0.98	1.10	0.326	No
179	29.53	1.80	0.64	1.16	0.92	0.400	1.38	0.291	0.98	1.10	0.327	No
180	29.69	1.81	0.65	1.17	0.92	0.401	1.38	0.291	0.98	1.10	0.327	No
181	29.86	1.82	0.65	1.17	0.92	0.401	1.38	0.291	0.98	1.10	0.328	No
182	30.02	1.83	0.66	1.17	0.92	0.401	1.38	0.291	0.98	1.10	0.328	No
183	30.19	1.84	0.66	1.18	0.92	0.401	1.38	0.291	0.98	1.10	0.329	No
184	30.35	1.85	0.67	1.18	0.92	0.401	1.38	0.292	0.97	1.10	0.329	No
185	30.51	1.86	0.67	1.19	0.92	0.401	1.38	0.292	0.97	1.10	0.330	No
186	30.68	1.87	0.68	1.19	0.92	0.401	1.38	0.292	0.97	1.10	0.330	No
187	30.84	1.88	0.68	1.20	0.92	0.402	1.38	0.292	0.97	1.10	0.330	No
188	31.01	1.89	0.69	1.20	0.92	0.402	1.38	0.292	0.97	1.10	0.331	No
189	31.17	1.90	0.69	1.21	0.91	0.402	1.38	0.292	0.97	1.10	0.331	No
190	31.33	1.91	0.70	1.21	0.91	0.402	1.38	0.292	0.97	1.10	0.332	No
191	31.50	1.92	0.70	1.22	0.91	0.402	1.38	0.292	0.97	1.10	2.000	Yes
192	31.66	1.93	0.71	1.22	0.91	0.402	1.38	0.292	0.97	1.10	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
193	31.83	1.94	0.71	1.23	0.91	0.402	1.38	0.292	0.97	1.10	2.000	Yes
194	31.99	1.95	0.72	1.24	0.91	0.402	1.38	0.292	0.97	1.10	2.000	Yes
195	32.15	1.96	0.72	1.24	0.91	0.402	1.38	0.292	0.96	1.10	2.000	Yes
196	32.32	1.97	0.73	1.25	0.91	0.402	1.38	0.292	0.96	1.10	0.334	No
197	32.48	1.98	0.73	1.25	0.91	0.402	1.38	0.292	0.96	1.10	0.334	No
198	32.65	2.00	0.74	1.26	0.91	0.402	1.38	0.292	0.96	1.10	0.334	No
199	32.81	2.01	0.74	1.26	0.90	0.402	1.38	0.292	0.96	1.10	0.334	No
200	32.97	2.02	0.75	1.27	0.90	0.402	1.38	0.292	0.96	1.10	0.335	No
201	33.14	2.03	0.75	1.28	0.90	0.401	1.38	0.292	0.96	1.10	0.335	No
202	33.30	2.04	0.76	1.28	0.90	0.401	1.38	0.292	0.96	1.10	0.335	No
203	33.47	2.05	0.76	1.29	0.90	0.401	1.38	0.292	0.96	1.10	0.335	No
204	33.63	2.06	0.77	1.29	0.90	0.401	1.38	0.292	0.96	1.10	0.336	No
205	33.79	2.07	0.77	1.30	0.90	0.401	1.38	0.292	0.95	1.10	0.336	No
206	33.96	2.08	0.78	1.30	0.90	0.401	1.38	0.292	0.95	1.10	0.336	No
207	34.12	2.09	0.78	1.31	0.90	0.401	1.38	0.291	0.95	1.10	0.336	No
208	34.29	2.10	0.79	1.31	0.90	0.401	1.38	0.291	0.95	1.10	0.337	No
209	34.45	2.11	0.79	1.31	0.89	0.401	1.38	0.291	0.95	1.10	0.337	No
210	34.61	2.12	0.80	1.32	0.89	0.401	1.38	0.291	0.95	1.10	0.337	No
211	34.78	2.13	0.80	1.32	0.89	0.401	1.38	0.291	0.95	1.10	0.337	No
212	34.94	2.14	0.81	1.33	0.89	0.401	1.38	0.291	0.95	1.10	0.338	No
213	35.11	2.15	0.81	1.33	0.89	0.401	1.38	0.291	0.95	1.10	0.338	No
214	35.27	2.16	0.82	1.34	0.89	0.400	1.38	0.291	0.95	1.10	0.338	No
215	35.43	2.17	0.82	1.34	0.89	0.400	1.38	0.291	0.95	1.10	0.338	No
216	35.60	2.18	0.83	1.35	0.89	0.400	1.38	0.291	0.95	1.10	0.338	No
217	35.76	2.19	0.83	1.35	0.89	0.400	1.38	0.291	0.94	1.10	0.338	No
218	35.93	2.20	0.84	1.36	0.88	0.400	1.38	0.291	0.94	1.10	0.339	No
219	36.09	2.21	0.85	1.36	0.88	0.400	1.38	0.291	0.94	1.10	2.000	Yes
220	36.26	2.22	0.85	1.37	0.88	0.400	1.38	0.290	0.94	1.10	2.000	Yes
221	36.42	2.23	0.86	1.37	0.88	0.399	1.38	0.290	0.94	1.10	2.000	Yes
222	36.58	2.24	0.86	1.38	0.88	0.399	1.38	0.290	0.94	1.10	2.000	Yes
223	36.75	2.25	0.87	1.38	0.88	0.399	1.38	0.290	0.94	1.10	2.000	Yes
224	36.91	2.26	0.87	1.39	0.88	0.399	1.38	0.290	0.94	1.10	2.000	Yes
225	37.08	2.27	0.88	1.39	0.88	0.398	1.38	0.290	0.94	1.10	0.339	No
226	37.24	2.28	0.88	1.40	0.87	0.398	1.38	0.289	0.94	1.10	0.339	No
227	37.40	2.29	0.89	1.40	0.87	0.398	1.38	0.289	0.94	1.10	0.340	No
228	37.57	2.30	0.89	1.41	0.87	0.398	1.38	0.289	0.94	1.10	0.340	No
229	37.73	2.31	0.90	1.41	0.87	0.397	1.38	0.289	0.94	1.10	0.340	No
230	37.90	2.32	0.90	1.42	0.87	0.397	1.38	0.289	0.93	1.10	0.340	No
231	38.06	2.33	0.91	1.42	0.87	0.397	1.38	0.288	0.93	1.10	0.340	No
232	38.22	2.34	0.91	1.43	0.87	0.397	1.38	0.288	0.93	1.10	0.340	No
233	38.39	2.35	0.92	1.43	0.86	0.396	1.38	0.288	0.93	1.10	0.340	No
234	38.55	2.36	0.92	1.44	0.86	0.396	1.38	0.288	0.93	1.10	0.340	No
235	38.72	2.37	0.93	1.44	0.86	0.396	1.38	0.288	0.93	1.10	0.340	No
236	38.88	2.38	0.93	1.45	0.86	0.396	1.38	0.287	0.93	1.10	0.340	No
237	39.04	2.39	0.94	1.45	0.86	0.395	1.38	0.287	0.93	1.10	0.340	No
238	39.21	2.40	0.94	1.46	0.86	0.395	1.38	0.287	0.93	1.10	0.340	No
239	39.37	2.41	0.95	1.46	0.86	0.395	1.38	0.287	0.93	1.10	0.340	No
240	39.54	2.42	0.95	1.46	0.86	0.394	1.38	0.287	0.93	1.10	0.340	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
241	39.70	2.43	0.96	1.47	0.85	0.394	1.38	0.286	0.93	1.10	0.340	No
242	39.86	2.44	0.96	1.47	0.85	0.394	1.38	0.286	0.93	1.10	0.340	No
243	40.03	2.45	0.97	1.48	0.85	0.394	1.38	0.286	0.93	1.10	0.340	No
244	40.19	2.45	0.97	1.48	0.85	0.393	1.38	0.286	0.93	1.10	0.340	No
245	40.36	2.46	0.98	1.49	0.85	0.393	1.38	0.286	0.92	1.10	0.340	No
246	40.52	2.47	0.98	1.49	0.85	0.393	1.38	0.285	0.92	1.10	0.340	No
247	40.68	2.48	0.99	1.49	0.84	0.392	1.38	0.285	0.92	1.10	0.340	No
248	40.85	2.49	0.99	1.50	0.84	0.392	1.38	0.285	0.92	1.10	0.340	No
249	41.01	2.50	1.00	1.50	0.84	0.392	1.38	0.285	0.92	1.10	0.339	No
250	41.18	2.51	1.00	1.51	0.84	0.391	1.38	0.284	0.92	1.10	0.339	No
251	41.34	2.52	1.01	1.51	0.84	0.391	1.38	0.284	0.92	1.10	0.339	No
252	41.50	2.53	1.01	1.52	0.84	0.391	1.38	0.284	0.92	1.10	0.339	No
253	41.67	2.54	1.02	1.52	0.84	0.390	1.38	0.284	0.92	1.10	0.339	No
254	41.83	2.55	1.02	1.52	0.83	0.390	1.38	0.283	0.92	1.10	0.339	No
255	42.00	2.56	1.03	1.53	0.83	0.390	1.38	0.283	0.92	1.10	0.339	No
256	42.16	2.57	1.03	1.53	0.83	0.389	1.38	0.283	0.92	1.10	0.339	No
257	42.32	2.58	1.04	1.54	0.83	0.389	1.38	0.283	0.92	1.10	0.339	No
258	42.49	2.59	1.04	1.54	0.83	0.388	1.38	0.282	0.92	1.10	0.339	No
259	42.65	2.60	1.05	1.55	0.83	0.388	1.38	0.282	0.92	1.10	0.338	No
260	42.82	2.61	1.06	1.55	0.83	0.388	1.38	0.282	0.92	1.10	0.338	No
261	42.98	2.62	1.06	1.56	0.82	0.387	1.38	0.281	0.92	1.10	0.338	No
262	43.15	2.63	1.07	1.56	0.82	0.387	1.38	0.281	0.91	1.10	0.338	No
263	43.31	2.64	1.07	1.57	0.82	0.386	1.38	0.281	0.91	1.10	0.338	No
264	43.47	2.65	1.08	1.57	0.82	0.386	1.38	0.280	0.91	1.10	0.338	No
265	43.64	2.66	1.08	1.57	0.82	0.385	1.38	0.280	0.91	1.10	0.337	No
266	43.80	2.66	1.09	1.58	0.82	0.385	1.38	0.280	0.91	1.10	0.337	No
267	43.97	2.67	1.09	1.58	0.81	0.384	1.38	0.279	0.91	1.10	0.337	No
268	44.13	2.68	1.10	1.59	0.81	0.384	1.38	0.279	0.91	1.10	0.337	No
269	44.29	2.69	1.10	1.59	0.81	0.383	1.38	0.279	0.91	1.10	0.337	No
270	44.46	2.70	1.11	1.60	0.81	0.383	1.38	0.278	0.91	1.10	0.336	No
271	44.62	2.71	1.11	1.60	0.81	0.382	1.38	0.278	0.91	1.10	0.336	No
272	44.79	2.72	1.12	1.60	0.81	0.382	1.38	0.278	0.91	1.10	0.336	No
273	44.95	2.73	1.12	1.61	0.80	0.381	1.38	0.277	0.91	1.10	0.336	No
274	45.11	2.74	1.13	1.61	0.80	0.381	1.38	0.277	0.91	1.10	0.336	No
275	45.28	2.75	1.13	1.62	0.80	0.380	1.38	0.277	0.91	1.10	0.335	No
276	45.44	2.76	1.14	1.62	0.80	0.380	1.38	0.276	0.91	1.10	0.335	No
277	45.61	2.77	1.14	1.63	0.80	0.379	1.38	0.276	0.91	1.10	0.335	No
278	45.77	2.78	1.15	1.63	0.80	0.379	1.38	0.275	0.91	1.10	2.000	Yes
279	45.93	2.79	1.15	1.64	0.79	0.378	1.38	0.275	0.90	1.10	2.000	Yes
280	46.10	2.80	1.16	1.64	0.79	0.378	1.38	0.274	0.90	1.10	2.000	Yes
281	46.26	2.81	1.16	1.65	0.79	0.377	1.38	0.274	0.90	1.10	2.000	Yes
282	46.43	2.82	1.17	1.65	0.79	0.376	1.38	0.274	0.90	1.10	0.333	No
283	46.59	2.83	1.17	1.66	0.79	0.376	1.38	0.273	0.90	1.10	0.333	No
284	46.75	2.84	1.18	1.66	0.79	0.375	1.38	0.273	0.90	1.10	0.333	No
285	46.92	2.85	1.18	1.67	0.78	0.374	1.38	0.272	0.90	1.10	0.332	No
286	47.08	2.86	1.19	1.68	0.78	0.374	1.38	0.272	0.90	1.10	0.332	No
287	47.25	2.88	1.19	1.68	0.78	0.373	1.38	0.271	0.90	1.10	0.332	No
288	47.41	2.89	1.20	1.69	0.78	0.372	1.38	0.271	0.90	1.10	0.332	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
289	47.57	2.90	1.20	1.69	0.78	0.372	1.38	0.270	0.90	1.10	0.331	No
290	47.74	2.91	1.21	1.70	0.78	0.371	1.38	0.270	0.90	1.10	0.331	No
291	47.90	2.92	1.21	1.70	0.77	0.370	1.38	0.269	0.90	1.10	0.331	No
292	48.07	2.93	1.22	1.71	0.77	0.370	1.38	0.269	0.90	1.10	0.330	No
293	48.23	2.94	1.22	1.72	0.77	0.369	1.38	0.268	0.89	1.10	0.330	No
294	48.39	2.95	1.23	1.72	0.77	0.369	1.38	0.268	0.89	1.10	0.329	No
295	48.56	2.96	1.23	1.73	0.77	0.368	1.38	0.267	0.89	1.10	0.329	No
296	48.72	2.97	1.24	1.73	0.77	0.367	1.38	0.267	0.89	1.10	0.329	No
297	48.89	2.98	1.24	1.74	0.76	0.366	1.38	0.266	0.89	1.10	0.328	No
298	49.05	2.99	1.25	1.74	0.76	0.366	1.38	0.266	0.89	1.10	0.328	No
299	49.22	3.00	1.25	1.75	0.76	0.365	1.38	0.265	0.89	1.10	0.328	No
300	49.38	3.01	1.26	1.75	0.76	0.365	1.38	0.265	0.89	1.10	0.327	No
301	49.54	3.02	1.26	1.76	0.76	0.364	1.38	0.264	0.89	1.10	0.327	No
302	49.71	3.04	1.27	1.77	0.76	0.363	1.38	0.264	0.89	1.10	0.327	No
303	49.87	3.05	1.28	1.77	0.75	0.363	1.38	0.263	0.89	1.10	0.326	No
304	50.04	3.06	1.28	1.78	0.75	0.362	1.38	0.263	0.89	1.10	2.000	Yes
305	50.20	3.07	1.29	1.78	0.75	0.361	1.38	0.262	0.89	1.10	2.000	Yes
306	50.36	3.08	1.29	1.79	0.75	0.361	1.38	0.262	0.89	1.10	2.000	Yes
307	50.53	3.09	1.30	1.79	0.75	0.360	1.38	0.262	0.89	1.10	2.000	Yes
308	50.69	3.10	1.30	1.80	0.75	0.359	1.38	0.261	0.89	1.10	2.000	Yes
309	50.86	3.11	1.31	1.80	0.74	0.359	1.38	0.261	0.88	1.10	0.324	No
310	51.02	3.12	1.31	1.81	0.74	0.358	1.38	0.260	0.88	1.10	0.324	No
311	51.18	3.13	1.32	1.81	0.74	0.358	1.38	0.260	0.88	1.10	0.323	No
312	51.35	3.14	1.32	1.82	0.74	0.357	1.38	0.259	0.88	1.10	0.323	No
313	51.51	3.15	1.33	1.82	0.74	0.356	1.38	0.259	0.88	1.10	0.323	No
314	51.68	3.16	1.33	1.82	0.74	0.356	1.38	0.259	0.88	1.10	0.322	No
315	51.84	3.16	1.34	1.83	0.73	0.355	1.38	0.258	0.88	1.10	0.322	No
316	52.00	3.17	1.34	1.83	0.73	0.355	1.38	0.258	0.88	1.10	0.322	No
317	52.17	3.18	1.35	1.84	0.73	0.354	1.38	0.257	0.88	1.10	0.321	No
318	52.33	3.19	1.35	1.84	0.73	0.354	1.38	0.257	0.88	1.10	0.321	No
319	52.50	3.20	1.36	1.84	0.73	0.353	1.38	0.257	0.88	1.10	0.321	No
320	52.66	3.21	1.36	1.85	0.73	0.352	1.38	0.256	0.88	1.10	0.320	No
321	52.82	3.22	1.37	1.85	0.72	0.352	1.38	0.256	0.88	1.10	0.320	No
322	52.99	3.23	1.37	1.86	0.72	0.351	1.38	0.255	0.88	1.10	0.320	No
323	53.15	3.24	1.38	1.86	0.72	0.351	1.38	0.255	0.88	1.10	0.319	No
324	53.32	3.25	1.38	1.87	0.72	0.350	1.38	0.254	0.88	1.10	0.319	No
325	53.48	3.26	1.39	1.87	0.72	0.350	1.38	0.254	0.88	1.10	0.319	No
326	53.64	3.27	1.39	1.87	0.72	0.349	1.38	0.254	0.88	1.10	0.318	No
327	53.81	3.28	1.40	1.88	0.71	0.348	1.38	0.253	0.88	1.10	0.318	No
328	53.97	3.29	1.40	1.88	0.71	0.348	1.38	0.253	0.88	1.10	0.317	No
329	54.14	3.30	1.41	1.89	0.71	0.347	1.38	0.252	0.88	1.10	0.317	No
330	54.30	3.31	1.41	1.89	0.71	0.347	1.38	0.252	0.87	1.10	0.317	No
331	54.46	3.32	1.42	1.90	0.71	0.346	1.38	0.251	0.87	1.10	0.316	No
332	54.63	3.33	1.42	1.90	0.71	0.345	1.38	0.251	0.87	1.10	0.316	No
333	54.79	3.34	1.43	1.91	0.71	0.345	1.38	0.250	0.87	1.10	0.316	No
334	54.96	3.35	1.43	1.92	0.70	0.344	1.38	0.250	0.87	1.10	0.315	No
335	55.12	3.36	1.44	1.92	0.70	0.343	1.38	0.249	0.87	1.10	0.315	No
336	55.28	3.37	1.44	1.93	0.70	0.343	1.38	0.249	0.87	1.10	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
337	55.45	3.38	1.45	1.93	0.70	0.342	1.38	0.249	0.87	1.10	2.000	Yes
338	55.61	3.39	1.45	1.94	0.70	0.341	1.38	0.248	0.87	1.10	2.000	Yes
339	55.78	3.40	1.46	1.94	0.70	0.341	1.38	0.248	0.87	1.10	2.000	Yes
340	55.94	3.41	1.46	1.95	0.69	0.340	1.38	0.247	0.87	1.10	2.000	Yes
341	56.11	3.42	1.47	1.95	0.69	0.339	1.38	0.247	0.87	1.10	2.000	Yes
342	56.27	3.43	1.47	1.96	0.69	0.339	1.38	0.246	0.87	1.10	2.000	Yes
343	56.43	3.44	1.48	1.96	0.69	0.338	1.38	0.246	0.87	1.10	2.000	Yes
344	56.60	3.45	1.49	1.97	0.69	0.338	1.38	0.245	0.87	1.10	2.000	Yes
345	56.76	3.46	1.49	1.97	0.69	0.337	1.38	0.245	0.87	1.10	2.000	Yes
346	56.93	3.47	1.50	1.98	0.69	0.336	1.38	0.244	0.87	1.10	0.311	No
347	57.09	3.48	1.50	1.98	0.68	0.336	1.38	0.244	0.87	1.10	0.310	No
348	57.25	3.49	1.51	1.99	0.68	0.335	1.38	0.244	0.86	1.10	0.310	No
349	57.42	3.50	1.51	1.99	0.68	0.335	1.38	0.243	0.86	1.10	0.310	No
350	57.58	3.51	1.52	2.00	0.68	0.334	1.38	0.243	0.86	1.10	0.309	No
351	57.75	3.52	1.52	2.00	0.68	0.334	1.38	0.242	0.86	1.10	0.309	No
352	57.91	3.53	1.53	2.01	0.68	0.333	1.38	0.242	0.86	1.10	0.308	No
353	58.07	3.54	1.53	2.01	0.68	0.333	1.38	0.242	0.86	1.10	0.308	No
354	58.24	3.55	1.54	2.02	0.67	0.332	1.38	0.241	0.86	1.10	0.308	No
355	58.40	3.56	1.54	2.02	0.67	0.331	1.38	0.241	0.86	1.10	0.307	No
356	58.57	3.57	1.55	2.03	0.67	0.331	1.38	0.240	0.86	1.10	0.307	No
357	58.73	3.58	1.55	2.03	0.67	0.330	1.38	0.240	0.86	1.10	0.307	No
358	58.89	3.59	1.56	2.04	0.67	0.330	1.38	0.240	0.86	1.10	0.306	No
359	59.06	3.60	1.56	2.04	0.67	0.329	1.38	0.239	0.86	1.10	0.306	No
360	59.22	3.61	1.57	2.05	0.67	0.329	1.38	0.239	0.86	1.10	0.306	No
361	59.39	3.62	1.57	2.05	0.66	0.328	1.38	0.238	0.86	1.10	0.305	No
362	59.55	3.63	1.58	2.06	0.66	0.327	1.38	0.238	0.86	1.10	0.305	No
363	59.71	3.64	1.58	2.06	0.66	0.327	1.38	0.237	0.86	1.10	0.305	No
364	59.88	3.66	1.59	2.07	0.66	0.326	1.38	0.237	0.86	1.10	2.000	Yes
365	60.04	3.67	1.59	2.07	0.66	0.326	1.38	0.237	0.86	1.10	2.000	Yes
366	60.21	3.68	1.60	2.08	0.66	0.325	1.38	0.236	0.86	1.10	2.000	Yes
367	60.37	3.69	1.60	2.08	0.66	0.324	1.38	0.236	0.86	1.10	2.000	Yes
368	60.53	3.70	1.61	2.09	0.65	0.324	1.38	0.235	0.86	1.10	2.000	Yes
369	60.70	3.71	1.61	2.09	0.65	0.323	1.38	0.235	0.85	1.10	2.000	Yes
370	60.86	3.72	1.62	2.10	0.65	0.323	1.38	0.235	0.85	1.10	2.000	Yes
371	61.03	3.73	1.62	2.11	0.65	0.322	1.38	0.234	0.85	1.10	2.000	No
372	61.19	3.74	1.63	2.11	0.65	0.322	1.38	0.234	0.85	1.10	2.000	No
373	61.35	3.75	1.63	2.12	0.65	0.321	1.38	0.233	0.85	1.10	2.000	No
374	61.52	3.76	1.64	2.12	0.65	0.321	1.38	0.233	0.85	1.10	2.000	No
375	61.68	3.77	1.64	2.13	0.65	0.320	1.38	0.233	0.85	1.10	2.000	No
376	61.85	3.78	1.65	2.13	0.64	0.320	1.38	0.232	0.85	1.10	2.000	No
377	62.01	3.79	1.65	2.14	0.64	0.319	1.38	0.232	0.85	1.10	2.000	No
378	62.17	3.80	1.66	2.14	0.64	0.318	1.38	0.231	0.85	1.10	2.000	No
379	62.34	3.81	1.66	2.15	0.64	0.318	1.38	0.231	0.85	1.10	2.000	No
380	62.50	3.82	1.67	2.15	0.64	0.317	1.38	0.231	0.85	1.10	2.000	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
σ_v: Total overburden pressure at test point (tsf)
u_0: Water pressure at test point (tsf)
σ_v': Effective overburden pressure based on GWT during earthquake (tsf)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.33	106.13	1.45	0.35	0.50	170.49	1.00	170.49	4.000	No	No	2.00
2	0.49	98.20	1.56	0.48	0.50	157.73	1.00	157.73	4.000	No	No	2.00
3	0.66	86.80	1.73	0.77	0.53	139.40	1.06	147.14	4.000	No	No	2.00
4	0.82	81.17	1.84	1.07	0.58	130.33	1.14	148.46	4.000	No	No	2.00
5	0.98	78.03	1.94	1.41	0.61	125.28	1.23	153.78	4.000	No	No	2.00
6	1.15	80.77	1.97	1.61	0.63	129.66	1.26	163.63	4.000	No	No	2.00
7	1.31	86.03	1.97	1.71	0.63	138.10	1.26	174.22	4.000	No	No	2.00
8	1.48	93.07	1.95	1.72	0.62	149.38	1.24	185.03	4.000	No	No	2.00
9	1.64	100.13	1.93	1.73	0.61	160.72	1.22	195.86	4.000	No	No	2.00
10	1.80	106.60	1.92	1.75	0.61	171.10	1.20	206.10	4.000	No	No	2.00
11	1.97	111.33	1.92	1.86	0.61	178.68	1.21	216.57	4.000	No	No	2.00
12	2.13	116.20	1.93	1.95	0.61	186.48	1.22	227.01	4.000	No	No	2.00
13	2.30	120.40	1.93	2.02	0.61	193.21	1.22	235.72	4.000	No	No	2.00
14	2.46	121.83	1.93	2.03	0.61	195.50	1.22	238.01	4.000	No	No	2.00
15	2.62	119.07	1.93	2.02	0.61	191.04	1.22	233.50	4.000	No	No	2.00
16	2.79	116.50	1.93	1.95	0.61	186.90	1.22	227.25	4.000	No	No	2.00
17	2.95	114.93	1.92	1.86	0.60	184.37	1.20	221.90	4.000	No	No	2.00
18	3.12	114.00	1.90	1.76	0.60	182.85	1.19	217.15	4.000	No	No	2.00
19	3.28	112.00	1.90	1.73	0.60	179.62	1.19	213.24	4.000	No	No	2.00
20	3.45	109.37	1.90	1.71	0.60	175.37	1.19	208.68	4.000	No	No	2.00
21	3.61	107.50	1.90	1.68	0.60	172.36	1.19	204.87	4.000	No	No	2.00
22	3.77	105.07	1.90	1.65	0.60	168.43	1.19	200.47	4.000	No	No	2.00
23	3.94	102.14	1.90	1.60	0.60	163.70	1.19	194.53	4.000	No	No	2.00
24	4.10	96.17	1.92	1.63	0.61	154.10	1.21	186.66	4.000	Yes	No	2.00
25	4.27	85.40	1.99	1.80	0.63	136.79	1.29	175.91	4.000	Yes	No	2.00
26	4.43	70.77	2.11	2.22	0.68	113.26	1.48	167.24	4.000	Yes	No	2.00
27	4.59	56.64	2.25	2.78	0.73	90.53	1.80	162.60	4.000	Yes	No	2.00
28	4.76	46.37	2.37	3.33	0.78	74.02	2.18	161.25	4.000	Yes	No	2.00
29	4.92	41.10	2.43	3.60	0.80	65.54	2.42	158.82	4.000	Yes	No	2.00
30	5.09	37.63	2.47	3.84	0.82	59.96	2.64	158.23	4.000	No	No	2.00
31	5.25	36.20	2.50	4.00	0.83	57.64	2.76	158.97	4.000	No	No	2.00
32	5.41	36.77	2.50	4.03	0.83	58.53	2.75	160.80	4.000	No	No	2.00
33	5.58	38.63	2.47	3.83	0.81	61.51	2.60	159.88	4.000	No	No	2.00
34	5.74	39.63	2.45	3.73	0.81	63.10	2.53	159.43	4.000	No	No	2.00
35	5.91	39.96	2.45	3.79	0.81	63.62	2.54	161.36	4.000	No	No	2.00
36	6.07	40.49	2.46	3.99	0.81	64.46	2.59	167.25	4.000	No	No	2.00
37	6.23	41.30	2.47	4.07	0.81	65.73	2.60	170.91	4.000	No	No	2.00
38	6.40	42.13	2.45	3.99	0.81	67.05	2.54	170.54	4.000	No	No	2.00
39	6.56	42.53	2.43	3.80	0.80	67.68	2.46	166.40	4.000	No	No	2.00
40	6.73	43.96	2.39	3.44	0.79	69.97	2.29	159.92	4.000	No	No	2.00
41	6.89	46.80	2.34	3.09	0.77	74.50	2.09	155.35	4.000	No	No	2.00
42	7.05	50.53	2.29	2.79	0.75	80.48	1.90	153.17	4.000	No	No	2.00
43	7.22	53.56	2.24	2.57	0.73	85.34	1.78	151.55	4.000	No	No	2.00
44	7.38	55.00	2.22	2.44	0.72	87.63	1.71	150.00	4.000	No	No	2.00
45	7.55	55.80	2.20	2.35	0.71	88.90	1.67	148.42	4.000	No	No	2.00
46	7.71	56.70	2.18	2.25	0.71	90.33	1.63	146.92	4.000	No	No	2.00
47	7.87	57.90	2.17	2.21	0.70	92.24	1.60	147.32	4.000	No	No	2.00
48	8.04	59.53	2.15	2.15	0.70	94.56	1.56	147.66	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	8.20	61.46	2.15	2.19	0.70	96.34	1.56	150.53	4.000	No	No	2.00
50	8.37	63.53	2.15	2.22	0.70	98.17	1.56	153.24	4.000	No	No	2.00
51	8.53	65.30	2.16	2.26	0.70	99.63	1.56	155.87	4.000	No	No	2.00
52	8.69	66.83	2.15	2.26	0.70	100.59	1.56	156.71	4.000	No	No	2.00
53	8.86	67.90	2.15	2.23	0.69	100.70	1.55	155.74	4.000	No	No	2.00
54	9.02	68.30	2.15	2.21	0.69	99.99	1.55	154.70	0.424	No	No	1.93
55	9.19	67.93	2.15	2.23	0.70	98.31	1.56	153.52	0.416	No	No	1.88
56	9.35	67.23	2.16	2.25	0.70	96.32	1.58	152.39	0.409	No	No	1.83
57	9.51	66.30	2.17	2.23	0.70	93.94	1.59	149.64	0.392	No	No	1.74
58	9.68	65.43	2.17	2.21	0.70	91.63	1.60	146.89	0.375	No	No	1.65
59	9.84	64.50	2.18	2.19	0.70	89.36	1.61	144.23	0.359	No	No	1.57
60	10.01	63.70	2.19	2.22	0.71	87.37	1.64	143.22	0.353	No	No	1.53
61	10.17	63.23	2.20	2.29	0.71	85.99	1.67	143.97	0.358	No	No	1.54
62	10.34	63.23	2.21	2.34	0.72	85.13	1.70	144.73	0.362	No	No	1.55
63	10.50	63.76	2.22	2.43	0.72	85.08	1.73	147.17	0.376	No	No	1.60
64	10.66	64.26	2.24	2.52	0.73	84.98	1.76	149.55	0.391	No	No	1.65
65	10.83	64.43	2.26	2.67	0.73	84.50	1.82	153.43	0.416	No	No	1.74
66	10.99	63.96	2.27	2.74	0.74	83.15	1.85	154.21	0.421	No	No	1.75
67	11.16	62.46	2.29	2.81	0.75	80.47	1.91	153.48	0.416	No	No	1.72
68	11.32	59.90	2.28	2.65	0.75	76.27	1.90	144.91	0.363	No	No	1.49
69	11.48	57.33	2.29	2.53	0.75	72.23	1.91	137.85	0.324	No	No	1.32
70	11.65	56.70	2.28	2.38	0.74	70.52	1.87	132.15	0.295	No	No	1.20
71	11.81	61.03	2.24	2.27	0.73	74.84	1.78	133.01	0.299	No	No	1.21
72	11.98	67.59	2.19	2.09	0.71	81.55	1.65	134.30	0.305	No	No	1.22
73	12.14	74.06	2.14	1.91	0.69	87.99	1.53	134.82	0.308	No	No	1.23
74	12.30	76.39	2.12	1.85	0.68	89.78	1.50	134.74	0.307	No	No	1.22
75	12.47	75.53	2.13	1.87	0.69	88.01	1.52	133.78	0.303	No	No	1.20
76	12.63	72.73	2.17	1.99	0.70	84.28	1.59	133.86	0.303	No	No	1.19
77	12.80	69.19	2.21	2.19	0.72	79.80	1.70	135.51	0.311	No	No	1.22
78	12.96	65.43	2.27	2.48	0.74	75.17	1.85	139.12	0.330	No	No	1.28
79	13.12	61.33	2.32	2.75	0.76	70.13	2.02	141.84	0.345	No	No	1.34
80	13.29	57.69	2.36	2.93	0.78	65.52	2.16	141.84	0.345	No	No	1.33
81	13.45	54.29	2.39	2.99	0.79	61.18	2.27	138.91	0.329	No	No	1.26
82	13.62	51.56	2.40	2.96	0.79	57.55	2.33	134.21	0.305	No	No	1.16
83	13.78	50.09	2.42	2.98	0.80	55.42	2.39	132.46	0.296	No	No	1.13
84	13.94	51.29	2.41	2.97	0.79	56.22	2.37	133.21	0.300	No	No	1.13
85	14.11	55.46	2.38	2.87	0.78	60.13	2.24	134.74	0.307	No	No	1.16
86	14.27	59.83	2.35	2.77	0.77	64.22	2.12	136.38	0.316	No	No	1.18
87	14.44	63.39	2.32	2.67	0.76	67.35	2.03	136.76	0.318	No	No	1.19
88	14.60	65.02	2.32	2.65	0.76	68.49	2.01	137.46	0.322	No	No	1.20
89	14.76	65.89	2.31	2.62	0.76	68.80	1.99	136.83	0.318	No	No	1.18
90	14.93	65.43	2.32	2.64	0.76	67.73	2.01	136.30	0.316	No	No	1.16
91	15.09	63.23	2.34	2.73	0.77	64.95	2.09	136.03	0.314	No	No	1.16
92	15.26	60.33	2.37	2.81	0.78	61.46	2.19	134.50	0.306	No	No	1.12
93	15.42	57.32	2.40	2.90	0.79	57.93	2.30	133.14	0.299	No	No	1.09
94	15.58	55.02	2.42	2.96	0.80	55.15	2.39	131.72	0.293	No	No	1.06
95	15.75	53.16	2.44	3.00	0.80	52.81	2.47	130.20	0.285	No	No	1.03
96	15.91	52.66	2.44	2.97	0.80	51.88	2.47	128.37	0.277	No	No	1.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	16.08	55.23	2.42	2.95	0.80	53.96	2.41	130.22	0.285	No	No	1.03
98	16.24	64.66	2.37	2.88	0.78	62.76	2.19	137.71	0.323	No	No	1.16
99	16.40	79.43	2.30	2.76	0.75	76.62	1.94	148.48	0.384	No	No	1.38
100	16.57	93.93	2.24	2.66	0.73	89.98	1.76	158.39	0.450	No	No	1.60
101	16.73	101.53	2.22	2.69	0.72	96.61	1.72	165.71	0.503	No	No	1.79
102	16.90	103.16	2.23	2.77	0.72	97.43	1.74	169.14	0.530	No	No	1.88
103	17.06	98.46	2.26	2.91	0.74	92.28	1.82	168.10	4.000	Yes	No	2.00
104	17.23	84.83	2.32	3.06	0.76	78.74	2.02	158.97	4.000	Yes	No	2.00
105	17.39	64.73	2.43	3.30	0.80	59.37	2.43	144.54	4.000	Yes	No	2.00
106	17.55	45.29	2.57	3.62	0.86	40.88	3.16	129.27	4.000	Yes	No	2.00
107	17.72	33.86	2.70	3.97	0.90	30.00	3.98	119.43	4.000	Yes	Yes	2.00
108	17.88	34.84	2.67	3.66	0.89	30.67	3.76	115.37	4.000	No	Yes	2.00
109	18.05	49.45	2.48	2.83	0.82	43.73	2.66	116.28	0.226	No	No	0.79
110	18.21	63.75	2.35	2.40	0.77	56.43	2.11	119.12	0.237	No	No	0.82
111	18.37	61.23	2.38	2.55	0.78	53.74	2.24	120.36	4.000	Yes	No	2.00
112	18.54	43.52	2.55	3.07	0.85	37.44	3.04	113.93	4.000	Yes	No	2.00
113	18.70	25.72	2.81	3.94	0.94	21.37	4.84	103.36	4.000	Yes	Yes	2.00
114	18.87	17.68	2.96	4.24	1.00	14.17	6.36	90.10	4.000	Yes	Yes	2.00
115	19.03	14.61	3.05	4.47	1.00	11.44	7.34	83.94	4.000	No	Yes	2.00
116	19.19	13.54	3.12	5.13	1.00	10.44	8.18	85.37	4.000	No	Yes	2.00
117	19.36	14.21	3.12	5.38	1.00	10.91	8.15	88.93	4.000	No	Yes	2.00
118	19.52	15.31	3.10	5.43	1.00	11.74	7.87	92.43	4.000	No	Yes	2.00
119	19.69	16.35	3.07	5.29	1.00	12.49	7.53	93.99	4.000	No	Yes	2.00
120	19.85	17.24	3.04	4.99	1.00	13.12	7.14	93.74	4.000	No	Yes	2.00
121	20.01	19.01	2.99	4.69	1.00	14.45	6.58	95.11	4.000	No	Yes	2.00
122	20.18	20.47	2.95	4.51	1.00	15.51	6.21	96.34	4.000	No	Yes	2.00
123	20.34	20.96	2.95	4.57	1.00	15.78	6.19	97.66	4.000	No	Yes	2.00
124	20.51	19.69	2.98	4.70	1.00	14.63	6.55	95.78	4.000	No	Yes	2.00
125	20.67	18.19	3.01	4.73	1.00	13.34	6.91	92.15	4.000	No	Yes	2.00
126	20.83	16.89	3.03	4.48	1.00	12.21	7.09	86.57	4.000	No	Yes	2.00
127	21.00	16.02	3.04	4.30	1.00	11.44	7.22	82.58	4.000	No	Yes	2.00
128	21.16	14.69	3.09	4.48	1.00	10.33	7.77	80.28	4.000	No	Yes	2.00
129	21.33	13.77	3.13	4.81	1.00	9.54	8.36	79.76	4.000	No	Yes	2.00
130	21.49	13.16	3.18	5.35	1.00	9.00	9.00	81.01	4.000	No	Yes	2.00
131	21.65	13.44	3.18	5.50	1.00	9.15	9.03	82.58	4.000	No	Yes	2.00
132	21.82	14.37	3.17	5.62	1.00	9.77	8.80	86.01	4.000	No	Yes	2.00
133	21.98	16.21	3.11	5.38	1.00	11.06	8.09	89.54	4.000	No	Yes	2.00
134	22.15	18.75	3.05	5.17	1.00	12.86	7.34	94.34	4.000	No	Yes	2.00
135	22.31	21.62	2.98	4.77	1.00	14.87	6.53	97.11	4.000	No	Yes	2.00
136	22.47	24.45	2.92	4.48	0.99	16.87	5.90	99.62	4.000	No	Yes	2.00
137	22.64	27.86	2.85	4.15	0.96	19.35	5.26	101.86	4.000	No	Yes	2.00
138	22.80	31.95	2.79	3.93	0.94	22.33	4.71	105.14	4.000	No	Yes	2.00
139	22.97	35.54	2.74	3.71	0.92	24.91	4.29	106.83	4.000	No	Yes	2.00
140	23.13	37.92	2.71	3.65	0.91	26.55	4.10	108.73	4.000	No	Yes	2.00
141	23.30	38.81	2.72	3.83	0.91	26.98	4.16	112.25	4.000	No	Yes	2.00
142	23.46	38.27	2.76	4.25	0.93	26.30	4.46	117.25	4.000	No	Yes	2.00
143	23.62	35.97	2.82	4.83	0.95	24.31	4.98	121.10	4.000	No	Yes	2.00
144	23.79	32.44	2.87	4.95	0.97	21.55	5.40	116.36	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	23.95	28.44	2.92	5.07	0.99	18.52	5.95	110.10	4.000	No	Yes	2.00
146	24.12	24.61	2.98	5.04	1.00	15.72	6.50	102.13	4.000	No	Yes	2.00
147	24.28	21.10	3.06	5.44	1.00	13.24	7.39	97.79	4.000	No	Yes	2.00
148	24.44	18.38	3.12	5.72	1.00	11.33	8.21	92.97	4.000	No	Yes	2.00
149	24.61	16.94	3.17	6.05	1.00	10.29	8.83	90.85	4.000	No	Yes	2.00
150	24.77	17.47	3.17	6.26	1.00	10.57	8.84	93.45	4.000	No	Yes	2.00
151	24.94	20.94	3.10	6.01	1.00	12.78	7.87	100.53	4.000	No	Yes	2.00
152	25.10	27.68	2.95	5.10	1.00	17.09	6.24	106.59	4.000	No	Yes	2.00
153	25.26	35.46	2.82	4.32	0.95	22.46	4.93	110.65	4.000	No	Yes	2.00
154	25.43	44.14	2.69	3.60	0.90	28.56	3.89	111.18	4.000	No	Yes	2.00
155	25.59	51.59	2.59	3.13	0.86	33.84	3.27	110.57	0.206	No	No	0.65
156	25.76	57.57	2.53	2.92	0.84	37.98	2.94	111.56	0.209	No	No	0.66
157	25.92	61.11	2.51	2.86	0.83	40.31	2.80	113.03	0.214	No	No	0.68
158	26.08	62.38	2.51	2.91	0.83	40.96	2.80	114.82	0.221	No	No	0.70
159	26.25	62.68	2.51	2.95	0.83	40.90	2.83	115.61	0.224	No	No	0.71
160	26.41	62.05	2.51	2.92	0.83	40.24	2.84	114.35	0.219	No	No	0.69
161	26.58	61.05	2.52	2.92	0.84	39.30	2.88	113.12	0.215	No	No	0.68
162	26.74	60.25	2.53	2.90	0.84	38.54	2.90	111.89	0.210	No	No	0.66
163	26.90	59.01	2.54	2.96	0.84	37.43	2.99	111.84	0.210	No	No	0.66
164	27.07	54.58	2.59	3.15	0.86	34.07	3.26	111.21	0.208	No	No	0.65
165	27.23	46.04	2.67	3.30	0.89	28.05	3.76	105.55	4.000	No	Yes	2.00
166	27.40	36.58	2.79	3.72	0.94	21.48	4.69	100.78	4.000	No	Yes	2.00
167	27.56	30.51	2.89	4.16	0.98	17.33	5.62	97.34	4.000	No	Yes	2.00
168	27.72	33.05	2.86	4.15	0.97	18.84	5.34	100.63	4.000	No	Yes	2.00
169	27.89	34.77	2.83	3.93	0.95	19.87	5.05	100.25	4.000	No	Yes	2.00
170	28.05	33.53	2.83	3.77	0.95	19.01	5.08	96.46	4.000	No	Yes	2.00
171	28.22	25.79	2.98	4.43	1.00	13.99	6.54	91.40	4.000	No	Yes	2.00
172	28.38	22.65	3.06	4.94	1.00	12.09	7.44	89.88	4.000	No	Yes	2.00
173	28.54	28.45	2.93	4.12	0.99	15.42	5.98	92.17	4.000	No	Yes	2.00
174	28.71	36.77	2.79	3.52	0.94	20.65	4.67	96.49	4.000	No	Yes	2.00
175	28.87	44.05	2.70	3.31	0.91	25.22	4.02	101.28	4.000	No	Yes	2.00
176	29.04	47.84	2.68	3.40	0.90	27.43	3.87	106.18	4.000	No	Yes	2.00
177	29.20	52.74	2.64	3.27	0.88	30.46	3.56	108.48	4.000	No	Yes	2.00
178	29.36	56.97	2.59	3.08	0.86	33.11	3.28	108.69	0.199	No	No	0.61
179	29.53	58.04	2.58	3.02	0.86	33.65	3.22	108.30	0.198	No	No	0.61
180	29.69	53.51	2.62	3.09	0.87	30.55	3.45	105.52	4.000	No	Yes	2.00
181	29.86	45.93	2.69	3.17	0.90	25.58	3.90	99.70	4.000	No	Yes	2.00
182	30.02	39.43	2.76	3.28	0.93	21.40	4.42	94.50	4.000	No	Yes	2.00
183	30.19	39.73	2.75	3.25	0.92	21.47	4.39	94.26	4.000	No	Yes	2.00
184	30.35	47.12	2.67	3.09	0.89	25.94	3.81	98.93	4.000	No	Yes	2.00
185	30.51	53.07	2.59	2.73	0.86	29.71	3.30	97.91	0.167	No	No	0.51
186	30.68	52.50	2.59	2.63	0.86	29.27	3.26	95.51	0.161	No	No	0.49
187	30.84	46.28	2.65	2.70	0.88	25.23	3.63	91.48	4.000	No	Yes	2.00
188	31.01	47.90	2.64	2.75	0.88	26.06	3.59	93.45	4.000	No	Yes	2.00
189	31.17	52.88	2.60	2.68	0.87	29.02	3.31	96.07	0.162	No	No	0.49
190	31.33	58.69	2.56	2.64	0.85	32.49	3.06	99.59	0.172	No	No	0.52
191	31.50	65.29	2.51	2.58	0.83	36.47	2.82	102.88	4.000	Yes	No	2.00
192	31.66	83.15	2.38	2.26	0.78	47.92	2.24	107.53	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	31.83	111.82	2.24	1.97	0.73	66.76	1.76	117.59	4.000	Yes	No	2.00
194	31.99	142.89	2.14	1.87	0.69	87.33	1.52	133.05	4.000	Yes	No	2.00
195	32.15	171.92	2.08	1.88	0.67	106.37	1.42	150.61	4.000	Yes	No	2.00
196	32.32	191.69	2.05	1.93	0.66	119.00	1.38	163.63	0.487	No	No	1.46
197	32.48	196.66	2.06	2.02	0.66	121.43	1.39	168.56	0.525	No	No	1.57
198	32.65	188.79	2.09	2.11	0.67	115.29	1.44	165.52	0.502	No	No	1.50
199	32.81	175.29	2.12	2.15	0.68	105.72	1.50	158.18	0.448	No	No	1.34
200	32.97	160.79	2.15	2.12	0.69	95.96	1.54	148.19	0.383	No	No	1.14
201	33.14	143.86	2.17	2.04	0.70	84.84	1.60	135.87	0.313	No	No	0.94
202	33.30	125.09	2.21	1.95	0.72	72.72	1.68	122.32	0.250	No	No	0.75
203	33.47	106.82	2.25	1.85	0.73	61.07	1.79	109.15	0.201	No	No	0.60
204	33.63	87.26	2.32	1.84	0.76	48.56	2.02	97.94	0.167	No	No	0.50
205	33.79	70.12	2.40	1.81	0.79	37.86	2.32	87.68	0.143	No	No	0.42
206	33.96	60.82	2.45	1.76	0.81	32.15	2.53	81.20	0.130	No	No	0.39
207	34.12	59.89	2.43	1.61	0.80	31.65	2.45	77.60	0.123	No	No	0.37
208	34.29	64.22	2.41	1.61	0.79	34.13	2.34	79.71	0.127	No	No	0.38
209	34.45	70.27	2.36	1.56	0.78	37.73	2.17	81.83	0.131	No	No	0.39
210	34.61	78.25	2.31	1.49	0.75	42.61	1.97	84.15	0.135	No	No	0.40
211	34.78	80.40	2.32	1.58	0.76	43.55	2.00	87.09	0.141	No	No	0.42
212	34.94	75.79	2.39	1.86	0.79	40.06	2.26	90.69	0.149	No	No	0.44
213	35.11	66.98	2.49	2.21	0.82	34.18	2.72	92.80	0.154	No	No	0.46
214	35.27	60.58	2.52	2.17	0.84	30.40	2.89	87.92	0.143	No	No	0.42
215	35.43	57.27	2.52	2.00	0.84	28.57	2.89	82.55	0.132	No	No	0.39
216	35.60	53.90	2.53	1.87	0.84	26.65	2.93	78.04	0.124	No	No	0.37
217	35.76	49.59	2.60	2.11	0.87	23.88	3.33	79.46	4.000	No	Yes	2.00
218	35.93	49.15	2.61	2.13	0.87	23.50	3.38	79.37	4.000	No	Yes	2.00
219	36.09	50.89	2.59	2.05	0.86	24.43	3.24	79.11	4.000	Yes	No	2.00
220	36.26	57.92	2.51	1.86	0.83	28.48	2.80	79.63	4.000	Yes	No	2.00
221	36.42	64.73	2.46	1.81	0.81	32.29	2.55	82.50	4.000	Yes	No	2.00
222	36.58	75.02	2.39	1.74	0.78	38.21	2.26	86.35	4.000	Yes	No	2.00
223	36.75	89.68	2.29	1.60	0.75	46.97	1.93	90.64	4.000	Yes	No	2.00
224	36.91	101.75	2.24	1.54	0.73	54.18	1.76	95.22	4.000	Yes	No	2.00
225	37.08	104.97	2.24	1.62	0.73	55.65	1.77	98.60	0.169	No	No	0.50
226	37.24	97.82	2.29	1.74	0.75	50.88	1.92	97.61	0.167	No	No	0.49
227	37.40	89.88	2.34	1.86	0.77	45.85	2.10	96.15	0.163	No	No	0.48
228	37.57	87.27	2.35	1.84	0.77	44.29	2.13	94.24	0.158	No	No	0.46
229	37.73	86.99	2.35	1.81	0.77	44.11	2.11	93.29	0.156	No	No	0.46
230	37.90	82.79	2.36	1.74	0.77	41.74	2.14	89.49	0.147	No	No	0.43
231	38.06	75.02	2.39	1.70	0.79	37.29	2.27	84.52	0.136	No	No	0.40
232	38.22	67.18	2.43	1.70	0.80	32.78	2.45	80.42	0.128	No	No	0.38
233	38.39	61.68	2.49	1.80	0.82	29.48	2.70	79.45	0.127	No	No	0.37
234	38.55	56.37	2.53	1.85	0.84	26.43	2.93	77.46	0.123	No	No	0.36
235	38.72	50.14	2.61	2.02	0.87	22.82	3.36	76.68	4.000	No	Yes	2.00
236	38.88	44.33	2.67	2.15	0.89	19.60	3.81	74.68	4.000	No	Yes	2.00
237	39.04	41.62	2.71	2.21	0.91	18.09	4.07	73.57	4.000	No	Yes	2.00
238	39.21	37.21	2.77	2.30	0.93	15.74	4.53	71.25	4.000	No	Yes	2.00
239	39.37	29.80	2.89	2.56	0.98	11.91	5.65	67.27	4.000	No	Yes	2.00
240	39.54	21.24	3.10	3.36	1.00	8.03	7.97	64.01	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	39.70	16.97	3.25	4.12	1.00	6.19	9.92	61.41	4.000	No	Yes	2.00
242	39.86	18.00	3.19	3.64	1.00	6.61	9.15	60.50	4.000	No	Yes	2.00
243	40.03	22.14	3.04	2.71	1.00	8.36	7.16	59.88	4.000	No	Yes	2.00
244	40.19	27.42	2.89	2.14	0.98	10.78	5.58	60.20	4.000	No	Yes	2.00
245	40.36	32.08	2.80	2.03	0.94	13.09	4.83	63.18	4.000	No	Yes	2.00
246	40.52	34.68	2.75	1.86	0.92	14.46	4.37	63.12	4.000	No	Yes	2.00
247	40.68	35.81	2.74	1.90	0.92	14.97	4.30	64.43	4.000	No	Yes	2.00
248	40.85	35.43	2.74	1.82	0.92	14.80	4.26	63.02	4.000	No	Yes	2.00
249	41.01	35.86	2.73	1.80	0.92	15.00	4.20	62.97	4.000	No	Yes	2.00
250	41.18	36.62	2.68	1.56	0.90	15.54	3.87	60.06	4.000	No	Yes	2.00
251	41.34	37.85	2.67	1.60	0.89	16.10	3.81	61.42	4.000	No	Yes	2.00
252	41.50	37.51	2.71	1.81	0.91	15.72	4.08	64.17	4.000	No	Yes	2.00
253	41.67	36.72	2.74	1.95	0.92	15.19	4.31	65.49	4.000	No	Yes	2.00
254	41.83	34.92	2.75	1.85	0.92	14.33	4.38	62.79	4.000	No	Yes	2.00
255	42.00	30.72	2.80	1.78	0.94	12.26	4.77	58.48	4.000	No	Yes	2.00
256	42.16	25.66	2.92	2.02	0.99	9.68	5.85	56.61	4.000	No	Yes	2.00
257	42.32	20.73	3.08	2.75	1.00	7.51	7.68	57.67	4.000	No	Yes	2.00
258	42.49	19.57	3.16	3.53	1.00	7.01	8.76	61.43	4.000	No	Yes	2.00
259	42.65	30.24	2.92	2.65	0.99	11.53	5.85	67.48	4.000	No	Yes	2.00
260	42.82	48.60	2.63	1.96	0.88	20.98	3.49	73.30	4.000	No	Yes	2.00
261	42.98	63.66	2.49	1.80	0.82	29.02	2.73	79.08	0.126	No	No	0.37
262	43.15	62.92	2.53	2.05	0.84	28.23	2.95	83.16	0.133	No	No	0.40
263	43.31	50.36	2.69	2.58	0.90	21.17	3.96	83.82	4.000	No	Yes	2.00
264	43.47	39.13	2.84	2.92	0.96	15.45	5.10	78.84	4.000	No	Yes	2.00
265	43.64	32.31	2.92	2.92	0.99	12.21	5.89	71.90	4.000	No	Yes	2.00
266	43.80	34.32	2.84	2.42	0.96	13.34	5.14	68.62	4.000	No	Yes	2.00
267	43.97	36.22	2.79	2.19	0.94	14.34	4.70	67.41	4.000	No	Yes	2.00
268	44.13	35.10	2.80	2.16	0.94	13.78	4.80	66.11	4.000	No	Yes	2.00
269	44.29	26.62	2.97	2.51	1.00	9.68	6.37	61.62	4.000	No	Yes	2.00
270	44.46	18.55	3.17	3.15	1.00	6.40	8.84	56.59	4.000	No	Yes	2.00
271	44.62	14.38	3.34	4.00	1.00	4.71	11.32	53.26	4.000	No	Yes	2.00
272	44.79	14.52	3.38	4.80	1.00	4.75	11.98	56.90	4.000	No	Yes	2.00
273	44.95	17.62	3.29	4.70	1.00	5.99	10.58	63.33	4.000	No	Yes	2.00
274	45.11	21.74	3.18	4.21	1.00	7.62	8.94	68.18	4.000	No	Yes	2.00
275	45.28	24.54	3.11	3.82	1.00	8.73	8.00	69.80	4.000	No	Yes	2.00
276	45.44	23.99	3.17	4.71	1.00	8.49	8.82	74.87	4.000	No	Yes	2.00
277	45.61	25.90	3.17	5.33	1.00	9.23	8.87	81.87	4.000	No	Yes	2.00
278	45.77	39.14	2.97	4.49	1.00	14.48	6.45	93.36	4.000	Yes	Yes	2.00
279	45.93	75.92	2.56	2.78	0.85	33.03	3.12	102.90	4.000	Yes	No	2.00
280	46.10	123.46	2.30	2.13	0.75	59.43	1.94	115.08	4.000	Yes	No	2.00
281	46.26	162.66	2.16	1.90	0.70	82.26	1.57	129.35	4.000	Yes	No	2.00
282	46.43	175.52	2.14	1.95	0.69	89.23	1.54	137.09	0.320	No	No	0.96
283	46.59	170.79	2.18	2.10	0.71	85.61	1.62	138.27	0.326	No	No	0.98
284	46.75	161.79	2.21	2.20	0.72	79.95	1.70	135.91	0.313	No	No	0.94
285	46.92	156.49	2.23	2.26	0.73	76.63	1.75	134.37	0.306	No	No	0.92
286	47.08	148.61	2.26	2.29	0.74	72.01	1.82	130.95	0.289	No	No	0.87
287	47.25	145.96	2.26	2.26	0.74	70.50	1.83	128.81	0.279	No	No	0.84
288	47.41	140.21	2.28	2.28	0.74	67.15	1.88	126.29	0.267	No	No	0.81

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	47.57	132.72	2.31	2.39	0.76	62.62	1.99	124.85	0.261	No	No	0.79
290	47.74	126.35	2.35	2.54	0.77	58.67	2.13	124.90	0.261	No	No	0.79
291	47.90	123.65	2.38	2.65	0.78	56.84	2.22	125.91	0.266	No	No	0.80
292	48.07	130.13	2.35	2.57	0.77	60.36	2.11	127.33	0.272	No	No	0.82
293	48.23	135.67	2.32	2.46	0.76	63.50	2.01	127.60	0.273	No	No	0.83
294	48.39	142.50	2.27	2.27	0.74	67.68	1.87	126.44	0.268	No	No	0.81
295	48.56	145.83	2.24	2.12	0.73	69.89	1.78	124.52	0.260	No	No	0.79
296	48.72	142.96	2.25	2.10	0.73	68.30	1.79	122.31	0.250	No	No	0.76
297	48.89	137.00	2.27	2.14	0.74	64.76	1.86	120.27	0.242	No	No	0.74
298	49.05	132.06	2.29	2.17	0.75	61.88	1.91	118.43	0.234	No	No	0.71
299	49.22	132.33	2.28	2.11	0.74	62.09	1.89	117.15	0.230	No	No	0.70
300	49.38	135.89	2.27	2.11	0.74	63.92	1.86	118.65	0.235	No	No	0.72
301	49.54	139.42	2.27	2.15	0.74	65.56	1.85	121.31	0.246	No	No	0.75
302	49.71	139.45	2.28	2.25	0.75	65.12	1.90	123.50	0.255	No	No	0.78
303	49.87	134.25	2.31	2.31	0.75	62.02	1.97	122.29	0.250	No	No	0.77
304	50.04	122.19	2.36	2.41	0.77	55.27	2.14	118.28	4.000	Yes	No	2.00
305	50.20	100.69	2.45	2.60	0.81	43.70	2.54	111.10	4.000	Yes	No	2.00
306	50.36	76.79	2.59	2.89	0.86	31.36	3.28	102.96	4.000	Yes	No	2.00
307	50.53	56.65	2.76	3.30	0.93	21.47	4.42	94.88	4.000	Yes	Yes	2.00
308	50.69	42.52	2.91	3.72	0.98	14.94	5.81	86.81	4.000	Yes	Yes	2.00
309	50.86	31.52	3.06	4.22	1.00	10.59	7.48	79.21	4.000	No	Yes	2.00
310	51.02	23.66	3.20	4.54	1.00	7.65	9.19	70.31	4.000	No	Yes	2.00
311	51.18	19.96	3.26	4.36	1.00	6.26	10.06	62.94	4.000	No	Yes	2.00
312	51.35	18.84	3.26	4.03	1.00	5.83	10.16	59.19	4.000	No	Yes	2.00
313	51.51	18.10	3.28	4.01	1.00	5.54	10.41	57.68	4.000	No	Yes	2.00
314	51.68	17.45	3.31	4.20	1.00	5.29	10.83	57.30	4.000	No	Yes	2.00
315	51.84	16.96	3.33	4.35	1.00	5.09	11.18	56.96	4.000	No	Yes	2.00
316	52.00	17.04	3.33	4.33	1.00	5.12	11.14	56.97	4.000	No	Yes	2.00
317	52.17	18.81	3.24	3.63	1.00	5.75	9.85	56.66	4.000	No	Yes	2.00
318	52.33	25.15	3.04	2.58	1.00	8.07	7.18	57.97	4.000	No	Yes	2.00
319	52.50	31.72	2.89	2.10	0.98	10.71	5.57	59.70	4.000	No	Yes	2.00
320	52.66	33.32	2.88	2.21	0.97	11.33	5.49	62.21	4.000	No	Yes	2.00
321	52.82	27.98	3.01	2.69	1.00	9.06	6.81	61.73	4.000	No	Yes	2.00
322	52.99	21.73	3.16	3.24	1.00	6.76	8.66	58.55	4.000	No	Yes	2.00
323	53.15	18.83	3.26	3.85	1.00	5.69	10.12	57.55	4.000	No	Yes	2.00
324	53.32	19.34	3.28	4.35	1.00	5.86	10.41	60.97	4.000	No	Yes	2.00
325	53.48	23.10	3.18	3.86	1.00	7.21	8.92	64.34	4.000	No	Yes	2.00
326	53.64	29.67	3.01	3.03	1.00	9.58	6.91	66.20	4.000	No	Yes	2.00
327	53.81	36.80	2.90	2.78	0.98	12.37	5.72	70.78	4.000	No	Yes	2.00
328	53.97	39.51	2.93	3.41	0.99	13.19	6.01	79.27	4.000	No	Yes	2.00
329	54.14	41.24	2.97	4.13	1.00	13.70	6.40	87.75	4.000	No	Yes	2.00
330	54.30	55.57	2.80	3.57	0.94	19.89	4.81	95.69	4.000	No	Yes	2.00
331	54.46	78.26	2.59	2.85	0.86	30.75	3.29	101.30	0.177	No	No	0.56
332	54.63	97.44	2.47	2.55	0.82	40.29	2.64	106.49	0.192	No	No	0.61
333	54.79	97.84	2.50	2.75	0.83	40.04	2.76	110.52	0.206	No	No	0.65
334	54.96	86.91	2.61	3.31	0.87	33.98	3.36	114.10	4.000	No	Yes	2.00
335	55.12	75.82	2.72	4.00	0.91	28.16	4.15	116.86	4.000	No	Yes	2.00
336	55.28	77.99	2.71	3.98	0.91	29.08	4.06	118.01	4.000	Yes	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
337	55.45	97.56	2.55	3.22	0.85	38.84	3.06	118.72	4.000	Yes	No	2.00
338	55.61	121.94	2.39	2.53	0.79	51.87	2.27	117.98	4.000	Yes	No	2.00
339	55.78	137.69	2.27	2.04	0.74	61.29	1.87	114.37	4.000	Yes	No	2.00
340	55.94	141.25	2.20	1.69	0.72	64.48	1.68	108.05	4.000	Yes	No	2.00
341	56.11	140.46	2.16	1.48	0.70	64.97	1.58	102.84	4.000	Yes	No	2.00
342	56.27	126.01	2.25	1.69	0.73	56.25	1.79	100.76	4.000	Yes	No	2.00
343	56.43	97.77	2.44	2.23	0.80	40.26	2.47	99.33	4.000	Yes	No	2.00
344	56.60	64.41	2.72	3.17	0.91	23.38	4.12	96.22	4.000	Yes	Yes	2.00
345	56.76	41.32	2.97	4.05	1.00	13.26	6.47	85.79	4.000	Yes	Yes	2.00
346	56.93	29.98	3.11	4.15	1.00	9.27	7.99	74.10	4.000	No	Yes	2.00
347	57.09	23.82	3.20	4.10	1.00	7.10	9.20	65.31	4.000	No	Yes	2.00
348	57.25	21.22	3.25	4.14	1.00	6.18	9.94	61.42	4.000	No	Yes	2.00
349	57.42	20.49	3.30	4.71	1.00	5.91	10.66	63.00	4.000	No	Yes	2.00
350	57.58	21.13	3.32	5.49	1.00	6.12	11.06	67.74	4.000	No	Yes	2.00
351	57.75	23.23	3.30	5.92	1.00	6.84	10.77	73.65	4.000	No	Yes	2.00
352	57.91	28.08	3.18	4.89	1.00	8.51	8.94	76.06	4.000	No	Yes	2.00
353	58.07	37.75	2.98	3.51	1.00	11.83	6.49	76.77	4.000	No	Yes	2.00
354	58.24	42.88	2.84	2.63	0.96	14.17	5.13	72.72	4.000	No	Yes	2.00
355	58.40	41.20	2.89	2.92	0.98	13.29	5.59	74.34	4.000	No	Yes	2.00
356	58.57	33.40	3.04	3.69	1.00	10.27	7.19	73.84	4.000	No	Yes	2.00
357	58.73	36.71	3.03	4.13	1.00	11.38	7.11	80.95	4.000	No	Yes	2.00
358	58.89	60.80	2.71	2.80	0.91	21.55	4.07	87.65	4.000	No	Yes	2.00
359	59.06	90.49	2.50	2.38	0.83	35.47	2.75	97.67	0.167	No	No	0.54
360	59.22	111.81	2.41	2.34	0.79	45.62	2.35	107.28	0.195	No	No	0.64
361	59.39	117.34	2.43	2.64	0.80	47.48	2.44	116.04	0.225	No	No	0.74
362	59.55	126.85	2.39	2.54	0.79	52.19	2.27	118.60	0.235	No	No	0.77
363	59.71	136.02	2.34	2.37	0.77	57.08	2.09	119.03	0.237	No	No	0.78
364	59.88	127.00	2.36	2.35	0.78	52.61	2.17	114.34	4.000	Yes	No	2.00
365	60.04	101.06	2.50	2.70	0.83	39.36	2.76	108.75	4.000	Yes	No	2.00
366	60.21	73.28	2.70	3.40	0.90	25.96	4.00	103.86	4.000	Yes	Yes	2.00
367	60.37	64.36	2.77	3.57	0.93	21.97	4.53	99.59	4.000	Yes	Yes	2.00
368	60.53	69.84	2.71	3.33	0.91	24.46	4.10	100.31	4.000	Yes	Yes	2.00
369	60.70	87.91	2.55	2.65	0.85	33.16	3.03	100.58	4.000	Yes	No	2.00
370	60.86	106.89	2.44	2.39	0.81	42.37	2.48	105.14	4.000	Yes	No	2.00
371	61.03	116.16	2.40	2.31	0.79	46.88	2.30	107.84	4.000	No	No	2.00
372	61.19	110.47	2.43	2.37	0.80	43.94	2.42	106.34	4.000	No	No	2.00
373	61.35	99.12	2.50	2.59	0.83	38.12	2.75	104.90	4.000	No	No	2.00
374	61.52	87.74	2.56	2.74	0.85	32.64	3.11	101.63	4.000	No	No	2.00
375	61.68	82.20	2.61	2.89	0.87	29.91	3.38	100.99	4.000	No	Yes	2.00
376	61.85	83.33	2.57	2.60	0.85	30.76	3.14	96.67	4.000	No	No	2.00
377	62.01	86.89	2.54	2.49	0.84	32.47	2.97	96.54	4.000	No	No	2.00
378	62.17	84.12	2.57	2.66	0.86	30.91	3.17	97.96	4.000	No	No	2.00
379	62.34	73.49	2.68	3.16	0.90	25.61	3.88	99.48	4.000	No	Yes	2.00
380	62.50	64.32	2.78	3.58	0.94	21.35	4.62	98.60	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
0.33	2.00	0.00	9.95	0.16	0.00	0.49	2.00	0.00	9.93	0.16	0.00
0.66	2.00	0.00	9.90	0.17	0.00	0.82	2.00	0.00	9.88	0.16	0.00
0.98	2.00	0.00	9.85	0.16	0.00	1.15	2.00	0.00	9.82	0.17	0.00
1.31	2.00	0.00	9.80	0.16	0.00	1.48	2.00	0.00	9.77	0.17	0.00
1.64	2.00	0.00	9.75	0.16	0.00	1.80	2.00	0.00	9.73	0.16	0.00
1.97	2.00	0.00	9.70	0.17	0.00	2.13	2.00	0.00	9.68	0.16	0.00
2.30	2.00	0.00	9.65	0.17	0.00	2.46	2.00	0.00	9.63	0.16	0.00
2.62	2.00	0.00	9.60	0.16	0.00	2.79	2.00	0.00	9.57	0.17	0.00
2.95	2.00	0.00	9.55	0.16	0.00	3.12	2.00	0.00	9.52	0.17	0.00
3.28	2.00	0.00	9.50	0.16	0.00	3.45	2.00	0.00	9.47	0.17	0.00
3.61	2.00	0.00	9.45	0.16	0.00	3.77	2.00	0.00	9.43	0.16	0.00
3.94	2.00	0.00	9.40	0.17	0.00	4.10	2.00	0.00	9.38	0.16	0.00
4.27	2.00	0.00	9.35	0.17	0.00	4.43	2.00	0.00	9.32	0.16	0.00
4.59	2.00	0.00	9.30	0.16	0.00	4.76	2.00	0.00	9.27	0.17	0.00
4.92	2.00	0.00	9.25	0.16	0.00	5.09	2.00	0.00	9.22	0.17	0.00
5.25	2.00	0.00	9.20	0.16	0.00	5.41	2.00	0.00	9.18	0.16	0.00
5.58	2.00	0.00	9.15	0.17	0.00	5.74	2.00	0.00	9.13	0.16	0.00
5.91	2.00	0.00	9.10	0.17	0.00	6.07	2.00	0.00	9.07	0.16	0.00
6.23	2.00	0.00	9.05	0.16	0.00	6.40	2.00	0.00	9.02	0.17	0.00
6.56	2.00	0.00	9.00	0.16	0.00	6.73	2.00	0.00	8.97	0.17	0.00
6.89	2.00	0.00	8.95	0.16	0.00	7.05	2.00	0.00	8.93	0.16	0.00
7.22	2.00	0.00	8.90	0.17	0.00	7.38	2.00	0.00	8.88	0.16	0.00
7.55	2.00	0.00	8.85	0.17	0.00	7.71	2.00	0.00	8.82	0.16	0.00
7.87	2.00	0.00	8.80	0.16	0.00	8.04	2.00	0.00	8.77	0.17	0.00
8.20	2.00	0.00	8.75	0.16	0.00	8.37	2.00	0.00	8.72	0.17	0.00
8.53	2.00	0.00	8.70	0.16	0.00	8.69	2.00	0.00	8.68	0.16	0.00
8.86	2.00	0.00	8.65	0.17	0.00	9.02	1.93	0.00	8.63	0.16	0.00
9.19	1.88	0.00	8.60	0.17	0.00	9.35	1.83	0.00	8.58	0.16	0.00
9.51	1.74	0.00	8.55	0.16	0.00	9.68	1.65	0.00	8.52	0.17	0.00
9.84	1.57	0.00	8.50	0.16	0.00	10.01	1.53	0.00	8.47	0.17	0.00
10.17	1.54	0.00	8.45	0.16	0.00	10.34	1.55	0.00	8.42	0.17	0.00
10.50	1.60	0.00	8.40	0.16	0.00	10.66	1.65	0.00	8.38	0.16	0.00
10.83	1.74	0.00	8.35	0.17	0.00	10.99	1.75	0.00	8.33	0.16	0.00
11.16	1.72	0.00	8.30	0.17	0.00	11.32	1.49	0.00	8.27	0.16	0.00
11.48	1.32	0.00	8.25	0.16	0.00	11.65	1.20	0.00	8.22	0.17	0.00
11.81	1.21	0.00	8.20	0.16	0.00	11.98	1.22	0.00	8.17	0.17	0.00
12.14	1.23	0.00	8.15	0.16	0.00	12.30	1.22	0.00	8.13	0.16	0.00
12.47	1.20	0.00	8.10	0.17	0.00	12.63	1.19	0.00	8.08	0.16	0.00
12.80	1.22	0.00	8.05	0.17	0.00	12.96	1.28	0.00	8.02	0.16	0.00
13.12	1.34	0.00	8.00	0.16	0.00	13.29	1.33	0.00	7.97	0.17	0.00
13.45	1.26	0.00	7.95	0.16	0.00	13.62	1.16	0.00	7.92	0.17	0.00
13.78	1.13	0.00	7.90	0.16	0.00	13.94	1.13	0.00	7.88	0.16	0.00
14.11	1.16	0.00	7.85	0.17	0.00	14.27	1.18	0.00	7.83	0.16	0.00
14.44	1.19	0.00	7.80	0.17	0.00	14.60	1.20	0.00	7.77	0.16	0.00
14.76	1.18	0.00	7.75	0.16	0.00	14.93	1.16	0.00	7.72	0.17	0.00
15.09	1.16	0.00	7.70	0.16	0.00	15.26	1.12	0.00	7.67	0.17	0.00
15.42	1.09	0.00	7.65	0.16	0.00	15.58	1.06	0.00	7.63	0.16	0.00
15.75	1.03	0.00	7.60	0.17	0.00	15.91	1.00	0.00	7.58	0.16	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
16.08	1.03	0.00	7.55	0.17	0.00	16.24	1.16	0.00	7.53	0.16	0.00
16.40	1.38	0.00	7.50	0.16	0.00	16.57	1.60	0.00	7.47	0.17	0.00
16.73	1.79	0.00	7.45	0.16	0.00	16.90	1.88	0.00	7.42	0.17	0.00
17.06	2.00	0.00	7.40	0.16	0.00	17.23	2.00	0.00	7.37	0.17	0.00
17.39	2.00	0.00	7.35	0.16	0.00	17.55	2.00	0.00	7.33	0.16	0.00
17.72	2.00	0.00	7.30	0.17	0.00	17.88	2.00	0.00	7.28	0.16	0.00
18.05	0.79	0.21	7.25	0.17	0.08	18.21	0.82	0.18	7.22	0.16	0.06
18.37	2.00	0.00	7.20	0.16	0.00	18.54	2.00	0.00	7.17	0.17	0.00
18.70	2.00	0.00	7.15	0.16	0.00	18.87	2.00	0.00	7.12	0.17	0.00
19.03	2.00	0.00	7.10	0.16	0.00	19.19	2.00	0.00	7.08	0.16	0.00
19.36	2.00	0.00	7.05	0.17	0.00	19.52	2.00	0.00	7.03	0.16	0.00
19.69	2.00	0.00	7.00	0.17	0.00	19.85	2.00	0.00	6.97	0.16	0.00
20.01	2.00	0.00	6.95	0.16	0.00	20.18	2.00	0.00	6.92	0.17	0.00
20.34	2.00	0.00	6.90	0.16	0.00	20.51	2.00	0.00	6.87	0.17	0.00
20.67	2.00	0.00	6.85	0.16	0.00	20.83	2.00	0.00	6.83	0.16	0.00
21.00	2.00	0.00	6.80	0.17	0.00	21.16	2.00	0.00	6.78	0.16	0.00
21.33	2.00	0.00	6.75	0.17	0.00	21.49	2.00	0.00	6.72	0.16	0.00
21.65	2.00	0.00	6.70	0.16	0.00	21.82	2.00	0.00	6.67	0.17	0.00
21.98	2.00	0.00	6.65	0.16	0.00	22.15	2.00	0.00	6.62	0.17	0.00
22.31	2.00	0.00	6.60	0.16	0.00	22.47	2.00	0.00	6.58	0.16	0.00
22.64	2.00	0.00	6.55	0.17	0.00	22.80	2.00	0.00	6.53	0.16	0.00
22.97	2.00	0.00	6.50	0.17	0.00	23.13	2.00	0.00	6.47	0.16	0.00
23.30	2.00	0.00	6.45	0.17	0.00	23.46	2.00	0.00	6.42	0.16	0.00
23.62	2.00	0.00	6.40	0.16	0.00	23.79	2.00	0.00	6.37	0.17	0.00
23.95	2.00	0.00	6.35	0.16	0.00	24.12	2.00	0.00	6.32	0.17	0.00
24.28	2.00	0.00	6.30	0.16	0.00	24.44	2.00	0.00	6.28	0.16	0.00
24.61	2.00	0.00	6.25	0.17	0.00	24.77	2.00	0.00	6.23	0.16	0.00
24.94	2.00	0.00	6.20	0.17	0.00	25.10	2.00	0.00	6.17	0.16	0.00
25.26	2.00	0.00	6.15	0.16	0.00	25.43	2.00	0.00	6.12	0.17	0.00
25.59	0.65	0.35	6.10	0.16	0.10	25.76	0.66	0.34	6.07	0.17	0.11
25.92	0.68	0.32	6.05	0.16	0.09	26.08	0.70	0.30	6.03	0.16	0.09
26.25	0.71	0.29	6.00	0.17	0.09	26.41	0.69	0.31	5.98	0.16	0.09
26.58	0.68	0.32	5.95	0.17	0.10	26.74	0.66	0.34	5.92	0.16	0.10
26.90	0.66	0.34	5.90	0.16	0.10	27.07	0.65	0.35	5.87	0.17	0.11
27.23	2.00	0.00	5.85	0.16	0.00	27.40	2.00	0.00	5.82	0.17	0.00
27.56	2.00	0.00	5.80	0.16	0.00	27.72	2.00	0.00	5.78	0.16	0.00
27.89	2.00	0.00	5.75	0.17	0.00	28.05	2.00	0.00	5.73	0.16	0.00
28.22	2.00	0.00	5.70	0.17	0.00	28.38	2.00	0.00	5.67	0.16	0.00
28.54	2.00	0.00	5.65	0.16	0.00	28.71	2.00	0.00	5.62	0.17	0.00
28.87	2.00	0.00	5.60	0.16	0.00	29.04	2.00	0.00	5.57	0.17	0.00
29.20	2.00	0.00	5.55	0.16	0.00	29.36	0.61	0.39	5.53	0.16	0.10
29.53	0.61	0.39	5.50	0.17	0.11	29.69	2.00	0.00	5.48	0.16	0.00
29.86	2.00	0.00	5.45	0.17	0.00	30.02	2.00	0.00	5.42	0.16	0.00
30.19	2.00	0.00	5.40	0.17	0.00	30.35	2.00	0.00	5.37	0.16	0.00
30.51	0.51	0.49	5.35	0.16	0.13	30.68	0.49	0.51	5.32	0.17	0.14
30.84	2.00	0.00	5.30	0.16	0.00	31.01	2.00	0.00	5.27	0.17	0.00
31.17	0.49	0.51	5.25	0.16	0.13	31.33	0.52	0.48	5.23	0.16	0.12
31.50	2.00	0.00	5.20	0.17	0.00	31.66	2.00	0.00	5.18	0.16	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
31.83	2.00	0.00	5.15	0.17	0.00	31.99	2.00	0.00	5.12	0.16	0.00
32.15	2.00	0.00	5.10	0.16	0.00	32.32	1.46	0.00	5.07	0.17	0.00
32.48	1.57	0.00	5.05	0.16	0.00	32.65	1.50	0.00	5.02	0.17	0.00
32.81	1.34	0.00	5.00	0.16	0.00	32.97	1.14	0.00	4.98	0.16	0.00
33.14	0.94	0.06	4.95	0.17	0.02	33.30	0.75	0.25	4.93	0.16	0.06
33.47	0.60	0.40	4.90	0.17	0.10	33.63	0.50	0.50	4.87	0.16	0.12
33.79	0.42	0.58	4.85	0.16	0.14	33.96	0.39	0.61	4.82	0.17	0.15
34.12	0.37	0.63	4.80	0.16	0.15	34.29	0.38	0.62	4.77	0.17	0.15
34.45	0.39	0.61	4.75	0.16	0.14	34.61	0.40	0.60	4.73	0.16	0.14
34.78	0.42	0.58	4.70	0.17	0.14	34.94	0.44	0.56	4.68	0.16	0.13
35.11	0.46	0.54	4.65	0.17	0.13	35.27	0.42	0.58	4.62	0.16	0.13
35.43	0.39	0.61	4.60	0.16	0.14	35.60	0.37	0.63	4.57	0.17	0.15
35.76	2.00	0.00	4.55	0.16	0.00	35.93	2.00	0.00	4.52	0.17	0.00
36.09	2.00	0.00	4.50	0.16	0.00	36.26	2.00	0.00	4.47	0.17	0.00
36.42	2.00	0.00	4.45	0.16	0.00	36.58	2.00	0.00	4.43	0.16	0.00
36.75	2.00	0.00	4.40	0.17	0.00	36.91	2.00	0.00	4.37	0.16	0.00
37.08	0.50	0.50	4.35	0.17	0.11	37.24	0.49	0.51	4.32	0.16	0.11
37.40	0.48	0.52	4.30	0.16	0.11	37.57	0.46	0.54	4.27	0.17	0.12
37.73	0.46	0.54	4.25	0.16	0.11	37.90	0.43	0.57	4.22	0.17	0.12
38.06	0.40	0.60	4.20	0.16	0.12	38.22	0.38	0.62	4.18	0.16	0.13
38.39	0.37	0.63	4.15	0.17	0.13	38.55	0.36	0.64	4.12	0.16	0.13
38.72	2.00	0.00	4.10	0.17	0.00	38.88	2.00	0.00	4.07	0.16	0.00
39.04	2.00	0.00	4.05	0.16	0.00	39.21	2.00	0.00	4.02	0.17	0.00
39.37	2.00	0.00	4.00	0.16	0.00	39.54	2.00	0.00	3.97	0.17	0.00
39.70	2.00	0.00	3.95	0.16	0.00	39.86	2.00	0.00	3.93	0.16	0.00
40.03	2.00	0.00	3.90	0.17	0.00	40.19	2.00	0.00	3.88	0.16	0.00
40.36	2.00	0.00	3.85	0.17	0.00	40.52	2.00	0.00	3.82	0.16	0.00
40.68	2.00	0.00	3.80	0.16	0.00	40.85	2.00	0.00	3.77	0.17	0.00
41.01	2.00	0.00	3.75	0.16	0.00	41.18	2.00	0.00	3.72	0.17	0.00
41.34	2.00	0.00	3.70	0.16	0.00	41.50	2.00	0.00	3.68	0.16	0.00
41.67	2.00	0.00	3.65	0.17	0.00	41.83	2.00	0.00	3.63	0.16	0.00
42.00	2.00	0.00	3.60	0.17	0.00	42.16	2.00	0.00	3.57	0.16	0.00
42.32	2.00	0.00	3.55	0.16	0.00	42.49	2.00	0.00	3.52	0.17	0.00
42.65	2.00	0.00	3.50	0.16	0.00	42.82	2.00	0.00	3.47	0.17	0.00
42.98	0.37	0.63	3.45	0.16	0.11	43.15	0.40	0.60	3.42	0.17	0.11
43.31	2.00	0.00	3.40	0.16	0.00	43.47	2.00	0.00	3.38	0.16	0.00
43.64	2.00	0.00	3.35	0.17	0.00	43.80	2.00	0.00	3.32	0.16	0.00
43.97	2.00	0.00	3.30	0.17	0.00	44.13	2.00	0.00	3.27	0.16	0.00
44.29	2.00	0.00	3.25	0.16	0.00	44.46	2.00	0.00	3.22	0.17	0.00
44.62	2.00	0.00	3.20	0.16	0.00	44.79	2.00	0.00	3.17	0.17	0.00
44.95	2.00	0.00	3.15	0.16	0.00	45.11	2.00	0.00	3.13	0.16	0.00
45.28	2.00	0.00	3.10	0.17	0.00	45.44	2.00	0.00	3.07	0.16	0.00
45.61	2.00	0.00	3.05	0.17	0.00	45.77	2.00	0.00	3.02	0.16	0.00
45.93	2.00	0.00	3.00	0.16	0.00	46.10	2.00	0.00	2.97	0.17	0.00
46.26	2.00	0.00	2.95	0.16	0.00	46.43	0.96	0.04	2.92	0.17	0.01
46.59	0.98	0.02	2.90	0.16	0.00	46.75	0.94	0.06	2.88	0.16	0.01
46.92	0.92	0.08	2.85	0.17	0.01	47.08	0.87	0.13	2.83	0.16	0.02
47.25	0.84	0.16	2.80	0.17	0.02	47.41	0.81	0.19	2.77	0.16	0.03

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
47.57	0.79	0.21	2.75	0.16	0.03	47.74	0.79	0.21	2.72	0.17	0.03
47.90	0.80	0.20	2.70	0.16	0.03	48.07	0.82	0.18	2.67	0.17	0.02
48.23	0.83	0.17	2.65	0.16	0.02	48.39	0.81	0.19	2.63	0.16	0.02
48.56	0.79	0.21	2.60	0.17	0.03	48.72	0.76	0.24	2.58	0.16	0.03
48.89	0.74	0.26	2.55	0.17	0.03	49.05	0.71	0.29	2.52	0.16	0.04
49.22	0.70	0.30	2.50	0.17	0.04	49.38	0.72	0.28	2.47	0.16	0.03
49.54	0.75	0.25	2.45	0.16	0.03	49.71	0.78	0.22	2.42	0.17	0.03
49.87	0.77	0.23	2.40	0.16	0.03	50.04	2.00	0.00	2.37	0.17	0.00
50.20	2.00	0.00	2.35	0.16	0.00	50.36	2.00	0.00	2.33	0.16	0.00
50.53	2.00	0.00	2.30	0.17	0.00	50.69	2.00	0.00	2.27	0.16	0.00
50.86	2.00	0.00	2.25	0.17	0.00	51.02	2.00	0.00	2.22	0.16	0.00
51.18	2.00	0.00	2.20	0.16	0.00	51.35	2.00	0.00	2.17	0.17	0.00
51.51	2.00	0.00	2.15	0.16	0.00	51.68	2.00	0.00	2.12	0.17	0.00
51.84	2.00	0.00	2.10	0.16	0.00	52.00	2.00	0.00	2.08	0.16	0.00
52.17	2.00	0.00	2.05	0.17	0.00	52.33	2.00	0.00	2.02	0.16	0.00
52.50	2.00	0.00	2.00	0.17	0.00	52.66	2.00	0.00	1.97	0.16	0.00
52.82	2.00	0.00	1.95	0.16	0.00	52.99	2.00	0.00	1.92	0.17	0.00
53.15	2.00	0.00	1.90	0.16	0.00	53.32	2.00	0.00	1.87	0.17	0.00
53.48	2.00	0.00	1.85	0.16	0.00	53.64	2.00	0.00	1.83	0.16	0.00
53.81	2.00	0.00	1.80	0.17	0.00	53.97	2.00	0.00	1.77	0.16	0.00
54.14	2.00	0.00	1.75	0.17	0.00	54.30	2.00	0.00	1.72	0.16	0.00
54.46	0.56	0.44	1.70	0.16	0.04	54.63	0.61	0.39	1.67	0.17	0.03
54.79	0.65	0.35	1.65	0.16	0.03	54.96	2.00	0.00	1.62	0.17	0.00
55.12	2.00	0.00	1.60	0.16	0.00	55.28	2.00	0.00	1.58	0.16	0.00
55.45	2.00	0.00	1.55	0.17	0.00	55.61	2.00	0.00	1.53	0.16	0.00
55.78	2.00	0.00	1.50	0.17	0.00	55.94	2.00	0.00	1.47	0.16	0.00
56.11	2.00	0.00	1.45	0.17	0.00	56.27	2.00	0.00	1.42	0.16	0.00
56.43	2.00	0.00	1.40	0.16	0.00	56.60	2.00	0.00	1.37	0.17	0.00
56.76	2.00	0.00	1.35	0.16	0.00	56.93	2.00	0.00	1.32	0.17	0.00
57.09	2.00	0.00	1.30	0.16	0.00	57.25	2.00	0.00	1.28	0.16	0.00
57.42	2.00	0.00	1.25	0.17	0.00	57.58	2.00	0.00	1.22	0.16	0.00
57.75	2.00	0.00	1.20	0.17	0.00	57.91	2.00	0.00	1.17	0.16	0.00
58.07	2.00	0.00	1.15	0.16	0.00	58.24	2.00	0.00	1.12	0.17	0.00
58.40	2.00	0.00	1.10	0.16	0.00	58.57	2.00	0.00	1.07	0.17	0.00
58.73	2.00	0.00	1.05	0.16	0.00	58.89	2.00	0.00	1.03	0.16	0.00
59.06	0.54	0.46	1.00	0.17	0.02	59.22	0.64	0.36	0.97	0.16	0.02
59.39	0.74	0.26	0.95	0.17	0.01	59.55	0.77	0.23	0.92	0.16	0.01
59.71	0.78	0.22	0.90	0.16	0.01	59.88	2.00	0.00	0.87	0.17	0.00
60.04	2.00	0.00	0.85	0.16	0.00	60.21	2.00	0.00	0.82	0.17	0.00
60.37	2.00	0.00	0.80	0.16	0.00	60.53	2.00	0.00	0.78	0.16	0.00
60.70	2.00	0.00	0.75	0.17	0.00	60.86	2.00	0.00	0.72	0.16	0.00
61.03	2.00	0.00	0.70	0.17	0.00	61.19	2.00	0.00	0.67	0.16	0.00
61.35	2.00	0.00	0.65	0.16	0.00	61.52	2.00	0.00	0.62	0.17	0.00
61.68	2.00	0.00	0.60	0.16	0.00	61.85	2.00	0.00	0.57	0.17	0.00
62.01	2.00	0.00	0.55	0.16	0.00	62.17	2.00	0.00	0.53	0.16	0.00
62.34	2.00	0.00	0.50	0.17	0.00	62.50	2.00	0.00	0.48	0.16	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI

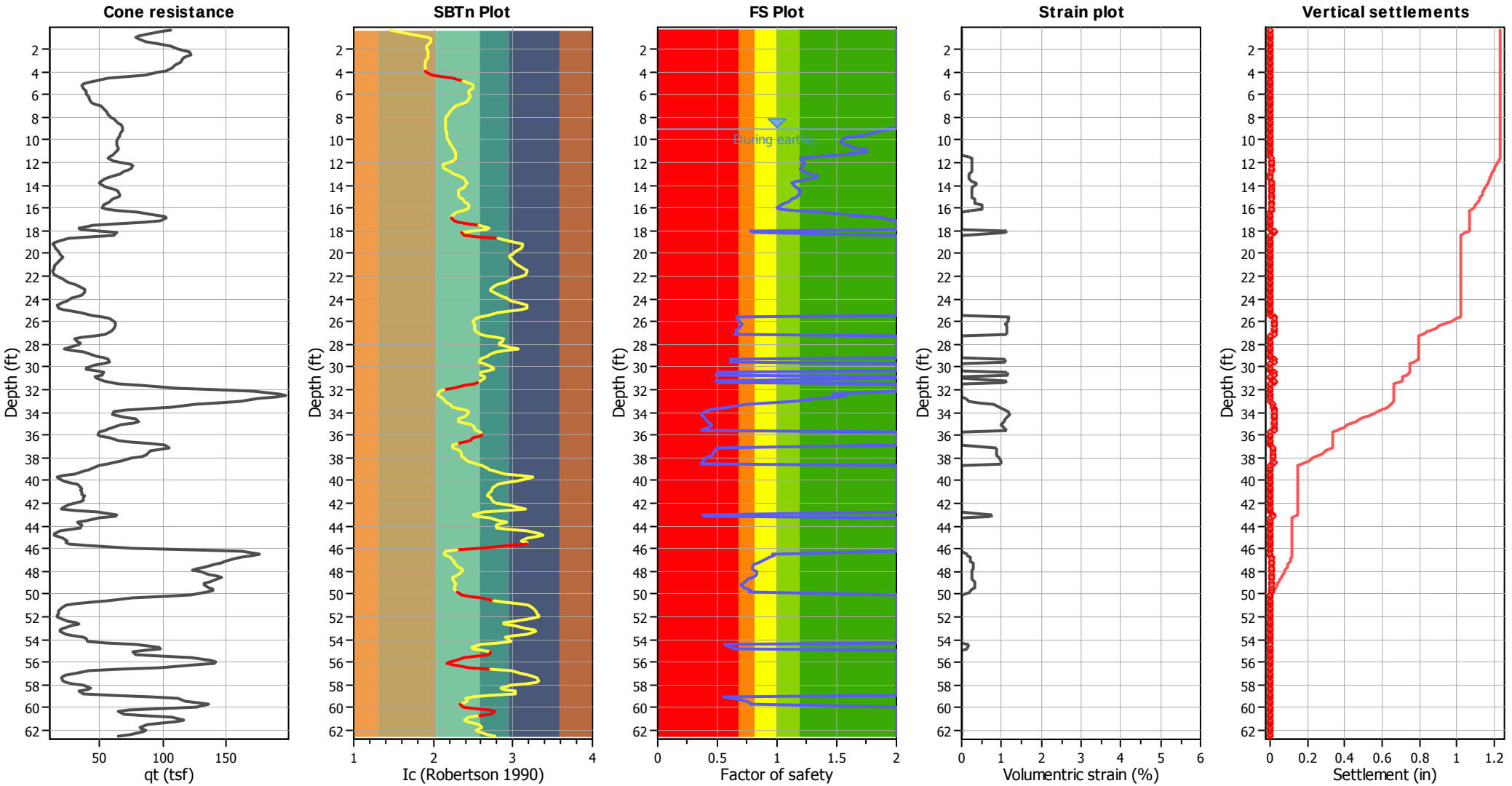
Overall liquefaction potential: 5.96

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (ft)
LPI: Liquefaction potential index value for test point

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 due to soil liquefaction ::

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
9.02	154.70	1.93	0.00	0.85	0.00	9.19	153.52	1.88	0.00	0.84	0.00
9.35	152.39	1.83	0.00	0.84	0.00	9.51	149.64	1.74	0.00	0.84	0.00
9.68	146.89	1.65	0.00	0.84	0.00	9.84	144.23	1.57	0.00	0.83	0.00
10.01	143.22	1.53	0.00	0.83	0.00	10.17	143.97	1.54	0.00	0.83	0.00
10.34	144.73	1.55	0.00	0.82	0.00	10.50	147.17	1.60	0.00	0.82	0.00
10.66	149.55	1.65	0.00	0.82	0.00	10.83	153.43	1.74	0.00	0.82	0.00
10.99	154.21	1.75	0.00	0.81	0.00	11.16	153.48	1.72	0.00	0.81	0.00
11.32	144.91	1.49	0.00	0.81	0.00	11.48	137.85	1.32	0.19	0.81	0.00
11.65	132.15	1.20	0.27	0.80	0.01	11.81	133.01	1.21	0.27	0.80	0.01
11.98	134.30	1.22	0.26	0.80	0.01	12.14	134.82	1.23	0.26	0.79	0.01
12.30	134.74	1.22	0.26	0.79	0.01	12.47	133.78	1.20	0.26	0.79	0.01
12.63	133.86	1.19	0.26	0.79	0.00	12.80	135.51	1.22	0.26	0.78	0.01
12.96	139.12	1.28	0.18	0.78	0.00	13.12	141.84	1.34	0.18	0.78	0.00
13.29	141.84	1.33	0.17	0.77	0.00	13.45	138.91	1.26	0.18	0.77	0.00
13.62	134.21	1.16	0.25	0.77	0.01	13.78	132.46	1.13	0.35	0.77	0.01
13.94	133.21	1.13	0.35	0.76	0.01	14.11	134.74	1.16	0.25	0.76	0.01
14.27	136.38	1.18	0.25	0.76	0.00	14.44	136.76	1.19	0.25	0.76	0.01
14.60	137.46	1.20	0.24	0.75	0.00	14.76	136.83	1.18	0.24	0.75	0.00
14.93	136.30	1.16	0.24	0.75	0.00	15.09	136.03	1.16	0.24	0.74	0.00
15.26	134.50	1.12	0.34	0.74	0.01	15.42	133.14	1.09	0.34	0.74	0.01
15.58	131.72	1.06	0.34	0.74	0.01	15.75	130.20	1.03	0.51	0.73	0.01
15.91	128.37	1.00	0.51	0.73	0.01	16.08	130.22	1.03	0.50	0.73	0.01
16.24	137.71	1.16	0.24	0.72	0.00	16.40	148.48	1.38	0.00	0.72	0.00
16.57	158.39	1.60	0.00	0.72	0.00	16.73	165.71	1.79	0.00	0.72	0.00
16.90	169.14	1.88	0.00	0.71	0.00	17.06	168.10	2.00	0.00	0.71	0.00
17.23	158.97	2.00	0.00	0.71	0.00	17.39	144.54	2.00	0.00	0.71	0.00
17.55	129.27	2.00	0.00	0.70	0.00	17.72	119.43	2.00	0.00	0.70	0.00
17.88	115.37	2.00	0.00	0.70	0.00	18.05	116.28	0.79	1.13	0.69	0.02
18.21	119.12	0.82	1.09	0.69	0.02	18.37	120.36	2.00	0.00	0.69	0.00
18.54	113.93	2.00	0.00	0.69	0.00	18.70	103.36	2.00	0.00	0.68	0.00
18.87	90.10	2.00	0.00	0.68	0.00	19.03	83.94	2.00	0.00	0.68	0.00
19.19	85.37	2.00	0.00	0.67	0.00	19.36	88.93	2.00	0.00	0.67	0.00
19.52	92.43	2.00	0.00	0.67	0.00	19.69	93.99	2.00	0.00	0.67	0.00
19.85	93.74	2.00	0.00	0.66	0.00	20.01	95.11	2.00	0.00	0.66	0.00
20.18	96.34	2.00	0.00	0.66	0.00	20.34	97.66	2.00	0.00	0.66	0.00
20.51	95.78	2.00	0.00	0.65	0.00	20.67	92.15	2.00	0.00	0.65	0.00
20.83	86.57	2.00	0.00	0.65	0.00	21.00	82.58	2.00	0.00	0.64	0.00
21.16	80.28	2.00	0.00	0.64	0.00	21.33	79.76	2.00	0.00	0.64	0.00
21.49	81.01	2.00	0.00	0.64	0.00	21.65	82.58	2.00	0.00	0.63	0.00
21.82	86.01	2.00	0.00	0.63	0.00	21.98	89.54	2.00	0.00	0.63	0.00
22.15	94.34	2.00	0.00	0.62	0.00	22.31	97.11	2.00	0.00	0.62	0.00
22.47	99.62	2.00	0.00	0.62	0.00	22.64	101.86	2.00	0.00	0.62	0.00
22.80	105.14	2.00	0.00	0.61	0.00	22.97	106.83	2.00	0.00	0.61	0.00
23.13	108.73	2.00	0.00	0.61	0.00	23.30	112.25	2.00	0.00	0.61	0.00
23.46	117.25	2.00	0.00	0.60	0.00	23.62	121.10	2.00	0.00	0.60	0.00
23.79	116.36	2.00	0.00	0.60	0.00	23.95	110.10	2.00	0.00	0.59	0.00
24.12	102.13	2.00	0.00	0.59	0.00	24.28	97.79	2.00	0.00	0.59	0.00
24.44	92.97	2.00	0.00	0.59	0.00	24.61	90.85	2.00	0.00	0.58	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
24.77	93.45	2.00	0.00	0.58	0.00	24.94	100.53	2.00	0.00	0.58	0.00
25.10	106.59	2.00	0.00	0.57	0.00	25.26	110.65	2.00	0.00	0.57	0.00
25.43	111.18	2.00	0.00	0.57	0.00	25.59	110.57	0.65	1.21	0.57	0.02
25.76	111.56	0.66	1.19	0.56	0.02	25.92	113.03	0.68	1.16	0.56	0.02
26.08	114.82	0.70	1.13	0.56	0.02	26.25	115.61	0.71	1.11	0.56	0.02
26.41	114.35	0.69	1.12	0.55	0.02	26.58	113.12	0.68	1.13	0.55	0.02
26.74	111.89	0.66	1.15	0.55	0.02	26.90	111.84	0.66	1.14	0.54	0.02
27.07	111.21	0.65	1.14	0.54	0.02	27.23	105.55	2.00	0.00	0.54	0.00
27.40	100.78	2.00	0.00	0.54	0.00	27.56	97.34	2.00	0.00	0.53	0.00
27.72	100.63	2.00	0.00	0.53	0.00	27.89	100.25	2.00	0.00	0.53	0.00
28.05	96.46	2.00	0.00	0.52	0.00	28.22	91.40	2.00	0.00	0.52	0.00
28.38	89.88	2.00	0.00	0.52	0.00	28.54	92.17	2.00	0.00	0.52	0.00
28.71	96.49	2.00	0.00	0.51	0.00	28.87	101.28	2.00	0.00	0.51	0.00
29.04	106.18	2.00	0.00	0.51	0.00	29.20	108.48	2.00	0.00	0.51	0.00
29.36	108.69	0.61	1.10	0.50	0.02	29.53	108.30	0.61	1.09	0.50	0.02
29.69	105.52	2.00	0.00	0.50	0.00	29.86	99.70	2.00	0.00	0.49	0.00
30.02	94.50	2.00	0.00	0.49	0.00	30.19	94.26	2.00	0.00	0.49	0.00
30.35	98.93	2.00	0.00	0.49	0.00	30.51	97.91	0.51	1.15	0.48	0.02
30.68	95.51	0.49	1.16	0.48	0.02	30.84	91.48	2.00	0.00	0.48	0.00
31.01	93.45	2.00	0.00	0.47	0.00	31.17	96.07	0.49	1.14	0.47	0.02
31.33	99.59	0.52	1.10	0.47	0.02	31.50	102.88	2.00	0.00	0.47	0.00
31.66	107.53	2.00	0.00	0.46	0.00	31.83	117.59	2.00	0.00	0.46	0.00
31.99	133.05	2.00	0.00	0.46	0.00	32.15	150.61	2.00	0.00	0.46	0.00
32.32	163.63	1.46	0.00	0.45	0.00	32.48	168.56	1.57	0.00	0.45	0.00
32.65	165.52	1.50	0.00	0.45	0.00	32.81	158.18	1.34	0.09	0.44	0.00
32.97	148.19	1.14	0.19	0.44	0.00	33.14	135.87	0.94	0.44	0.44	0.01
33.30	122.32	0.75	0.80	0.44	0.02	33.47	109.15	0.60	0.94	0.43	0.02
33.63	97.94	0.50	1.02	0.43	0.02	33.79	87.68	0.42	1.11	0.43	0.02
33.96	81.20	0.39	1.18	0.42	0.02	34.12	77.60	0.37	1.21	0.42	0.02
34.29	79.71	0.38	1.18	0.42	0.02	34.45	81.83	0.39	1.15	0.42	0.02
34.61	84.15	0.40	1.11	0.41	0.02	34.78	87.09	0.42	1.07	0.41	0.02
34.94	90.69	0.44	1.03	0.41	0.02	35.11	92.80	0.46	1.01	0.40	0.02
35.27	87.92	0.42	1.04	0.40	0.02	35.43	82.55	0.39	1.09	0.40	0.02
35.60	78.04	0.37	1.14	0.40	0.02	35.76	79.46	2.00	0.00	0.39	0.00
35.93	79.37	2.00	0.00	0.39	0.00	36.09	79.11	2.00	0.00	0.39	0.00
36.26	79.63	2.00	0.00	0.39	0.00	36.42	82.50	2.00	0.00	0.38	0.00
36.58	86.35	2.00	0.00	0.38	0.00	36.75	90.64	2.00	0.00	0.38	0.00
36.91	95.22	2.00	0.00	0.37	0.00	37.08	98.60	0.50	0.88	0.37	0.02
37.24	97.61	0.49	0.88	0.37	0.02	37.40	96.15	0.48	0.88	0.37	0.02
37.57	94.24	0.46	0.89	0.36	0.02	37.73	93.29	0.46	0.89	0.36	0.02
37.90	89.49	0.43	0.92	0.36	0.02	38.06	84.52	0.40	0.95	0.35	0.02
38.22	80.42	0.38	0.98	0.35	0.02	38.39	79.45	0.37	0.99	0.35	0.02
38.55	77.46	0.36	1.00	0.35	0.02	38.72	76.68	2.00	0.00	0.34	0.00
38.88	74.68	2.00	0.00	0.34	0.00	39.04	73.57	2.00	0.00	0.34	0.00
39.21	71.25	2.00	0.00	0.34	0.00	39.37	67.27	2.00	0.00	0.33	0.00
39.54	64.01	2.00	0.00	0.33	0.00	39.70	61.41	2.00	0.00	0.33	0.00
39.86	60.50	2.00	0.00	0.32	0.00	40.03	59.88	2.00	0.00	0.32	0.00
40.19	60.20	2.00	0.00	0.32	0.00	40.36	63.18	2.00	0.00	0.32	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
40.52	63.12	2.00	0.00	0.31	0.00	40.68	64.43	2.00	0.00	0.31	0.00
40.85	63.02	2.00	0.00	0.31	0.00	41.01	62.97	2.00	0.00	0.30	0.00
41.18	60.06	2.00	0.00	0.30	0.00	41.34	61.42	2.00	0.00	0.30	0.00
41.50	64.17	2.00	0.00	0.30	0.00	41.67	65.49	2.00	0.00	0.29	0.00
41.83	62.79	2.00	0.00	0.29	0.00	42.00	58.48	2.00	0.00	0.29	0.00
42.16	56.61	2.00	0.00	0.29	0.00	42.32	57.67	2.00	0.00	0.28	0.00
42.49	61.43	2.00	0.00	0.28	0.00	42.65	67.48	2.00	0.00	0.28	0.00
42.82	73.30	2.00	0.00	0.27	0.00	42.98	79.08	0.37	0.77	0.27	0.01
43.15	83.16	0.40	0.73	0.27	0.01	43.31	83.82	2.00	0.00	0.27	0.00
43.47	78.84	2.00	0.00	0.26	0.00	43.64	71.90	2.00	0.00	0.26	0.00
43.80	68.62	2.00	0.00	0.26	0.00	43.97	67.41	2.00	0.00	0.25	0.00
44.13	66.11	2.00	0.00	0.25	0.00	44.29	61.62	2.00	0.00	0.25	0.00
44.46	56.59	2.00	0.00	0.25	0.00	44.62	53.26	2.00	0.00	0.24	0.00
44.79	56.90	2.00	0.00	0.24	0.00	44.95	63.33	2.00	0.00	0.24	0.00
45.11	68.18	2.00	0.00	0.24	0.00	45.28	69.80	2.00	0.00	0.23	0.00
45.44	74.87	2.00	0.00	0.23	0.00	45.61	81.87	2.00	0.00	0.23	0.00
45.77	93.36	2.00	0.00	0.22	0.00	45.93	102.90	2.00	0.00	0.22	0.00
46.10	115.08	2.00	0.00	0.22	0.00	46.26	129.35	2.00	0.00	0.22	0.00
46.43	137.09	0.96	0.14	0.21	0.00	46.59	138.27	0.98	0.14	0.21	0.00
46.75	135.91	0.94	0.21	0.21	0.00	46.92	134.37	0.92	0.21	0.20	0.00
47.08	130.95	0.87	0.21	0.20	0.00	47.25	128.81	0.84	0.28	0.20	0.01
47.41	126.29	0.81	0.28	0.20	0.01	47.57	124.85	0.79	0.28	0.19	0.01
47.74	124.90	0.79	0.28	0.19	0.01	47.90	125.91	0.80	0.27	0.19	0.01
48.07	127.33	0.82	0.26	0.19	0.01	48.23	127.60	0.83	0.26	0.18	0.00
48.39	126.44	0.81	0.26	0.18	0.00	48.56	124.52	0.79	0.26	0.18	0.01
48.72	122.31	0.76	0.26	0.17	0.01	48.89	120.27	0.74	0.32	0.17	0.01
49.05	118.43	0.71	0.33	0.17	0.01	49.22	117.15	0.70	0.33	0.17	0.01
49.38	118.65	0.72	0.31	0.16	0.01	49.54	121.31	0.75	0.25	0.16	0.00
49.71	123.50	0.78	0.24	0.16	0.00	49.87	122.29	0.77	0.23	0.15	0.00
50.04	118.28	2.00	0.00	0.15	0.00	50.20	111.10	2.00	0.00	0.15	0.00
50.36	102.96	2.00	0.00	0.15	0.00	50.53	94.88	2.00	0.00	0.14	0.00
50.69	86.81	2.00	0.00	0.14	0.00	50.86	79.21	2.00	0.00	0.14	0.00
51.02	70.31	2.00	0.00	0.14	0.00	51.18	62.94	2.00	0.00	0.13	0.00
51.35	59.19	2.00	0.00	0.13	0.00	51.51	57.68	2.00	0.00	0.13	0.00
51.68	57.30	2.00	0.00	0.12	0.00	51.84	56.96	2.00	0.00	0.12	0.00
52.00	56.97	2.00	0.00	0.12	0.00	52.17	56.66	2.00	0.00	0.12	0.00
52.33	57.97	2.00	0.00	0.11	0.00	52.50	59.70	2.00	0.00	0.11	0.00
52.66	62.21	2.00	0.00	0.11	0.00	52.82	61.73	2.00	0.00	0.10	0.00
52.99	58.55	2.00	0.00	0.10	0.00	53.15	57.55	2.00	0.00	0.10	0.00
53.32	60.97	2.00	0.00	0.10	0.00	53.48	64.34	2.00	0.00	0.09	0.00
53.64	66.20	2.00	0.00	0.09	0.00	53.81	70.78	2.00	0.00	0.09	0.00
53.97	79.27	2.00	0.00	0.09	0.00	54.14	87.75	2.00	0.00	0.08	0.00
54.30	95.69	2.00	0.00	0.08	0.00	54.46	101.30	0.56	0.18	0.08	0.00
54.63	106.49	0.61	0.16	0.07	0.00	54.79	110.52	0.65	0.15	0.07	0.00
54.96	114.10	2.00	0.00	0.07	0.00	55.12	116.86	2.00	0.00	0.07	0.00
55.28	118.01	2.00	0.00	0.06	0.00	55.45	118.72	2.00	0.00	0.06	0.00
55.61	117.98	2.00	0.00	0.06	0.00	55.78	114.37	2.00	0.00	0.05	0.00
55.94	108.05	2.00	0.00	0.05	0.00	56.11	102.84	2.00	0.00	0.05	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
56.27	100.76	2.00	0.00	0.05	0.00	56.43	99.33	2.00	0.00	0.04	0.00
56.60	96.22	2.00	0.00	0.04	0.00	56.76	85.79	2.00	0.00	0.04	0.00
56.93	74.10	2.00	0.00	0.04	0.00	57.09	65.31	2.00	0.00	0.03	0.00
57.25	61.42	2.00	0.00	0.03	0.00	57.42	63.00	2.00	0.00	0.03	0.00
57.58	67.74	2.00	0.00	0.02	0.00	57.75	73.65	2.00	0.00	0.02	0.00
57.91	76.06	2.00	0.00	0.02	0.00	58.07	76.77	2.00	0.00	0.02	0.00
58.24	72.72	2.00	0.00	0.01	0.00	58.40	74.34	2.00	0.00	0.01	0.00
58.57	73.84	2.00	0.00	0.01	0.00	58.73	80.95	2.00	0.00	0.00	0.00
58.89	87.65	2.00	0.00	0.00	0.00	59.06	97.67	0.54	0.00	0.00	0.00
59.22	107.28	0.64	0.00	0.00	0.00	59.39	116.04	0.74	0.00	0.00	0.00
59.55	118.60	0.77	0.00	0.00	0.00	59.71	119.03	0.78	0.00	0.00	0.00
59.88	114.34	2.00	0.00	0.00	0.00	60.04	108.75	2.00	0.00	0.00	0.00
60.21	103.86	2.00	0.00	0.00	0.00	60.37	99.59	2.00	0.00	0.00	0.00
60.53	100.31	2.00	0.00	0.00	0.00	60.70	100.58	2.00	0.00	0.00	0.00
60.86	105.14	2.00	0.00	0.00	0.00	61.03	107.84	2.00	0.00	0.00	0.00
61.19	106.34	2.00	0.00	0.00	0.00	61.35	104.90	2.00	0.00	0.00	0.00
61.52	101.63	2.00	0.00	0.00	0.00	61.68	100.99	2.00	0.00	0.00	0.00
61.85	96.67	2.00	0.00	0.00	0.00	62.01	96.54	2.00	0.00	0.00	0.00
62.17	97.96	2.00	0.00	0.00	0.00	62.34	99.48	2.00	0.00	0.00	0.00
62.50	98.60	2.00	0.00	0.00	0.00						

Total estimated settlement: 1.23

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

:: Strength loss calculation (Robertson (2009) ::

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.33	106.13	170.49	1.00	170.49	1.45	N/A	N/A
0.49	98.20	157.73	1.00	157.73	1.56	N/A	N/A
0.66	86.80	139.40	1.06	147.14	1.73	N/A	N/A
0.82	81.17	130.33	1.14	148.46	1.84	N/A	N/A
0.98	78.03	125.28	1.23	153.78	1.94	N/A	N/A
1.15	80.77	129.66	1.26	163.63	1.97	N/A	N/A
1.31	86.03	138.10	1.26	174.22	1.97	N/A	N/A
1.48	93.07	149.38	1.24	185.03	1.95	N/A	N/A
1.64	100.13	160.72	1.22	195.86	1.93	N/A	N/A
1.80	106.60	171.10	1.20	206.10	1.92	N/A	N/A
1.97	111.33	178.68	1.21	216.57	1.92	N/A	N/A
2.13	116.20	186.48	1.22	227.01	1.93	N/A	N/A
2.30	120.40	193.21	1.22	235.72	1.93	N/A	N/A
2.46	121.83	195.50	1.22	238.01	1.93	N/A	N/A
2.62	119.07	191.04	1.22	233.50	1.93	N/A	N/A
2.79	116.50	186.90	1.22	227.25	1.93	N/A	N/A
2.95	114.93	184.37	1.20	221.90	1.92	N/A	N/A
3.12	114.00	182.85	1.19	217.15	1.90	N/A	N/A
3.28	112.00	179.62	1.19	213.24	1.90	N/A	N/A
3.45	109.37	175.37	1.19	208.68	1.90	N/A	N/A
3.61	107.50	172.36	1.19	204.87	1.90	N/A	N/A
3.77	105.07	168.43	1.19	200.47	1.90	N/A	N/A
3.94	102.14	163.70	1.19	194.53	1.90	N/A	N/A
4.10	96.17	154.10	1.21	186.66	1.92	N/A	N/A
4.27	85.40	136.79	1.29	175.91	1.99	N/A	N/A
4.43	70.77	113.26	1.48	167.24	2.11	N/A	N/A
4.59	56.64	90.53	1.80	162.60	2.25	N/A	N/A
4.76	46.37	74.02	2.18	161.25	2.37	N/A	N/A
4.92	41.10	65.54	2.42	158.82	2.43	N/A	N/A
5.09	37.63	59.96	2.64	158.23	2.47	N/A	N/A
5.25	36.20	57.64	2.76	158.97	2.50	N/A	N/A
5.41	36.77	58.53	2.75	160.80	2.50	N/A	N/A
5.58	38.63	61.51	2.60	159.88	2.47	N/A	N/A
5.74	39.63	63.10	2.53	159.43	2.45	N/A	N/A
5.91	39.96	63.62	2.54	161.36	2.45	N/A	N/A
6.07	40.49	64.46	2.59	167.25	2.46	N/A	N/A
6.23	41.30	65.73	2.60	170.91	2.47	N/A	N/A
6.40	42.13	67.05	2.54	170.54	2.45	N/A	N/A
6.56	42.53	67.68	2.46	166.40	2.43	N/A	N/A
6.73	43.96	69.97	2.29	159.92	2.39	N/A	N/A
6.89	46.80	74.50	2.09	155.35	2.34	N/A	N/A
7.05	50.53	80.48	1.90	153.17	2.29	N/A	N/A
7.22	53.56	85.34	1.78	151.55	2.24	N/A	N/A
7.38	55.00	87.63	1.71	150.00	2.22	N/A	N/A
7.55	55.80	88.90	1.67	148.42	2.20	N/A	N/A
7.71	56.70	90.33	1.63	146.92	2.18	N/A	N/A
7.87	57.90	92.24	1.60	147.32	2.17	N/A	N/A
8.04	59.53	94.56	1.56	147.66	2.15	N/A	N/A

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.20	61.46	96.34	1.56	150.53	2.15	N/A	N/A
8.37	63.53	98.17	1.56	153.24	2.15	N/A	N/A
8.53	65.30	99.63	1.56	155.87	2.16	N/A	N/A
8.69	66.83	100.59	1.56	156.71	2.15	N/A	N/A
8.86	67.90	100.70	1.55	155.74	2.15	N/A	N/A
9.02	68.30	99.99	1.55	154.70	2.15	0.83	0.83
9.19	67.93	98.31	1.56	153.52	2.15	0.82	0.82
9.35	67.23	96.32	1.58	152.39	2.16	0.82	0.82
9.51	66.30	93.94	1.59	149.64	2.17	0.82	0.82
9.68	65.43	91.63	1.60	146.89	2.17	0.82	0.82
9.84	64.50	89.36	1.61	144.23	2.18	0.81	0.81
10.01	63.70	87.37	1.64	143.22	2.19	0.81	0.81
10.17	63.23	85.99	1.67	143.97	2.20	0.81	0.81
10.34	63.23	85.13	1.70	144.73	2.21	0.80	0.80
10.50	63.76	85.08	1.73	147.17	2.22	0.80	0.80
10.66	64.26	84.98	1.76	149.55	2.24	0.80	0.80
10.83	64.43	84.50	1.82	153.43	2.26	0.80	0.80
10.99	63.96	83.15	1.85	154.21	2.27	0.80	0.80
11.16	62.46	80.47	1.91	153.48	2.29	0.80	0.80
11.32	59.90	76.27	1.90	144.91	2.28	0.79	0.79
11.48	57.33	72.23	1.91	137.85	2.29	0.78	0.78
11.65	56.70	70.52	1.87	132.15	2.28	0.78	0.78
11.81	61.03	74.84	1.78	133.01	2.24	0.79	0.79
11.98	67.59	81.55	1.65	134.30	2.19	0.80	0.80
12.14	74.06	87.99	1.53	134.82	2.14	0.81	0.81
12.30	76.39	89.78	1.50	134.74	2.12	0.81	0.81
12.47	75.53	88.01	1.52	133.78	2.13	0.81	0.81
12.63	72.73	84.28	1.59	133.86	2.17	0.80	0.80
12.80	69.19	79.80	1.70	135.51	2.21	0.80	0.80
12.96	65.43	75.17	1.85	139.12	2.27	0.79	0.79
13.12	61.33	70.13	2.02	141.84	2.32	0.78	0.78
13.29	57.69	65.52	2.16	141.84	2.36	0.77	0.77
13.45	54.29	61.18	2.27	138.91	2.39	0.76	0.76
13.62	51.56	57.55	2.33	134.21	2.40	0.75	0.75
13.78	50.09	55.42	2.39	132.46	2.42	0.75	0.75
13.94	51.29	56.22	2.37	133.21	2.41	0.75	0.75
14.11	55.46	60.13	2.24	134.74	2.38	0.76	0.76
14.27	59.83	64.22	2.12	136.38	2.35	0.77	0.77
14.44	63.39	67.35	2.03	136.76	2.32	0.77	0.77
14.60	65.02	68.49	2.01	137.46	2.32	0.78	0.78
14.76	65.89	68.80	1.99	136.83	2.31	0.78	0.78
14.93	65.43	67.73	2.01	136.30	2.32	0.77	0.77
15.09	63.23	64.95	2.09	136.03	2.34	0.77	0.77
15.26	60.33	61.46	2.19	134.50	2.37	0.76	0.76
15.42	57.32	57.93	2.30	133.14	2.40	0.75	0.75
15.58	55.02	55.15	2.39	131.72	2.42	0.75	0.75
15.75	53.16	52.81	2.47	130.20	2.44	0.74	0.74
15.91	52.66	51.88	2.47	128.37	2.44	0.74	0.74

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
16.08	55.23	53.96	2.41	130.22	2.42	0.74	0.74
16.24	64.66	62.76	2.19	137.71	2.37	0.76	0.76
16.40	79.43	76.62	1.94	148.48	2.30	0.79	0.79
16.57	93.93	89.98	1.76	158.39	2.24	0.81	0.81
16.73	101.53	96.61	1.72	165.71	2.22	0.82	0.82
16.90	103.16	97.43	1.74	169.14	2.23	0.82	0.82
17.06	98.46	92.28	1.82	168.10	2.26	0.82	0.82
17.23	84.83	78.74	2.02	158.97	2.32	0.79	0.79
17.39	64.73	59.37	2.43	144.54	2.43	0.76	0.76
17.55	45.29	40.88	3.16	129.27	2.57	0.71	0.71
17.72	33.86	30.00	3.98	119.43	2.70	2.14	2.14
17.88	34.84	30.67	3.76	115.37	2.67	2.18	2.18
18.05	49.45	43.73	2.66	116.28	2.48	0.72	0.72
18.21	63.75	56.43	2.11	119.12	2.35	0.75	0.75
18.37	61.23	53.74	2.24	120.36	2.38	0.74	0.74
18.54	43.52	37.44	3.04	113.93	2.55	0.70	0.70
18.70	25.72	21.37	4.84	103.36	2.81	1.52	1.52
18.87	17.68	14.17	6.36	90.10	2.96	1.01	1.01
19.03	14.61	11.44	7.34	83.94	3.05	0.82	0.82
19.19	13.54	10.44	8.18	85.37	3.12	0.75	0.75
19.36	14.21	10.91	8.15	88.93	3.12	0.78	0.78
19.52	15.31	11.74	7.87	92.43	3.10	0.84	0.84
19.69	16.35	12.49	7.53	93.99	3.07	0.89	0.89
19.85	17.24	13.12	7.14	93.74	3.04	0.94	0.94
20.01	19.01	14.45	6.58	95.11	2.99	1.03	1.03
20.18	20.47	15.51	6.21	96.34	2.95	1.11	1.11
20.34	20.96	15.78	6.19	97.66	2.95	1.13	1.13
20.51	19.69	14.63	6.55	95.78	2.98	1.05	1.05
20.67	18.19	13.34	6.91	92.15	3.01	0.95	0.95
20.83	16.89	12.21	7.09	86.57	3.03	0.87	0.87
21.00	16.02	11.44	7.22	82.58	3.04	0.82	0.82
21.16	14.69	10.33	7.77	80.28	3.09	0.74	0.74
21.33	13.77	9.54	8.36	79.76	3.13	0.68	0.68
21.49	13.16	9.00	9.00	81.01	3.18	0.64	0.64
21.65	13.44	9.15	9.03	82.58	3.18	0.65	0.65
21.82	14.37	9.77	8.80	86.01	3.17	0.70	0.70
21.98	16.21	11.06	8.09	89.54	3.11	0.79	0.79
22.15	18.75	12.86	7.34	94.34	3.05	0.92	0.92
22.31	21.62	14.87	6.53	97.11	2.98	1.06	1.06
22.47	24.45	16.87	5.90	99.62	2.92	1.20	1.20
22.64	27.86	19.35	5.26	101.86	2.85	1.37	1.37
22.80	31.95	22.33	4.71	105.14	2.79	1.57	1.57
22.97	35.54	24.91	4.29	106.83	2.74	1.74	1.74
23.13	37.92	26.55	4.10	108.73	2.71	1.85	1.85
23.30	38.81	26.98	4.16	112.25	2.72	1.88	1.88
23.46	38.27	26.30	4.46	117.25	2.76	1.84	1.84
23.62	35.97	24.31	4.98	121.10	2.82	1.71	1.71
23.79	32.44	21.55	5.40	116.36	2.87	1.52	1.52

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
23.95	28.44	18.52	5.95	110.10	2.92	1.32	1.32
24.12	24.61	15.72	6.50	102.13	2.98	1.12	1.12
24.28	21.10	13.24	7.39	97.79	3.06	0.95	0.95
24.44	18.38	11.33	8.21	92.97	3.12	0.81	0.81
24.61	16.94	10.29	8.83	90.85	3.17	0.73	0.73
24.77	17.47	10.57	8.84	93.45	3.17	0.76	0.76
24.94	20.94	12.78	7.87	100.53	3.10	0.91	0.91
25.10	27.68	17.09	6.24	106.59	2.95	1.22	1.22
25.26	35.46	22.46	4.93	110.65	2.82	1.57	1.57
25.43	44.14	28.56	3.89	111.18	2.69	1.96	1.96
25.59	51.59	33.84	3.27	110.57	2.59	0.69	0.69
25.76	57.57	37.98	2.94	111.56	2.53	0.70	0.70
25.92	61.11	40.31	2.80	113.03	2.51	0.71	0.71
26.08	62.38	40.96	2.80	114.82	2.51	0.71	0.71
26.25	62.68	40.90	2.83	115.61	2.51	0.71	0.71
26.41	62.05	40.24	2.84	114.35	2.51	0.71	0.71
26.58	61.05	39.30	2.88	113.12	2.52	0.70	0.70
26.74	60.25	38.54	2.90	111.89	2.53	0.70	0.70
26.90	59.01	37.43	2.99	111.84	2.54	0.70	0.70
27.07	54.58	34.07	3.26	111.21	2.59	0.69	0.69
27.23	46.04	28.05	3.76	105.55	2.67	1.91	1.91
27.40	36.58	21.48	4.69	100.78	2.79	1.49	1.49
27.56	30.51	17.33	5.62	97.34	2.89	1.22	1.22
27.72	33.05	18.84	5.34	100.63	2.86	1.32	1.32
27.89	34.77	19.87	5.05	100.25	2.83	1.39	1.39
28.05	33.53	19.01	5.08	96.46	2.83	1.33	1.33
28.22	25.79	13.99	6.54	91.40	2.98	1.00	1.00
28.38	22.65	12.09	7.44	89.88	3.06	0.86	0.86
28.54	28.45	15.42	5.98	92.17	2.93	1.10	1.10
28.71	36.77	20.65	4.67	96.49	2.79	1.43	1.43
28.87	44.05	25.22	4.02	101.28	2.70	1.72	1.72
29.04	47.84	27.43	3.87	106.18	2.68	1.86	1.86
29.20	52.74	30.46	3.56	108.48	2.64	2.04	2.04
29.36	56.97	33.11	3.28	108.69	2.59	0.68	0.68
29.53	58.04	33.65	3.22	108.30	2.58	0.68	0.68
29.69	53.51	30.55	3.45	105.52	2.62	2.04	2.04
29.86	45.93	25.58	3.90	99.70	2.69	1.73	1.73
30.02	39.43	21.40	4.42	94.50	2.76	1.47	1.47
30.19	39.73	21.47	4.39	94.26	2.75	1.47	1.47
30.35	47.12	25.94	3.81	98.93	2.67	1.75	1.75
30.51	53.07	29.71	3.30	97.91	2.59	0.67	0.67
30.68	52.50	29.27	3.26	95.51	2.59	0.67	0.67
30.84	46.28	25.23	3.63	91.48	2.65	1.69	1.69
31.01	47.90	26.06	3.59	93.45	2.64	1.74	1.74
31.17	52.88	29.02	3.31	96.07	2.60	0.67	0.67
31.33	58.69	32.49	3.06	99.59	2.56	0.68	0.68
31.50	65.29	36.47	2.82	102.88	2.51	0.69	0.69
31.66	83.15	47.92	2.24	107.53	2.38	0.73	0.73

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
31.83	111.82	66.76	1.76	117.59	2.24	0.77	0.77
31.99	142.89	87.33	1.52	133.05	2.14	0.81	0.81
32.15	171.92	106.37	1.42	150.61	2.08	0.84	0.84
32.32	191.69	119.00	1.38	163.63	2.05	0.85	0.85
32.48	196.66	121.43	1.39	168.56	2.06	0.85	0.85
32.65	188.79	115.29	1.44	165.52	2.09	0.85	0.85
32.81	175.29	105.72	1.50	158.18	2.12	0.84	0.84
32.97	160.79	95.96	1.54	148.19	2.15	0.82	0.82
33.14	143.86	84.84	1.60	135.87	2.17	0.80	0.80
33.30	125.09	72.72	1.68	122.32	2.21	0.78	0.78
33.47	106.82	61.07	1.79	109.15	2.25	0.76	0.76
33.63	87.26	48.56	2.02	97.94	2.32	0.73	0.73
33.79	70.12	37.86	2.32	87.68	2.40	0.70	0.70
33.96	60.82	32.15	2.53	81.20	2.45	0.68	0.68
34.12	59.89	31.65	2.45	77.60	2.43	0.68	0.68
34.29	64.22	34.13	2.34	79.71	2.41	0.69	0.69
34.45	70.27	37.73	2.17	81.83	2.36	0.70	0.70
34.61	78.25	42.61	1.97	84.15	2.31	0.71	0.71
34.78	80.40	43.55	2.00	87.09	2.32	0.72	0.72
34.94	75.79	40.06	2.26	90.69	2.39	0.71	0.71
35.11	66.98	34.18	2.72	92.80	2.49	0.69	0.69
35.27	60.58	30.40	2.89	87.92	2.52	0.67	0.67
35.43	57.27	28.57	2.89	82.55	2.52	0.66	0.66
35.60	53.90	26.65	2.93	78.04	2.53	0.66	0.66
35.76	49.59	23.88	3.33	79.46	2.60	1.55	1.55
35.93	49.15	23.50	3.38	79.37	2.61	1.53	1.53
36.09	50.89	24.43	3.24	79.11	2.59	0.65	0.65
36.26	57.92	28.48	2.80	79.63	2.51	0.66	0.66
36.42	64.73	32.29	2.55	82.50	2.46	0.68	0.68
36.58	75.02	38.21	2.26	86.35	2.39	0.70	0.70
36.75	89.68	46.97	1.93	90.64	2.29	0.73	0.73
36.91	101.75	54.18	1.76	95.22	2.24	0.74	0.74
37.08	104.97	55.65	1.77	98.60	2.24	0.75	0.75
37.24	97.82	50.88	1.92	97.61	2.29	0.74	0.74
37.40	89.88	45.85	2.10	96.15	2.34	0.72	0.72
37.57	87.27	44.29	2.13	94.24	2.35	0.72	0.72
37.73	86.99	44.11	2.11	93.29	2.35	0.72	0.72
37.90	82.79	41.74	2.14	89.49	2.36	0.71	0.71
38.06	75.02	37.29	2.27	84.52	2.39	0.70	0.70
38.22	67.18	32.78	2.45	80.42	2.43	0.68	0.68
38.39	61.68	29.48	2.70	79.45	2.49	0.67	0.67
38.55	56.37	26.43	2.93	77.46	2.53	0.66	0.66
38.72	50.14	22.82	3.36	76.68	2.61	1.47	1.47
38.88	44.33	19.60	3.81	74.68	2.67	1.29	1.29
39.04	41.62	18.09	4.07	73.57	2.71	1.20	1.20
39.21	37.21	15.74	4.53	71.25	2.77	1.06	1.06
39.37	29.80	11.91	5.65	67.27	2.89	0.30	0.84
39.54	21.24	8.03	7.97	64.01	3.10	0.26	0.57

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
39.70	16.97	6.19	9.92	61.41	3.25	0.26	0.44
39.86	18.00	6.61	9.15	60.50	3.19	0.26	0.47
40.03	22.14	8.36	7.16	59.88	3.04	0.21	0.60
40.19	27.42	10.78	5.58	60.20	2.89	0.21	0.76
40.36	32.08	13.09	4.83	63.18	2.80	0.25	0.89
40.52	34.68	14.46	4.37	63.12	2.75	0.30	0.97
40.68	35.81	14.97	4.30	64.43	2.74	0.21	1.00
40.85	35.43	14.80	4.26	63.02	2.74	0.29	0.99
41.01	35.86	15.00	4.20	62.97	2.73	0.25	1.00
41.18	36.62	15.54	3.87	60.06	2.68	0.21	1.02
41.34	37.85	16.10	3.81	61.42	2.67	0.21	1.06
41.50	37.51	15.72	4.08	64.17	2.71	0.29	1.04
41.67	36.72	15.19	4.31	65.49	2.74	0.29	1.02
41.83	34.92	14.33	4.38	62.79	2.75	0.25	0.96
42.00	30.72	12.26	4.77	58.48	2.80	0.21	0.84
42.16	25.66	9.68	5.85	56.61	2.92	0.17	0.68
42.32	20.73	7.51	7.68	57.67	3.08	0.21	0.54
42.49	19.57	7.01	8.76	61.43	3.16	0.25	0.50
42.65	30.24	11.53	5.85	67.48	2.92	0.29	0.81
42.82	48.60	20.98	3.49	73.30	2.63	1.35	1.35
42.98	63.66	29.02	2.73	79.08	2.49	0.67	0.67
43.15	62.92	28.23	2.95	83.16	2.53	0.66	0.66
43.31	50.36	21.17	3.96	83.82	2.69	1.39	1.39
43.47	39.13	15.45	5.10	78.84	2.84	1.06	1.06
43.64	32.31	12.21	5.89	71.90	2.92	0.86	0.86
43.80	34.32	13.34	5.14	68.62	2.84	0.28	0.92
43.97	36.22	14.34	4.70	67.41	2.79	0.32	0.97
44.13	35.10	13.78	4.80	66.11	2.80	0.28	0.94
44.29	26.62	9.68	6.37	61.62	2.97	0.24	0.69
44.46	18.55	6.40	8.84	56.59	3.17	0.20	0.46
44.62	14.38	4.71	11.32	53.26	3.34	0.16	0.34
44.79	14.52	4.75	11.98	56.90	3.38	0.20	0.34
44.95	17.62	5.99	10.58	63.33	3.29	0.32	0.43
45.11	21.74	7.62	8.94	68.18	3.18	0.32	0.54
45.28	24.54	8.73	8.00	69.80	3.11	0.32	0.62
45.44	23.99	8.49	8.82	74.87	3.17	0.61	0.61
45.61	25.90	9.23	8.87	81.87	3.17	0.66	0.66
45.77	39.14	14.48	6.45	93.36	2.97	1.03	1.03
45.93	75.92	33.03	3.12	102.90	2.56	0.68	0.68
46.10	123.46	59.43	1.94	115.08	2.30	0.76	0.76
46.26	162.66	82.26	1.57	129.35	2.16	0.80	0.80
46.43	175.52	89.23	1.54	137.09	2.14	0.81	0.81
46.59	170.79	85.61	1.62	138.27	2.18	0.81	0.81
46.75	161.79	79.95	1.70	135.91	2.21	0.80	0.80
46.92	156.49	76.63	1.75	134.37	2.23	0.79	0.79
47.08	148.61	72.01	1.82	130.95	2.26	0.78	0.78
47.25	145.96	70.50	1.83	128.81	2.26	0.78	0.78
47.41	140.21	67.15	1.88	126.29	2.28	0.77	0.77

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
47.57	132.72	62.62	1.99	124.85	2.31	0.76	0.76
47.74	126.35	58.67	2.13	124.90	2.35	0.75	0.75
47.90	123.65	56.84	2.22	125.91	2.38	0.75	0.75
48.07	130.13	60.36	2.11	127.33	2.35	0.76	0.76
48.23	135.67	63.50	2.01	127.60	2.32	0.77	0.77
48.39	142.50	67.68	1.87	126.44	2.27	0.77	0.77
48.56	145.83	69.89	1.78	124.52	2.24	0.78	0.78
48.72	142.96	68.30	1.79	122.31	2.25	0.78	0.78
48.89	137.00	64.76	1.86	120.27	2.27	0.77	0.77
49.05	132.06	61.88	1.91	118.43	2.29	0.76	0.76
49.22	132.33	62.09	1.89	117.15	2.28	0.76	0.76
49.38	135.89	63.92	1.86	118.65	2.27	0.77	0.77
49.54	139.42	65.56	1.85	121.31	2.27	0.77	0.77
49.71	139.45	65.12	1.90	123.50	2.28	0.77	0.77
49.87	134.25	62.02	1.97	122.29	2.31	0.76	0.76
50.04	122.19	55.27	2.14	118.28	2.36	0.75	0.75
50.20	100.69	43.70	2.54	111.10	2.45	0.72	0.72
50.36	76.79	31.36	3.28	102.96	2.59	0.68	0.68
50.53	56.65	21.47	4.42	94.88	2.76	1.43	1.43
50.69	42.52	14.94	5.81	86.81	2.91	1.05	1.05
50.86	31.52	10.59	7.48	79.21	3.06	0.76	0.76
51.02	23.66	7.65	9.19	70.31	3.20	0.55	0.55
51.18	19.96	6.26	10.06	62.94	3.26	0.26	0.45
51.35	18.84	5.83	10.16	59.19	3.26	0.22	0.42
51.51	18.10	5.54	10.41	57.68	3.28	0.22	0.40
51.68	17.45	5.29	10.83	57.30	3.31	0.22	0.38
51.84	16.96	5.09	11.18	56.96	3.33	0.22	0.36
52.00	17.04	5.12	11.14	56.97	3.33	0.22	0.37
52.17	18.81	5.75	9.85	56.66	3.24	0.22	0.41
52.33	25.15	8.07	7.18	57.97	3.04	0.18	0.58
52.50	31.72	10.71	5.57	59.70	2.89	0.22	0.75
52.66	33.32	11.33	5.49	62.21	2.88	0.26	0.79
52.82	27.98	9.06	6.81	61.73	3.01	0.26	0.65
52.99	21.73	6.76	8.66	58.55	3.16	0.22	0.48
53.15	18.83	5.69	10.12	57.55	3.26	0.18	0.41
53.32	19.34	5.86	10.41	60.97	3.28	0.25	0.42
53.48	23.10	7.21	8.92	64.34	3.18	0.33	0.52
53.64	29.67	9.58	6.91	66.20	3.01	0.25	0.68
53.81	36.80	12.37	5.72	70.78	2.90	0.87	0.87
53.97	39.51	13.19	6.01	79.27	2.93	0.94	0.94
54.14	41.24	13.70	6.40	87.75	2.97	0.98	0.98
54.30	55.57	19.89	4.81	95.69	2.80	1.35	1.35
54.46	78.26	30.75	3.29	101.30	2.59	0.67	0.67
54.63	97.44	40.29	2.64	106.49	2.47	0.71	0.71
54.79	97.84	40.04	2.76	110.52	2.50	0.71	0.71
54.96	86.91	33.98	3.36	114.10	2.61	2.13	2.13
55.12	75.82	28.16	4.15	116.86	2.72	1.85	1.85
55.28	77.99	29.08	4.06	118.01	2.71	1.90	1.90

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
55.45	97.56	38.84	3.06	118.72	2.55	0.70	0.70
55.61	121.94	51.87	2.27	117.98	2.39	0.74	0.74
55.78	137.69	61.29	1.87	114.37	2.27	0.76	0.76
55.94	141.25	64.48	1.68	108.05	2.20	0.77	0.77
56.11	140.46	64.97	1.58	102.84	2.16	0.77	0.77
56.27	126.01	56.25	1.79	100.76	2.25	0.75	0.75
56.43	97.77	40.26	2.47	99.33	2.44	0.71	0.71
56.60	64.41	23.38	4.12	96.22	2.72	1.53	1.53
56.76	41.32	13.26	6.47	85.79	2.97	0.95	0.95
56.93	29.98	9.27	7.99	74.10	3.11	0.66	0.66
57.09	23.82	7.10	9.20	65.31	3.20	0.24	0.51
57.25	21.22	6.18	9.94	61.42	3.25	0.24	0.44
57.42	20.49	5.91	10.66	63.00	3.30	0.28	0.42
57.58	21.13	6.12	11.06	67.74	3.32	0.31	0.44
57.75	23.23	6.84	10.77	73.65	3.30	0.49	0.49
57.91	28.08	8.51	8.94	76.06	3.18	0.61	0.61
58.07	37.75	11.83	6.49	76.77	2.98	0.85	0.85
58.24	42.88	14.17	5.13	72.72	2.84	0.97	0.97
58.40	41.20	13.29	5.59	74.34	2.89	0.93	0.93
58.57	33.40	10.27	7.19	73.84	3.04	0.73	0.73
58.73	36.71	11.38	7.11	80.95	3.03	0.81	0.81
58.89	60.80	21.55	4.07	87.65	2.71	1.40	1.40
59.06	90.49	35.47	2.75	97.67	2.50	0.69	0.69
59.22	111.81	45.62	2.35	107.28	2.41	0.72	0.72
59.39	117.34	47.48	2.44	116.04	2.43	0.73	0.73
59.55	126.85	52.19	2.27	118.60	2.39	0.74	0.74
59.71	136.02	57.08	2.09	119.03	2.34	0.75	0.75
59.88	127.00	52.61	2.17	114.34	2.36	0.74	0.74
60.04	101.06	39.36	2.76	108.75	2.50	0.70	0.70
60.21	73.28	25.96	4.00	103.86	2.70	1.68	1.68
60.37	64.36	21.97	4.53	99.59	2.77	1.46	1.46
60.53	69.84	24.46	4.10	100.31	2.71	1.59	1.59
60.70	87.91	33.16	3.03	100.58	2.55	0.68	0.68
60.86	106.89	42.37	2.48	105.14	2.44	0.71	0.71
61.03	116.16	46.88	2.30	107.84	2.40	0.73	0.73
61.19	110.47	43.94	2.42	106.34	2.43	0.72	0.72
61.35	99.12	38.12	2.75	104.90	2.50	0.70	0.70
61.52	87.74	32.64	3.11	101.63	2.56	0.68	0.68
61.68	82.20	29.91	3.38	100.99	2.61	1.86	1.86
61.85	83.33	30.76	3.14	96.67	2.57	0.67	0.67
62.01	86.89	32.47	2.97	96.54	2.54	0.68	0.68
62.17	84.12	30.91	3.17	97.96	2.57	0.67	0.67
62.34	73.49	25.61	3.88	99.48	2.68	1.64	1.64
62.50	64.32	21.35	4.62	98.60	2.78	1.42	1.42

:: Strength loss calculation (Robertson (2009) :: (continued)

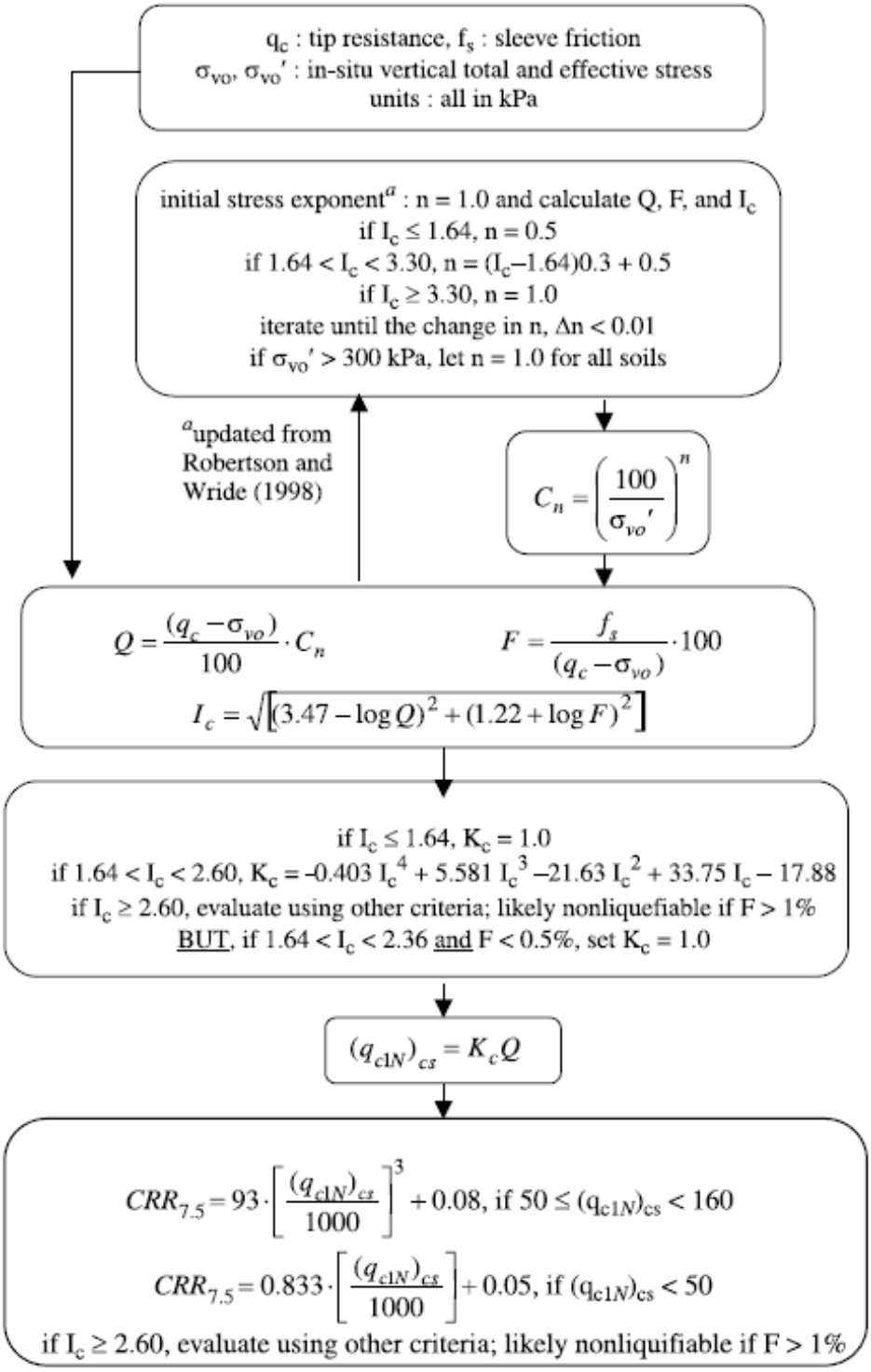
Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$

Abbreviations

q_t:	Total cone resistance
K_c:	Cone resistance correction factor due to fines
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
I_c:	Soil behavior type index
$S_{u(liq)}/\sigma'_v$:	Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$:	Calculated peak undrained strength ratio

Procedure for the evaluation of soil liquefaction resistance, NCEER (1998)

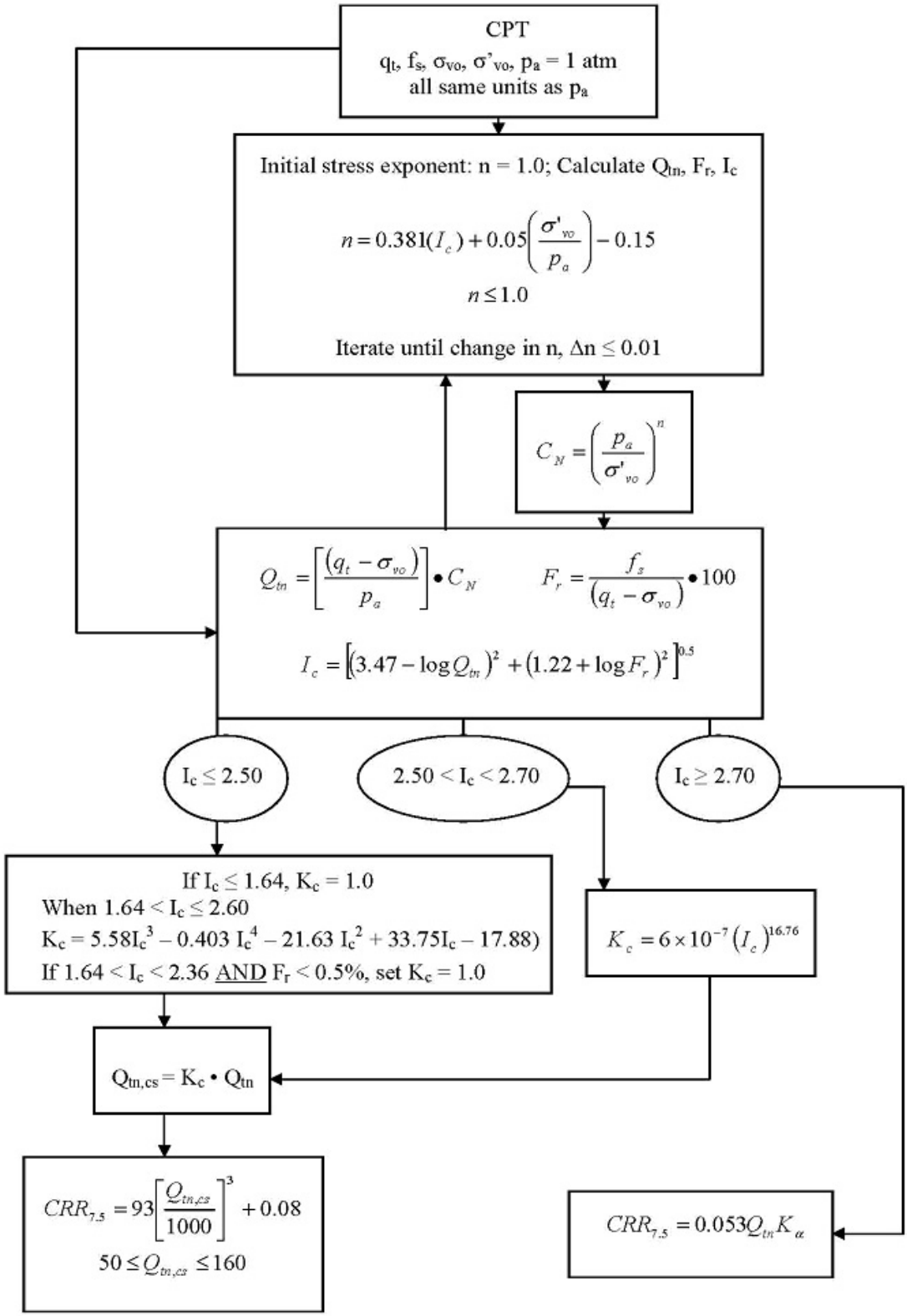
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:



[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

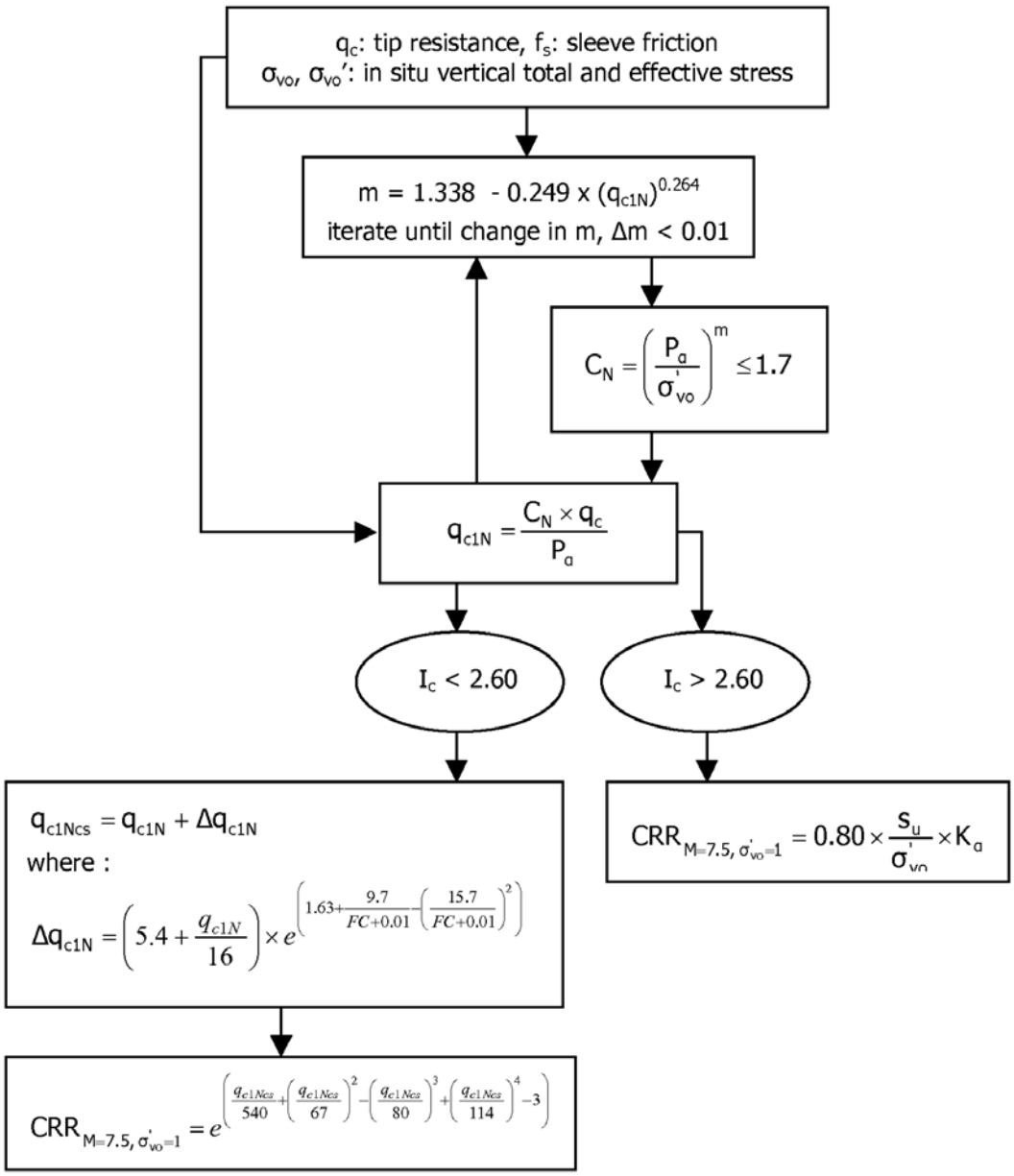
Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. This procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:

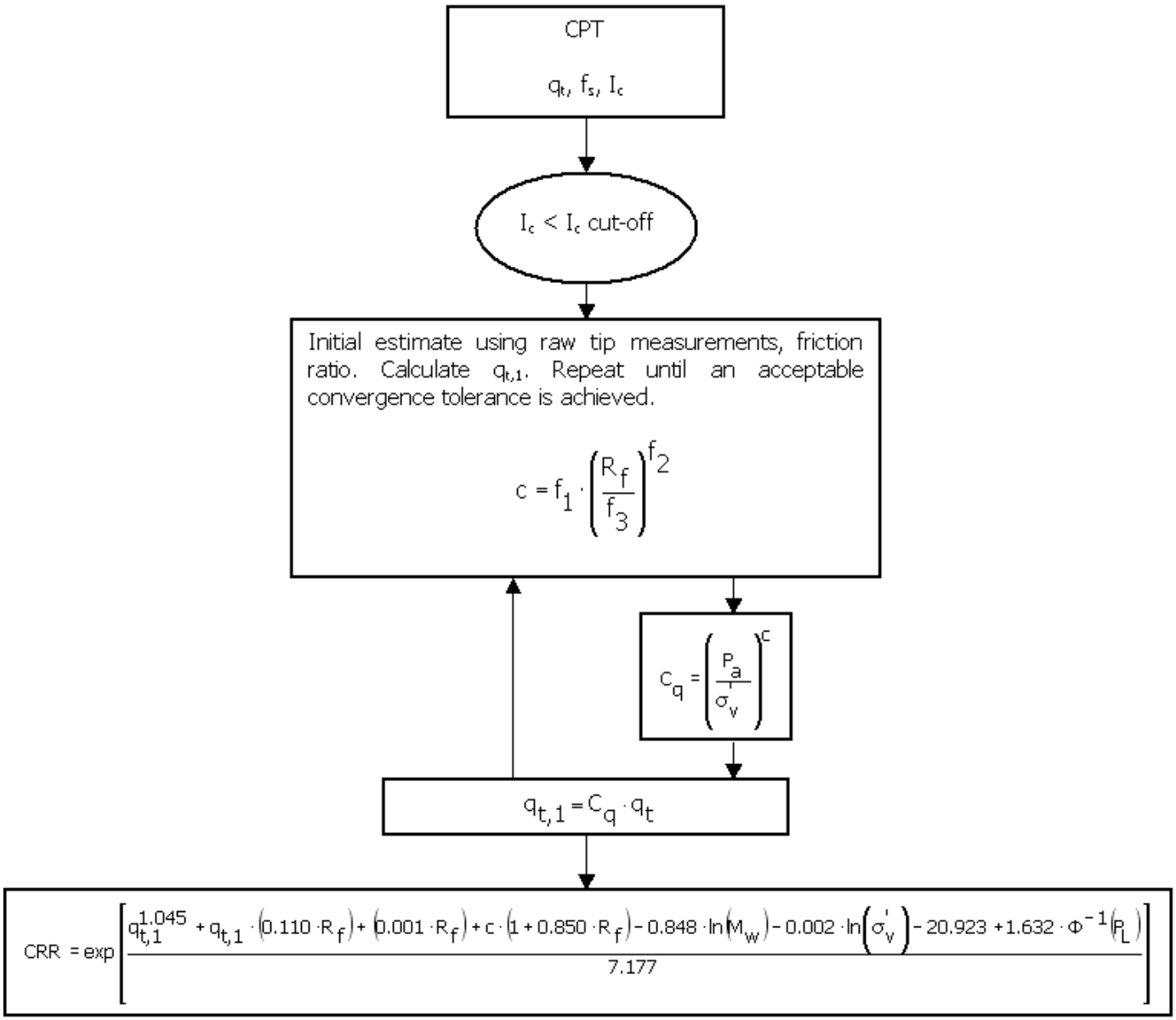


[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

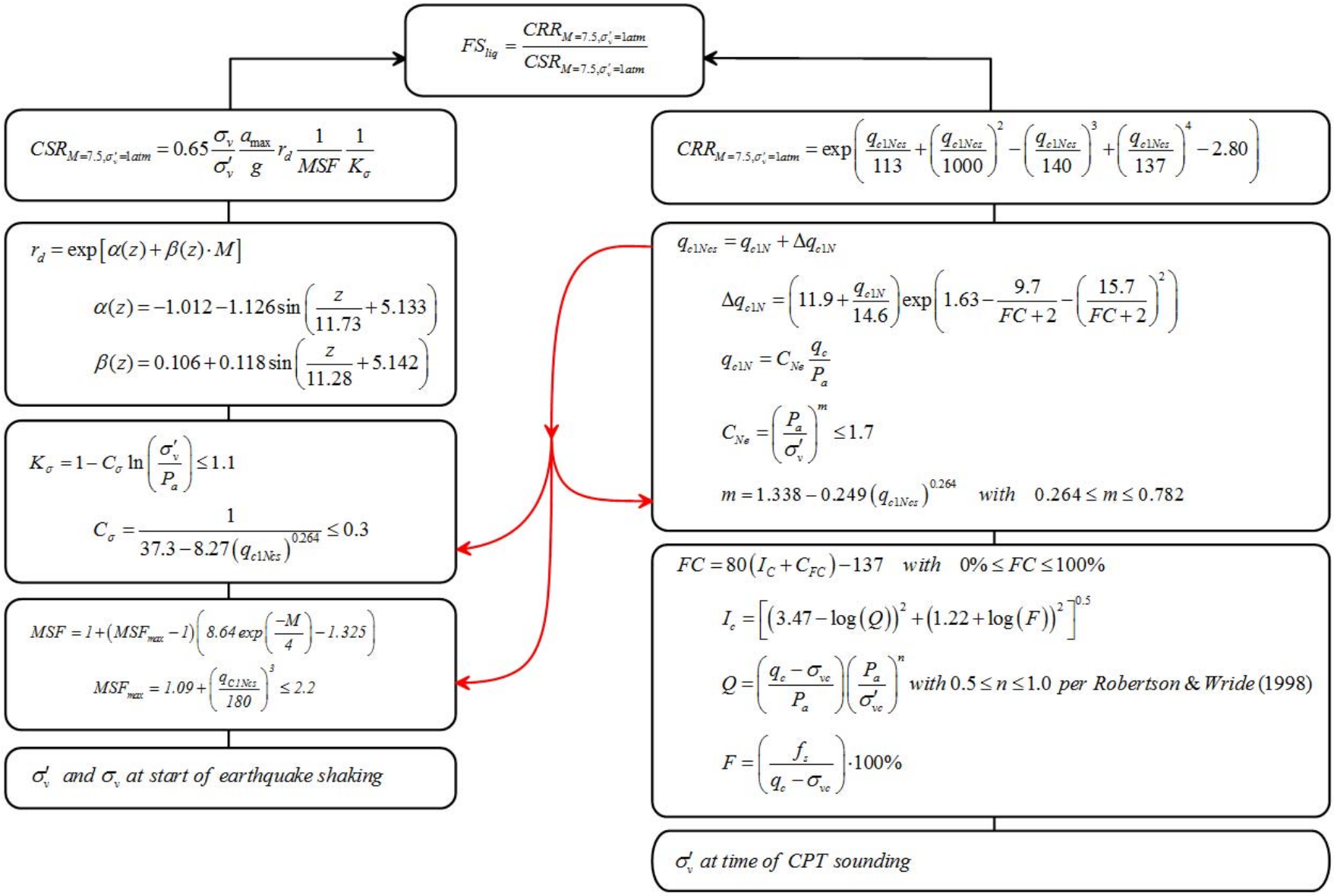
Procedure for the evaluation of soil liquefaction resistance, Idriss & Boulanger (2008)



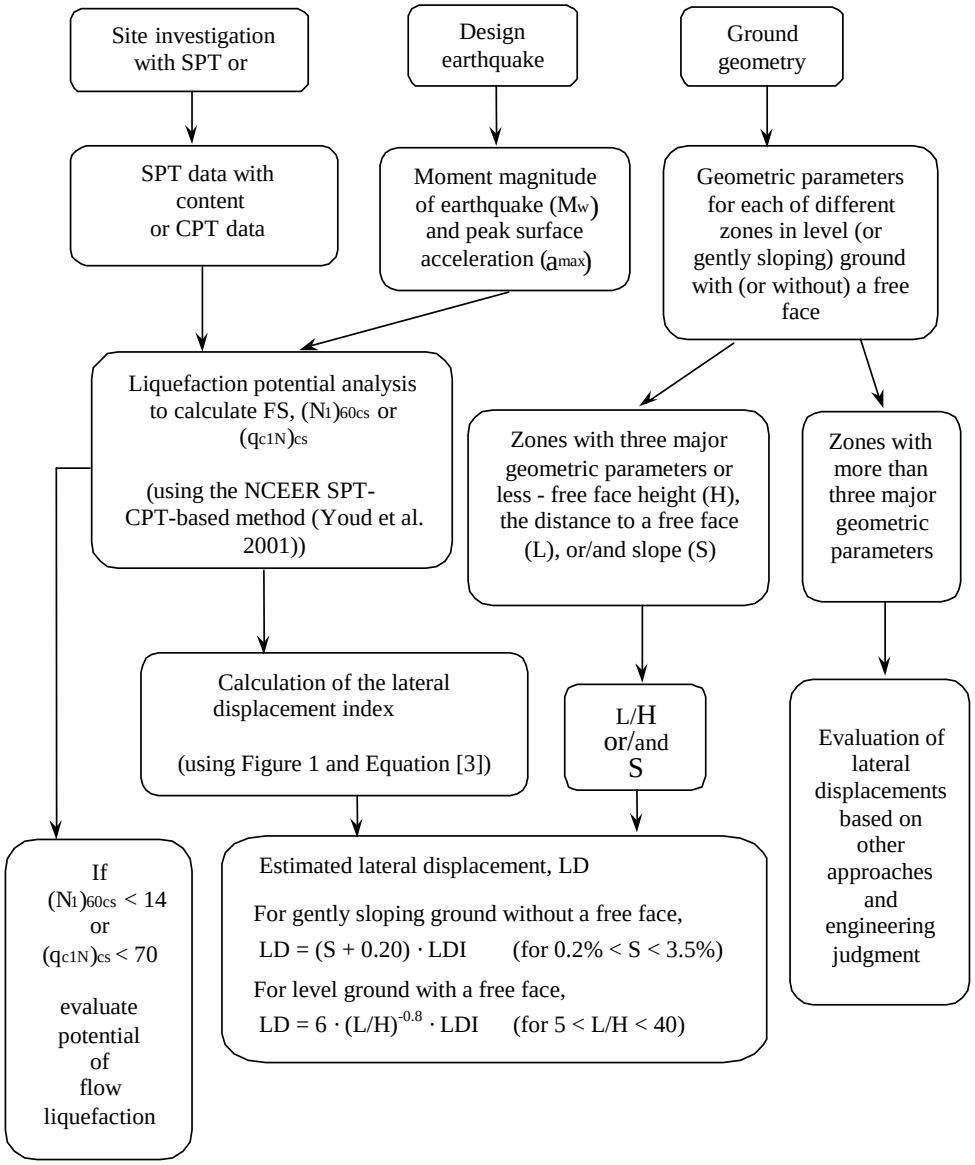
Procedure for the evaluation of soil liquefaction resistance (sandy soils), Moss et al. (2006)



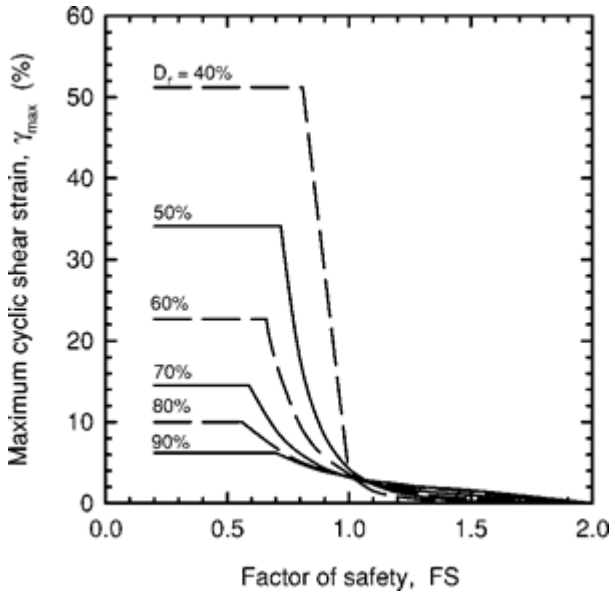
Procedure for the evaluation of soil liquefaction resistance, Boulanger & Idriss(2014)



Procedure for the evaluation of liquefaction-induced lateral spreading displacements



[1] Flow chart illustrating major steps in estimating liquefaction-induced lateral spreading displacements using the proposed approach



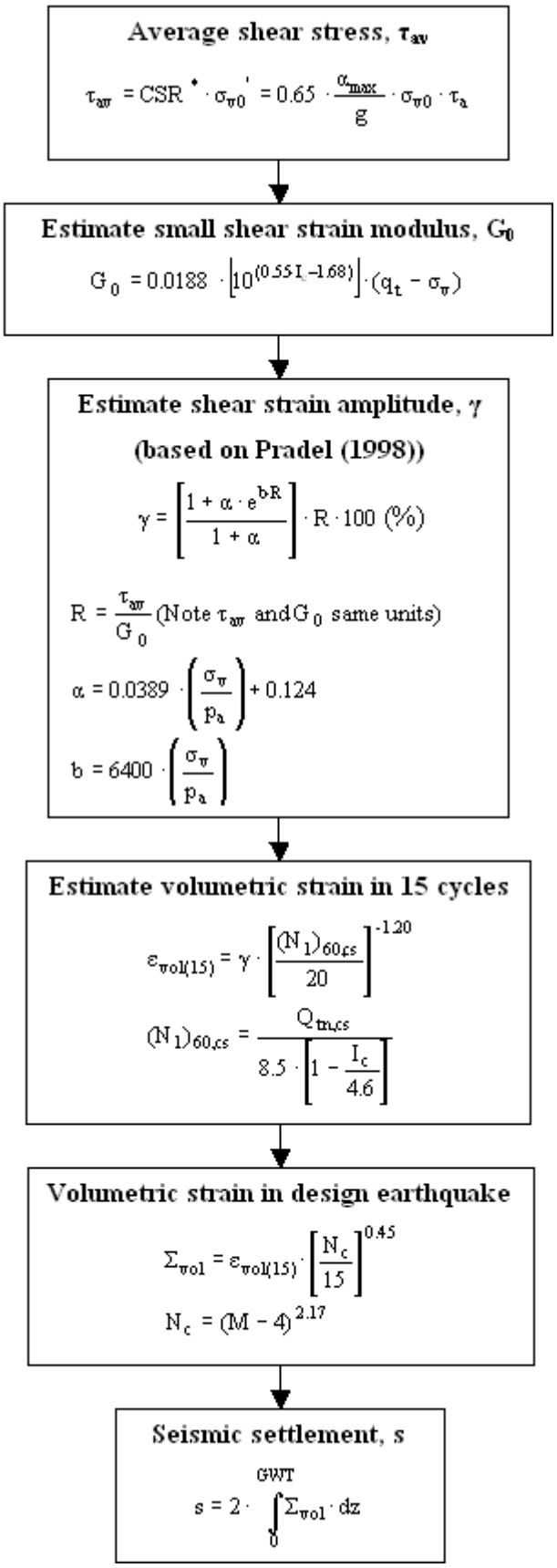
[1] **Figure 1**

$$LDI = \int_0^{z_{max}} \gamma_{max} dz$$

[1] **Equation [3]**

[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

Procedure for the estimation of seismic induced settlements in dry sands



Robertson, P.K. and Lisheng, S., 2010, "Estimation of seismic compression in dry soils using the CPT" FIFTH INTERNATIONAL CONFERENCE ON RECENT ADVANCES IN GEOTECHNICAL EARTHQUAKE ENGINEERING AND SOIL DYNAMICS, Symposium in honor of professor I. M. Idriss, San Diego, CA

Liquefaction Potential Index (LPI) calculation procedure

Calculation of the Liquefaction Potential Index (LPI) is used to interpret the liquefaction assessment calculations in terms of severity over depth. The calculation procedure is based on the methology developed by Iwasaki (1982) and is adopted by AFPS.

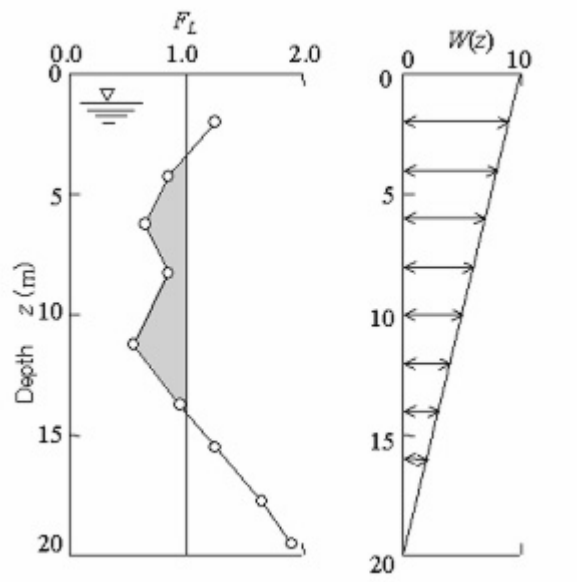
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\mathbf{LPI} = \int_0^{20} (10 - 0{,}5z) \times F_L \times dz$$

where:
F_L = 1 - F.S. when F.S. less than 1
F_L = 0 when F.S. greater than 1
z depth of measurment in meters

Values of LPI range between zero (0) when no test point is characterized as liquefiable and 100 when all points are characterized as susceptible to liquefaction. Iwasaki proposed four (4) discrete categories based on the numeric value of LPI:

- LPI = 0 : Liquefaction risk is very low
- 0 < LPI <= 5 : Liquefaction risk is low
- 5 < LPI <= 15 : Liquefaction risk is high
- LPI > 15 : Liquefaction risk is very high



Graphical presentation of the LPI calculation procedure

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Geocon West, Inc.

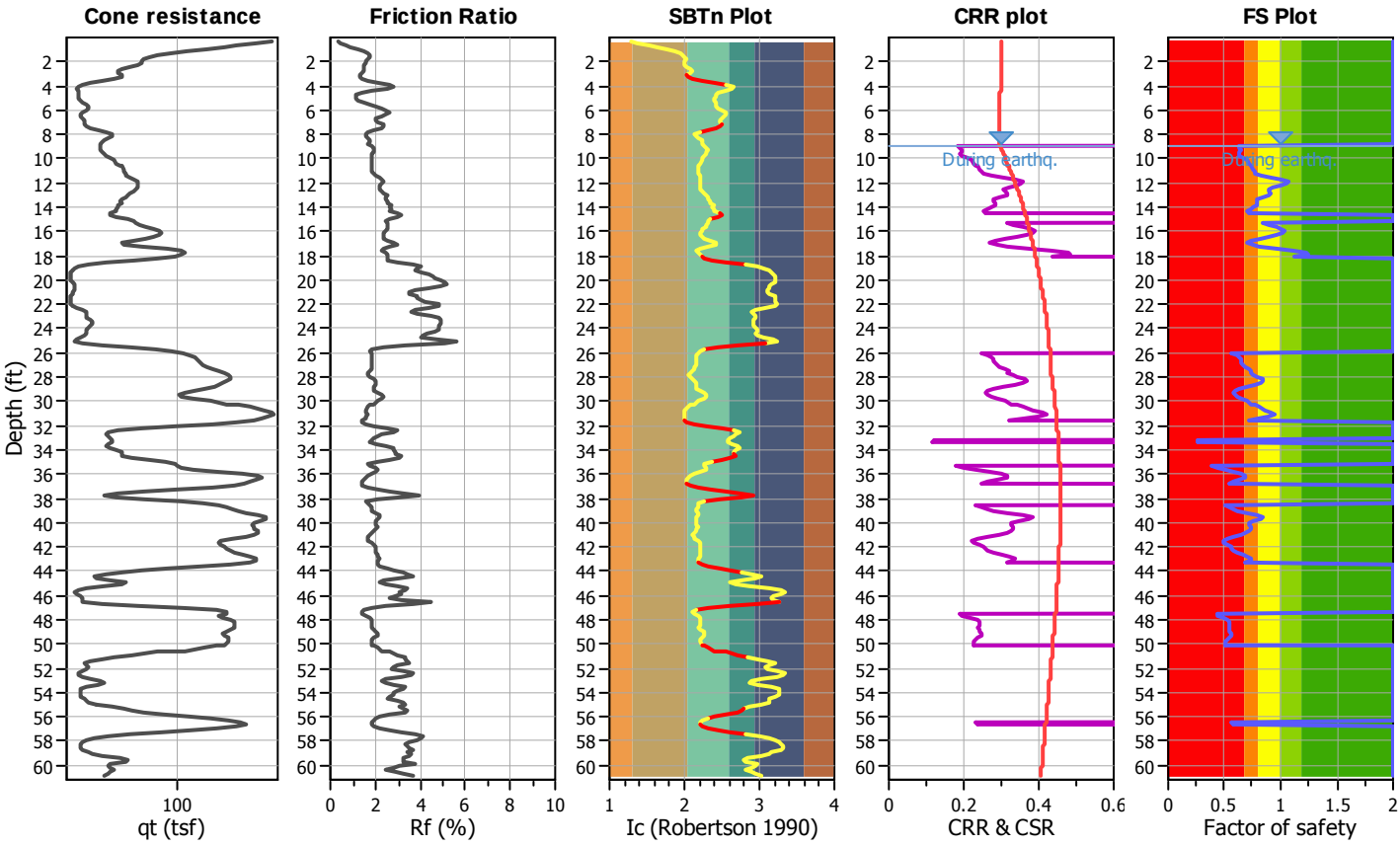
LIQUEFACTION ANALYSIS REPORT

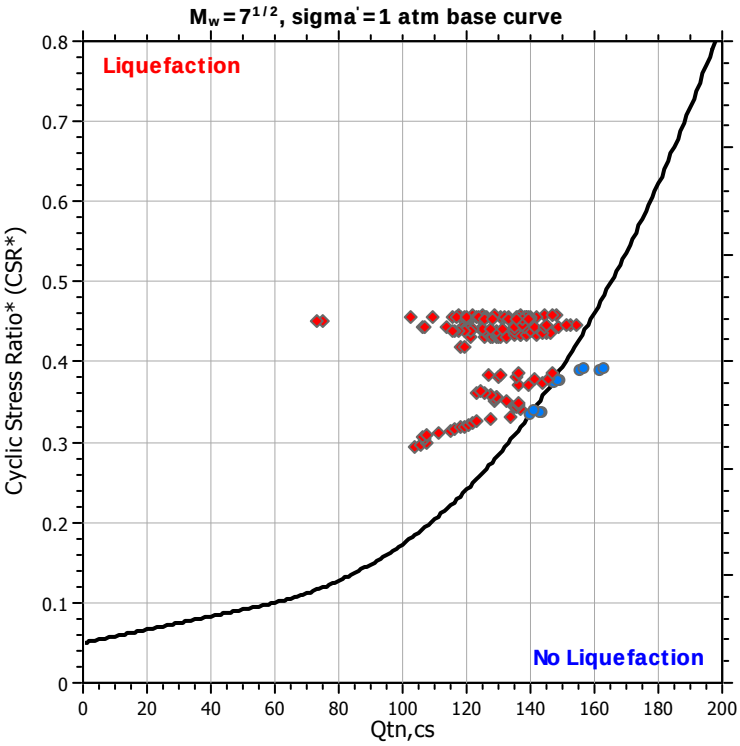
Project title : A9911-06-01 **Location : Bellflower Mixed-Use**

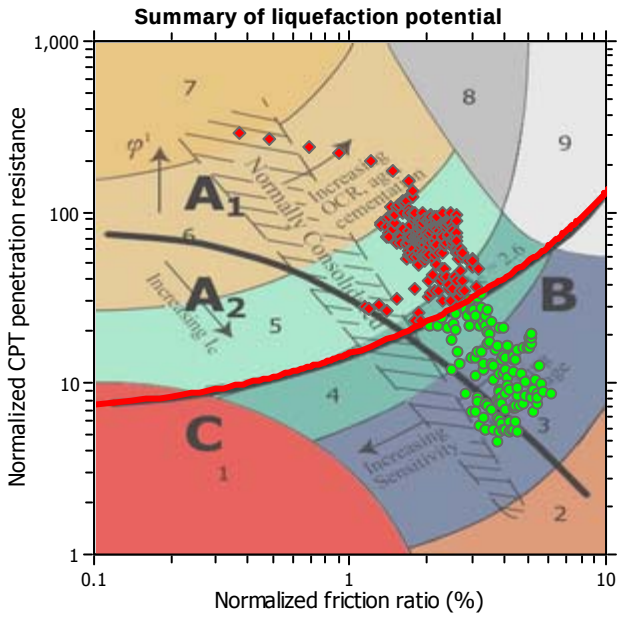
CPT file : CPT-01

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	37.20 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	9.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	60.00 ft
Earthquake magnitude M_w:	6.60	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.64	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

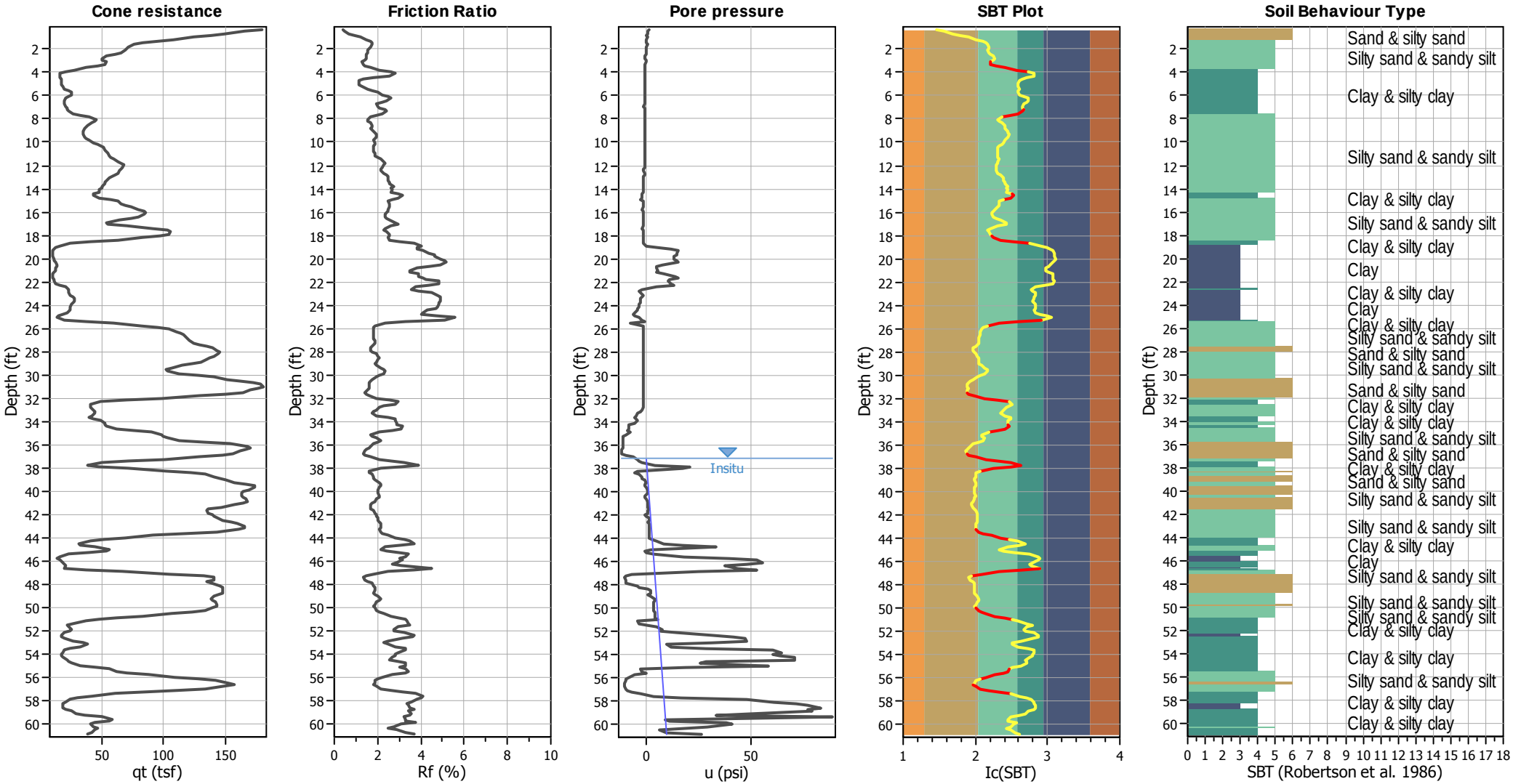






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



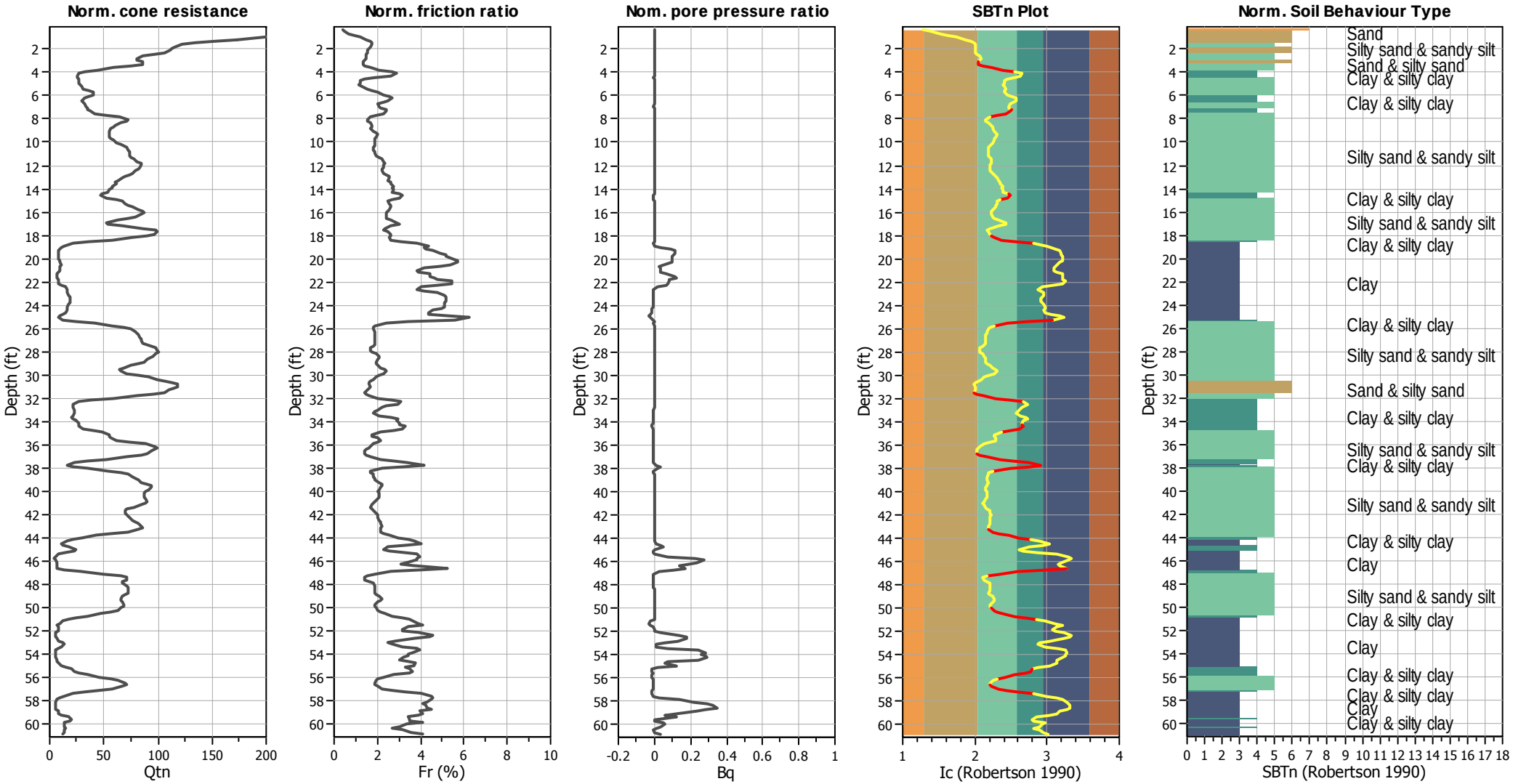
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	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:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.64	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBT 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

CPT basic interpretation plots (normalized)



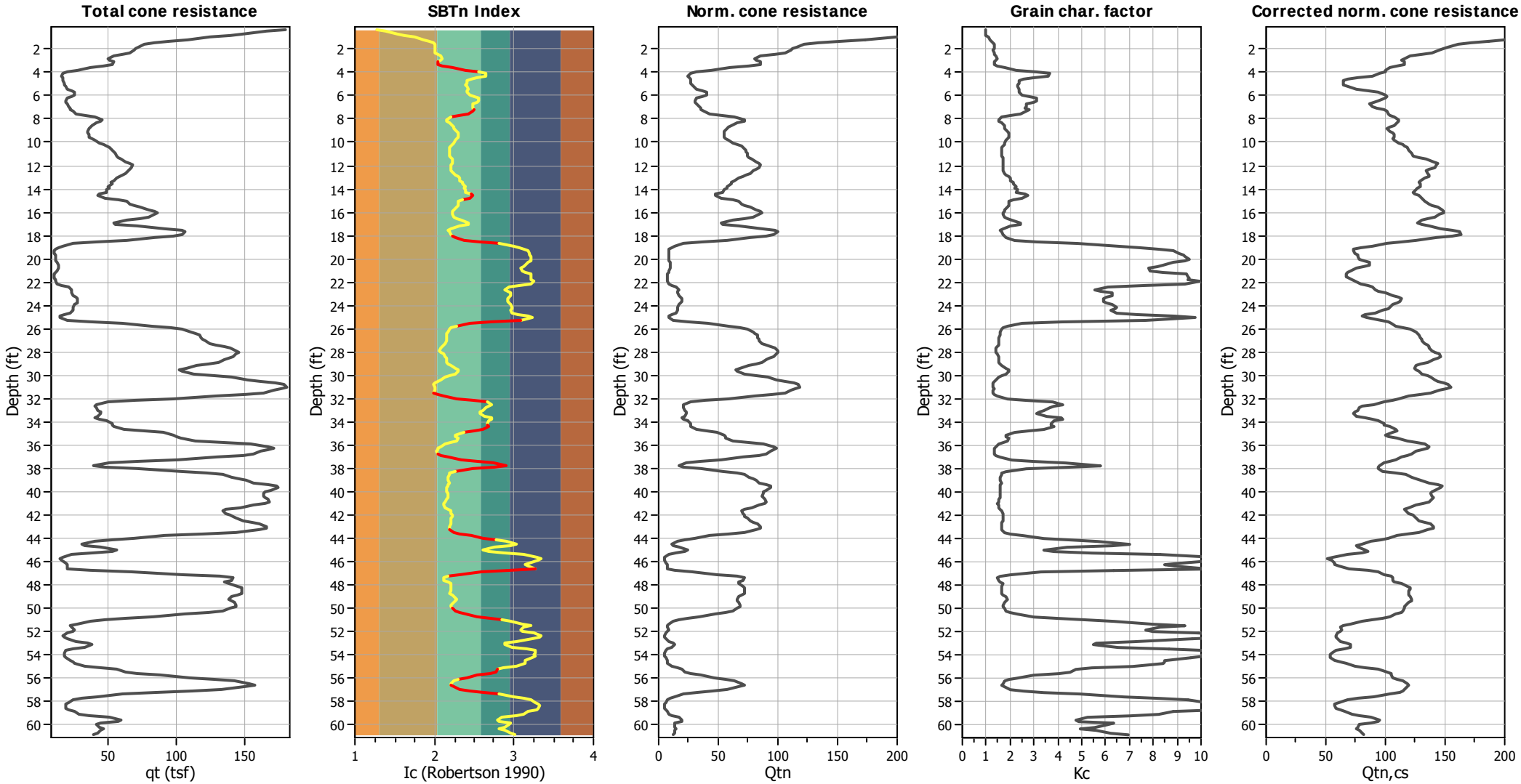
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	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:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.64	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

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

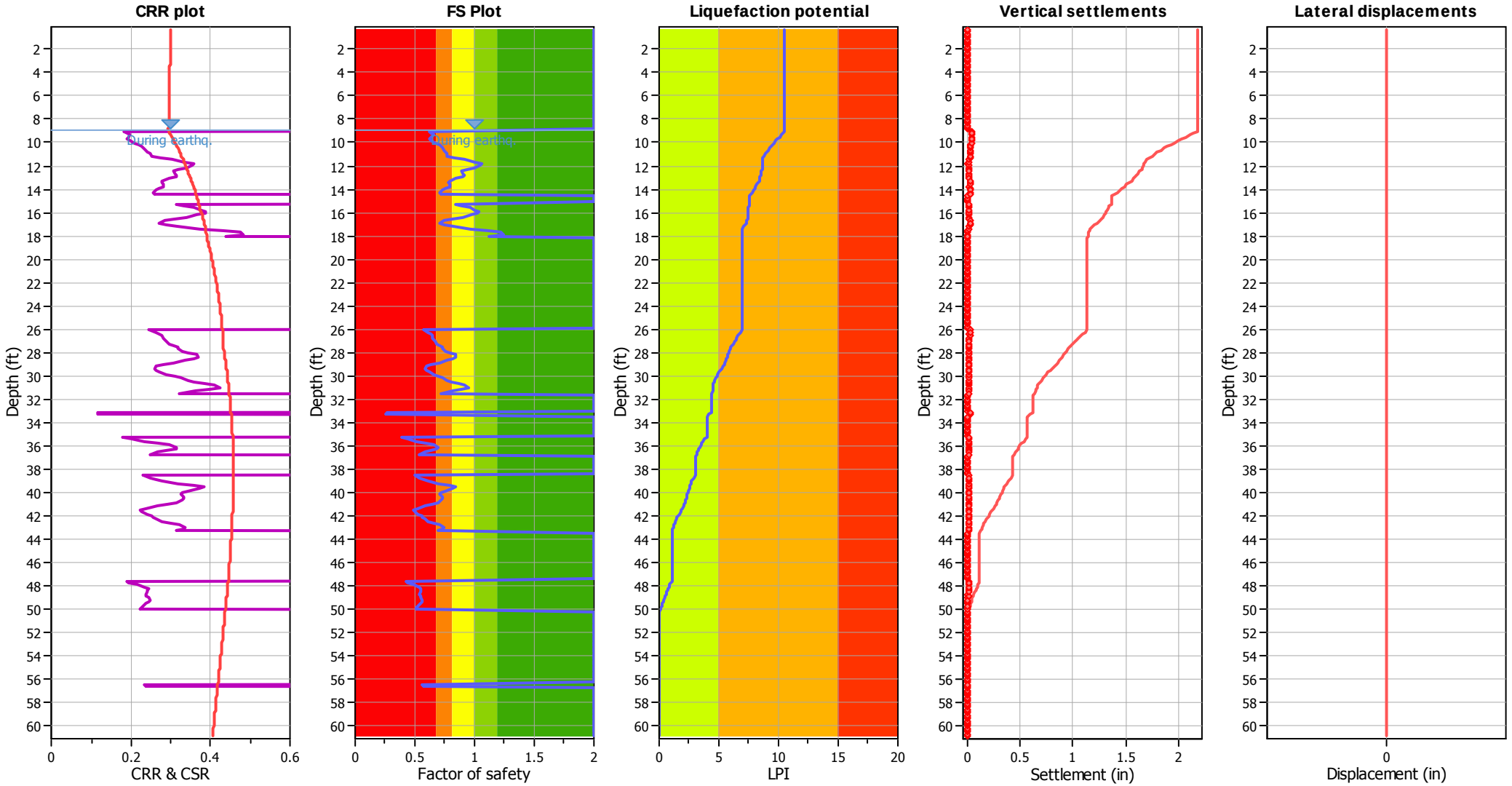
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	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:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.64	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	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:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.64	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

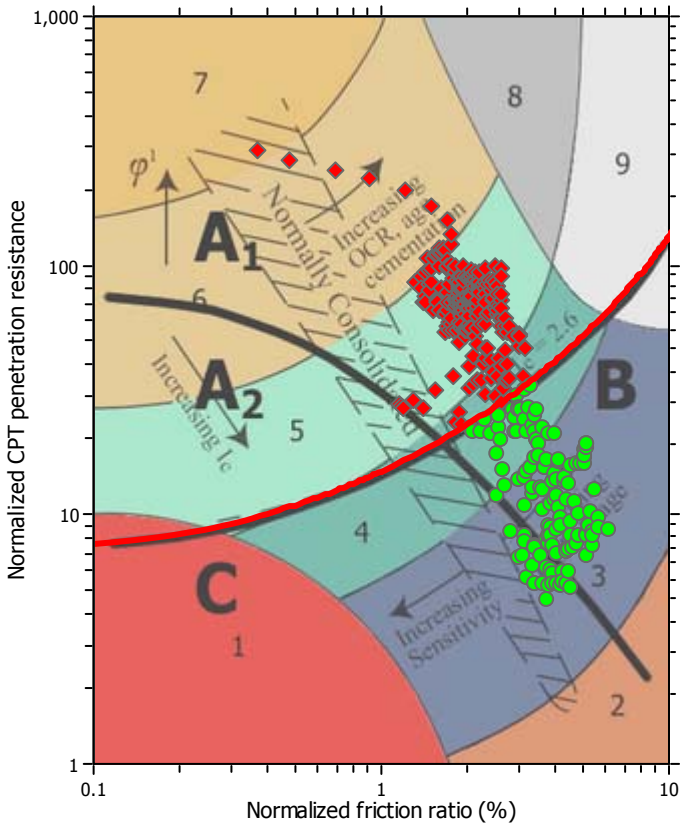
F.S. color scheme

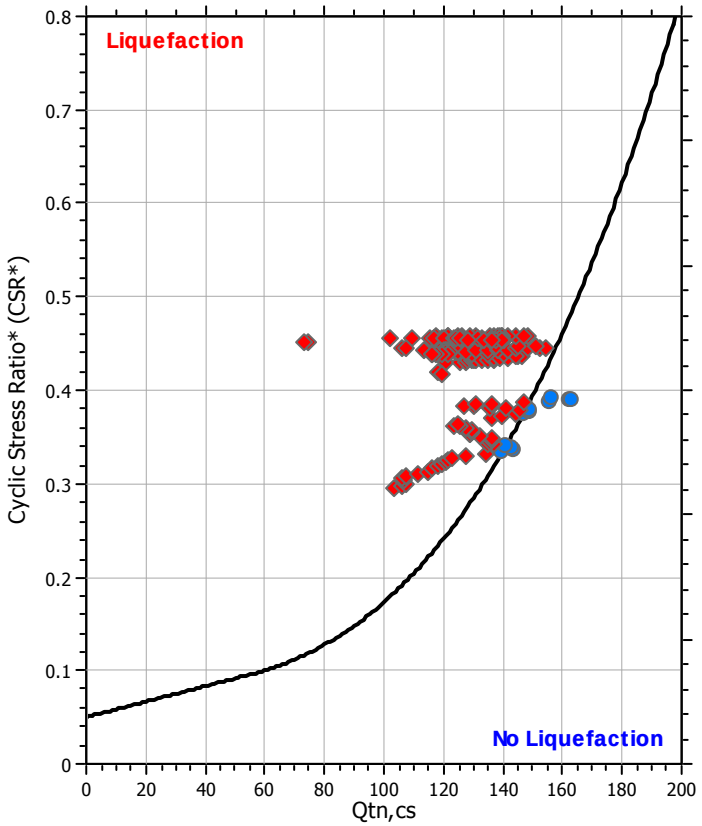
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

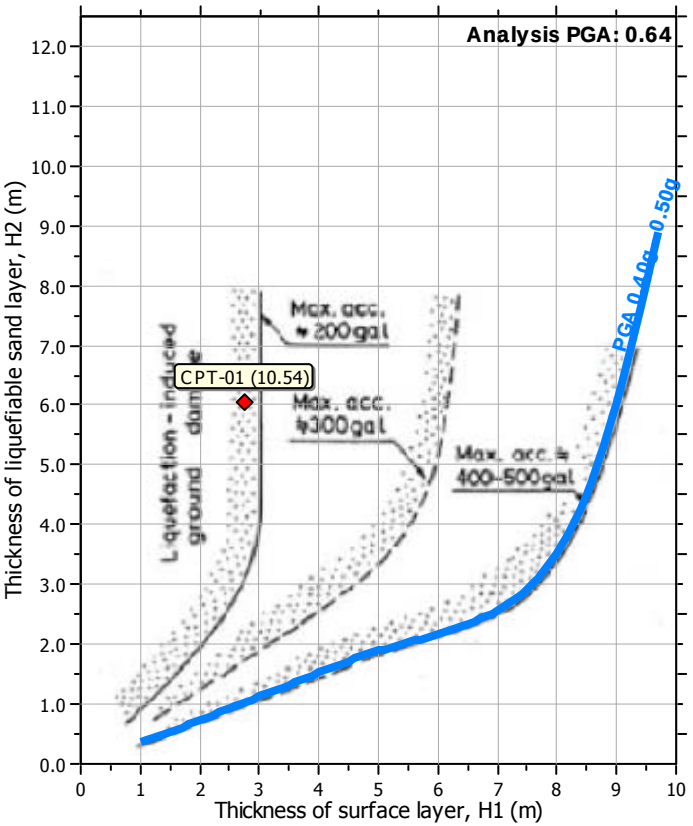
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



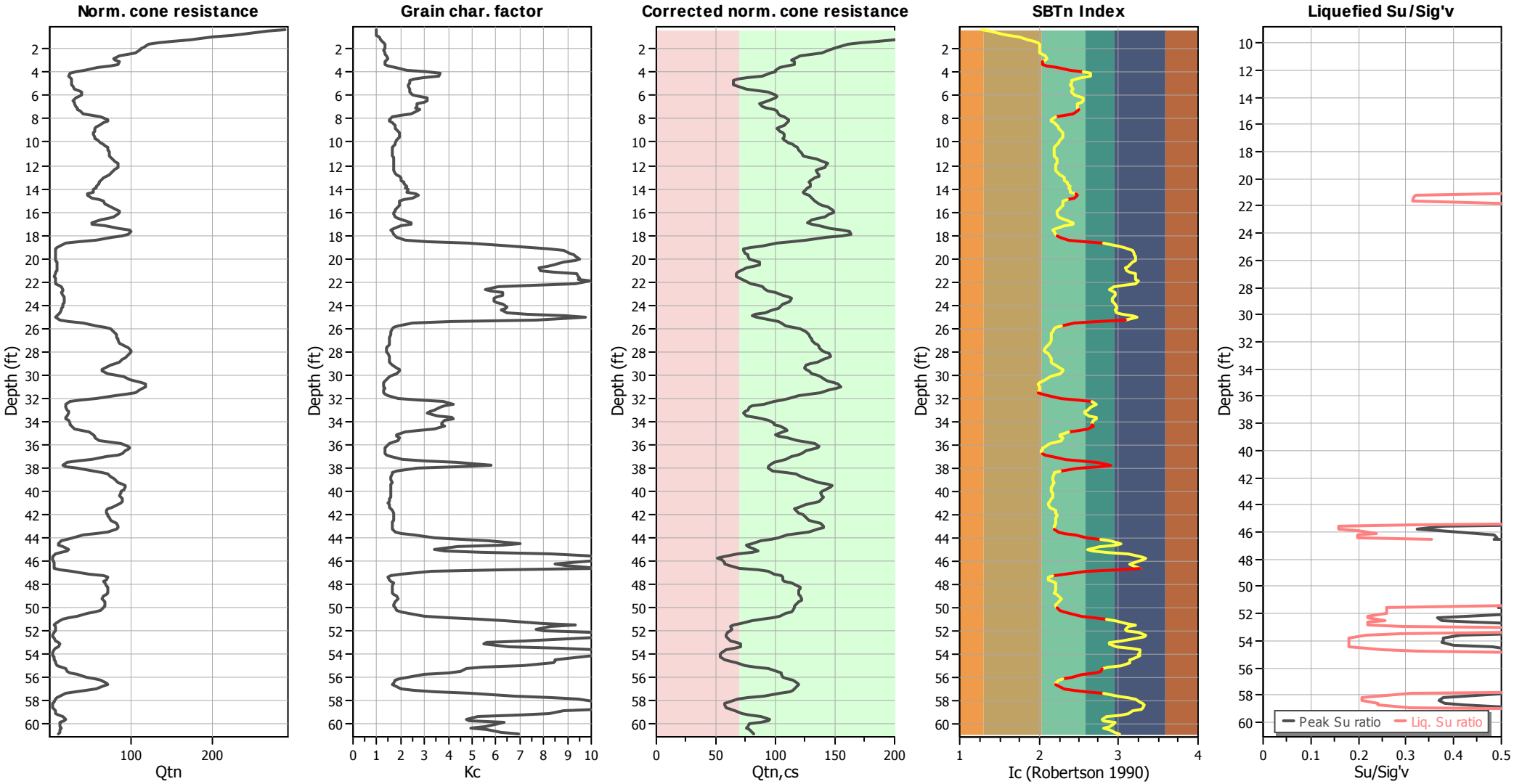




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	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:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.64	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

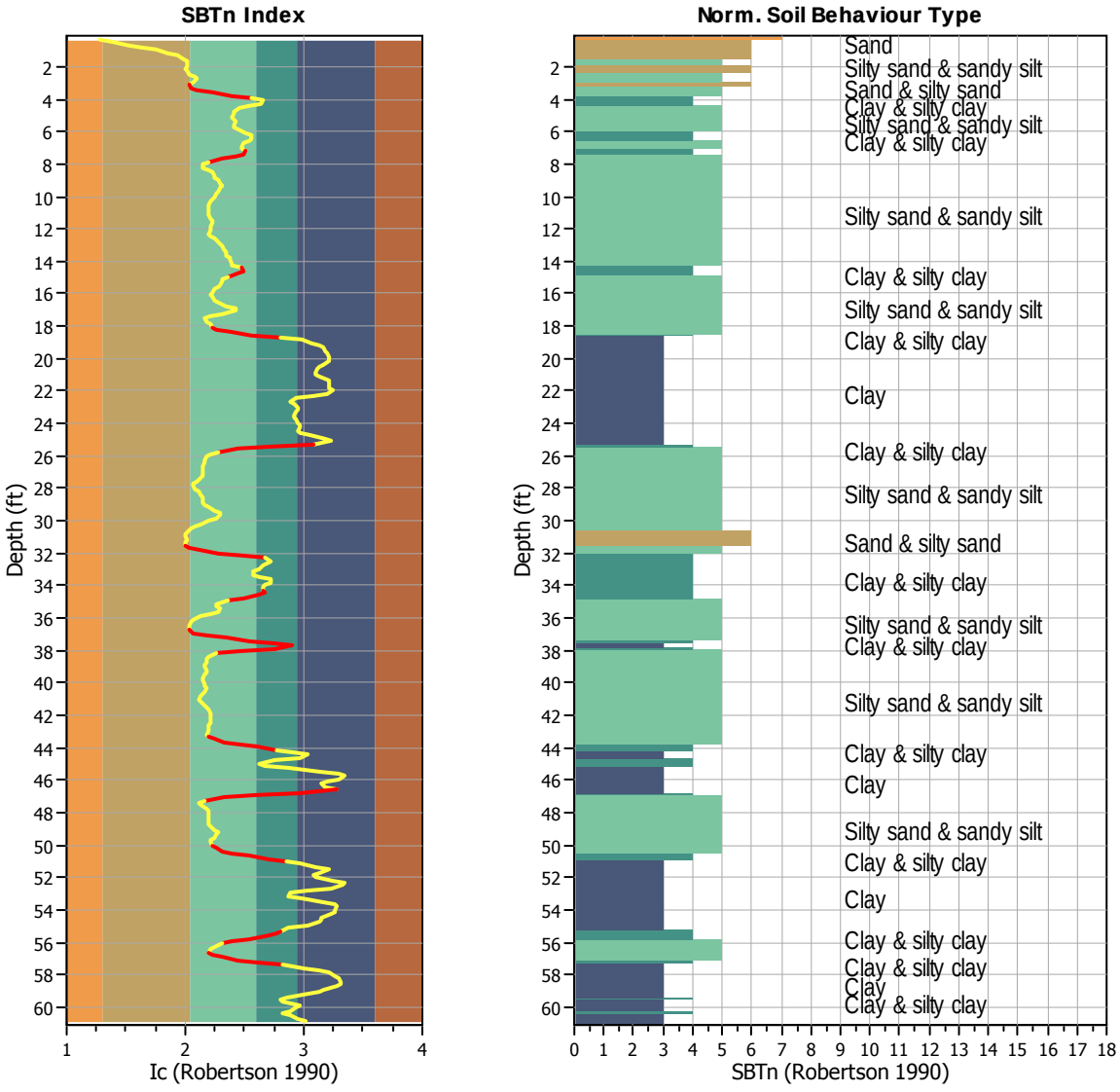
Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.64	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	370
I_c maximum check value:	3.00	Total points excluded:	76
I_c change ratio value:	0.0250	Exclusion percentage:	20.54%
Minimum number of points in layer:	4	Number of layers detected:	14

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	6	Start depth: 3.28 (ft)	5	Silty sand & sandy silt
		End depth: 4.10 (ft)	4	Clay & silty clay
Transition layer 2	5	Start depth: 7.38 (ft)	4	Clay & silty clay
		End depth: 8.04 (ft)	5	Silty sand & sandy silt
Transition layer 3	4	Start depth: 14.60 (ft)	4	Clay & silty clay
		End depth: 15.09 (ft)	5	Silty sand & sandy silt
Transition layer 4	5	Start depth: 18.21 (ft)	5	Silty sand & sandy silt
		End depth: 18.87 (ft)	3	Clay
Transition layer 5	4	Start depth: 25.43 (ft)	4	Clay & silty clay
		End depth: 25.92 (ft)	5	Silty sand & sandy silt
Transition layer 6	6	Start depth: 31.66 (ft)	5	Silty sand & sandy silt
		End depth: 32.48 (ft)	4	Clay & silty clay
Transition layer 7	5	Start depth: 34.45 (ft)	4	Clay & silty clay
		End depth: 35.11 (ft)	5	Silty sand & sandy silt
Transition layer 8	6	Start depth: 36.91 (ft)	5	Silty sand & sandy silt
		End depth: 37.73 (ft)	3	Clay
Transition layer 9	5	Start depth: 37.73 (ft)	3	Clay
		End depth: 38.39 (ft)	5	Silty sand & sandy silt
Transition layer 10	6	Start depth: 43.47 (ft)	5	Silty sand & sandy silt
		End depth: 44.29 (ft)	3	Clay
Transition layer 11	5	Start depth: 46.75 (ft)	3	Clay
		End depth: 47.41 (ft)	5	Silty sand & sandy silt
Transition layer 12	7	Start depth: 50.20 (ft)	5	Silty sand & sandy silt
		End depth: 51.18 (ft)	3	Clay
Transition layer 13	6	Start depth: 55.45 (ft)	4	Clay & silty clay
		End depth: 56.27 (ft)	5	Silty sand & sandy silt
Transition layer 14	6	Start depth: 56.76 (ft)	5	Silty sand & sandy silt
		End depth: 57.58 (ft)	3	Clay

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
1	0.33	192.70	0.60	1.80	0.22	119.97
2	0.49	153.60	0.80	0.90	1.29	121.11
3	0.66	151.70	1.00	1.30	3.15	122.72
4	0.82	141.90	1.30	0.30	4.82	124.04
5	0.98	123.50	1.50	1.10	7.10	125.00
6	1.15	107.20	1.70	0.30	9.37	125.13
7	1.31	93.80	1.60	0.20	11.33	124.81
8	1.48	83.20	1.50	0.00	12.53	123.88
9	1.64	74.70	1.30	0.80	13.29	122.95
10	1.80	71.00	1.20	0.10	13.36	122.04
11	1.97	70.40	1.10	0.00	13.30	121.56
12	2.13	69.40	1.10	0.00	13.02	121.08
13	2.30	68.20	1.00	0.00	13.26	120.50
14	2.46	61.00	0.90	0.00	13.90	119.51
15	2.62	52.60	0.80	-0.10	15.06	118.35
16	2.79	47.30	0.70	-0.10	15.62	117.54
17	2.95	49.90	0.70	0.00	14.95	117.24
18	3.12	54.90	0.70	0.00	13.98	117.37
19	3.28	55.90	0.70	-0.10	14.08	117.36
20	3.45	49.00	0.70	-0.20	15.91	116.70
21	3.61	36.30	0.60	-0.20	20.11	115.75
22	3.77	26.50	0.60	-0.30	26.06	114.19
23	3.94	19.40	0.50	-0.30	33.39	113.02
24	4.10	15.10	0.50	-0.20	37.75	111.55
25	4.27	15.30	0.40	-0.20	37.33	110.29
26	4.43	16.80	0.30	-0.70	32.52	108.28
27	4.59	17.00	0.20	-0.40	28.77	106.53
28	4.76	17.10	0.20	-0.40	27.08	105.41
29	4.92	17.10	0.20	-0.40	26.85	105.44
30	5.09	17.50	0.20	-0.40	26.29	105.49
31	5.25	18.30	0.20	-0.40	26.73	106.73
32	5.41	19.40	0.30	-0.40	27.35	108.75
33	5.58	21.90	0.40	-0.40	26.88	111.20
34	5.74	27.20	0.50	-0.40	27.03	113.05
35	5.91	26.00	0.60	-0.40	28.22	113.99
36	6.07	22.70	0.60	-0.50	31.01	113.74
37	6.23	19.80	0.50	-0.50	33.48	113.03
38	6.40	18.70	0.50	-0.50	33.59	111.90
39	6.56	19.00	0.40	-0.60	32.36	111.38
40	6.73	20.40	0.40	-0.70	30.12	110.90
41	6.89	21.40	0.40	-0.80	29.68	111.62
42	7.05	22.20	0.50	-0.70	29.60	112.24
43	7.22	22.70	0.50	-0.60	30.75	113.26
44	7.38	22.60	0.60	-0.60	30.07	113.84
45	7.55	25.80	0.60	-0.60	27.58	114.54
46	7.71	31.70	0.60	-0.60	22.97	115.46
47	7.87	41.50	0.70	-0.60	19.09	116.32
48	8.04	47.70	0.70	-0.50	17.17	116.96

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
49	8.20	46.80	0.70	-0.50	17.36	116.94
50	8.37	40.20	0.70	-0.60	18.86	116.76
51	8.53	38.10	0.70	-0.60	20.11	116.20
52	8.69	37.00	0.60	-0.60	20.49	115.73
53	8.86	35.60	0.60	-0.50	20.61	115.26
54	9.02	34.90	0.60	-0.70	21.61	115.61
55	9.19	35.10	0.70	-0.60	22.32	115.98
56	9.35	35.30	0.70	-0.60	22.71	116.37
57	9.51	36.10	0.70	-0.60	22.36	116.42
58	9.68	37.60	0.70	-0.60	21.70	116.52
59	9.84	39.60	0.70	-0.60	21.09	117.00
60	10.01	42.80	0.80	-0.60	20.56	117.81
61	10.17	46.70	0.90	-0.50	19.98	118.58
62	10.34	49.30	0.90	-0.60	19.25	119.00
63	10.50	51.60	0.90	-0.60	18.85	119.37
64	10.66	53.30	1.00	-0.60	18.65	119.71
65	10.83	54.40	1.00	-0.60	18.66	120.01
66	10.99	55.10	1.00	-0.60	18.76	120.29
67	11.16	56.00	1.10	-0.60	18.85	120.56
68	11.32	57.10	1.10	-0.60	19.35	121.28
69	11.48	59.10	1.30	-0.60	19.72	122.17
70	11.65	63.00	1.50	-0.50	19.75	123.01
71	11.81	66.80	1.50	-0.50	19.62	123.61
72	11.98	67.90	1.60	-0.50	19.24	123.67
73	12.14	67.80	1.50	-0.70	19.18	123.50
74	12.30	66.20	1.40	-0.80	19.14	123.13
75	12.47	64.80	1.40	-0.80	19.51	122.90
76	12.63	63.00	1.40	-0.70	20.41	123.01
77	12.80	61.00	1.50	-0.70	21.47	123.09
78	12.96	58.60	1.50	-0.80	22.40	123.00
79	13.12	56.20	1.40	-0.80	22.99	122.55
80	13.29	53.40	1.30	-0.90	23.46	122.10
81	13.45	52.10	1.30	-0.80	24.32	122.02
82	13.62	51.10	1.40	-0.90	24.34	122.24
83	13.78	56.00	1.40	-1.10	25.78	122.11
84	13.94	43.50	1.30	-0.80	25.42	121.95
85	14.11	52.30	1.30	-0.90	26.33	121.65
86	14.27	49.40	1.30	-1.00	26.08	121.47
87	14.44	43.90	1.20	-1.50	29.30	121.17
88	14.60	35.70	1.30	-2.10	30.26	121.53
89	14.76	48.60	1.50	-1.90	28.18	122.35
90	14.93	60.00	1.50	-2.40	24.60	123.29
91	15.09	64.40	1.60	-1.00	22.67	123.68
92	15.26	66.40	1.60	-1.00	22.68	124.22
93	15.42	66.60	1.80	-1.00	22.31	124.77
94	15.58	74.40	1.90	-1.10	21.76	125.46
95	15.75	80.40	2.00	-1.50	20.66	126.03
96	15.91	85.10	2.10	-1.10	20.00	126.39

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
97	16.08	87.00	2.10	-1.00	19.68	126.44
98	16.24	85.40	2.00	-1.00	19.78	126.16
99	16.40	80.60	1.90	-1.10	20.37	125.66
100	16.57	74.70	1.80	-1.00	21.60	124.91
101	16.73	65.10	1.60	-1.00	23.99	124.00
102	16.90	52.20	1.50	-1.00	27.47	123.14
103	17.06	45.30	1.50	-0.80	27.77	123.66
104	17.23	68.90	1.90	-0.80	23.24	125.09
105	17.39	98.10	2.10	-2.10	19.40	126.82
106	17.55	106.10	2.40	-0.90	17.86	127.90
107	17.72	107.20	2.60	-1.00	18.44	128.64
108	17.88	105.50	2.80	-0.90	19.22	128.78
109	18.05	99.30	2.60	-1.00	19.97	128.14
110	18.21	87.60	2.10	-1.10	21.40	126.50
111	18.37	64.80	1.60	-1.20	25.26	123.97
112	18.54	37.30	1.20	-1.20	33.67	120.86
113	18.70	20.70	0.90	-1.10	46.20	117.31
114	18.87	15.70	0.60	0.30	57.54	114.13
115	19.03	12.80	0.50	5.70	62.79	111.47
116	19.19	10.50	0.40	12.20	67.19	110.08
117	19.36	10.30	0.40	15.20	70.63	109.93
118	19.52	10.60	0.50	14.80	71.97	110.49
119	19.69	10.70	0.50	14.50	73.02	111.02
120	19.85	10.70	0.50	13.60	73.46	111.01
121	20.01	10.50	0.50	13.50	74.54	111.51
122	20.18	11.00	0.60	14.80	73.44	112.54
123	20.34	13.10	0.70	15.70	70.76	113.55
124	20.51	14.20	0.70	7.90	68.27	113.68
125	20.67	13.30	0.60	4.90	66.83	112.89
126	20.83	12.90	0.50	5.00	64.95	111.49
127	21.00	13.10	0.40	5.60	65.18	110.31
128	21.16	11.20	0.40	4.80	68.13	109.51
129	21.33	9.80	0.40	8.70	73.78	109.26
130	21.49	9.60	0.40	14.30	74.27	109.25
131	21.65	10.90	0.40	15.60	74.31	109.92
132	21.82	10.80	0.50	11.30	73.97	110.55
133	21.98	10.90	0.50	10.70	76.72	111.54
134	22.15	11.10	0.60	11.80	73.37	112.68
135	22.31	14.70	0.70	13.30	63.63	114.44
136	22.47	22.00	0.80	5.10	54.66	115.69
137	22.64	24.50	0.80	-2.00	50.86	116.62
138	22.80	23.40	0.90	-3.10	52.74	117.16
139	22.97	21.50	1.00	-2.30	55.49	118.17
140	23.13	24.40	1.20	-0.90	55.61	119.18
141	23.30	27.20	1.30	-2.10	54.01	120.19
142	23.46	28.30	1.40	-2.80	53.20	120.67
143	23.62	28.10	1.40	-2.40	53.32	120.67
144	23.79	27.30	1.30	-2.60	54.00	120.22

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
145	23.95	25.50	1.20	-3.00	55.53	119.70
146	24.12	23.80	1.20	-3.30	56.68	119.18
147	24.28	23.80	1.10	-3.60	56.49	118.96
148	24.44	25.20	1.10	-4.10	55.33	118.26
149	24.61	23.20	0.90	-5.00	56.76	117.04
150	24.77	17.80	0.70	-5.80	61.76	115.07
151	24.94	13.70	0.60	-5.10	71.06	114.23
152	25.10	13.10	0.80	-3.40	75.69	115.14
153	25.26	16.40	1.00	-1.80	64.02	117.83
154	25.43	31.00	1.30	-0.50	41.52	120.64
155	25.59	65.00	1.40	-7.00	28.37	122.72
156	25.76	84.10	1.50	-1.40	21.49	124.14
157	25.92	96.80	1.70	-1.30	19.16	125.27
158	26.08	105.50	1.90	-1.30	18.36	126.31
159	26.25	111.60	2.10	-1.30	17.93	126.94
160	26.41	114.60	2.10	-1.30	17.65	127.25
161	26.58	116.00	2.10	-1.30	17.40	127.42
162	26.74	119.20	2.20	-1.30	17.31	127.57
163	26.90	119.70	2.20	-1.30	17.27	127.71
164	27.07	120.00	2.20	-1.20	17.24	127.85
165	27.23	123.30	2.30	-1.20	17.05	128.13
166	27.40	129.20	2.40	-1.20	16.56	128.43
167	27.56	135.30	2.40	-1.20	15.86	128.64
168	27.72	140.80	2.40	-1.20	14.94	128.52
169	27.89	143.70	2.20	-1.20	14.78	128.79
170	28.05	145.80	2.60	-1.20	15.07	129.22
171	28.22	146.70	2.80	-1.20	16.12	129.84
172	28.38	140.40	2.90	-1.40	16.91	130.06
173	28.54	137.80	2.90	-1.20	17.37	129.91
174	28.71	135.70	2.70	-1.20	17.36	129.50
175	28.87	131.80	2.50	-1.20	17.30	128.86
176	29.04	124.60	2.30	-1.20	17.80	128.22
177	29.20	114.80	2.20	-1.20	19.10	127.84
178	29.36	106.30	2.30	-1.20	20.84	127.66
179	29.53	99.90	2.30	-1.20	22.46	127.74
180	29.69	98.90	2.40	-1.20	22.50	128.10
181	29.86	112.70	2.60	-1.20	21.13	128.70
182	30.02	127.50	2.70	-1.20	18.75	129.28
183	30.19	144.00	2.70	-1.20	16.90	129.60
184	30.35	150.70	2.70	-1.20	15.40	129.79
185	30.51	160.90	2.70	-1.20	14.22	129.94
186	30.68	173.60	2.70	-1.00	13.17	130.19
187	30.84	183.20	2.80	-1.10	12.84	130.55
188	31.01	181.00	3.00	-1.10	13.10	130.91
189	31.17	179.30	3.10	-1.20	13.27	130.60
190	31.33	170.10	2.50	-1.10	13.13	129.90
191	31.50	163.80	2.30	-1.10	12.85	128.91
192	31.66	158.60	2.20	-1.20	13.88	128.15

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
193	31.83	127.70	2.00	-1.10	16.41	127.44
194	31.99	101.70	2.00	-1.30	21.95	126.29
195	32.15	65.70	1.80	-1.30	30.11	124.80
196	32.32	43.10	1.50	-1.30	38.79	122.60
197	32.48	40.40	1.10	-1.10	41.99	120.48
198	32.65	40.80	0.90	-0.90	39.48	118.80
199	32.81	40.40	0.80	-0.90	38.00	118.29
200	32.97	42.10	0.90	-1.60	36.18	118.09
201	33.14	45.70	0.80	-2.50	34.48	117.88
202	33.30	45.20	0.70	-3.60	33.74	117.59
203	33.47	43.20	0.80	-4.70	36.87	118.07
204	33.63	38.40	1.00	-5.00	41.40	119.28
205	33.79	39.20	1.20	-4.30	41.92	120.77
206	33.96	51.20	1.40	-3.80	39.16	122.05
207	34.12	56.60	1.50	-5.10	38.25	123.08
208	34.29	51.10	1.70	-7.70	38.40	123.07
209	34.45	51.00	1.40	-8.20	39.27	123.89
210	34.61	60.40	2.00	-8.20	36.24	125.04
211	34.78	75.10	2.30	-8.60	30.46	126.05
212	34.94	94.70	1.80	-7.30	25.02	125.94
213	35.11	100.30	1.60	-9.70	21.26	125.20
214	35.27	100.20	1.60	-10.80	21.23	125.54
215	35.43	100.90	2.00	-10.90	22.46	126.77
216	35.60	108.10	2.50	-10.80	22.02	128.21
217	35.76	131.50	2.70	-10.70	19.45	129.37
218	35.93	159.50	2.80	-10.70	16.71	130.09
219	36.09	172.10	2.90	-10.70	15.02	130.30
220	36.26	171.80	2.70	-11.10	14.31	130.08
221	36.42	169.90	2.50	-11.30	13.96	129.36
222	36.58	159.90	2.20	-11.40	13.81	128.67
223	36.75	156.80	2.10	-11.50	13.94	128.14
224	36.91	153.90	2.10	-9.40	15.01	128.01
225	37.08	135.50	2.20	-6.10	18.14	127.79
226	37.24	99.30	2.20	-4.10	24.01	126.95
227	37.40	67.10	1.90	-3.50	32.57	125.40
228	37.57	49.50	1.60	-2.10	42.76	123.43
229	37.73	35.30	1.40	4.70	52.51	122.34
230	37.90	32.20	1.60	21.10	43.22	122.51
231	38.06	75.60	1.40	17.40	29.90	123.81
232	38.22	106.30	1.60	-3.60	20.95	125.31
233	38.39	126.10	2.00	-5.10	18.80	127.06
234	38.55	134.30	2.40	-3.30	18.50	128.52
235	38.72	141.50	2.70	-1.90	18.14	129.14
236	38.88	146.30	2.50	-1.60	17.89	129.60
237	39.04	149.90	2.80	-0.60	17.78	130.13
238	39.21	157.10	3.20	0.30	18.37	131.19
239	39.37	164.30	3.70	-0.30	18.16	132.13
240	39.54	180.60	3.90	-0.50	17.85	132.56

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
241	39.70	176.50	3.70	0.20	17.47	132.37
242	39.86	166.60	3.40	0.90	17.48	131.81
243	40.03	163.90	3.20	1.00	17.62	131.46
244	40.19	163.90	3.30	0.90	17.81	131.44
245	40.36	162.90	3.40	-0.20	18.14	131.66
246	40.52	164.40	3.50	-0.30	17.96	131.68
247	40.68	168.20	3.30	0.30	17.37	131.49
248	40.85	169.30	3.10	0.80	16.74	131.13
249	41.01	166.70	3.00	1.10	16.32	130.52
250	41.18	159.50	2.60	1.20	16.55	129.78
251	41.34	145.10	2.40	1.20	17.13	128.94
252	41.50	135.20	2.30	1.70	18.25	128.47
253	41.67	130.10	2.30	0.90	19.10	128.74
254	41.83	138.50	2.70	1.10	19.50	129.26
255	42.00	141.40	2.80	-0.70	19.68	129.77
256	42.16	139.50	2.80	0.40	19.56	129.88
257	42.32	143.40	2.80	1.40	19.43	130.10
258	42.49	148.90	3.00	1.50	19.21	130.51
259	42.65	153.60	3.20	1.20	19.08	131.16
260	42.82	163.00	3.50	1.40	19.00	131.68
261	42.98	164.80	3.60	1.60	18.71	132.04
262	43.15	169.50	3.60	1.90	18.59	131.98
263	43.31	163.60	3.40	1.90	18.81	131.54
264	43.47	149.00	3.10	1.80	20.37	130.59
265	43.64	119.00	2.70	1.80	23.48	129.11
266	43.80	89.70	2.20	1.80	28.99	127.39
267	43.97	66.80	2.00	2.00	36.01	125.55
268	44.13	51.00	1.70	2.80	44.03	123.82
269	44.29	39.90	1.40	5.00	51.95	121.76
270	44.46	30.10	1.10	8.30	60.25	119.56
271	44.62	22.40	0.90	17.60	55.79	118.77
272	44.79	44.50	1.00	33.80	43.24	119.74
273	44.95	64.10	1.20	2.40	36.23	121.66
274	45.11	61.10	1.50	-0.50	39.21	121.90
275	45.28	35.30	1.20	0.00	50.26	120.35
276	45.44	21.30	0.80	4.00	67.53	116.34
277	45.61	13.60	0.40	18.10	80.52	112.46
278	45.77	12.70	0.40	39.60	84.52	110.62
279	45.93	14.70	0.50	52.90	80.73	111.93
280	46.10	17.90	0.60	55.80	72.50	112.81
281	46.26	21.10	0.50	48.10	68.80	112.98
282	46.43	19.00	0.50	37.50	71.18	114.27
283	46.59	19.00	0.90	43.90	78.99	116.81
284	46.75	20.20	1.30	53.30	55.94	121.39
285	46.92	71.10	1.90	25.10	35.18	124.27
286	47.08	108.90	1.80	-6.70	23.34	126.31
287	47.25	133.30	2.00	-9.50	17.86	127.14
288	47.41	155.70	2.10	-10.10	16.25	127.17

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
289	47.57	135.80	1.70	-9.40	16.52	127.29
290	47.74	131.60	2.10	-9.60	18.20	127.66
291	47.90	137.30	2.50	-9.10	19.15	128.81
292	48.07	147.20	2.70	-3.60	19.06	129.59
293	48.23	151.60	2.80	-3.30	18.98	129.91
294	48.39	146.80	2.80	0.80	19.02	129.91
295	48.56	146.60	2.70	2.60	18.95	129.82
296	48.72	150.70	2.70	2.40	18.87	129.72
297	48.89	146.20	2.70	1.20	19.60	129.86
298	49.05	138.50	2.90	2.70	20.77	130.04
299	49.22	137.70	3.00	4.30	21.56	130.26
300	49.38	140.10	3.00	4.40	21.20	130.20
301	49.54	142.60	2.80	4.00	20.31	129.90
302	49.71	143.80	2.60	3.80	19.52	129.56
303	49.87	144.60	2.60	3.90	19.32	129.37
304	50.04	141.60	2.60	3.80	20.07	129.41
305	50.20	133.50	2.70	3.80	21.22	129.30
306	50.36	125.90	2.60	4.10	23.12	129.01
307	50.53	111.50	2.50	4.20	26.31	128.06
308	50.69	81.70	2.10	4.10	32.52	126.72
309	50.86	56.60	1.90	4.40	40.59	124.92
310	51.02	49.00	1.60	6.00	48.92	122.98
311	51.18	37.10	1.20	-3.90	56.10	120.62
312	51.35	25.10	0.90	-2.90	65.84	117.81
313	51.51	19.10	0.70	1.10	73.51	115.85
314	51.68	21.20	0.70	5.20	67.68	115.37
315	51.84	30.30	0.70	7.70	64.17	115.54
316	52.00	24.20	0.70	7.00	65.78	115.07
317	52.17	17.50	0.60	14.60	76.35	114.18
318	52.33	16.10	0.60	33.10	84.37	113.86
319	52.50	16.50	0.70	41.70	82.79	113.92
320	52.66	18.40	0.60	47.70	75.12	114.24
321	52.82	23.20	0.60	48.00	61.06	115.32
322	52.99	36.80	0.80	31.50	51.56	117.31
323	53.15	43.80	1.00	10.30	50.49	118.64
324	53.32	32.60	1.00	12.40	57.23	118.29
325	53.48	21.70	0.80	28.60	69.70	116.40
326	53.64	16.60	0.60	60.50	77.80	114.15
327	53.81	17.30	0.50	64.60	78.73	112.72
328	53.97	17.30	0.50	60.30	77.62	112.24
329	54.14	16.50	0.50	64.10	77.93	112.23
330	54.30	17.00	0.50	70.90	74.86	112.36
331	54.46	20.10	0.50	70.70	68.62	113.66
332	54.63	26.50	0.70	28.70	68.73	115.38
333	54.79	22.50	0.90	26.20	68.28	116.82
334	54.96	25.50	0.90	58.40	60.78	119.23
335	55.12	47.70	1.40	19.30	50.23	121.83
336	55.28	60.30	1.80	-2.50	45.87	124.52

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
337	55.45	59.50	2.30	-2.00	44.16	125.89
338	55.61	66.80	2.30	0.00	40.49	126.86
339	55.78	86.40	2.40	-5.60	32.69	127.51
340	55.94	112.50	2.40	-8.00	26.39	128.23
341	56.11	130.00	2.50	-9.20	22.65	128.90
342	56.27	140.70	2.70	-9.60	20.62	129.63
343	56.43	156.40	2.90	-9.90	19.35	130.17
344	56.60	163.10	2.90	-9.90	19.03	130.40
345	56.76	152.50	2.90	-9.80	20.24	130.28
346	56.93	133.80	2.90	-9.20	23.24	130.00
347	57.09	114.40	2.90	-8.40	28.52	129.55
348	57.25	85.90	2.90	-6.50	36.18	128.50
349	57.42	58.50	2.40	-2.60	47.06	126.38
350	57.58	38.00	1.60	4.00	58.48	123.42
351	57.75	29.40	1.20	17.20	67.59	120.14
352	57.91	22.90	0.90	47.90	74.00	117.56
353	58.07	19.00	0.70	61.40	78.55	115.40
354	58.24	17.70	0.60	71.90	81.17	114.10
355	58.40	17.10	0.60	77.20	82.56	114.05
356	58.57	17.50	0.70	83.40	82.05	114.49
357	58.73	19.10	0.70	76.90	79.79	115.72
358	58.89	22.10	0.90	79.50	70.64	117.12
359	59.06	32.10	1.00	48.20	67.40	118.71
360	59.22	30.00	1.20	33.80	60.22	120.75
361	59.39	43.80	1.60	89.00	49.03	123.45
362	59.55	77.10	2.10	9.00	45.74	125.04
363	59.71	54.20	2.10	11.60	46.76	124.69
364	59.88	38.10	1.40	38.40	56.18	123.25
365	60.04	39.10	1.50	41.50	54.36	121.08
366	60.21	45.20	0.90	29.70	50.99	120.80
367	60.37	44.70	1.20	17.80	47.12	120.54
368	60.53	48.10	1.30	6.40	51.42	121.23
369	60.70	38.80	1.30	9.90	55.27	121.67
370	60.86	38.40	1.50	26.40	59.61	121.83

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
q_c: Measured cone resistance (tsf)
f_s: Sleeve friction resistance (tsf)
u: Pore pressure (tsf)
Fines content: Percentage of fines in soil (%)
Unit weight: Bulk soil unit weight (pcf)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	0.33	0.02	0.00	0.02	1.00	0.416	1.39	0.300	1.00	1.00	2.000	No
2	0.49	0.03	0.00	0.03	1.00	0.416	1.39	0.300	1.00	1.00	2.000	No
3	0.66	0.04	0.00	0.04	1.00	0.416	1.39	0.300	1.00	1.00	2.000	No
4	0.82	0.05	0.00	0.05	1.00	0.416	1.39	0.300	1.00	1.00	2.000	No
5	0.98	0.06	0.00	0.06	1.00	0.416	1.39	0.300	1.00	1.00	2.000	No
6	1.15	0.07	0.00	0.07	1.00	0.416	1.39	0.300	1.00	1.00	2.000	No
7	1.31	0.08	0.00	0.08	1.00	0.416	1.39	0.300	1.00	1.00	2.000	No
8	1.48	0.09	0.00	0.09	1.00	0.415	1.39	0.300	1.00	1.00	2.000	No
9	1.64	0.10	0.00	0.10	1.00	0.415	1.39	0.299	1.00	1.00	2.000	No
10	1.80	0.11	0.00	0.11	1.00	0.415	1.39	0.299	1.00	1.00	2.000	No
11	1.97	0.12	0.00	0.12	1.00	0.415	1.39	0.299	1.00	1.00	2.000	No
12	2.13	0.13	0.00	0.13	1.00	0.415	1.39	0.299	1.00	1.00	2.000	No
13	2.30	0.14	0.00	0.14	1.00	0.415	1.39	0.299	1.00	1.00	2.000	No
14	2.46	0.15	0.00	0.15	1.00	0.414	1.39	0.299	1.00	1.00	2.000	No
15	2.62	0.16	0.00	0.16	1.00	0.414	1.39	0.299	1.00	1.00	2.000	No
16	2.79	0.17	0.00	0.17	1.00	0.414	1.39	0.299	1.00	1.00	2.000	No
17	2.95	0.18	0.00	0.18	1.00	0.414	1.39	0.299	1.00	1.00	2.000	No
18	3.12	0.19	0.00	0.19	0.99	0.414	1.39	0.298	1.00	1.00	2.000	No
19	3.28	0.20	0.00	0.20	0.99	0.414	1.39	0.298	1.00	1.00	2.000	Yes
20	3.45	0.21	0.00	0.21	0.99	0.413	1.39	0.298	1.00	1.00	2.000	Yes
21	3.61	0.22	0.00	0.22	0.99	0.413	1.39	0.298	1.00	1.00	2.000	Yes
22	3.77	0.23	0.00	0.23	0.99	0.413	1.39	0.298	1.00	1.00	2.000	Yes
23	3.94	0.24	0.00	0.24	0.99	0.413	1.39	0.298	1.00	1.00	2.000	Yes
24	4.10	0.25	0.00	0.25	0.99	0.413	1.39	0.298	1.00	1.00	2.000	Yes
25	4.27	0.25	0.00	0.25	0.99	0.413	1.39	0.298	1.00	1.00	2.000	No
26	4.43	0.26	0.00	0.26	0.99	0.412	1.39	0.297	1.00	1.00	2.000	No
27	4.59	0.27	0.00	0.27	0.99	0.412	1.39	0.297	1.00	1.00	2.000	No
28	4.76	0.28	0.00	0.28	0.99	0.412	1.39	0.297	1.00	1.00	2.000	No
29	4.92	0.29	0.00	0.29	0.99	0.412	1.39	0.297	1.00	1.00	2.000	No
30	5.09	0.30	0.00	0.30	0.99	0.412	1.39	0.297	1.00	1.00	2.000	No
31	5.25	0.31	0.00	0.31	0.99	0.412	1.39	0.297	1.00	1.00	2.000	No
32	5.41	0.32	0.00	0.32	0.99	0.412	1.39	0.297	1.00	1.00	2.000	No
33	5.58	0.33	0.00	0.33	0.99	0.411	1.39	0.297	1.00	1.00	2.000	No
34	5.74	0.33	0.00	0.33	0.99	0.411	1.39	0.297	1.00	1.00	2.000	No
35	5.91	0.34	0.00	0.34	0.99	0.411	1.39	0.296	1.00	1.00	2.000	No
36	6.07	0.35	0.00	0.35	0.99	0.411	1.39	0.296	1.00	1.00	2.000	No
37	6.23	0.36	0.00	0.36	0.99	0.411	1.39	0.296	1.00	1.00	2.000	No
38	6.40	0.37	0.00	0.37	0.99	0.411	1.39	0.296	1.00	1.00	2.000	No
39	6.56	0.38	0.00	0.38	0.99	0.410	1.39	0.296	1.00	1.00	2.000	No
40	6.73	0.39	0.00	0.39	0.99	0.410	1.39	0.296	1.00	1.00	2.000	No
41	6.89	0.40	0.00	0.40	0.99	0.410	1.39	0.296	1.00	1.00	2.000	No
42	7.05	0.41	0.00	0.41	0.99	0.410	1.39	0.296	1.00	1.00	2.000	No
43	7.22	0.42	0.00	0.42	0.99	0.410	1.39	0.296	1.00	1.00	2.000	No
44	7.38	0.43	0.00	0.43	0.98	0.410	1.39	0.295	1.00	1.00	2.000	Yes
45	7.55	0.44	0.00	0.44	0.98	0.410	1.39	0.295	1.00	1.00	2.000	Yes
46	7.71	0.45	0.00	0.45	0.98	0.409	1.39	0.295	1.00	1.00	2.000	Yes
47	7.87	0.45	0.00	0.45	0.98	0.409	1.39	0.295	1.00	1.00	2.000	Yes
48	8.04	0.46	0.00	0.46	0.98	0.409	1.39	0.295	1.00	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	8.20	0.47	0.00	0.47	0.98	0.409	1.39	0.295	1.00	1.00	2.000	No
50	8.37	0.48	0.00	0.48	0.98	0.409	1.39	0.295	1.00	1.00	2.000	No
51	8.53	0.49	0.00	0.49	0.98	0.409	1.39	0.295	1.00	1.00	2.000	No
52	8.69	0.50	0.00	0.50	0.98	0.408	1.39	0.295	1.00	1.00	2.000	No
53	8.86	0.51	0.00	0.51	0.98	0.408	1.39	0.294	1.00	1.00	2.000	No
54	9.02	0.52	0.00	0.52	0.98	0.409	1.39	0.295	1.00	1.00	0.295	No
55	9.19	0.53	0.01	0.53	0.98	0.413	1.39	0.298	1.00	1.00	0.298	No
56	9.35	0.54	0.01	0.53	0.98	0.416	1.39	0.300	1.00	1.00	0.300	No
57	9.51	0.55	0.02	0.53	0.98	0.420	1.39	0.303	1.00	1.00	0.303	No
58	9.68	0.56	0.02	0.54	0.98	0.424	1.39	0.306	1.00	1.00	0.306	No
59	9.84	0.57	0.03	0.54	0.98	0.427	1.39	0.308	1.00	1.00	0.308	No
60	10.01	0.58	0.03	0.55	0.98	0.431	1.39	0.311	1.00	1.00	0.311	No
61	10.17	0.59	0.04	0.55	0.98	0.434	1.39	0.313	1.00	1.00	0.313	No
62	10.34	0.60	0.04	0.56	0.98	0.438	1.39	0.316	1.00	1.00	0.316	No
63	10.50	0.61	0.05	0.56	0.98	0.441	1.39	0.318	1.00	1.00	0.318	No
64	10.66	0.62	0.05	0.57	0.98	0.444	1.39	0.320	1.00	1.00	0.320	No
65	10.83	0.63	0.06	0.57	0.98	0.447	1.39	0.323	1.00	1.00	0.323	No
66	10.99	0.64	0.06	0.58	0.98	0.450	1.39	0.325	1.00	1.00	0.325	No
67	11.16	0.65	0.07	0.58	0.98	0.453	1.39	0.327	1.00	1.00	0.327	No
68	11.32	0.66	0.07	0.59	0.98	0.456	1.39	0.329	1.00	1.00	0.329	No
69	11.48	0.67	0.08	0.59	0.98	0.459	1.39	0.331	1.00	1.00	0.331	No
70	11.65	0.68	0.08	0.60	0.98	0.462	1.39	0.333	1.00	1.00	0.333	No
71	11.81	0.69	0.09	0.60	0.98	0.465	1.39	0.335	1.00	1.00	0.335	No
72	11.98	0.70	0.09	0.61	0.97	0.468	1.39	0.337	1.00	1.00	0.337	No
73	12.14	0.71	0.10	0.61	0.97	0.471	1.39	0.339	1.00	1.00	0.339	No
74	12.30	0.72	0.10	0.62	0.97	0.473	1.39	0.341	1.00	1.00	0.341	No
75	12.47	0.73	0.11	0.62	0.97	0.476	1.39	0.343	1.00	1.00	0.343	No
76	12.63	0.74	0.11	0.63	0.97	0.478	1.39	0.345	1.00	1.00	0.345	No
77	12.80	0.75	0.12	0.63	0.97	0.481	1.39	0.347	1.00	1.00	0.347	No
78	12.96	0.76	0.12	0.64	0.97	0.483	1.39	0.349	1.00	1.00	0.349	No
79	13.12	0.77	0.13	0.64	0.97	0.486	1.39	0.350	1.00	1.00	0.350	No
80	13.29	0.78	0.13	0.65	0.97	0.488	1.39	0.352	1.00	1.00	0.352	No
81	13.45	0.79	0.14	0.65	0.97	0.491	1.39	0.354	1.00	1.00	0.354	No
82	13.62	0.80	0.14	0.65	0.97	0.493	1.39	0.356	1.00	1.00	0.356	No
83	13.78	0.81	0.15	0.66	0.97	0.495	1.39	0.357	1.00	1.00	0.357	No
84	13.94	0.82	0.15	0.66	0.97	0.498	1.39	0.359	1.00	1.00	0.359	No
85	14.11	0.83	0.16	0.67	0.97	0.500	1.39	0.360	1.00	1.00	0.360	No
86	14.27	0.84	0.16	0.67	0.97	0.502	1.39	0.362	1.00	1.00	0.362	No
87	14.44	0.85	0.17	0.68	0.97	0.504	1.39	0.364	1.00	1.00	0.364	No
88	14.60	0.86	0.17	0.68	0.97	0.506	1.39	0.365	1.00	1.00	2.000	Yes
89	14.76	0.87	0.18	0.69	0.97	0.508	1.39	0.367	1.00	1.00	2.000	Yes
90	14.93	0.88	0.19	0.69	0.97	0.510	1.39	0.368	1.00	1.00	2.000	Yes
91	15.09	0.89	0.19	0.70	0.97	0.512	1.39	0.369	1.00	1.00	2.000	Yes
92	15.26	0.90	0.20	0.70	0.97	0.514	1.39	0.371	1.00	1.00	0.371	No
93	15.42	0.91	0.20	0.71	0.97	0.516	1.39	0.372	1.00	1.00	0.372	No
94	15.58	0.92	0.21	0.71	0.97	0.518	1.39	0.374	1.00	1.00	0.374	No
95	15.75	0.93	0.21	0.72	0.97	0.520	1.39	0.375	1.00	1.00	0.375	No
96	15.91	0.94	0.22	0.72	0.97	0.522	1.39	0.376	1.00	1.00	0.376	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	16.08	0.95	0.22	0.73	0.97	0.524	1.39	0.378	1.00	1.00	0.378	No
98	16.24	0.96	0.23	0.74	0.97	0.525	1.39	0.379	1.00	1.00	0.379	No
99	16.40	0.97	0.23	0.74	0.97	0.527	1.39	0.380	1.00	1.00	0.380	No
100	16.57	0.98	0.24	0.75	0.97	0.529	1.39	0.381	1.00	1.00	0.381	No
101	16.73	0.99	0.24	0.75	0.96	0.530	1.39	0.382	1.00	1.00	0.382	No
102	16.90	1.00	0.25	0.76	0.96	0.532	1.39	0.384	1.00	1.00	0.384	No
103	17.06	1.01	0.25	0.76	0.96	0.534	1.39	0.385	1.00	1.00	0.385	No
104	17.23	1.02	0.26	0.77	0.96	0.535	1.39	0.386	1.00	1.00	0.386	No
105	17.39	1.03	0.26	0.77	0.96	0.537	1.39	0.387	1.00	1.00	0.387	No
106	17.55	1.04	0.27	0.78	0.96	0.538	1.39	0.388	1.00	1.00	0.388	No
107	17.72	1.05	0.27	0.78	0.96	0.540	1.39	0.389	1.00	1.00	0.389	No
108	17.88	1.06	0.28	0.79	0.96	0.541	1.39	0.390	1.00	1.00	0.390	No
109	18.05	1.08	0.28	0.79	0.96	0.543	1.39	0.391	1.00	1.00	0.391	No
110	18.21	1.09	0.29	0.80	0.96	0.544	1.39	0.392	1.00	1.00	2.000	Yes
111	18.37	1.10	0.29	0.80	0.96	0.545	1.39	0.393	1.00	1.00	2.000	Yes
112	18.54	1.11	0.30	0.81	0.96	0.547	1.39	0.394	1.00	1.00	2.000	Yes
113	18.70	1.11	0.30	0.81	0.96	0.548	1.39	0.395	1.00	1.00	2.000	Yes
114	18.87	1.12	0.31	0.82	0.96	0.550	1.39	0.396	1.00	1.00	2.000	Yes
115	19.03	1.13	0.31	0.82	0.96	0.551	1.39	0.398	1.00	1.00	0.398	No
116	19.19	1.14	0.32	0.82	0.96	0.553	1.39	0.399	1.00	1.00	0.399	No
117	19.36	1.15	0.32	0.83	0.96	0.554	1.39	0.400	1.00	1.00	0.400	No
118	19.52	1.16	0.33	0.83	0.96	0.556	1.39	0.401	1.00	1.00	0.401	No
119	19.69	1.17	0.33	0.84	0.96	0.557	1.39	0.402	1.00	1.00	0.402	No
120	19.85	1.18	0.34	0.84	0.96	0.559	1.39	0.403	1.00	1.00	0.403	No
121	20.01	1.19	0.34	0.84	0.96	0.560	1.39	0.404	1.00	1.00	0.404	No
122	20.18	1.20	0.35	0.85	0.96	0.561	1.39	0.405	1.00	1.00	0.405	No
123	20.34	1.21	0.35	0.85	0.96	0.563	1.39	0.406	1.00	1.00	0.406	No
124	20.51	1.22	0.36	0.86	0.96	0.564	1.39	0.407	1.00	1.00	0.407	No
125	20.67	1.23	0.36	0.86	0.96	0.565	1.39	0.408	1.00	1.00	0.408	No
126	20.83	1.23	0.37	0.86	0.95	0.567	1.39	0.409	1.00	1.00	0.409	No
127	21.00	1.24	0.37	0.87	0.95	0.568	1.39	0.410	1.00	1.00	0.410	No
128	21.16	1.25	0.38	0.87	0.95	0.569	1.39	0.411	1.00	1.00	0.411	No
129	21.33	1.26	0.38	0.88	0.95	0.571	1.39	0.411	1.00	1.00	0.411	No
130	21.49	1.27	0.39	0.88	0.95	0.572	1.39	0.412	1.00	1.00	0.412	No
131	21.65	1.28	0.39	0.88	0.95	0.573	1.39	0.413	1.00	1.00	0.413	No
132	21.82	1.29	0.40	0.89	0.95	0.574	1.39	0.414	1.00	1.00	0.414	No
133	21.98	1.30	0.40	0.89	0.95	0.575	1.39	0.415	1.00	1.00	0.415	No
134	22.15	1.31	0.41	0.90	0.95	0.577	1.39	0.416	1.00	1.00	0.416	No
135	22.31	1.32	0.42	0.90	0.95	0.578	1.39	0.417	1.00	1.00	0.417	No
136	22.47	1.33	0.42	0.90	0.95	0.579	1.39	0.417	1.00	1.00	0.417	No
137	22.64	1.34	0.43	0.91	0.95	0.580	1.39	0.418	1.00	1.00	0.418	No
138	22.80	1.34	0.43	0.91	0.95	0.581	1.39	0.419	1.00	1.00	0.419	No
139	22.97	1.35	0.44	0.92	0.95	0.582	1.39	0.420	1.00	1.00	0.420	No
140	23.13	1.36	0.44	0.92	0.95	0.583	1.39	0.420	1.00	1.00	0.420	No
141	23.30	1.37	0.45	0.93	0.95	0.584	1.39	0.421	1.00	1.00	0.421	No
142	23.46	1.38	0.45	0.93	0.95	0.584	1.39	0.422	1.00	1.00	0.422	No
143	23.62	1.39	0.46	0.94	0.95	0.585	1.39	0.422	1.00	1.00	0.422	No
144	23.79	1.40	0.46	0.94	0.95	0.586	1.39	0.423	1.00	1.00	0.423	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
145	23.95	1.41	0.47	0.95	0.95	0.587	1.39	0.423	1.00	1.00	0.423	No
146	24.12	1.42	0.47	0.95	0.94	0.588	1.39	0.424	1.00	1.00	0.424	No
147	24.28	1.43	0.48	0.96	0.94	0.589	1.39	0.425	1.00	1.00	0.425	No
148	24.44	1.44	0.48	0.96	0.94	0.589	1.39	0.425	1.00	1.00	0.425	No
149	24.61	1.45	0.49	0.97	0.94	0.590	1.39	0.426	1.00	1.00	0.426	No
150	24.77	1.46	0.49	0.97	0.94	0.591	1.39	0.426	1.00	1.00	0.426	No
151	24.94	1.47	0.50	0.97	0.94	0.592	1.39	0.427	1.00	1.00	0.427	No
152	25.10	1.48	0.50	0.98	0.94	0.593	1.39	0.427	1.00	1.00	0.427	No
153	25.26	1.49	0.51	0.98	0.94	0.593	1.39	0.428	1.00	1.00	0.428	No
154	25.43	1.50	0.51	0.99	0.94	0.594	1.39	0.428	1.00	1.00	2.000	Yes
155	25.59	1.51	0.52	0.99	0.94	0.595	1.39	0.429	1.00	1.00	2.000	Yes
156	25.76	1.52	0.52	1.00	0.94	0.595	1.39	0.429	1.00	1.00	2.000	Yes
157	25.92	1.53	0.53	1.00	0.94	0.596	1.39	0.430	1.00	1.00	2.000	Yes
158	26.08	1.54	0.53	1.01	0.94	0.596	1.39	0.430	1.00	1.00	0.430	No
159	26.25	1.55	0.54	1.01	0.94	0.597	1.39	0.430	1.00	1.00	0.430	No
160	26.41	1.56	0.54	1.02	0.94	0.597	1.39	0.431	1.00	1.00	0.431	No
161	26.58	1.57	0.55	1.02	0.94	0.598	1.39	0.431	1.00	1.00	0.431	No
162	26.74	1.58	0.55	1.03	0.94	0.598	1.39	0.431	1.00	1.00	0.431	No
163	26.90	1.59	0.56	1.03	0.93	0.599	1.39	0.432	1.00	1.00	0.432	No
164	27.07	1.60	0.56	1.04	0.93	0.599	1.39	0.432	1.00	1.00	0.432	No
165	27.23	1.61	0.57	1.05	0.93	0.599	1.39	0.432	1.00	1.00	0.432	No
166	27.40	1.63	0.57	1.05	0.93	0.600	1.39	0.433	1.00	1.00	0.433	No
167	27.56	1.64	0.58	1.06	0.93	0.600	1.39	0.433	1.00	1.00	0.433	No
168	27.72	1.65	0.58	1.06	0.93	0.601	1.39	0.433	1.00	1.00	0.433	No
169	27.89	1.66	0.59	1.07	0.93	0.601	1.39	0.433	1.00	1.00	0.434	No
170	28.05	1.67	0.59	1.07	0.93	0.601	1.39	0.434	1.00	1.00	0.435	No
171	28.22	1.68	0.60	1.08	0.93	0.601	1.39	0.434	1.00	1.00	0.436	No
172	28.38	1.69	0.60	1.08	0.93	0.602	1.39	0.434	0.99	1.00	0.436	No
173	28.54	1.70	0.61	1.09	0.93	0.602	1.39	0.434	0.99	1.00	0.437	No
174	28.71	1.71	0.61	1.09	0.93	0.602	1.39	0.434	0.99	1.00	0.438	No
175	28.87	1.72	0.62	1.10	0.93	0.602	1.39	0.434	0.99	1.00	0.438	No
176	29.04	1.73	0.63	1.11	0.93	0.603	1.39	0.435	0.99	1.00	0.439	No
177	29.20	1.74	0.63	1.11	0.92	0.603	1.39	0.435	0.99	1.00	0.440	No
178	29.36	1.75	0.64	1.12	0.92	0.603	1.39	0.435	0.99	1.00	0.440	No
179	29.53	1.76	0.64	1.12	0.92	0.603	1.39	0.435	0.99	1.00	0.441	No
180	29.69	1.77	0.65	1.13	0.92	0.603	1.39	0.435	0.99	1.00	0.441	No
181	29.86	1.78	0.65	1.13	0.92	0.603	1.39	0.435	0.98	1.00	0.442	No
182	30.02	1.79	0.66	1.14	0.92	0.604	1.39	0.435	0.98	1.00	0.443	No
183	30.19	1.80	0.66	1.14	0.92	0.604	1.39	0.435	0.98	1.00	0.443	No
184	30.35	1.82	0.67	1.15	0.92	0.604	1.39	0.435	0.98	1.00	0.444	No
185	30.51	1.83	0.67	1.15	0.92	0.604	1.39	0.435	0.98	1.00	0.444	No
186	30.68	1.84	0.68	1.16	0.92	0.604	1.39	0.436	0.98	1.00	0.445	No
187	30.84	1.85	0.68	1.17	0.92	0.604	1.39	0.436	0.98	1.00	0.445	No
188	31.01	1.86	0.69	1.17	0.92	0.604	1.39	0.436	0.98	1.00	0.446	No
189	31.17	1.87	0.69	1.18	0.91	0.604	1.39	0.436	0.98	1.00	0.446	No
190	31.33	1.88	0.70	1.18	0.91	0.604	1.39	0.436	0.97	1.00	0.447	No
191	31.50	1.89	0.70	1.19	0.91	0.604	1.39	0.436	0.97	1.00	0.447	No
192	31.66	1.90	0.71	1.19	0.91	0.604	1.39	0.436	0.97	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
193	31.83	1.91	0.71	1.20	0.91	0.604	1.39	0.436	0.97	1.00	2.000	Yes
194	31.99	1.92	0.72	1.20	0.91	0.604	1.39	0.436	0.97	1.00	2.000	Yes
195	32.15	1.93	0.72	1.21	0.91	0.604	1.39	0.436	0.97	1.00	2.000	Yes
196	32.32	1.94	0.73	1.21	0.91	0.604	1.39	0.436	0.97	1.00	2.000	Yes
197	32.48	1.95	0.73	1.22	0.91	0.604	1.39	0.436	0.97	1.00	2.000	Yes
198	32.65	1.96	0.74	1.22	0.91	0.604	1.39	0.436	0.97	1.00	0.450	No
199	32.81	1.97	0.74	1.23	0.90	0.604	1.39	0.436	0.97	1.00	0.451	No
200	32.97	1.98	0.75	1.23	0.90	0.604	1.39	0.436	0.97	1.00	0.451	No
201	33.14	1.99	0.75	1.24	0.90	0.604	1.39	0.436	0.96	1.00	0.452	No
202	33.30	2.00	0.76	1.24	0.90	0.604	1.39	0.436	0.96	1.00	0.452	No
203	33.47	2.01	0.76	1.25	0.90	0.604	1.39	0.436	0.96	1.00	0.453	No
204	33.63	2.02	0.77	1.25	0.90	0.604	1.39	0.436	0.96	1.00	0.453	No
205	33.79	2.03	0.77	1.26	0.90	0.604	1.39	0.436	0.96	1.00	0.453	No
206	33.96	2.04	0.78	1.26	0.90	0.604	1.39	0.436	0.96	1.00	0.454	No
207	34.12	2.05	0.78	1.27	0.90	0.604	1.39	0.436	0.96	1.00	0.454	No
208	34.29	2.06	0.79	1.27	0.90	0.604	1.39	0.435	0.96	1.00	0.454	No
209	34.45	2.07	0.79	1.28	0.89	0.604	1.39	0.435	0.96	1.00	2.000	Yes
210	34.61	2.08	0.80	1.28	0.89	0.604	1.39	0.435	0.96	1.00	2.000	Yes
211	34.78	2.09	0.80	1.29	0.89	0.603	1.39	0.435	0.96	1.00	2.000	Yes
212	34.94	2.10	0.81	1.29	0.89	0.603	1.39	0.435	0.96	1.00	2.000	Yes
213	35.11	2.11	0.81	1.30	0.89	0.603	1.39	0.435	0.95	1.00	2.000	Yes
214	35.27	2.12	0.82	1.30	0.89	0.603	1.39	0.435	0.95	1.00	0.456	No
215	35.43	2.13	0.82	1.31	0.89	0.602	1.39	0.434	0.95	1.00	0.456	No
216	35.60	2.14	0.83	1.31	0.89	0.602	1.39	0.434	0.95	1.00	0.456	No
217	35.76	2.15	0.83	1.32	0.89	0.602	1.39	0.434	0.95	1.00	0.456	No
218	35.93	2.16	0.84	1.32	0.88	0.601	1.39	0.434	0.95	1.00	0.456	No
219	36.09	2.17	0.85	1.33	0.88	0.601	1.39	0.433	0.95	1.00	0.457	No
220	36.26	2.18	0.85	1.33	0.88	0.600	1.39	0.433	0.95	1.00	0.457	No
221	36.42	2.20	0.86	1.34	0.88	0.600	1.39	0.433	0.95	1.00	0.457	No
222	36.58	2.21	0.86	1.35	0.88	0.600	1.39	0.432	0.95	1.00	0.457	No
223	36.75	2.22	0.87	1.35	0.88	0.599	1.39	0.432	0.95	1.00	0.457	No
224	36.91	2.23	0.87	1.36	0.88	0.599	1.39	0.432	0.94	1.00	2.000	Yes
225	37.08	2.24	0.88	1.36	0.88	0.598	1.39	0.432	0.94	1.00	2.000	Yes
226	37.24	2.25	0.88	1.37	0.87	0.598	1.39	0.431	0.94	1.00	2.000	Yes
227	37.40	2.26	0.89	1.37	0.87	0.598	1.39	0.431	0.94	1.00	2.000	Yes
228	37.57	2.27	0.89	1.38	0.87	0.597	1.39	0.431	0.94	1.00	2.000	Yes
229	37.73	2.28	0.90	1.38	0.87	0.597	1.39	0.430	0.94	1.00	2.000	Yes
230	37.90	2.29	0.90	1.39	0.87	0.596	1.39	0.430	0.94	1.00	2.000	Yes
231	38.06	2.30	0.91	1.39	0.87	0.596	1.39	0.430	0.94	1.00	2.000	Yes
232	38.22	2.31	0.91	1.40	0.87	0.596	1.39	0.429	0.94	1.00	2.000	Yes
233	38.39	2.32	0.92	1.40	0.86	0.595	1.39	0.429	0.94	1.00	2.000	Yes
234	38.55	2.33	0.92	1.41	0.86	0.594	1.39	0.429	0.94	1.00	0.458	No
235	38.72	2.34	0.93	1.41	0.86	0.594	1.39	0.428	0.94	1.00	0.458	No
236	38.88	2.35	0.93	1.42	0.86	0.593	1.39	0.428	0.93	1.00	0.458	No
237	39.04	2.36	0.94	1.42	0.86	0.593	1.39	0.427	0.93	1.00	0.458	No
238	39.21	2.37	0.94	1.43	0.86	0.592	1.39	0.427	0.93	1.00	0.458	No
239	39.37	2.38	0.95	1.44	0.86	0.592	1.39	0.427	0.93	1.00	0.458	No
240	39.54	2.39	0.95	1.44	0.86	0.591	1.39	0.426	0.93	1.00	0.457	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
241	39.70	2.40	0.96	1.45	0.85	0.590	1.39	0.426	0.93	1.00	0.457	No
242	39.86	2.42	0.96	1.45	0.85	0.590	1.39	0.425	0.93	1.00	0.457	No
243	40.03	2.43	0.97	1.46	0.85	0.589	1.39	0.425	0.93	1.00	0.457	No
244	40.19	2.44	0.97	1.46	0.85	0.588	1.39	0.424	0.93	1.00	0.457	No
245	40.36	2.45	0.98	1.47	0.85	0.587	1.39	0.424	0.93	1.00	0.457	No
246	40.52	2.46	0.98	1.48	0.85	0.587	1.39	0.423	0.93	1.00	0.457	No
247	40.68	2.47	0.99	1.48	0.84	0.586	1.39	0.423	0.93	1.00	0.457	No
248	40.85	2.48	0.99	1.49	0.84	0.585	1.39	0.422	0.92	1.00	0.457	No
249	41.01	2.49	1.00	1.49	0.84	0.585	1.39	0.422	0.92	1.00	0.456	No
250	41.18	2.50	1.00	1.50	0.84	0.584	1.39	0.421	0.92	1.00	0.456	No
251	41.34	2.51	1.01	1.50	0.84	0.583	1.39	0.421	0.92	1.00	0.456	No
252	41.50	2.52	1.01	1.51	0.84	0.583	1.39	0.420	0.92	1.00	0.456	No
253	41.67	2.53	1.02	1.51	0.84	0.582	1.39	0.420	0.92	1.00	0.456	No
254	41.83	2.54	1.02	1.52	0.83	0.581	1.39	0.419	0.92	1.00	0.455	No
255	42.00	2.55	1.03	1.53	0.83	0.580	1.39	0.419	0.92	1.00	0.455	No
256	42.16	2.57	1.03	1.53	0.83	0.580	1.39	0.418	0.92	1.00	0.455	No
257	42.32	2.58	1.04	1.54	0.83	0.579	1.39	0.417	0.92	1.00	0.455	No
258	42.49	2.59	1.04	1.54	0.83	0.578	1.39	0.417	0.92	1.00	0.455	No
259	42.65	2.60	1.05	1.55	0.83	0.577	1.39	0.416	0.92	1.00	0.454	No
260	42.82	2.61	1.06	1.55	0.83	0.576	1.39	0.416	0.92	1.00	0.454	No
261	42.98	2.62	1.06	1.56	0.82	0.576	1.39	0.415	0.91	1.00	0.454	No
262	43.15	2.63	1.07	1.56	0.82	0.575	1.39	0.414	0.91	1.00	0.453	No
263	43.31	2.64	1.07	1.57	0.82	0.574	1.39	0.414	0.91	1.00	0.453	No
264	43.47	2.65	1.08	1.58	0.82	0.573	1.39	0.413	0.91	1.00	2.000	Yes
265	43.64	2.66	1.08	1.58	0.82	0.572	1.39	0.413	0.91	1.00	2.000	Yes
266	43.80	2.67	1.09	1.59	0.82	0.571	1.39	0.412	0.91	1.00	2.000	Yes
267	43.97	2.68	1.09	1.59	0.81	0.571	1.39	0.412	0.91	1.00	2.000	Yes
268	44.13	2.69	1.10	1.60	0.81	0.570	1.39	0.411	0.91	1.00	2.000	Yes
269	44.29	2.70	1.10	1.60	0.81	0.569	1.39	0.410	0.91	1.00	2.000	Yes
270	44.46	2.71	1.11	1.61	0.81	0.568	1.39	0.410	0.91	1.00	0.451	No
271	44.62	2.72	1.11	1.61	0.81	0.568	1.39	0.409	0.91	1.00	0.451	No
272	44.79	2.73	1.12	1.62	0.81	0.567	1.39	0.409	0.91	1.00	0.451	No
273	44.95	2.74	1.12	1.62	0.80	0.566	1.39	0.408	0.91	1.00	0.450	No
274	45.11	2.75	1.13	1.63	0.80	0.565	1.39	0.408	0.91	1.00	0.450	No
275	45.28	2.76	1.13	1.63	0.80	0.564	1.39	0.407	0.91	1.00	0.450	No
276	45.44	2.77	1.14	1.63	0.80	0.564	1.39	0.407	0.90	1.00	0.449	No
277	45.61	2.78	1.14	1.64	0.80	0.563	1.39	0.406	0.90	1.00	0.449	No
278	45.77	2.79	1.15	1.64	0.80	0.562	1.39	0.406	0.90	1.00	0.449	No
279	45.93	2.80	1.15	1.65	0.79	0.562	1.39	0.405	0.90	1.00	0.448	No
280	46.10	2.81	1.16	1.65	0.79	0.561	1.39	0.404	0.90	1.00	0.448	No
281	46.26	2.82	1.16	1.65	0.79	0.560	1.39	0.404	0.90	1.00	0.448	No
282	46.43	2.83	1.17	1.66	0.79	0.559	1.39	0.403	0.90	1.00	0.447	No
283	46.59	2.84	1.17	1.66	0.79	0.559	1.39	0.403	0.90	1.00	0.447	No
284	46.75	2.85	1.18	1.67	0.79	0.558	1.39	0.402	0.90	1.00	2.000	Yes
285	46.92	2.86	1.18	1.67	0.78	0.557	1.39	0.402	0.90	1.00	2.000	Yes
286	47.08	2.87	1.19	1.68	0.78	0.556	1.39	0.401	0.90	1.00	2.000	Yes
287	47.25	2.88	1.19	1.68	0.78	0.555	1.39	0.400	0.90	1.00	2.000	Yes
288	47.41	2.89	1.20	1.69	0.78	0.554	1.39	0.400	0.90	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
289	47.57	2.90	1.20	1.69	0.78	0.553	1.39	0.399	0.90	1.00	0.445	No
290	47.74	2.91	1.21	1.70	0.78	0.552	1.39	0.398	0.90	1.00	0.444	No
291	47.90	2.92	1.21	1.71	0.77	0.551	1.39	0.398	0.90	1.00	0.444	No
292	48.07	2.93	1.22	1.71	0.77	0.550	1.39	0.397	0.90	1.00	0.443	No
293	48.23	2.94	1.22	1.72	0.77	0.549	1.39	0.396	0.89	1.00	0.443	No
294	48.39	2.95	1.23	1.72	0.77	0.548	1.39	0.395	0.89	1.00	0.442	No
295	48.56	2.96	1.23	1.73	0.77	0.547	1.39	0.395	0.89	1.00	0.442	No
296	48.72	2.97	1.24	1.73	0.77	0.546	1.39	0.394	0.89	1.00	0.441	No
297	48.89	2.98	1.24	1.74	0.76	0.545	1.39	0.393	0.89	1.00	0.441	No
298	49.05	2.99	1.25	1.74	0.76	0.544	1.39	0.393	0.89	1.00	0.440	No
299	49.22	3.00	1.25	1.75	0.76	0.543	1.39	0.392	0.89	1.00	0.440	No
300	49.38	3.02	1.26	1.76	0.76	0.542	1.39	0.391	0.89	1.00	0.439	No
301	49.54	3.03	1.26	1.76	0.76	0.541	1.39	0.390	0.89	1.00	0.439	No
302	49.71	3.04	1.27	1.77	0.76	0.540	1.39	0.390	0.89	1.00	0.438	No
303	49.87	3.05	1.28	1.77	0.75	0.539	1.39	0.389	0.89	1.00	0.438	No
304	50.04	3.06	1.28	1.78	0.75	0.538	1.39	0.388	0.89	1.00	0.437	No
305	50.20	3.07	1.29	1.78	0.75	0.537	1.39	0.388	0.89	1.00	2.000	Yes
306	50.36	3.08	1.29	1.79	0.75	0.536	1.39	0.387	0.89	1.00	2.000	Yes
307	50.53	3.09	1.30	1.79	0.75	0.535	1.39	0.386	0.89	1.00	2.000	Yes
308	50.69	3.10	1.30	1.80	0.75	0.534	1.39	0.385	0.89	1.00	2.000	Yes
309	50.86	3.11	1.31	1.80	0.74	0.534	1.39	0.385	0.88	1.00	2.000	Yes
310	51.02	3.12	1.31	1.81	0.74	0.533	1.39	0.384	0.88	1.00	2.000	Yes
311	51.18	3.13	1.32	1.81	0.74	0.532	1.39	0.383	0.88	1.00	2.000	Yes
312	51.35	3.14	1.32	1.82	0.74	0.531	1.39	0.383	0.88	1.00	0.434	No
313	51.51	3.15	1.33	1.82	0.74	0.530	1.39	0.382	0.88	1.00	0.433	No
314	51.68	3.16	1.33	1.83	0.74	0.529	1.39	0.382	0.88	1.00	0.433	No
315	51.84	3.17	1.34	1.83	0.73	0.528	1.39	0.381	0.88	1.00	0.432	No
316	52.00	3.18	1.34	1.84	0.73	0.527	1.39	0.380	0.88	1.00	0.432	No
317	52.17	3.19	1.35	1.84	0.73	0.527	1.39	0.380	0.88	1.00	0.431	No
318	52.33	3.20	1.35	1.84	0.73	0.526	1.39	0.379	0.88	1.00	0.431	No
319	52.50	3.21	1.36	1.85	0.73	0.525	1.39	0.379	0.88	1.00	0.430	No
320	52.66	3.22	1.36	1.85	0.73	0.524	1.39	0.378	0.88	1.00	0.430	No
321	52.82	3.22	1.37	1.86	0.72	0.523	1.39	0.377	0.88	1.00	0.429	No
322	52.99	3.23	1.37	1.86	0.72	0.522	1.39	0.377	0.88	1.00	0.429	No
323	53.15	3.24	1.38	1.87	0.72	0.521	1.39	0.376	0.88	1.00	0.428	No
324	53.32	3.25	1.38	1.87	0.72	0.521	1.39	0.375	0.88	1.00	0.428	No
325	53.48	3.26	1.39	1.88	0.72	0.520	1.39	0.375	0.88	1.00	0.427	No
326	53.64	3.27	1.39	1.88	0.72	0.519	1.39	0.374	0.88	1.00	0.427	No
327	53.81	3.28	1.40	1.88	0.71	0.518	1.39	0.374	0.88	1.00	0.427	No
328	53.97	3.29	1.40	1.89	0.71	0.517	1.39	0.373	0.88	1.00	0.426	No
329	54.14	3.30	1.41	1.89	0.71	0.516	1.39	0.372	0.87	1.00	0.426	No
330	54.30	3.31	1.41	1.90	0.71	0.516	1.39	0.372	0.87	1.00	0.425	No
331	54.46	3.32	1.42	1.90	0.71	0.515	1.39	0.371	0.87	1.00	0.425	No
332	54.63	3.33	1.42	1.90	0.71	0.514	1.39	0.371	0.87	1.00	0.424	No
333	54.79	3.34	1.43	1.91	0.71	0.513	1.39	0.370	0.87	1.00	0.424	No
334	54.96	3.35	1.43	1.91	0.70	0.512	1.39	0.369	0.87	1.00	0.423	No
335	55.12	3.36	1.44	1.92	0.70	0.511	1.39	0.369	0.87	1.00	0.423	No
336	55.28	3.37	1.44	1.92	0.70	0.510	1.39	0.368	0.87	1.00	0.422	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
337	55.45	3.38	1.45	1.93	0.70	0.509	1.39	0.367	0.87	1.00	2.000	Yes
338	55.61	3.39	1.45	1.93	0.70	0.508	1.39	0.367	0.87	1.00	2.000	Yes
339	55.78	3.40	1.46	1.94	0.70	0.507	1.39	0.366	0.87	1.00	2.000	Yes
340	55.94	3.41	1.46	1.94	0.69	0.507	1.39	0.365	0.87	1.00	2.000	Yes
341	56.11	3.42	1.47	1.95	0.69	0.506	1.39	0.365	0.87	1.00	2.000	Yes
342	56.27	3.43	1.47	1.96	0.69	0.505	1.39	0.364	0.87	1.00	2.000	Yes
343	56.43	3.44	1.48	1.96	0.69	0.504	1.39	0.363	0.87	1.00	0.419	No
344	56.60	3.45	1.49	1.97	0.69	0.503	1.39	0.363	0.87	1.00	0.418	No
345	56.76	3.46	1.49	1.97	0.69	0.502	1.39	0.362	0.87	1.00	2.000	Yes
346	56.93	3.47	1.50	1.98	0.69	0.501	1.39	0.361	0.87	1.00	2.000	Yes
347	57.09	3.48	1.50	1.98	0.68	0.500	1.39	0.360	0.87	1.00	2.000	Yes
348	57.25	3.49	1.51	1.99	0.68	0.499	1.39	0.360	0.86	1.00	2.000	Yes
349	57.42	3.51	1.51	1.99	0.68	0.498	1.39	0.359	0.86	1.00	2.000	Yes
350	57.58	3.51	1.52	2.00	0.68	0.497	1.39	0.359	0.86	1.00	2.000	Yes
351	57.75	3.53	1.52	2.00	0.68	0.496	1.39	0.358	0.86	1.00	0.415	No
352	57.91	3.53	1.53	2.01	0.68	0.496	1.39	0.357	0.86	1.00	0.414	No
353	58.07	3.54	1.53	2.01	0.68	0.495	1.39	0.357	0.86	1.00	0.414	No
354	58.24	3.55	1.54	2.02	0.67	0.494	1.39	0.356	0.86	1.00	0.413	No
355	58.40	3.56	1.54	2.02	0.67	0.493	1.39	0.356	0.86	1.00	0.413	No
356	58.57	3.57	1.55	2.03	0.67	0.492	1.39	0.355	0.86	1.00	0.412	No
357	58.73	3.58	1.55	2.03	0.67	0.492	1.39	0.355	0.86	1.00	0.412	No
358	58.89	3.59	1.56	2.03	0.67	0.491	1.39	0.354	0.86	1.00	0.411	No
359	59.06	3.60	1.56	2.04	0.67	0.490	1.39	0.353	0.86	1.00	0.411	No
360	59.22	3.61	1.57	2.04	0.67	0.489	1.39	0.353	0.86	1.00	0.410	No
361	59.39	3.62	1.57	2.05	0.66	0.488	1.39	0.352	0.86	1.00	0.410	No
362	59.55	3.63	1.58	2.05	0.66	0.488	1.39	0.352	0.86	1.00	0.410	No
363	59.71	3.64	1.58	2.06	0.66	0.487	1.39	0.351	0.86	1.00	0.409	No
364	59.88	3.65	1.59	2.06	0.66	0.486	1.39	0.350	0.86	1.00	0.409	No
365	60.04	3.66	1.59	2.07	0.66	0.485	1.39	0.350	0.86	1.00	2.000	No
366	60.21	3.67	1.60	2.07	0.66	0.484	1.39	0.349	0.86	1.00	2.000	No
367	60.37	3.68	1.60	2.08	0.66	0.484	1.39	0.349	0.86	1.00	2.000	No
368	60.53	3.69	1.61	2.08	0.65	0.483	1.39	0.348	0.86	1.00	2.000	No
369	60.70	3.70	1.61	2.09	0.65	0.482	1.39	0.348	0.86	1.00	2.000	No
370	60.86	3.71	1.62	2.09	0.65	0.481	1.39	0.347	0.85	1.00	2.000	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
σ_v: Total overburden pressure at test point (tsf)
u_0: Water pressure at test point (tsf)
σ_v': Effective overburden pressure based on GWT during earthquake (tsf)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.33	179.69	1.28	0.37	0.50	288.66	1.00	288.66	4.000	No	No	2.00
2	0.49	166.02	1.38	0.48	0.50	266.69	1.00	266.69	4.000	No	No	2.00
3	0.66	149.08	1.52	0.69	0.50	239.45	1.00	239.45	4.000	No	No	2.00
4	0.82	139.05	1.63	0.91	0.50	223.32	1.00	223.32	4.000	No	No	2.00
5	0.98	124.21	1.75	1.21	0.54	199.46	1.07	213.83	4.000	No	No	2.00
6	1.15	108.17	1.86	1.48	0.58	173.68	1.15	199.80	4.000	No	No	2.00
7	1.31	94.74	1.94	1.69	0.61	152.08	1.23	186.56	4.000	No	No	2.00
8	1.48	83.90	1.98	1.75	0.63	134.66	1.28	172.39	4.000	No	No	2.00
9	1.64	76.30	2.01	1.75	0.64	122.43	1.32	161.22	4.000	No	No	2.00
10	1.80	72.04	2.02	1.67	0.64	115.56	1.32	152.56	4.000	No	No	2.00
11	1.97	70.27	2.01	1.62	0.64	112.70	1.32	148.43	4.000	No	No	2.00
12	2.13	69.33	2.00	1.54	0.64	111.18	1.30	144.90	4.000	No	No	2.00
13	2.30	66.20	2.01	1.51	0.64	106.13	1.32	139.58	4.000	No	No	2.00
14	2.46	60.60	2.03	1.49	0.65	97.12	1.35	130.87	4.000	No	No	2.00
15	2.62	53.63	2.07	1.50	0.67	85.91	1.41	121.22	4.000	No	No	2.00
16	2.79	49.93	2.09	1.47	0.67	79.95	1.44	115.41	4.000	No	No	2.00
17	2.95	50.70	2.07	1.39	0.66	81.17	1.40	114.02	4.000	No	No	2.00
18	3.12	53.57	2.04	1.31	0.65	85.76	1.35	115.95	4.000	No	No	2.00
19	3.28	53.27	2.04	1.32	0.65	85.26	1.36	115.73	4.000	Yes	No	2.00
20	3.45	47.06	2.10	1.42	0.68	75.28	1.46	109.98	4.000	Yes	No	2.00
21	3.61	37.26	2.23	1.71	0.73	59.52	1.75	104.20	4.000	Yes	No	2.00
22	3.77	27.40	2.39	2.09	0.79	43.65	2.28	99.40	4.000	Yes	No	2.00
23	3.94	20.33	2.56	2.65	0.85	32.28	3.08	99.58	4.000	Yes	No	2.00
24	4.10	16.60	2.65	2.85	0.88	26.27	3.63	95.46	4.000	Yes	Yes	2.00
25	4.27	15.73	2.64	2.59	0.88	24.86	3.58	88.98	4.000	No	Yes	2.00
26	4.43	16.36	2.54	1.86	0.84	25.86	2.98	77.11	4.000	No	No	2.00
27	4.59	16.96	2.46	1.40	0.81	26.81	2.56	68.56	4.000	No	No	2.00
28	4.76	17.06	2.42	1.19	0.80	26.96	2.38	64.18	4.000	No	No	2.00
29	4.92	17.23	2.41	1.18	0.79	27.21	2.36	64.14	4.000	No	No	2.00
30	5.09	17.63	2.40	1.15	0.79	27.84	2.30	64.05	4.000	No	No	2.00
31	5.25	18.39	2.41	1.29	0.79	29.06	2.34	68.13	4.000	No	No	2.00
32	5.41	19.86	2.42	1.53	0.80	31.40	2.41	75.61	4.000	No	No	2.00
33	5.58	22.83	2.41	1.78	0.79	36.15	2.36	85.33	4.000	No	No	2.00
34	5.74	25.03	2.42	2.02	0.80	39.67	2.37	94.22	4.000	No	No	2.00
35	5.91	25.29	2.44	2.27	0.81	40.09	2.50	100.15	4.000	No	No	2.00
36	6.07	22.83	2.51	2.52	0.83	36.11	2.81	101.32	4.000	No	No	2.00
37	6.23	20.39	2.56	2.66	0.85	32.18	3.10	99.62	4.000	No	No	2.00
38	6.40	19.16	2.56	2.48	0.85	30.18	3.11	93.83	4.000	No	No	2.00
39	6.56	19.36	2.54	2.28	0.84	30.49	2.96	90.30	4.000	No	No	2.00
40	6.73	20.26	2.49	2.01	0.82	31.92	2.71	86.36	4.000	No	No	2.00
41	6.89	21.32	2.48	2.07	0.82	33.62	2.66	89.29	4.000	No	No	2.00
42	7.05	22.09	2.48	2.15	0.82	34.84	2.65	92.25	4.000	No	No	2.00
43	7.22	22.49	2.50	2.42	0.83	35.46	2.78	98.44	4.000	No	No	2.00
44	7.38	23.69	2.49	2.44	0.82	37.38	2.70	100.91	4.000	Yes	No	2.00
45	7.55	26.69	2.43	2.29	0.80	42.18	2.43	102.57	4.000	Yes	No	2.00
46	7.71	32.99	2.31	1.95	0.76	52.29	1.99	103.95	4.000	Yes	No	2.00
47	7.87	40.29	2.20	1.67	0.71	64.00	1.67	107.12	4.000	Yes	No	2.00
48	8.04	45.33	2.14	1.56	0.69	72.08	1.54	111.00	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	8.20	44.89	2.15	1.58	0.69	71.36	1.55	110.82	4.000	No	No	2.00
50	8.37	41.69	2.20	1.70	0.71	66.21	1.66	109.70	4.000	No	No	2.00
51	8.53	38.42	2.23	1.76	0.73	60.94	1.75	106.71	4.000	No	No	2.00
52	8.69	36.89	2.24	1.74	0.73	58.46	1.78	104.10	4.000	No	No	2.00
53	8.86	35.82	2.25	1.70	0.73	56.72	1.79	101.51	4.000	No	No	2.00
54	9.02	35.19	2.28	1.83	0.74	55.39	1.87	103.66	0.184	No	No	0.62
55	9.19	35.09	2.29	1.93	0.75	54.73	1.93	105.71	0.190	No	No	0.64
56	9.35	35.49	2.30	2.00	0.75	54.79	1.96	107.64	0.196	No	No	0.65
57	9.51	36.32	2.30	1.96	0.75	55.24	1.93	106.87	0.194	No	No	0.64
58	9.68	37.76	2.28	1.88	0.74	56.43	1.88	106.01	0.191	No	No	0.62
59	9.84	39.99	2.26	1.86	0.74	58.84	1.83	107.57	0.196	No	No	0.64
60	10.01	43.03	2.25	1.88	0.73	62.30	1.79	111.28	0.208	No	No	0.67
61	10.17	46.26	2.23	1.90	0.72	65.99	1.74	114.90	0.221	No	No	0.71
62	10.34	49.19	2.21	1.85	0.72	69.03	1.69	116.35	0.226	No	No	0.72
63	10.50	51.39	2.20	1.84	0.71	71.15	1.66	117.83	0.232	No	No	0.73
64	10.66	53.09	2.19	1.84	0.71	72.62	1.64	119.24	0.238	No	No	0.74
65	10.83	54.26	2.19	1.86	0.71	73.37	1.64	120.52	0.243	No	No	0.75
66	10.99	55.16	2.19	1.90	0.71	73.83	1.65	121.78	0.248	No	No	0.76
67	11.16	56.06	2.20	1.93	0.71	74.23	1.66	122.96	0.253	No	No	0.77
68	11.32	57.39	2.21	2.06	0.72	75.40	1.69	127.67	0.274	No	No	0.83
69	11.48	59.73	2.22	2.20	0.72	77.82	1.72	133.92	0.303	No	No	0.92
70	11.65	62.96	2.22	2.30	0.72	81.16	1.72	139.84	0.334	No	No	1.00
71	11.81	65.89	2.22	2.35	0.72	84.03	1.71	143.94	0.357	No	No	1.07
72	11.98	67.49	2.21	2.30	0.72	85.00	1.69	143.23	0.353	No	No	1.05
73	12.14	67.29	2.21	2.25	0.72	83.86	1.68	140.95	0.340	No	No	1.00
74	12.30	66.26	2.20	2.19	0.72	81.72	1.68	137.10	0.320	No	No	0.94
75	12.47	64.66	2.22	2.19	0.72	79.01	1.70	134.70	0.307	No	No	0.90
76	12.63	62.92	2.24	2.30	0.73	76.39	1.77	135.51	0.311	No	No	0.90
77	12.80	60.86	2.27	2.44	0.74	73.37	1.86	136.43	0.316	No	No	0.91
78	12.96	58.59	2.30	2.54	0.75	70.14	1.94	135.98	0.314	No	No	0.90
79	13.12	56.05	2.31	2.53	0.76	66.55	1.99	132.41	0.296	No	No	0.84
80	13.29	53.89	2.33	2.51	0.76	63.38	2.03	128.77	0.279	No	No	0.79
81	13.45	52.19	2.35	2.59	0.77	60.91	2.11	128.53	0.277	No	No	0.78
82	13.62	53.05	2.35	2.62	0.77	61.30	2.11	129.46	0.282	No	No	0.79
83	13.78	50.19	2.38	2.77	0.78	57.60	2.25	129.59	0.282	No	No	0.79
84	13.94	50.59	2.38	2.68	0.78	57.46	2.21	127.24	0.272	No	No	0.76
85	14.11	48.39	2.40	2.73	0.79	54.49	2.30	125.56	0.264	No	No	0.73
86	14.27	48.52	2.39	2.66	0.79	54.10	2.28	123.29	0.254	No	No	0.70
87	14.44	42.98	2.47	3.01	0.82	47.65	2.62	124.62	0.260	No	No	0.71
88	14.60	42.71	2.49	3.19	0.82	46.98	2.72	127.83	4.000	Yes	No	2.00
89	14.76	48.07	2.44	3.04	0.81	52.30	2.49	130.46	4.000	Yes	No	2.00
90	14.93	57.64	2.35	2.70	0.77	61.91	2.14	132.27	4.000	Yes	No	2.00
91	15.09	63.58	2.30	2.50	0.75	67.56	1.96	132.50	4.000	Yes	No	2.00
92	15.26	65.79	2.30	2.57	0.75	69.31	1.96	136.05	0.314	No	No	0.85
93	15.42	69.12	2.29	2.59	0.75	72.21	1.93	139.43	0.332	No	No	0.89
94	15.58	73.78	2.28	2.61	0.74	76.44	1.88	144.00	0.358	No	No	0.96
95	15.75	79.95	2.25	2.53	0.73	82.07	1.79	147.23	0.377	No	No	1.00
96	15.91	84.15	2.23	2.48	0.72	85.67	1.74	149.28	0.389	No	No	1.03

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	16.08	85.82	2.22	2.44	0.72	86.62	1.72	148.78	0.386	No	No	1.02
98	16.24	84.32	2.22	2.40	0.72	84.45	1.73	145.70	0.368	No	No	0.97
99	16.40	80.22	2.24	2.40	0.73	79.73	1.77	141.23	0.342	No	No	0.90
100	16.57	73.45	2.27	2.44	0.74	72.40	1.87	135.45	0.311	No	No	0.82
101	16.73	63.99	2.34	2.59	0.77	62.57	2.08	130.13	0.285	No	No	0.75
102	16.90	54.19	2.43	2.88	0.80	52.49	2.42	127.05	0.271	No	No	0.71
103	17.06	55.45	2.43	3.00	0.80	53.32	2.45	130.71	0.288	No	No	0.75
104	17.23	70.75	2.32	2.63	0.76	67.62	2.01	136.03	0.314	No	No	0.81
105	17.39	91.02	2.21	2.37	0.72	86.53	1.70	146.83	0.374	No	No	0.97
106	17.55	103.78	2.17	2.30	0.70	98.07	1.59	155.60	0.430	No	No	1.11
107	17.72	106.25	2.18	2.47	0.71	99.70	1.63	162.17	0.477	No	No	1.22
108	17.88	103.99	2.21	2.59	0.72	96.86	1.68	163.08	0.483	No	No	1.24
109	18.05	97.45	2.23	2.59	0.72	90.03	1.74	156.65	0.437	No	No	1.12
110	18.21	83.88	2.27	2.54	0.74	76.80	1.85	142.35	4.000	Yes	No	2.00
111	18.37	63.22	2.37	2.63	0.78	57.15	2.20	125.69	4.000	Yes	No	2.00
112	18.54	40.92	2.56	3.10	0.85	36.25	3.12	113.03	4.000	Yes	No	2.00
113	18.70	24.56	2.80	3.84	0.94	21.09	4.82	101.55	4.000	Yes	Yes	2.00
114	18.87	16.42	2.99	4.36	1.00	13.60	6.59	89.62	4.000	Yes	Yes	2.00
115	19.03	13.09	3.06	4.18	1.00	10.55	7.47	78.73	4.000	No	Yes	2.00
116	19.19	11.36	3.12	4.24	1.00	8.94	8.22	73.55	4.000	No	Yes	2.00
117	19.36	10.67	3.17	4.55	1.00	8.26	8.83	72.96	4.000	No	Yes	2.00
118	19.52	10.75	3.19	4.87	1.00	8.26	9.07	74.90	4.000	No	Yes	2.00
119	19.69	10.87	3.20	5.15	1.00	8.29	9.25	76.74	4.000	No	Yes	2.00
120	19.85	10.83	3.21	5.18	1.00	8.19	9.33	76.43	4.000	No	Yes	2.00
121	20.01	10.93	3.22	5.47	1.00	8.21	9.53	78.18	4.000	No	Yes	2.00
122	20.18	11.74	3.21	5.69	1.00	8.81	9.33	82.18	4.000	No	Yes	2.00
123	20.34	12.95	3.17	5.68	1.00	9.74	8.85	86.17	4.000	No	Yes	2.00
124	20.51	13.67	3.14	5.35	1.00	10.24	8.41	86.15	4.000	No	Yes	2.00
125	20.67	13.55	3.12	4.87	1.00	10.06	8.16	82.12	4.000	No	Yes	2.00
126	20.83	13.17	3.09	4.19	1.00	9.68	7.83	75.81	4.000	No	Yes	2.00
127	21.00	12.47	3.10	3.86	1.00	9.03	7.87	71.13	4.000	No	Yes	2.00
128	21.16	11.46	3.14	3.92	1.00	8.15	8.39	68.37	4.000	No	Yes	2.00
129	21.33	10.33	3.21	4.41	1.00	7.19	9.39	67.53	4.000	No	Yes	2.00
130	21.49	10.29	3.22	4.44	1.00	7.10	9.48	67.28	4.000	No	Yes	2.00
131	21.65	10.63	3.22	4.63	1.00	7.31	9.49	69.36	4.000	No	Yes	2.00
132	21.82	11.05	3.21	4.78	1.00	7.57	9.42	71.39	4.000	No	Yes	2.00
133	21.98	11.10	3.25	5.44	1.00	7.55	9.92	74.93	4.000	No	Yes	2.00
134	22.15	12.41	3.20	5.41	1.00	8.49	9.32	79.11	4.000	No	Yes	2.00
135	22.31	16.08	3.07	4.74	1.00	11.22	7.61	85.36	4.000	No	Yes	2.00
136	22.47	20.48	2.94	4.00	1.00	14.47	6.12	88.55	4.000	No	Yes	2.00
137	22.64	23.30	2.88	3.79	0.97	16.55	5.52	91.40	4.000	No	Yes	2.00
138	22.80	23.10	2.91	4.14	0.98	16.24	5.81	94.43	4.000	No	Yes	2.00
139	22.97	23.07	2.95	4.76	1.00	16.03	6.25	100.27	4.000	No	Yes	2.00
140	23.13	24.34	2.96	5.08	1.00	16.84	6.27	105.68	4.000	No	Yes	2.00
141	23.30	26.61	2.93	5.15	0.99	18.40	6.02	110.69	4.000	No	Yes	2.00
142	23.46	27.83	2.92	5.17	0.99	19.17	5.89	112.91	4.000	No	Yes	2.00
143	23.62	27.86	2.92	5.16	0.99	19.06	5.91	112.55	4.000	No	Yes	2.00
144	23.79	26.93	2.93	5.09	0.99	18.22	6.02	109.60	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	23.95	25.49	2.96	5.12	1.00	17.03	6.26	106.66	4.000	No	Yes	2.00
146	24.12	24.32	2.97	5.10	1.00	16.08	6.45	103.69	4.000	No	Yes	2.00
147	24.28	24.21	2.97	4.97	1.00	15.90	6.42	102.00	4.000	No	Yes	2.00
148	24.44	24.01	2.95	4.58	1.00	15.64	6.23	97.43	4.000	No	Yes	2.00
149	24.61	22.00	2.97	4.38	1.00	14.14	6.46	91.37	4.000	No	Yes	2.00
150	24.77	18.16	3.05	4.39	1.00	11.42	7.29	83.28	4.000	No	Yes	2.00
151	24.94	14.80	3.17	5.25	1.00	9.06	8.90	80.65	4.000	No	Yes	2.00
152	25.10	14.35	3.23	6.22	1.00	8.69	9.73	84.61	4.000	No	Yes	2.00
153	25.26	20.14	3.08	5.54	1.00	12.52	7.68	96.06	4.000	No	Yes	2.00
154	25.43	37.42	2.72	3.43	0.91	24.69	4.14	102.32	4.000	Yes	Yes	2.00
155	25.59	59.99	2.45	2.39	0.81	41.46	2.52	104.28	4.000	Yes	No	2.00
156	25.76	81.92	2.27	1.91	0.74	58.08	1.86	108.13	4.000	Yes	No	2.00
157	25.92	95.45	2.20	1.81	0.72	68.16	1.68	114.43	4.000	Yes	No	2.00
158	26.08	104.61	2.18	1.84	0.71	74.71	1.62	121.12	0.245	No	No	0.57
159	26.25	110.55	2.17	1.87	0.70	78.76	1.59	125.33	0.263	No	No	0.61
160	26.41	114.05	2.16	1.87	0.70	81.02	1.57	127.38	0.272	No	No	0.63
161	26.58	116.58	2.15	1.85	0.69	82.53	1.56	128.38	0.277	No	No	0.64
162	26.74	118.28	2.15	1.86	0.69	83.41	1.55	129.21	0.281	No	No	0.65
163	26.90	119.62	2.15	1.86	0.69	83.99	1.55	129.94	0.284	No	No	0.66
164	27.07	120.98	2.15	1.87	0.69	84.57	1.54	130.65	0.287	No	No	0.67
165	27.23	124.15	2.14	1.88	0.69	86.51	1.53	132.56	0.297	No	No	0.69
166	27.40	129.25	2.12	1.85	0.68	89.91	1.50	134.95	0.309	No	No	0.71
167	27.56	135.08	2.10	1.80	0.68	93.97	1.46	136.96	0.319	No	No	0.74
168	27.72	139.92	2.07	1.69	0.66	97.45	1.40	136.86	0.318	No	No	0.73
169	27.89	143.42	2.07	1.69	0.66	99.57	1.40	138.91	0.329	No	No	0.76
170	28.05	145.38	2.08	1.76	0.67	100.36	1.41	141.64	0.344	No	No	0.79
171	28.22	144.28	2.11	1.94	0.68	98.53	1.47	145.21	0.365	No	No	0.84
172	28.38	141.62	2.14	2.05	0.69	95.85	1.52	145.97	0.369	No	No	0.85
173	28.54	137.95	2.15	2.08	0.69	92.69	1.55	144.00	0.358	No	No	0.82
174	28.71	135.08	2.15	2.02	0.69	90.33	1.55	140.25	0.337	No	No	0.77
175	28.87	130.68	2.15	1.94	0.69	87.01	1.55	134.77	0.308	No	No	0.70
176	29.04	123.72	2.16	1.91	0.70	81.70	1.58	129.29	0.281	No	No	0.64
177	29.20	115.22	2.20	2.00	0.71	75.13	1.67	125.78	0.265	No	No	0.60
178	29.36	106.98	2.25	2.15	0.73	68.71	1.81	124.28	0.259	No	No	0.59
179	29.53	101.68	2.30	2.34	0.75	64.38	1.94	125.13	0.262	No	No	0.59
180	29.69	103.82	2.30	2.38	0.75	65.45	1.95	127.44	0.272	No	No	0.62
181	29.86	113.02	2.26	2.31	0.74	71.55	1.83	131.08	0.289	No	No	0.65
182	30.02	128.05	2.19	2.11	0.71	82.00	1.65	135.22	0.310	No	No	0.70
183	30.19	140.72	2.14	1.94	0.69	90.88	1.52	138.40	0.327	No	No	0.74
184	30.35	151.85	2.09	1.80	0.67	98.76	1.43	141.29	0.342	No	No	0.77
185	30.51	161.72	2.05	1.69	0.65	105.73	1.36	144.30	0.359	No	No	0.81
186	30.68	172.55	2.01	1.60	0.64	113.34	1.31	148.57	0.385	No	No	0.87
187	30.84	179.25	2.00	1.60	0.64	117.65	1.29	152.35	0.409	No	No	0.92
188	31.01	181.15	2.01	1.65	0.64	118.21	1.31	154.55	0.423	No	No	0.95
189	31.17	176.78	2.01	1.64	0.64	114.76	1.32	150.97	0.400	No	No	0.90
190	31.33	171.05	2.01	1.56	0.64	110.72	1.31	144.92	0.363	No	No	0.81
191	31.50	164.15	2.00	1.44	0.64	106.05	1.30	137.34	0.321	No	No	0.72
192	31.66	150.02	2.03	1.46	0.65	95.66	1.35	128.84	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	31.83	129.32	2.12	1.62	0.68	80.41	1.49	119.95	4.000	Yes	No	2.00
194	31.99	98.35	2.28	2.00	0.75	58.41	1.90	110.97	4.000	Yes	No	2.00
195	32.15	70.15	2.49	2.59	0.82	39.30	2.70	106.26	4.000	Yes	No	2.00
196	32.32	49.72	2.67	3.07	0.89	26.27	3.77	99.04	4.000	Yes	Yes	2.00
197	32.48	41.42	2.73	2.96	0.92	21.30	4.21	89.65	4.000	Yes	Yes	2.00
198	32.65	40.52	2.68	2.42	0.90	20.94	3.86	80.92	4.000	No	Yes	2.00
199	32.81	41.08	2.65	2.22	0.89	21.30	3.67	78.08	4.000	No	Yes	2.00
200	32.97	42.71	2.62	2.05	0.87	22.27	3.43	76.42	4.000	No	Yes	2.00
201	33.14	44.30	2.58	1.89	0.86	23.24	3.22	74.77	0.119	No	No	0.26
202	33.30	44.65	2.57	1.80	0.85	23.42	3.13	73.24	0.117	No	No	0.26
203	33.47	42.20	2.63	2.07	0.88	21.62	3.52	76.10	4.000	No	Yes	2.00
204	33.63	40.20	2.72	2.62	0.91	20.02	4.13	82.63	4.000	No	Yes	2.00
205	33.79	42.87	2.73	2.94	0.91	21.28	4.20	89.35	4.000	No	Yes	2.00
206	33.96	48.94	2.68	2.91	0.90	24.63	3.82	94.11	4.000	No	Yes	2.00
207	34.12	52.89	2.66	3.02	0.89	26.71	3.70	98.79	4.000	No	Yes	2.00
208	34.29	52.80	2.66	3.02	0.89	26.52	3.72	98.61	4.000	No	Yes	2.00
209	34.45	54.05	2.68	3.27	0.90	26.93	3.84	103.31	4.000	Yes	Yes	2.00
210	34.61	62.05	2.62	3.17	0.87	31.41	3.44	108.01	4.000	Yes	Yes	2.00
211	34.78	76.62	2.50	2.73	0.83	40.14	2.74	110.14	4.000	Yes	No	2.00
212	34.94	89.91	2.37	2.16	0.78	48.73	2.18	106.06	4.000	Yes	No	2.00
213	35.11	98.27	2.27	1.73	0.74	54.57	1.84	100.54	4.000	Yes	No	2.00
214	35.27	100.32	2.26	1.77	0.74	55.54	1.84	102.21	0.179	No	No	0.39
215	35.43	102.91	2.30	2.02	0.75	56.30	1.94	109.39	0.202	No	No	0.44
216	35.60	113.34	2.29	2.16	0.75	62.08	1.91	118.32	0.234	No	No	0.51
217	35.76	132.88	2.21	2.04	0.72	74.17	1.70	126.10	0.266	No	No	0.58
218	35.93	154.21	2.13	1.84	0.69	87.94	1.51	132.82	0.298	No	No	0.65
219	36.09	167.64	2.07	1.69	0.67	96.85	1.41	136.46	0.316	No	No	0.69
220	36.26	171.11	2.05	1.60	0.66	99.22	1.37	135.86	0.313	No	No	0.69
221	36.42	167.04	2.04	1.50	0.65	96.85	1.35	130.84	0.288	No	No	0.63
222	36.58	162.04	2.03	1.42	0.65	93.76	1.34	125.91	0.266	No	No	0.58
223	36.75	156.71	2.04	1.38	0.65	90.22	1.35	121.76	0.248	No	No	0.54
224	36.91	148.60	2.07	1.46	0.67	84.33	1.41	118.76	4.000	Yes	No	2.00
225	37.08	129.47	2.17	1.70	0.70	70.99	1.61	113.98	4.000	Yes	No	2.00
226	37.24	100.57	2.34	2.14	0.77	52.17	2.08	108.60	4.000	Yes	No	2.00
227	37.40	71.92	2.54	2.73	0.84	34.82	2.99	104.02	4.000	Yes	No	2.00
228	37.57	50.63	2.74	3.38	0.92	22.76	4.32	98.23	4.000	Yes	Yes	2.00
229	37.73	39.11	2.91	4.16	0.98	16.50	5.78	95.33	4.000	Yes	Yes	2.00
230	37.90	47.91	2.75	3.22	0.92	21.33	4.38	93.45	4.000	Yes	Yes	2.00
231	38.06	71.53	2.48	2.21	0.82	34.94	2.68	93.68	4.000	Yes	No	2.00
232	38.22	102.71	2.26	1.66	0.74	54.02	1.82	98.17	4.000	Yes	No	2.00
233	38.39	122.18	2.19	1.67	0.71	65.57	1.65	108.34	4.000	Yes	No	2.00
234	38.55	133.92	2.19	1.80	0.71	72.06	1.63	117.54	0.231	No	No	0.50
235	38.72	140.67	2.17	1.83	0.70	75.86	1.61	121.80	0.248	No	No	0.54
236	38.88	145.88	2.17	1.86	0.70	78.76	1.59	125.12	0.262	No	No	0.57
237	39.04	151.09	2.16	1.91	0.70	81.56	1.58	128.94	0.279	No	No	0.61
238	39.21	157.10	2.18	2.09	0.71	84.25	1.62	136.63	0.317	No	No	0.69
239	39.37	167.33	2.17	2.18	0.70	89.83	1.61	144.40	0.360	No	No	0.79
240	39.54	173.80	2.17	2.20	0.70	93.45	1.59	148.17	0.383	No	No	0.84

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	39.70	174.57	2.15	2.13	0.70	94.03	1.56	146.71	0.374	No	No	0.82
242	39.86	169.01	2.15	2.06	0.70	90.83	1.56	141.77	0.345	No	No	0.75
243	40.03	164.81	2.16	2.03	0.70	88.26	1.57	138.61	0.328	No	No	0.72
244	40.19	163.57	2.16	2.05	0.70	87.29	1.58	138.18	0.325	No	No	0.71
245	40.36	163.74	2.17	2.11	0.70	86.95	1.61	139.61	0.333	No	No	0.73
246	40.52	165.17	2.17	2.09	0.70	87.71	1.59	139.77	0.334	No	No	0.73
247	40.68	167.30	2.15	2.00	0.69	89.21	1.55	138.59	0.328	No	No	0.72
248	40.85	168.08	2.13	1.89	0.69	90.02	1.51	136.14	0.315	No	No	0.69
249	41.01	165.18	2.12	1.78	0.68	88.67	1.49	131.77	0.293	No	No	0.64
250	41.18	157.12	2.12	1.72	0.68	83.93	1.50	125.93	0.266	No	No	0.58
251	41.34	146.62	2.14	1.69	0.69	77.67	1.54	119.41	0.238	No	No	0.52
252	41.50	136.82	2.18	1.74	0.71	71.49	1.61	115.36	0.223	No	No	0.49
253	41.67	134.62	2.20	1.84	0.71	69.64	1.67	116.61	0.227	No	No	0.50
254	41.83	136.67	2.21	1.94	0.72	70.35	1.70	119.87	0.240	No	No	0.53
255	42.00	139.80	2.22	2.02	0.72	71.74	1.72	123.24	0.254	No	No	0.56
256	42.16	141.44	2.22	2.02	0.72	72.55	1.71	123.99	0.257	No	No	0.57
257	42.32	143.95	2.21	2.03	0.72	73.82	1.70	125.45	0.264	No	No	0.58
258	42.49	148.65	2.21	2.05	0.72	76.30	1.68	128.41	0.277	No	No	0.61
259	42.65	155.19	2.20	2.12	0.71	79.68	1.67	133.30	0.300	No	No	0.66
260	42.82	160.49	2.20	2.17	0.71	82.36	1.67	137.33	0.321	No	No	0.71
261	42.98	165.79	2.19	2.19	0.71	85.22	1.65	140.27	0.337	No	No	0.74
262	43.15	165.99	2.19	2.16	0.71	85.27	1.64	139.65	0.333	No	No	0.74
263	43.31	160.73	2.19	2.13	0.71	82.21	1.65	135.91	0.313	No	No	0.69
264	43.47	143.89	2.24	2.17	0.73	72.26	1.77	128.00	4.000	Yes	No	2.00
265	43.64	119.26	2.33	2.29	0.76	57.95	2.03	117.82	4.000	Yes	No	2.00
266	43.80	91.86	2.46	2.58	0.81	42.36	2.58	109.31	4.000	Yes	No	2.00
267	43.97	69.20	2.61	2.96	0.87	30.02	3.41	102.35	4.000	Yes	Yes	2.00
268	44.13	52.61	2.77	3.41	0.93	21.40	4.50	96.27	4.000	Yes	Yes	2.00
269	44.29	40.41	2.90	3.71	0.98	15.46	5.69	87.96	4.000	Yes	Yes	2.00
270	44.46	30.95	3.03	4.01	1.00	11.36	7.04	79.92	4.000	No	Yes	2.00
271	44.62	32.62	2.96	3.34	1.00	12.00	6.30	75.66	4.000	No	Yes	2.00
272	44.79	43.92	2.75	2.51	0.92	17.61	4.38	77.23	4.000	No	Yes	2.00
273	44.95	56.74	2.62	2.28	0.87	24.09	3.44	82.81	4.000	No	Yes	2.00
274	45.11	53.51	2.68	2.56	0.90	22.18	3.83	84.90	4.000	No	Yes	2.00
275	45.28	39.25	2.87	3.20	0.97	14.92	5.43	80.99	4.000	No	Yes	2.00
276	45.44	23.51	3.13	3.86	1.00	8.25	8.28	68.30	4.000	No	Yes	2.00
277	45.61	16.16	3.29	3.99	1.00	5.31	10.62	56.41	4.000	No	Yes	2.00
278	45.77	14.20	3.34	3.80	1.00	4.52	11.36	51.36	4.000	No	Yes	2.00
279	45.93	15.81	3.30	3.84	1.00	5.15	10.66	54.88	4.000	No	Yes	2.00
280	46.10	18.65	3.19	3.37	1.00	6.26	9.16	57.36	4.000	No	Yes	2.00
281	46.26	20.01	3.15	3.10	1.00	6.78	8.51	57.69	4.000	No	Yes	2.00
282	46.43	20.32	3.18	3.62	1.00	6.89	8.93	61.50	4.000	No	Yes	2.00
283	46.59	20.05	3.27	5.23	1.00	6.77	10.34	69.93	4.000	No	Yes	2.00
284	46.75	37.35	2.96	3.96	1.00	13.54	6.33	85.69	4.000	Yes	Yes	2.00
285	46.92	67.08	2.60	2.60	0.86	28.34	3.30	93.65	4.000	Yes	No	2.00
286	47.08	104.48	2.32	1.87	0.76	49.08	2.02	99.18	4.000	Yes	No	2.00
287	47.25	132.51	2.17	1.52	0.70	65.90	1.59	104.53	4.000	Yes	No	2.00
288	47.41	141.46	2.11	1.40	0.68	71.56	1.48	106.04	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	47.57	140.89	2.12	1.43	0.68	70.95	1.50	106.34	0.192	No	No	0.43
290	47.74	134.77	2.18	1.59	0.70	66.50	1.61	107.08	0.194	No	No	0.44
291	47.90	138.59	2.20	1.79	0.72	67.67	1.68	113.55	0.216	No	No	0.49
292	48.07	145.29	2.20	1.87	0.71	70.95	1.67	118.62	0.235	No	No	0.53
293	48.23	148.50	2.20	1.90	0.71	72.50	1.67	120.75	0.244	No	No	0.55
294	48.39	148.33	2.20	1.90	0.71	72.27	1.67	120.61	0.243	No	No	0.55
295	48.56	148.06	2.20	1.88	0.71	72.07	1.66	119.90	0.240	No	No	0.54
296	48.72	147.86	2.20	1.86	0.71	71.92	1.66	119.21	0.238	No	No	0.54
297	48.89	145.16	2.22	1.95	0.72	69.94	1.71	119.72	0.240	No	No	0.54
298	49.05	140.84	2.25	2.08	0.73	66.93	1.80	120.64	0.243	No	No	0.55
299	49.22	138.82	2.27	2.18	0.74	65.33	1.87	122.00	0.249	No	No	0.57
300	49.38	140.19	2.26	2.14	0.74	66.12	1.84	121.49	0.247	No	No	0.56
301	49.54	142.23	2.24	2.01	0.73	67.58	1.77	119.39	0.238	No	No	0.54
302	49.71	143.72	2.22	1.90	0.72	68.74	1.71	117.27	0.230	No	No	0.52
303	49.87	143.39	2.21	1.85	0.72	68.62	1.69	115.99	0.225	No	No	0.51
304	50.04	139.96	2.23	1.92	0.73	66.32	1.75	115.88	0.225	No	No	0.51
305	50.20	133.72	2.26	2.02	0.74	62.48	1.84	114.91	4.000	Yes	No	2.00
306	50.36	123.69	2.32	2.16	0.76	56.55	2.00	113.16	4.000	Yes	No	2.00
307	50.53	106.43	2.40	2.32	0.79	47.00	2.30	108.20	4.000	Yes	No	2.00
308	50.69	83.33	2.54	2.70	0.84	34.64	2.98	103.28	4.000	Yes	No	2.00
309	50.86	62.50	2.70	3.14	0.90	24.17	4.01	97.04	4.000	Yes	Yes	2.00
310	51.02	47.60	2.85	3.52	0.96	17.15	5.22	89.54	4.000	Yes	Yes	2.00
311	51.18	37.06	2.96	3.63	1.00	12.60	6.35	80.03	4.000	Yes	Yes	2.00
312	51.35	27.07	3.10	3.90	1.00	8.87	7.99	70.86	4.000	No	Yes	2.00
313	51.51	21.82	3.21	4.11	1.00	6.91	9.34	64.53	4.000	No	Yes	2.00
314	51.68	23.60	3.13	3.42	1.00	7.55	8.31	62.74	4.000	No	Yes	2.00
315	51.84	25.33	3.08	3.16	1.00	8.17	7.70	62.95	4.000	No	Yes	2.00
316	52.00	24.14	3.10	3.18	1.00	7.72	7.98	61.59	4.000	No	Yes	2.00
317	52.17	19.53	3.24	3.88	1.00	6.01	9.85	59.20	4.000	No	Yes	2.00
318	52.33	17.13	3.34	4.55	1.00	5.11	11.33	57.94	4.000	No	Yes	2.00
319	52.50	17.59	3.32	4.40	1.00	5.27	11.04	58.17	4.000	No	Yes	2.00
320	52.66	20.03	3.23	3.77	1.00	6.15	9.63	59.25	4.000	No	Yes	2.00
321	52.82	26.74	3.04	2.83	1.00	8.59	7.17	61.64	4.000	No	Yes	2.00
322	52.99	35.03	2.89	2.52	0.98	11.85	5.63	66.70	4.000	No	Yes	2.00
323	53.15	37.99	2.88	2.69	0.97	13.01	5.46	71.07	4.000	No	Yes	2.00
324	53.32	32.95	2.98	3.14	1.00	10.79	6.54	70.56	4.000	No	Yes	2.00
325	53.48	24.12	3.16	3.84	1.00	7.57	8.66	65.58	4.000	No	Yes	2.00
326	53.64	19.27	3.26	3.96	1.00	5.80	10.12	58.66	4.000	No	Yes	2.00
327	53.81	17.96	3.27	3.63	1.00	5.31	10.29	54.63	4.000	No	Yes	2.00
328	53.97	17.94	3.26	3.41	1.00	5.29	10.08	53.38	4.000	No	Yes	2.00
329	54.14	17.87	3.26	3.43	1.00	5.26	10.14	53.31	4.000	No	Yes	2.00
330	54.30	18.85	3.22	3.22	1.00	5.60	9.58	53.67	4.000	No	Yes	2.00
331	54.46	22.02	3.14	3.03	1.00	6.73	8.47	57.00	4.000	No	Yes	2.00
332	54.63	23.64	3.14	3.45	1.00	7.29	8.49	61.94	4.000	No	Yes	2.00
333	54.79	25.38	3.14	3.78	1.00	7.90	8.41	66.49	4.000	No	Yes	2.00
334	54.96	32.40	3.03	3.67	1.00	10.40	7.13	74.11	4.000	No	Yes	2.00
335	55.12	44.86	2.87	3.29	0.97	15.28	5.42	82.85	4.000	No	Yes	2.00
336	55.28	55.90	2.80	3.49	0.94	19.83	4.77	94.51	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
337	55.45	62.18	2.77	3.63	0.93	22.40	4.52	101.18	4.000	Yes	Yes	2.00
338	55.61	70.86	2.70	3.46	0.90	26.33	4.00	105.37	4.000	Yes	Yes	2.00
339	55.78	88.50	2.54	2.78	0.84	35.15	3.00	105.47	4.000	Yes	No	2.00
340	55.94	109.52	2.40	2.29	0.79	46.18	2.31	106.70	4.000	Yes	No	2.00
341	56.11	127.60	2.30	2.04	0.75	55.94	1.96	109.64	4.000	Yes	No	2.00
342	56.27	142.23	2.25	1.95	0.73	63.76	1.79	114.19	4.000	Yes	No	2.00
343	56.43	153.26	2.21	1.89	0.72	69.68	1.69	117.99	0.233	No	No	0.56
344	56.60	157.19	2.20	1.89	0.71	71.66	1.67	119.61	0.239	No	No	0.57
345	56.76	149.66	2.24	1.98	0.73	67.14	1.76	118.24	4.000	Yes	No	2.00
346	56.93	133.44	2.32	2.23	0.76	57.77	2.01	116.22	4.000	Yes	No	2.00
347	57.09	111.25	2.45	2.69	0.81	45.51	2.53	115.17	4.000	Yes	No	2.00
348	57.25	86.18	2.62	3.31	0.87	32.74	3.43	112.30	4.000	Yes	Yes	2.00
349	57.42	60.78	2.82	4.02	0.95	20.95	4.94	103.57	4.000	Yes	Yes	2.00
350	57.58	42.06	3.00	4.50	1.00	13.39	6.74	90.26	4.000	Yes	Yes	2.00
351	57.75	30.43	3.13	4.58	1.00	9.33	8.29	77.37	4.000	No	Yes	2.00
352	57.91	24.37	3.21	4.48	1.00	7.21	9.43	68.04	4.000	No	Yes	2.00
353	58.07	20.74	3.27	4.27	1.00	5.94	10.26	60.95	4.000	No	Yes	2.00
354	58.24	18.94	3.30	4.12	1.00	5.31	10.74	57.03	4.000	No	Yes	2.00
355	58.40	18.55	3.32	4.23	1.00	5.17	10.99	56.78	4.000	No	Yes	2.00
356	58.57	19.04	3.31	4.31	1.00	5.32	10.90	58.01	4.000	No	Yes	2.00
357	58.73	20.72	3.28	4.47	1.00	5.89	10.48	61.73	4.000	No	Yes	2.00
358	58.89	25.42	3.17	3.97	1.00	7.49	8.83	66.13	4.000	No	Yes	2.00
359	59.06	28.84	3.13	4.09	1.00	8.65	8.26	71.42	4.000	No	Yes	2.00
360	59.22	36.12	3.03	3.90	1.00	11.12	7.03	78.20	4.000	No	Yes	2.00
361	59.39	50.93	2.85	3.45	0.96	16.79	5.24	87.95	4.000	No	Yes	2.00
362	59.55	58.89	2.80	3.50	0.94	20.00	4.75	94.95	4.000	No	Yes	2.00
363	59.71	56.75	2.81	3.51	0.95	19.06	4.90	93.35	4.000	No	Yes	2.00
364	59.88	44.24	2.97	4.11	1.00	13.79	6.37	87.76	4.000	No	Yes	2.00
365	60.04	41.33	2.94	3.36	0.99	12.84	6.07	77.96	4.000	No	Yes	2.00
366	60.21	43.43	2.88	3.02	0.97	13.82	5.54	76.57	4.000	No	Yes	2.00
367	60.37	46.26	2.82	2.66	0.95	15.15	4.95	75.01	4.000	No	Yes	2.00
368	60.53	44.03	2.89	3.14	0.98	13.94	5.61	78.19	4.000	No	Yes	2.00
369	60.70	41.97	2.95	3.57	1.00	12.89	6.22	80.18	4.000	No	Yes	2.00
370	60.86	38.83	3.02	4.08	1.00	11.81	6.93	81.89	4.000	No	Yes	2.00

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
0.33	2.00	0.00	9.95	0.16	0.00	0.49	2.00	0.00	9.93	0.16	0.00
0.66	2.00	0.00	9.90	0.17	0.00	0.82	2.00	0.00	9.88	0.16	0.00
0.98	2.00	0.00	9.85	0.16	0.00	1.15	2.00	0.00	9.82	0.17	0.00
1.31	2.00	0.00	9.80	0.16	0.00	1.48	2.00	0.00	9.77	0.17	0.00
1.64	2.00	0.00	9.75	0.16	0.00	1.80	2.00	0.00	9.73	0.16	0.00
1.97	2.00	0.00	9.70	0.17	0.00	2.13	2.00	0.00	9.68	0.16	0.00
2.30	2.00	0.00	9.65	0.17	0.00	2.46	2.00	0.00	9.63	0.16	0.00
2.62	2.00	0.00	9.60	0.16	0.00	2.79	2.00	0.00	9.57	0.17	0.00
2.95	2.00	0.00	9.55	0.16	0.00	3.12	2.00	0.00	9.52	0.17	0.00
3.28	2.00	0.00	9.50	0.16	0.00	3.45	2.00	0.00	9.47	0.17	0.00
3.61	2.00	0.00	9.45	0.16	0.00	3.77	2.00	0.00	9.43	0.16	0.00
3.94	2.00	0.00	9.40	0.17	0.00	4.10	2.00	0.00	9.38	0.16	0.00
4.27	2.00	0.00	9.35	0.17	0.00	4.43	2.00	0.00	9.32	0.16	0.00
4.59	2.00	0.00	9.30	0.16	0.00	4.76	2.00	0.00	9.27	0.17	0.00
4.92	2.00	0.00	9.25	0.16	0.00	5.09	2.00	0.00	9.22	0.17	0.00
5.25	2.00	0.00	9.20	0.16	0.00	5.41	2.00	0.00	9.18	0.16	0.00
5.58	2.00	0.00	9.15	0.17	0.00	5.74	2.00	0.00	9.13	0.16	0.00
5.91	2.00	0.00	9.10	0.17	0.00	6.07	2.00	0.00	9.07	0.16	0.00
6.23	2.00	0.00	9.05	0.16	0.00	6.40	2.00	0.00	9.02	0.17	0.00
6.56	2.00	0.00	9.00	0.16	0.00	6.73	2.00	0.00	8.97	0.17	0.00
6.89	2.00	0.00	8.95	0.16	0.00	7.05	2.00	0.00	8.93	0.16	0.00
7.22	2.00	0.00	8.90	0.17	0.00	7.38	2.00	0.00	8.88	0.16	0.00
7.55	2.00	0.00	8.85	0.17	0.00	7.71	2.00	0.00	8.82	0.16	0.00
7.87	2.00	0.00	8.80	0.16	0.00	8.04	2.00	0.00	8.77	0.17	0.00
8.20	2.00	0.00	8.75	0.16	0.00	8.37	2.00	0.00	8.72	0.17	0.00
8.53	2.00	0.00	8.70	0.16	0.00	8.69	2.00	0.00	8.68	0.16	0.00
8.86	2.00	0.00	8.65	0.17	0.00	9.02	0.62	0.38	8.63	0.16	0.16
9.19	0.64	0.36	8.60	0.17	0.16	9.35	0.65	0.35	8.58	0.16	0.15
9.51	0.64	0.36	8.55	0.16	0.15	9.68	0.62	0.38	8.52	0.17	0.17
9.84	0.64	0.36	8.50	0.16	0.15	10.01	0.67	0.33	8.47	0.17	0.14
10.17	0.71	0.29	8.45	0.16	0.12	10.34	0.72	0.28	8.42	0.17	0.12
10.50	0.73	0.27	8.40	0.16	0.11	10.66	0.74	0.26	8.38	0.16	0.11
10.83	0.75	0.25	8.35	0.17	0.11	10.99	0.76	0.24	8.33	0.16	0.10
11.16	0.77	0.23	8.30	0.17	0.10	11.32	0.83	0.17	8.27	0.16	0.07
11.48	0.92	0.08	8.25	0.16	0.03	11.65	1.00	0.00	8.22	0.17	0.00
11.81	1.07	0.00	8.20	0.16	0.00	11.98	1.05	0.00	8.17	0.17	0.00
12.14	1.00	0.00	8.15	0.16	0.00	12.30	0.94	0.06	8.13	0.16	0.03
12.47	0.90	0.10	8.10	0.17	0.04	12.63	0.90	0.10	8.08	0.16	0.04
12.80	0.91	0.09	8.05	0.17	0.04	12.96	0.90	0.10	8.02	0.16	0.04
13.12	0.84	0.16	8.00	0.16	0.06	13.29	0.79	0.21	7.97	0.17	0.09
13.45	0.78	0.22	7.95	0.16	0.08	13.62	0.79	0.21	7.92	0.17	0.09
13.78	0.79	0.21	7.90	0.16	0.08	13.94	0.76	0.24	7.88	0.16	0.09
14.11	0.73	0.27	7.85	0.17	0.11	14.27	0.70	0.30	7.83	0.16	0.11
14.44	0.71	0.29	7.80	0.17	0.12	14.60	2.00	0.00	7.77	0.16	0.00
14.76	2.00	0.00	7.75	0.16	0.00	14.93	2.00	0.00	7.72	0.17	0.00
15.09	2.00	0.00	7.70	0.16	0.00	15.26	0.85	0.15	7.67	0.17	0.06
15.42	0.89	0.11	7.65	0.16	0.04	15.58	0.96	0.04	7.63	0.16	0.02
15.75	1.00	0.00	7.60	0.17	0.00	15.91	1.03	0.00	7.58	0.16	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
16.08	1.02	0.00	7.55	0.17	0.00	16.24	0.97	0.03	7.53	0.16	0.01
16.40	0.90	0.10	7.50	0.16	0.04	16.57	0.82	0.18	7.47	0.17	0.07
16.73	0.75	0.25	7.45	0.16	0.09	16.90	0.71	0.29	7.42	0.17	0.11
17.06	0.75	0.25	7.40	0.16	0.09	17.23	0.81	0.19	7.37	0.17	0.07
17.39	0.97	0.03	7.35	0.16	0.01	17.55	1.11	0.00	7.33	0.16	0.00
17.72	1.22	0.00	7.30	0.17	0.00	17.88	1.24	0.00	7.28	0.16	0.00
18.05	1.12	0.00	7.25	0.17	0.00	18.21	2.00	0.00	7.22	0.16	0.00
18.37	2.00	0.00	7.20	0.16	0.00	18.54	2.00	0.00	7.17	0.17	0.00
18.70	2.00	0.00	7.15	0.16	0.00	18.87	2.00	0.00	7.12	0.17	0.00
19.03	2.00	0.00	7.10	0.16	0.00	19.19	2.00	0.00	7.08	0.16	0.00
19.36	2.00	0.00	7.05	0.17	0.00	19.52	2.00	0.00	7.03	0.16	0.00
19.69	2.00	0.00	7.00	0.17	0.00	19.85	2.00	0.00	6.97	0.16	0.00
20.01	2.00	0.00	6.95	0.16	0.00	20.18	2.00	0.00	6.92	0.17	0.00
20.34	2.00	0.00	6.90	0.16	0.00	20.51	2.00	0.00	6.87	0.17	0.00
20.67	2.00	0.00	6.85	0.16	0.00	20.83	2.00	0.00	6.83	0.16	0.00
21.00	2.00	0.00	6.80	0.17	0.00	21.16	2.00	0.00	6.78	0.16	0.00
21.33	2.00	0.00	6.75	0.17	0.00	21.49	2.00	0.00	6.72	0.16	0.00
21.65	2.00	0.00	6.70	0.16	0.00	21.82	2.00	0.00	6.67	0.17	0.00
21.98	2.00	0.00	6.65	0.16	0.00	22.15	2.00	0.00	6.62	0.17	0.00
22.31	2.00	0.00	6.60	0.16	0.00	22.47	2.00	0.00	6.58	0.16	0.00
22.64	2.00	0.00	6.55	0.17	0.00	22.80	2.00	0.00	6.53	0.16	0.00
22.97	2.00	0.00	6.50	0.17	0.00	23.13	2.00	0.00	6.47	0.16	0.00
23.30	2.00	0.00	6.45	0.17	0.00	23.46	2.00	0.00	6.42	0.16	0.00
23.62	2.00	0.00	6.40	0.16	0.00	23.79	2.00	0.00	6.37	0.17	0.00
23.95	2.00	0.00	6.35	0.16	0.00	24.12	2.00	0.00	6.32	0.17	0.00
24.28	2.00	0.00	6.30	0.16	0.00	24.44	2.00	0.00	6.28	0.16	0.00
24.61	2.00	0.00	6.25	0.17	0.00	24.77	2.00	0.00	6.23	0.16	0.00
24.94	2.00	0.00	6.20	0.17	0.00	25.10	2.00	0.00	6.17	0.16	0.00
25.26	2.00	0.00	6.15	0.16	0.00	25.43	2.00	0.00	6.12	0.17	0.00
25.59	2.00	0.00	6.10	0.16	0.00	25.76	2.00	0.00	6.07	0.17	0.00
25.92	2.00	0.00	6.05	0.16	0.00	26.08	0.57	0.43	6.03	0.16	0.13
26.25	0.61	0.39	6.00	0.17	0.12	26.41	0.63	0.37	5.98	0.16	0.11
26.58	0.64	0.36	5.95	0.17	0.11	26.74	0.65	0.35	5.92	0.16	0.10
26.90	0.66	0.34	5.90	0.16	0.10	27.07	0.67	0.33	5.87	0.17	0.10
27.23	0.69	0.31	5.85	0.16	0.09	27.40	0.71	0.29	5.82	0.17	0.09
27.56	0.74	0.26	5.80	0.16	0.07	27.72	0.73	0.27	5.78	0.16	0.07
27.89	0.76	0.24	5.75	0.17	0.07	28.05	0.79	0.21	5.73	0.16	0.06
28.22	0.84	0.16	5.70	0.17	0.05	28.38	0.85	0.15	5.67	0.16	0.04
28.54	0.82	0.18	5.65	0.16	0.05	28.71	0.77	0.23	5.62	0.17	0.07
28.87	0.70	0.30	5.60	0.16	0.08	29.04	0.64	0.36	5.57	0.17	0.10
29.20	0.60	0.40	5.55	0.16	0.11	29.36	0.59	0.41	5.53	0.16	0.11
29.53	0.59	0.41	5.50	0.17	0.12	29.69	0.62	0.38	5.48	0.16	0.10
29.86	0.65	0.35	5.45	0.17	0.10	30.02	0.70	0.30	5.42	0.16	0.08
30.19	0.74	0.26	5.40	0.17	0.07	30.35	0.77	0.23	5.37	0.16	0.06
30.51	0.81	0.19	5.35	0.16	0.05	30.68	0.87	0.13	5.32	0.17	0.04
30.84	0.92	0.08	5.30	0.16	0.02	31.01	0.95	0.05	5.27	0.17	0.01
31.17	0.90	0.10	5.25	0.16	0.03	31.33	0.81	0.19	5.23	0.16	0.05
31.50	0.72	0.28	5.20	0.17	0.08	31.66	2.00	0.00	5.18	0.16	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
31.83	2.00	0.00	5.15	0.17	0.00	31.99	2.00	0.00	5.12	0.16	0.00
32.15	2.00	0.00	5.10	0.16	0.00	32.32	2.00	0.00	5.07	0.17	0.00
32.48	2.00	0.00	5.05	0.16	0.00	32.65	2.00	0.00	5.02	0.17	0.00
32.81	2.00	0.00	5.00	0.16	0.00	32.97	2.00	0.00	4.98	0.16	0.00
33.14	0.26	0.74	4.95	0.17	0.19	33.30	0.26	0.74	4.93	0.16	0.18
33.47	2.00	0.00	4.90	0.17	0.00	33.63	2.00	0.00	4.87	0.16	0.00
33.79	2.00	0.00	4.85	0.16	0.00	33.96	2.00	0.00	4.82	0.17	0.00
34.12	2.00	0.00	4.80	0.16	0.00	34.29	2.00	0.00	4.77	0.17	0.00
34.45	2.00	0.00	4.75	0.16	0.00	34.61	2.00	0.00	4.73	0.16	0.00
34.78	2.00	0.00	4.70	0.17	0.00	34.94	2.00	0.00	4.68	0.16	0.00
35.11	2.00	0.00	4.65	0.17	0.00	35.27	0.39	0.61	4.62	0.16	0.14
35.43	0.44	0.56	4.60	0.16	0.13	35.60	0.51	0.49	4.57	0.17	0.12
35.76	0.58	0.42	4.55	0.16	0.09	35.93	0.65	0.35	4.52	0.17	0.08
36.09	0.69	0.31	4.50	0.16	0.07	36.26	0.69	0.31	4.47	0.17	0.07
36.42	0.63	0.37	4.45	0.16	0.08	36.58	0.58	0.42	4.43	0.16	0.09
36.75	0.54	0.46	4.40	0.17	0.10	36.91	2.00	0.00	4.37	0.16	0.00
37.08	2.00	0.00	4.35	0.17	0.00	37.24	2.00	0.00	4.32	0.16	0.00
37.40	2.00	0.00	4.30	0.16	0.00	37.57	2.00	0.00	4.27	0.17	0.00
37.73	2.00	0.00	4.25	0.16	0.00	37.90	2.00	0.00	4.22	0.17	0.00
38.06	2.00	0.00	4.20	0.16	0.00	38.22	2.00	0.00	4.18	0.16	0.00
38.39	2.00	0.00	4.15	0.17	0.00	38.55	0.50	0.50	4.12	0.16	0.10
38.72	0.54	0.46	4.10	0.17	0.10	38.88	0.57	0.43	4.07	0.16	0.08
39.04	0.61	0.39	4.05	0.16	0.08	39.21	0.69	0.31	4.02	0.17	0.06
39.37	0.79	0.21	4.00	0.16	0.04	39.54	0.84	0.16	3.97	0.17	0.03
39.70	0.82	0.18	3.95	0.16	0.04	39.86	0.75	0.25	3.93	0.16	0.05
40.03	0.72	0.28	3.90	0.17	0.06	40.19	0.71	0.29	3.88	0.16	0.05
40.36	0.73	0.27	3.85	0.17	0.05	40.52	0.73	0.27	3.82	0.16	0.05
40.68	0.72	0.28	3.80	0.16	0.05	40.85	0.69	0.31	3.77	0.17	0.06
41.01	0.64	0.36	3.75	0.16	0.07	41.18	0.58	0.42	3.72	0.17	0.08
41.34	0.52	0.48	3.70	0.16	0.09	41.50	0.49	0.51	3.68	0.16	0.09
41.67	0.50	0.50	3.65	0.17	0.09	41.83	0.53	0.47	3.63	0.16	0.08
42.00	0.56	0.44	3.60	0.17	0.08	42.16	0.57	0.43	3.57	0.16	0.08
42.32	0.58	0.42	3.55	0.16	0.07	42.49	0.61	0.39	3.52	0.17	0.07
42.65	0.66	0.34	3.50	0.16	0.06	42.82	0.71	0.29	3.47	0.17	0.05
42.98	0.74	0.26	3.45	0.16	0.04	43.15	0.74	0.26	3.42	0.17	0.05
43.31	0.69	0.31	3.40	0.16	0.05	43.47	2.00	0.00	3.38	0.16	0.00
43.64	2.00	0.00	3.35	0.17	0.00	43.80	2.00	0.00	3.32	0.16	0.00
43.97	2.00	0.00	3.30	0.17	0.00	44.13	2.00	0.00	3.27	0.16	0.00
44.29	2.00	0.00	3.25	0.16	0.00	44.46	2.00	0.00	3.22	0.17	0.00
44.62	2.00	0.00	3.20	0.16	0.00	44.79	2.00	0.00	3.17	0.17	0.00
44.95	2.00	0.00	3.15	0.16	0.00	45.11	2.00	0.00	3.13	0.16	0.00
45.28	2.00	0.00	3.10	0.17	0.00	45.44	2.00	0.00	3.07	0.16	0.00
45.61	2.00	0.00	3.05	0.17	0.00	45.77	2.00	0.00	3.02	0.16	0.00
45.93	2.00	0.00	3.00	0.16	0.00	46.10	2.00	0.00	2.97	0.17	0.00
46.26	2.00	0.00	2.95	0.16	0.00	46.43	2.00	0.00	2.92	0.17	0.00
46.59	2.00	0.00	2.90	0.16	0.00	46.75	2.00	0.00	2.88	0.16	0.00
46.92	2.00	0.00	2.85	0.17	0.00	47.08	2.00	0.00	2.83	0.16	0.00
47.25	2.00	0.00	2.80	0.17	0.00	47.41	2.00	0.00	2.77	0.16	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
47.57	0.43	0.57	2.75	0.16	0.08	47.74	0.44	0.56	2.72	0.17	0.08
47.90	0.49	0.51	2.70	0.16	0.07	48.07	0.53	0.47	2.67	0.17	0.07
48.23	0.55	0.45	2.65	0.16	0.06	48.39	0.55	0.45	2.63	0.16	0.06
48.56	0.54	0.46	2.60	0.17	0.06	48.72	0.54	0.46	2.58	0.16	0.06
48.89	0.54	0.46	2.55	0.17	0.06	49.05	0.55	0.45	2.52	0.16	0.06
49.22	0.57	0.43	2.50	0.17	0.06	49.38	0.56	0.44	2.47	0.16	0.05
49.54	0.54	0.46	2.45	0.16	0.05	49.71	0.52	0.48	2.42	0.17	0.06
49.87	0.51	0.49	2.40	0.16	0.06	50.04	0.51	0.49	2.37	0.17	0.06
50.20	2.00	0.00	2.35	0.16	0.00	50.36	2.00	0.00	2.33	0.16	0.00
50.53	2.00	0.00	2.30	0.17	0.00	50.69	2.00	0.00	2.27	0.16	0.00
50.86	2.00	0.00	2.25	0.17	0.00	51.02	2.00	0.00	2.22	0.16	0.00
51.18	2.00	0.00	2.20	0.16	0.00	51.35	2.00	0.00	2.17	0.17	0.00
51.51	2.00	0.00	2.15	0.16	0.00	51.68	2.00	0.00	2.12	0.17	0.00
51.84	2.00	0.00	2.10	0.16	0.00	52.00	2.00	0.00	2.08	0.16	0.00
52.17	2.00	0.00	2.05	0.17	0.00	52.33	2.00	0.00	2.02	0.16	0.00
52.50	2.00	0.00	2.00	0.17	0.00	52.66	2.00	0.00	1.97	0.16	0.00
52.82	2.00	0.00	1.95	0.16	0.00	52.99	2.00	0.00	1.92	0.17	0.00
53.15	2.00	0.00	1.90	0.16	0.00	53.32	2.00	0.00	1.87	0.17	0.00
53.48	2.00	0.00	1.85	0.16	0.00	53.64	2.00	0.00	1.83	0.16	0.00
53.81	2.00	0.00	1.80	0.17	0.00	53.97	2.00	0.00	1.77	0.16	0.00
54.14	2.00	0.00	1.75	0.17	0.00	54.30	2.00	0.00	1.72	0.16	0.00
54.46	2.00	0.00	1.70	0.16	0.00	54.63	2.00	0.00	1.67	0.17	0.00
54.79	2.00	0.00	1.65	0.16	0.00	54.96	2.00	0.00	1.62	0.17	0.00
55.12	2.00	0.00	1.60	0.16	0.00	55.28	2.00	0.00	1.58	0.16	0.00
55.45	2.00	0.00	1.55	0.17	0.00	55.61	2.00	0.00	1.53	0.16	0.00
55.78	2.00	0.00	1.50	0.17	0.00	55.94	2.00	0.00	1.47	0.16	0.00
56.11	2.00	0.00	1.45	0.17	0.00	56.27	2.00	0.00	1.42	0.16	0.00
56.43	0.56	0.44	1.40	0.16	0.03	56.60	0.57	0.43	1.37	0.17	0.03
56.76	2.00	0.00	1.35	0.16	0.00	56.93	2.00	0.00	1.32	0.17	0.00
57.09	2.00	0.00	1.30	0.16	0.00	57.25	2.00	0.00	1.28	0.16	0.00
57.42	2.00	0.00	1.25	0.17	0.00	57.58	2.00	0.00	1.22	0.16	0.00
57.75	2.00	0.00	1.20	0.17	0.00	57.91	2.00	0.00	1.17	0.16	0.00
58.07	2.00	0.00	1.15	0.16	0.00	58.24	2.00	0.00	1.12	0.17	0.00
58.40	2.00	0.00	1.10	0.16	0.00	58.57	2.00	0.00	1.07	0.17	0.00
58.73	2.00	0.00	1.05	0.16	0.00	58.89	2.00	0.00	1.03	0.16	0.00
59.06	2.00	0.00	1.00	0.17	0.00	59.22	2.00	0.00	0.97	0.16	0.00
59.39	2.00	0.00	0.95	0.17	0.00	59.55	2.00	0.00	0.92	0.16	0.00
59.71	2.00	0.00	0.90	0.16	0.00	59.88	2.00	0.00	0.87	0.17	0.00
60.04	2.00	0.00	0.85	0.16	0.00	60.21	2.00	0.00	0.82	0.17	0.00
60.37	2.00	0.00	0.80	0.16	0.00	60.53	2.00	0.00	0.78	0.16	0.00
60.70	2.00	0.00	0.75	0.17	0.00	60.86	2.00	0.00	0.72	0.16	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI

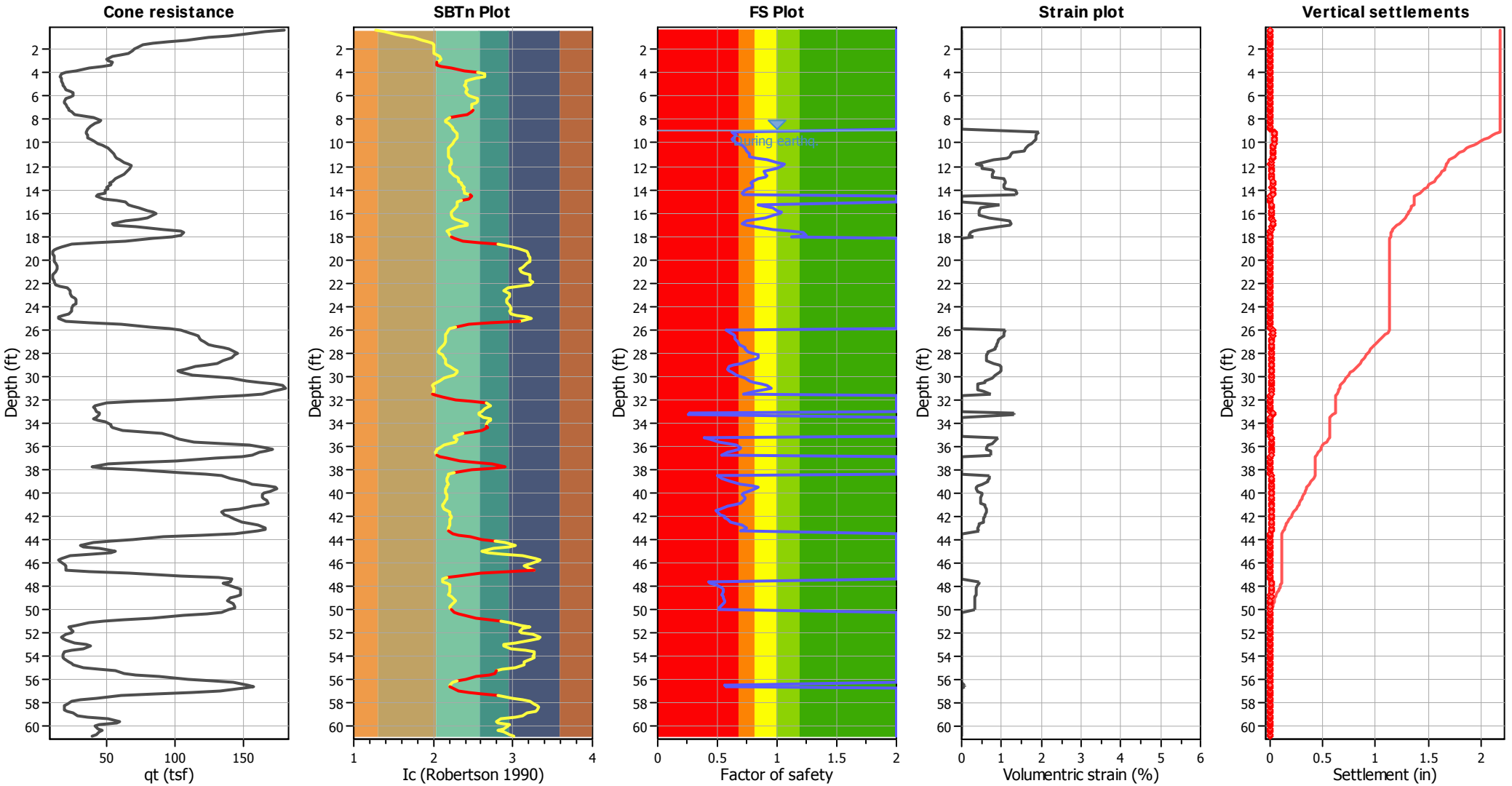
Overall liquefaction potential: 10.54

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (ft)
LPI: Liquefaction potential index value for test point

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 due to soil liquefaction ::

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
9.02	103.66	0.62	1.92	0.85	0.04	9.19	105.71	0.64	1.88	0.84	0.04
9.35	107.64	0.65	1.85	0.84	0.04	9.51	106.87	0.64	1.86	0.84	0.04
9.68	106.01	0.62	1.86	0.84	0.04	9.84	107.57	0.64	1.83	0.83	0.04
10.01	111.28	0.67	1.75	0.83	0.04	10.17	114.90	0.71	1.67	0.83	0.03
10.34	116.35	0.72	1.64	0.82	0.03	10.50	117.83	0.73	1.60	0.82	0.03
10.66	119.24	0.74	1.57	0.82	0.03	10.83	120.52	0.75	1.26	0.82	0.03
10.99	121.78	0.76	1.24	0.81	0.02	11.16	122.96	0.77	1.22	0.81	0.02
11.32	127.67	0.83	1.15	0.81	0.02	11.48	133.92	0.92	0.82	0.81	0.02
11.65	139.84	1.00	0.52	0.80	0.01	11.81	143.94	1.07	0.35	0.80	0.01
11.98	143.23	1.05	0.50	0.80	0.01	12.14	140.95	1.00	0.51	0.79	0.01
12.30	137.10	0.94	0.78	0.79	0.01	12.47	134.70	0.90	0.80	0.79	0.02
12.63	135.51	0.90	0.79	0.79	0.02	12.80	136.43	0.91	0.78	0.78	0.02
12.96	135.98	0.90	0.78	0.78	0.01	13.12	132.41	0.84	1.05	0.78	0.02
13.29	128.77	0.79	1.09	0.77	0.02	13.45	128.53	0.78	1.09	0.77	0.02
13.62	129.46	0.79	1.07	0.77	0.02	13.78	129.59	0.79	1.07	0.77	0.02
13.94	127.24	0.76	1.09	0.76	0.02	14.11	125.56	0.73	1.35	0.76	0.03
14.27	123.29	0.70	1.38	0.76	0.03	14.44	124.62	0.71	1.36	0.76	0.03
14.60	127.83	2.00	0.00	0.75	0.00	14.76	130.46	2.00	0.00	0.75	0.00
14.93	132.27	2.00	0.00	0.75	0.00	15.09	132.50	2.00	0.00	0.74	0.00
15.26	136.05	0.85	0.96	0.74	0.02	15.42	139.43	0.89	0.71	0.74	0.01
15.58	144.00	0.96	0.46	0.74	0.01	15.75	147.23	1.00	0.45	0.73	0.01
15.91	149.28	1.03	0.44	0.73	0.01	16.08	148.78	1.02	0.44	0.73	0.01
16.24	145.70	0.97	0.45	0.72	0.01	16.40	141.23	0.90	0.68	0.72	0.01
16.57	135.45	0.82	0.94	0.72	0.02	16.73	130.13	0.75	1.21	0.72	0.02
16.90	127.05	0.71	1.25	0.71	0.03	17.06	130.71	0.75	1.19	0.71	0.02
17.23	136.03	0.81	0.92	0.71	0.02	17.39	146.83	0.97	0.44	0.71	0.01
17.55	155.60	1.11	0.29	0.70	0.01	17.72	162.17	1.22	0.20	0.70	0.00
17.88	163.08	1.24	0.20	0.70	0.00	18.05	156.65	1.12	0.29	0.69	0.01
18.21	142.35	2.00	0.00	0.69	0.00	18.37	125.69	2.00	0.00	0.69	0.00
18.54	113.03	2.00	0.00	0.69	0.00	18.70	101.55	2.00	0.00	0.68	0.00
18.87	89.62	2.00	0.00	0.68	0.00	19.03	78.73	2.00	0.00	0.68	0.00
19.19	73.55	2.00	0.00	0.67	0.00	19.36	72.96	2.00	0.00	0.67	0.00
19.52	74.90	2.00	0.00	0.67	0.00	19.69	76.74	2.00	0.00	0.67	0.00
19.85	76.43	2.00	0.00	0.66	0.00	20.01	78.18	2.00	0.00	0.66	0.00
20.18	82.18	2.00	0.00	0.66	0.00	20.34	86.17	2.00	0.00	0.66	0.00
20.51	86.15	2.00	0.00	0.65	0.00	20.67	82.12	2.00	0.00	0.65	0.00
20.83	75.81	2.00	0.00	0.65	0.00	21.00	71.13	2.00	0.00	0.64	0.00
21.16	68.37	2.00	0.00	0.64	0.00	21.33	67.53	2.00	0.00	0.64	0.00
21.49	67.28	2.00	0.00	0.64	0.00	21.65	69.36	2.00	0.00	0.63	0.00
21.82	71.39	2.00	0.00	0.63	0.00	21.98	74.93	2.00	0.00	0.63	0.00
22.15	79.11	2.00	0.00	0.62	0.00	22.31	85.36	2.00	0.00	0.62	0.00
22.47	88.55	2.00	0.00	0.62	0.00	22.64	91.40	2.00	0.00	0.62	0.00
22.80	94.43	2.00	0.00	0.61	0.00	22.97	100.27	2.00	0.00	0.61	0.00
23.13	105.68	2.00	0.00	0.61	0.00	23.30	110.69	2.00	0.00	0.61	0.00
23.46	112.91	2.00	0.00	0.60	0.00	23.62	112.55	2.00	0.00	0.60	0.00
23.79	109.60	2.00	0.00	0.60	0.00	23.95	106.66	2.00	0.00	0.59	0.00
24.12	103.69	2.00	0.00	0.59	0.00	24.28	102.00	2.00	0.00	0.59	0.00
24.44	97.43	2.00	0.00	0.59	0.00	24.61	91.37	2.00	0.00	0.58	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
24.77	83.28	2.00	0.00	0.58	0.00	24.94	80.65	2.00	0.00	0.58	0.00
25.10	84.61	2.00	0.00	0.57	0.00	25.26	96.06	2.00	0.00	0.57	0.00
25.43	102.32	2.00	0.00	0.57	0.00	25.59	104.28	2.00	0.00	0.57	0.00
25.76	108.13	2.00	0.00	0.56	0.00	25.92	114.43	2.00	0.00	0.56	0.00
26.08	121.12	0.57	1.11	0.56	0.02	26.25	125.33	0.61	1.08	0.56	0.02
26.41	127.38	0.63	1.06	0.55	0.02	26.58	128.38	0.64	1.05	0.55	0.02
26.74	129.21	0.65	0.93	0.55	0.02	26.90	129.94	0.66	0.92	0.54	0.02
27.07	130.65	0.67	0.91	0.54	0.02	27.23	132.56	0.69	0.89	0.54	0.02
27.40	134.95	0.71	0.86	0.54	0.02	27.56	136.96	0.74	0.84	0.53	0.02
27.72	136.86	0.73	0.83	0.53	0.02	27.89	138.91	0.76	0.66	0.53	0.01
28.05	141.64	0.79	0.64	0.52	0.01	28.22	145.21	0.84	0.61	0.52	0.01
28.38	145.97	0.85	0.61	0.52	0.01	28.54	144.00	0.82	0.62	0.52	0.01
28.71	140.25	0.77	0.64	0.51	0.01	28.87	134.77	0.70	0.82	0.51	0.02
29.04	129.29	0.64	0.96	0.51	0.02	29.20	125.78	0.60	0.98	0.51	0.02
29.36	124.28	0.59	0.98	0.50	0.02	29.53	125.13	0.59	0.97	0.50	0.02
29.69	127.44	0.62	0.95	0.50	0.02	29.86	131.08	0.65	0.83	0.49	0.02
30.02	135.22	0.70	0.79	0.49	0.02	30.19	138.40	0.74	0.76	0.49	0.02
30.35	141.29	0.77	0.60	0.49	0.01	30.51	144.30	0.81	0.57	0.48	0.01
30.68	148.57	0.87	0.42	0.48	0.01	30.84	152.35	0.92	0.40	0.48	0.01
31.01	154.55	0.95	0.39	0.47	0.01	31.17	150.97	0.90	0.40	0.47	0.01
31.33	144.92	0.81	0.55	0.47	0.01	31.50	137.34	0.72	0.73	0.47	0.01
31.66	128.84	2.00	0.00	0.46	0.00	31.83	119.95	2.00	0.00	0.46	0.00
31.99	110.97	2.00	0.00	0.46	0.00	32.15	106.26	2.00	0.00	0.46	0.00
32.32	99.04	2.00	0.00	0.45	0.00	32.48	89.65	2.00	0.00	0.45	0.00
32.65	80.92	2.00	0.00	0.45	0.00	32.81	78.08	2.00	0.00	0.44	0.00
32.97	76.42	2.00	0.00	0.44	0.00	33.14	74.77	0.26	1.30	0.44	0.03
33.30	73.24	0.26	1.31	0.44	0.03	33.47	76.10	2.00	0.00	0.43	0.00
33.63	82.63	2.00	0.00	0.43	0.00	33.79	89.35	2.00	0.00	0.43	0.00
33.96	94.11	2.00	0.00	0.42	0.00	34.12	98.79	2.00	0.00	0.42	0.00
34.29	98.61	2.00	0.00	0.42	0.00	34.45	103.31	2.00	0.00	0.42	0.00
34.61	108.01	2.00	0.00	0.41	0.00	34.78	110.14	2.00	0.00	0.41	0.00
34.94	106.06	2.00	0.00	0.41	0.00	35.11	100.54	2.00	0.00	0.40	0.00
35.27	102.21	0.39	0.92	0.40	0.02	35.43	109.39	0.44	0.87	0.40	0.02
35.60	118.32	0.51	0.81	0.40	0.02	35.76	126.10	0.58	0.76	0.39	0.01
35.93	132.82	0.65	0.64	0.39	0.01	36.09	136.46	0.69	0.61	0.39	0.01
36.26	135.86	0.69	0.61	0.39	0.01	36.42	130.84	0.63	0.72	0.38	0.01
36.58	125.91	0.58	0.74	0.38	0.01	36.75	121.76	0.54	0.75	0.38	0.02
36.91	118.76	2.00	0.00	0.37	0.00	37.08	113.98	2.00	0.00	0.37	0.00
37.24	108.60	2.00	0.00	0.37	0.00	37.40	104.02	2.00	0.00	0.37	0.00
37.57	98.23	2.00	0.00	0.36	0.00	37.73	95.33	2.00	0.00	0.36	0.00
37.90	93.45	2.00	0.00	0.36	0.00	38.06	93.68	2.00	0.00	0.35	0.00
38.22	98.17	2.00	0.00	0.35	0.00	38.39	108.34	2.00	0.00	0.35	0.00
38.55	117.54	0.50	0.71	0.35	0.01	38.72	121.80	0.54	0.68	0.34	0.01
38.88	125.12	0.57	0.66	0.34	0.01	39.04	128.94	0.61	0.64	0.34	0.01
39.21	136.63	0.69	0.53	0.34	0.01	39.37	144.40	0.79	0.40	0.33	0.01
39.54	148.17	0.84	0.38	0.33	0.01	39.70	146.71	0.82	0.38	0.33	0.01
39.86	141.77	0.75	0.40	0.32	0.01	40.03	138.61	0.72	0.50	0.32	0.01
40.19	138.18	0.71	0.50	0.32	0.01	40.36	139.61	0.73	0.48	0.32	0.01

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
40.52	139.77	0.73	0.48	0.31	0.01	40.68	138.59	0.72	0.48	0.31	0.01
40.85	136.14	0.69	0.49	0.31	0.01	41.01	131.77	0.64	0.57	0.30	0.01
41.18	125.93	0.58	0.58	0.30	0.01	41.34	119.41	0.52	0.60	0.30	0.01
41.50	115.36	0.49	0.62	0.30	0.01	41.67	116.61	0.50	0.61	0.29	0.01
41.83	119.87	0.53	0.59	0.29	0.01	42.00	123.24	0.56	0.57	0.29	0.01
42.16	123.99	0.57	0.56	0.29	0.01	42.32	125.45	0.58	0.55	0.28	0.01
42.49	128.41	0.61	0.53	0.28	0.01	42.65	133.30	0.66	0.45	0.28	0.01
42.82	137.33	0.71	0.43	0.27	0.01	42.98	140.27	0.74	0.41	0.27	0.01
43.15	139.65	0.74	0.41	0.27	0.01	43.31	135.91	0.69	0.42	0.27	0.01
43.47	128.00	2.00	0.00	0.26	0.00	43.64	117.82	2.00	0.00	0.26	0.00
43.80	109.31	2.00	0.00	0.26	0.00	43.97	102.35	2.00	0.00	0.25	0.00
44.13	96.27	2.00	0.00	0.25	0.00	44.29	87.96	2.00	0.00	0.25	0.00
44.46	79.92	2.00	0.00	0.25	0.00	44.62	75.66	2.00	0.00	0.24	0.00
44.79	77.23	2.00	0.00	0.24	0.00	44.95	82.81	2.00	0.00	0.24	0.00
45.11	84.90	2.00	0.00	0.24	0.00	45.28	80.99	2.00	0.00	0.23	0.00
45.44	68.30	2.00	0.00	0.23	0.00	45.61	56.41	2.00	0.00	0.23	0.00
45.77	51.36	2.00	0.00	0.22	0.00	45.93	54.88	2.00	0.00	0.22	0.00
46.10	57.36	2.00	0.00	0.22	0.00	46.26	57.69	2.00	0.00	0.22	0.00
46.43	61.50	2.00	0.00	0.21	0.00	46.59	69.93	2.00	0.00	0.21	0.00
46.75	85.69	2.00	0.00	0.21	0.00	46.92	93.65	2.00	0.00	0.20	0.00
47.08	99.18	2.00	0.00	0.20	0.00	47.25	104.53	2.00	0.00	0.20	0.00
47.41	106.04	2.00	0.00	0.20	0.00	47.57	106.34	0.43	0.43	0.19	0.01
47.74	107.08	0.44	0.42	0.19	0.01	47.90	113.55	0.49	0.40	0.19	0.01
48.07	118.62	0.53	0.38	0.19	0.01	48.23	120.75	0.55	0.37	0.18	0.01
48.39	120.61	0.55	0.36	0.18	0.01	48.56	119.90	0.54	0.36	0.18	0.01
48.72	119.21	0.54	0.35	0.17	0.01	48.89	119.72	0.54	0.35	0.17	0.01
49.05	120.64	0.55	0.34	0.17	0.01	49.22	122.00	0.57	0.33	0.17	0.01
49.38	121.49	0.56	0.32	0.16	0.01	49.54	119.39	0.54	0.32	0.16	0.01
49.71	117.27	0.52	0.32	0.16	0.01	49.87	115.99	0.51	0.32	0.15	0.01
50.04	115.88	0.51	0.31	0.15	0.01	50.20	114.91	2.00	0.00	0.15	0.00
50.36	113.16	2.00	0.00	0.15	0.00	50.53	108.20	2.00	0.00	0.14	0.00
50.69	103.28	2.00	0.00	0.14	0.00	50.86	97.04	2.00	0.00	0.14	0.00
51.02	89.54	2.00	0.00	0.14	0.00	51.18	80.03	2.00	0.00	0.13	0.00
51.35	70.86	2.00	0.00	0.13	0.00	51.51	64.53	2.00	0.00	0.13	0.00
51.68	62.74	2.00	0.00	0.12	0.00	51.84	62.95	2.00	0.00	0.12	0.00
52.00	61.59	2.00	0.00	0.12	0.00	52.17	59.20	2.00	0.00	0.12	0.00
52.33	57.94	2.00	0.00	0.11	0.00	52.50	58.17	2.00	0.00	0.11	0.00
52.66	59.25	2.00	0.00	0.11	0.00	52.82	61.64	2.00	0.00	0.10	0.00
52.99	66.70	2.00	0.00	0.10	0.00	53.15	71.07	2.00	0.00	0.10	0.00
53.32	70.56	2.00	0.00	0.10	0.00	53.48	65.58	2.00	0.00	0.09	0.00
53.64	58.66	2.00	0.00	0.09	0.00	53.81	54.63	2.00	0.00	0.09	0.00
53.97	53.38	2.00	0.00	0.09	0.00	54.14	53.31	2.00	0.00	0.08	0.00
54.30	53.67	2.00	0.00	0.08	0.00	54.46	57.00	2.00	0.00	0.08	0.00
54.63	61.94	2.00	0.00	0.07	0.00	54.79	66.49	2.00	0.00	0.07	0.00
54.96	74.11	2.00	0.00	0.07	0.00	55.12	82.85	2.00	0.00	0.07	0.00
55.28	94.51	2.00	0.00	0.06	0.00	55.45	101.18	2.00	0.00	0.06	0.00
55.61	105.37	2.00	0.00	0.06	0.00	55.78	105.47	2.00	0.00	0.05	0.00
55.94	106.70	2.00	0.00	0.05	0.00	56.11	109.64	2.00	0.00	0.05	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
56.27	114.19	2.00	0.00	0.05	0.00	56.43	117.99	0.56	0.09	0.04	0.00
56.60	119.61	0.57	0.08	0.04	0.00	56.76	118.24	2.00	0.00	0.04	0.00
56.93	116.22	2.00	0.00	0.04	0.00	57.09	115.17	2.00	0.00	0.03	0.00
57.25	112.30	2.00	0.00	0.03	0.00	57.42	103.57	2.00	0.00	0.03	0.00
57.58	90.26	2.00	0.00	0.02	0.00	57.75	77.37	2.00	0.00	0.02	0.00
57.91	68.04	2.00	0.00	0.02	0.00	58.07	60.95	2.00	0.00	0.02	0.00
58.24	57.03	2.00	0.00	0.01	0.00	58.40	56.78	2.00	0.00	0.01	0.00
58.57	58.01	2.00	0.00	0.01	0.00	58.73	61.73	2.00	0.00	0.00	0.00
58.89	66.13	2.00	0.00	0.00	0.00	59.06	71.42	2.00	0.00	0.00	0.00
59.22	78.20	2.00	0.00	0.00	0.00	59.39	87.95	2.00	0.00	0.00	0.00
59.55	94.95	2.00	0.00	0.00	0.00	59.71	93.35	2.00	0.00	0.00	0.00
59.88	87.76	2.00	0.00	0.00	0.00	60.04	77.96	2.00	0.00	0.00	0.00
60.21	76.57	2.00	0.00	0.00	0.00	60.37	75.01	2.00	0.00	0.00	0.00
60.53	78.19	2.00	0.00	0.00	0.00	60.70	80.18	2.00	0.00	0.00	0.00
60.86	81.89	2.00	0.00	0.00	0.00						

Total estimated settlement: 2.18

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

:: Strength loss calculation (Robertson (2009) ::

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.33	179.69	288.66	1.00	288.66	1.28	N/A	N/A
0.49	166.02	266.69	1.00	266.69	1.38	N/A	N/A
0.66	149.08	239.45	1.00	239.45	1.52	N/A	N/A
0.82	139.05	223.32	1.00	223.32	1.63	N/A	N/A
0.98	124.21	199.46	1.07	213.83	1.75	N/A	N/A
1.15	108.17	173.68	1.15	199.80	1.86	N/A	N/A
1.31	94.74	152.08	1.23	186.56	1.94	N/A	N/A
1.48	83.90	134.66	1.28	172.39	1.98	N/A	N/A
1.64	76.30	122.43	1.32	161.22	2.01	N/A	N/A
1.80	72.04	115.56	1.32	152.56	2.02	N/A	N/A
1.97	70.27	112.70	1.32	148.43	2.01	N/A	N/A
2.13	69.33	111.18	1.30	144.90	2.00	N/A	N/A
2.30	66.20	106.13	1.32	139.58	2.01	N/A	N/A
2.46	60.60	97.12	1.35	130.87	2.03	N/A	N/A
2.62	53.63	85.91	1.41	121.22	2.07	N/A	N/A
2.79	49.93	79.95	1.44	115.41	2.09	N/A	N/A
2.95	50.70	81.17	1.40	114.02	2.07	N/A	N/A
3.12	53.57	85.76	1.35	115.95	2.04	N/A	N/A
3.28	53.27	85.26	1.36	115.73	2.04	N/A	N/A
3.45	47.06	75.28	1.46	109.98	2.10	N/A	N/A
3.61	37.26	59.52	1.75	104.20	2.23	N/A	N/A
3.77	27.40	43.65	2.28	99.40	2.39	N/A	N/A
3.94	20.33	32.28	3.08	99.58	2.56	N/A	N/A
4.10	16.60	26.27	3.63	95.46	2.65	N/A	N/A
4.27	15.73	24.86	3.58	88.98	2.64	N/A	N/A
4.43	16.36	25.86	2.98	77.11	2.54	N/A	N/A
4.59	16.96	26.81	2.56	68.56	2.46	N/A	N/A
4.76	17.06	26.96	2.38	64.18	2.42	N/A	N/A
4.92	17.23	27.21	2.36	64.14	2.41	N/A	N/A
5.09	17.63	27.84	2.30	64.05	2.40	N/A	N/A
5.25	18.39	29.06	2.34	68.13	2.41	N/A	N/A
5.41	19.86	31.40	2.41	75.61	2.42	N/A	N/A
5.58	22.83	36.15	2.36	85.33	2.41	N/A	N/A
5.74	25.03	39.67	2.37	94.22	2.42	N/A	N/A
5.91	25.29	40.09	2.50	100.15	2.44	N/A	N/A
6.07	22.83	36.11	2.81	101.32	2.51	N/A	N/A
6.23	20.39	32.18	3.10	99.62	2.56	N/A	N/A
6.40	19.16	30.18	3.11	93.83	2.56	N/A	N/A
6.56	19.36	30.49	2.96	90.30	2.54	N/A	N/A
6.73	20.26	31.92	2.71	86.36	2.49	N/A	N/A
6.89	21.32	33.62	2.66	89.29	2.48	N/A	N/A
7.05	22.09	34.84	2.65	92.25	2.48	N/A	N/A
7.22	22.49	35.46	2.78	98.44	2.50	N/A	N/A
7.38	23.69	37.38	2.70	100.91	2.49	N/A	N/A
7.55	26.69	42.18	2.43	102.57	2.43	N/A	N/A
7.71	32.99	52.29	1.99	103.95	2.31	N/A	N/A
7.87	40.29	64.00	1.67	107.12	2.20	N/A	N/A
8.04	45.33	72.08	1.54	111.00	2.14	N/A	N/A

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.20	44.89	71.36	1.55	110.82	2.15	N/A	N/A
8.37	41.69	66.21	1.66	109.70	2.20	N/A	N/A
8.53	38.42	60.94	1.75	106.71	2.23	N/A	N/A
8.69	36.89	58.46	1.78	104.10	2.24	N/A	N/A
8.86	35.82	56.72	1.79	101.51	2.25	N/A	N/A
9.02	35.19	55.39	1.87	103.66	2.28	0.75	0.75
9.19	35.09	54.73	1.93	105.71	2.29	0.75	0.75
9.35	35.49	54.79	1.96	107.64	2.30	0.75	0.75
9.51	36.32	55.24	1.93	106.87	2.30	0.75	0.75
9.68	37.76	56.43	1.88	106.01	2.28	0.75	0.75
9.84	39.99	58.84	1.83	107.57	2.26	0.76	0.76
10.01	43.03	62.30	1.79	111.28	2.25	0.76	0.76
10.17	46.26	65.99	1.74	114.90	2.23	0.77	0.77
10.34	49.19	69.03	1.69	116.35	2.21	0.78	0.78
10.50	51.39	71.15	1.66	117.83	2.20	0.78	0.78
10.66	53.09	72.62	1.64	119.24	2.19	0.78	0.78
10.83	54.26	73.37	1.64	120.52	2.19	0.78	0.78
10.99	55.16	73.83	1.65	121.78	2.19	0.79	0.79
11.16	56.06	74.23	1.66	122.96	2.20	0.79	0.79
11.32	57.39	75.40	1.69	127.67	2.21	0.79	0.79
11.48	59.73	77.82	1.72	133.92	2.22	0.79	0.79
11.65	62.96	81.16	1.72	139.84	2.22	0.80	0.80
11.81	65.89	84.03	1.71	143.94	2.22	0.80	0.80
11.98	67.49	85.00	1.69	143.23	2.21	0.80	0.80
12.14	67.29	83.86	1.68	140.95	2.21	0.80	0.80
12.30	66.26	81.72	1.68	137.10	2.20	0.80	0.80
12.47	64.66	79.01	1.70	134.70	2.22	0.79	0.79
12.63	62.92	76.39	1.77	135.51	2.24	0.79	0.79
12.80	60.86	73.37	1.86	136.43	2.27	0.78	0.78
12.96	58.59	70.14	1.94	135.98	2.30	0.78	0.78
13.12	56.05	66.55	1.99	132.41	2.31	0.77	0.77
13.29	53.89	63.38	2.03	128.77	2.33	0.77	0.77
13.45	52.19	60.91	2.11	128.53	2.35	0.76	0.76
13.62	53.05	61.30	2.11	129.46	2.35	0.76	0.76
13.78	50.19	57.60	2.25	129.59	2.38	0.75	0.75
13.94	50.59	57.46	2.21	127.24	2.38	0.75	0.75
14.11	48.39	54.49	2.30	125.56	2.40	0.75	0.75
14.27	48.52	54.10	2.28	123.29	2.39	0.74	0.74
14.44	42.98	47.65	2.62	124.62	2.47	0.73	0.73
14.60	42.71	46.98	2.72	127.83	2.49	0.73	0.73
14.76	48.07	52.30	2.49	130.46	2.44	0.74	0.74
14.93	57.64	61.91	2.14	132.27	2.35	0.76	0.76
15.09	63.58	67.56	1.96	132.50	2.30	0.77	0.77
15.26	65.79	69.31	1.96	136.05	2.30	0.78	0.78
15.42	69.12	72.21	1.93	139.43	2.29	0.78	0.78
15.58	73.78	76.44	1.88	144.00	2.28	0.79	0.79
15.75	79.95	82.07	1.79	147.23	2.25	0.80	0.80
15.91	84.15	85.67	1.74	149.28	2.23	0.81	0.81

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
16.08	85.82	86.62	1.72	148.78	2.22	0.81	0.81
16.24	84.32	84.45	1.73	145.70	2.22	0.80	0.80
16.40	80.22	79.73	1.77	141.23	2.24	0.80	0.80
16.57	73.45	72.40	1.87	135.45	2.27	0.78	0.78
16.73	63.99	62.57	2.08	130.13	2.34	0.76	0.76
16.90	54.19	52.49	2.42	127.05	2.43	0.74	0.74
17.06	55.45	53.32	2.45	130.71	2.43	0.74	0.74
17.23	70.75	67.62	2.01	136.03	2.32	0.77	0.77
17.39	91.02	86.53	1.70	146.83	2.21	0.81	0.81
17.55	103.78	98.07	1.59	155.60	2.17	0.82	0.82
17.72	106.25	99.70	1.63	162.17	2.18	0.83	0.83
17.88	103.99	96.86	1.68	163.08	2.21	0.82	0.82
18.05	97.45	90.03	1.74	156.65	2.23	0.81	0.81
18.21	83.88	76.80	1.85	142.35	2.27	0.79	0.79
18.37	63.22	57.15	2.20	125.69	2.37	0.75	0.75
18.54	40.92	36.25	3.12	113.03	2.56	0.69	0.69
18.70	24.56	21.09	4.82	101.55	2.80	1.50	1.50
18.87	16.42	13.60	6.59	89.62	2.99	0.97	0.97
19.03	13.09	10.55	7.47	78.73	3.06	0.75	0.75
19.19	11.36	8.94	8.22	73.55	3.12	0.64	0.64
19.36	10.67	8.26	8.83	72.96	3.17	0.59	0.59
19.52	10.75	8.26	9.07	74.90	3.19	0.59	0.59
19.69	10.87	8.29	9.25	76.74	3.20	0.59	0.59
19.85	10.83	8.19	9.33	76.43	3.21	0.58	0.58
20.01	10.93	8.21	9.53	78.18	3.22	0.59	0.59
20.18	11.74	8.81	9.33	82.18	3.21	0.63	0.63
20.34	12.95	9.74	8.85	86.17	3.17	0.70	0.70
20.51	13.67	10.24	8.41	86.15	3.14	0.73	0.73
20.67	13.55	10.06	8.16	82.12	3.12	0.72	0.72
20.83	13.17	9.68	7.83	75.81	3.09	0.69	0.69
21.00	12.47	9.03	7.87	71.13	3.10	0.65	0.65
21.16	11.46	8.15	8.39	68.37	3.14	0.32	0.58
21.33	10.33	7.19	9.39	67.53	3.21	0.32	0.51
21.49	10.29	7.10	9.48	67.28	3.22	0.31	0.51
21.65	10.63	7.31	9.49	69.36	3.22	0.31	0.52
21.82	11.05	7.57	9.42	71.39	3.21	0.54	0.54
21.98	11.10	7.55	9.92	74.93	3.25	0.54	0.54
22.15	12.41	8.49	9.32	79.11	3.20	0.61	0.61
22.31	16.08	11.22	7.61	85.36	3.07	0.80	0.80
22.47	20.48	14.47	6.12	88.55	2.94	1.03	1.03
22.64	23.30	16.55	5.52	91.40	2.88	1.18	1.18
22.80	23.10	16.24	5.81	94.43	2.91	1.16	1.16
22.97	23.07	16.03	6.25	100.27	2.95	1.15	1.15
23.13	24.34	16.84	6.27	105.68	2.96	1.20	1.20
23.30	26.61	18.40	6.02	110.69	2.93	1.31	1.31
23.46	27.83	19.17	5.89	112.91	2.92	1.36	1.36
23.62	27.86	19.06	5.91	112.55	2.92	1.36	1.36
23.79	26.93	18.22	6.02	109.60	2.93	1.30	1.30

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
23.95	25.49	17.03	6.26	106.66	2.96	1.22	1.22
24.12	24.32	16.08	6.45	103.69	2.97	1.15	1.15
24.28	24.21	15.90	6.42	102.00	2.97	1.14	1.14
24.44	24.01	15.64	6.23	97.43	2.95	1.12	1.12
24.61	22.00	14.14	6.46	91.37	2.97	1.01	1.01
24.77	18.16	11.42	7.29	83.28	3.05	0.82	0.82
24.94	14.80	9.06	8.90	80.65	3.17	0.65	0.65
25.10	14.35	8.69	9.73	84.61	3.23	0.62	0.62
25.26	20.14	12.52	7.68	96.06	3.08	0.89	0.89
25.43	37.42	24.69	4.14	102.32	2.72	1.71	1.71
25.59	59.99	41.46	2.52	104.28	2.45	0.71	0.71
25.76	81.92	58.08	1.86	108.13	2.27	0.75	0.75
25.92	95.45	68.16	1.68	114.43	2.20	0.77	0.77
26.08	104.61	74.71	1.62	121.12	2.18	0.79	0.79
26.25	110.55	78.76	1.59	125.33	2.17	0.79	0.79
26.41	114.05	81.02	1.57	127.38	2.16	0.80	0.80
26.58	116.58	82.53	1.56	128.38	2.15	0.80	0.80
26.74	118.28	83.41	1.55	129.21	2.15	0.80	0.80
26.90	119.62	83.99	1.55	129.94	2.15	0.80	0.80
27.07	120.98	84.57	1.54	130.65	2.15	0.80	0.80
27.23	124.15	86.51	1.53	132.56	2.14	0.81	0.81
27.40	129.25	89.91	1.50	134.95	2.12	0.81	0.81
27.56	135.08	93.97	1.46	136.96	2.10	0.82	0.82
27.72	139.92	97.45	1.40	136.86	2.07	0.82	0.82
27.89	143.42	99.57	1.40	138.91	2.07	0.83	0.83
28.05	145.38	100.36	1.41	141.64	2.08	0.83	0.83
28.22	144.28	98.53	1.47	145.21	2.11	0.83	0.83
28.38	141.62	95.85	1.52	145.97	2.14	0.82	0.82
28.54	137.95	92.69	1.55	144.00	2.15	0.82	0.82
28.71	135.08	90.33	1.55	140.25	2.15	0.81	0.81
28.87	130.68	87.01	1.55	134.77	2.15	0.81	0.81
29.04	123.72	81.70	1.58	129.29	2.16	0.80	0.80
29.20	115.22	75.13	1.67	125.78	2.20	0.79	0.79
29.36	106.98	68.71	1.81	124.28	2.25	0.78	0.78
29.53	101.68	64.38	1.94	125.13	2.30	0.77	0.77
29.69	103.82	65.45	1.95	127.44	2.30	0.77	0.77
29.86	113.02	71.55	1.83	131.08	2.26	0.78	0.78
30.02	128.05	82.00	1.65	135.22	2.19	0.80	0.80
30.19	140.72	90.88	1.52	138.40	2.14	0.81	0.81
30.35	151.85	98.76	1.43	141.29	2.09	0.83	0.83
30.51	161.72	105.73	1.36	144.30	2.05	0.84	0.84
30.68	172.55	113.34	1.31	148.57	2.01	0.85	0.85
30.84	179.25	117.65	1.29	152.35	2.00	0.85	0.85
31.01	181.15	118.21	1.31	154.55	2.01	0.85	0.85
31.17	176.78	114.76	1.32	150.97	2.01	0.85	0.85
31.33	171.05	110.72	1.31	144.92	2.01	0.84	0.84
31.50	164.15	106.05	1.30	137.34	2.00	0.84	0.84
31.66	150.02	95.66	1.35	128.84	2.03	0.82	0.82

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
31.83	129.32	80.41	1.49	119.95	2.12	0.80	0.80
31.99	98.35	58.41	1.90	110.97	2.28	0.75	0.75
32.15	70.15	39.30	2.70	106.26	2.49	0.70	0.70
32.32	49.72	26.27	3.77	99.04	2.67	1.76	1.76
32.48	41.42	21.30	4.21	89.65	2.73	1.44	1.44
32.65	40.52	20.94	3.86	80.92	2.68	1.40	1.40
32.81	41.08	21.30	3.67	78.08	2.65	1.42	1.42
32.97	42.71	22.27	3.43	76.42	2.62	1.47	1.47
33.14	44.30	23.24	3.22	74.77	2.58	0.64	0.64
33.30	44.65	23.42	3.13	73.24	2.57	0.64	0.64
33.47	42.20	21.62	3.52	76.10	2.63	1.43	1.43
33.63	40.20	20.02	4.13	82.63	2.72	1.35	1.35
33.79	42.87	21.28	4.20	89.35	2.73	1.44	1.44
33.96	48.94	24.63	3.82	94.11	2.68	1.64	1.64
34.12	52.89	26.71	3.70	98.79	2.66	1.77	1.77
34.29	52.80	26.52	3.72	98.61	2.66	1.76	1.76
34.45	54.05	26.93	3.84	103.31	2.68	1.79	1.79
34.61	62.05	31.41	3.44	108.01	2.62	2.06	2.06
34.78	76.62	40.14	2.74	110.14	2.50	0.71	0.71
34.94	89.91	48.73	2.18	106.06	2.37	0.73	0.73
35.11	98.27	54.57	1.84	100.54	2.27	0.75	0.75
35.27	100.32	55.54	1.84	102.21	2.26	0.75	0.75
35.43	102.91	56.30	1.94	109.39	2.30	0.75	0.75
35.60	113.34	62.08	1.91	118.32	2.29	0.76	0.76
35.76	132.88	74.17	1.70	126.10	2.21	0.79	0.79
35.93	154.21	87.94	1.51	132.82	2.13	0.81	0.81
36.09	167.64	96.85	1.41	136.46	2.07	0.82	0.82
36.26	171.11	99.22	1.37	135.86	2.05	0.83	0.83
36.42	167.04	96.85	1.35	130.84	2.04	0.82	0.82
36.58	162.04	93.76	1.34	125.91	2.03	0.82	0.82
36.75	156.71	90.22	1.35	121.76	2.04	0.81	0.81
36.91	148.60	84.33	1.41	118.76	2.07	0.80	0.80
37.08	129.47	70.99	1.61	113.98	2.17	0.78	0.78
37.24	100.57	52.17	2.08	108.60	2.34	0.74	0.74
37.40	71.92	34.82	2.99	104.02	2.54	0.69	0.69
37.57	50.63	22.76	4.32	98.23	2.74	1.53	1.53
37.73	39.11	16.50	5.78	95.33	2.91	1.16	1.16
37.90	47.91	21.33	4.38	93.45	2.75	1.44	1.44
38.06	71.53	34.94	2.68	93.68	2.48	0.69	0.69
38.22	102.71	54.02	1.82	98.17	2.26	0.74	0.74
38.39	122.18	65.57	1.65	108.34	2.19	0.77	0.77
38.55	133.92	72.06	1.63	117.54	2.19	0.78	0.78
38.72	140.67	75.86	1.61	121.80	2.17	0.79	0.79
38.88	145.88	78.76	1.59	125.12	2.17	0.79	0.79
39.04	151.09	81.56	1.58	128.94	2.16	0.80	0.80
39.21	157.10	84.25	1.62	136.63	2.18	0.80	0.80
39.37	167.33	89.83	1.61	144.40	2.17	0.81	0.81
39.54	173.80	93.45	1.59	148.17	2.17	0.82	0.82

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
39.70	174.57	94.03	1.56	146.71	2.15	0.82	0.82
39.86	169.01	90.83	1.56	141.77	2.15	0.81	0.81
40.03	164.81	88.26	1.57	138.61	2.16	0.81	0.81
40.19	163.57	87.29	1.58	138.18	2.16	0.81	0.81
40.36	163.74	86.95	1.61	139.61	2.17	0.81	0.81
40.52	165.17	87.71	1.59	139.77	2.17	0.81	0.81
40.68	167.30	89.21	1.55	138.59	2.15	0.81	0.81
40.85	168.08	90.02	1.51	136.14	2.13	0.81	0.81
41.01	165.18	88.67	1.49	131.77	2.12	0.81	0.81
41.18	157.12	83.93	1.50	125.93	2.12	0.80	0.80
41.34	146.62	77.67	1.54	119.41	2.14	0.79	0.79
41.50	136.82	71.49	1.61	115.36	2.18	0.78	0.78
41.67	134.62	69.64	1.67	116.61	2.20	0.78	0.78
41.83	136.67	70.35	1.70	119.87	2.21	0.78	0.78
42.00	139.80	71.74	1.72	123.24	2.22	0.78	0.78
42.16	141.44	72.55	1.71	123.99	2.22	0.78	0.78
42.32	143.95	73.82	1.70	125.45	2.21	0.79	0.79
42.49	148.65	76.30	1.68	128.41	2.21	0.79	0.79
42.65	155.19	79.68	1.67	133.30	2.20	0.80	0.80
42.82	160.49	82.36	1.67	137.33	2.20	0.80	0.80
42.98	165.79	85.22	1.65	140.27	2.19	0.81	0.81
43.15	165.99	85.27	1.64	139.65	2.19	0.81	0.81
43.31	160.73	82.21	1.65	135.91	2.19	0.80	0.80
43.47	143.89	72.26	1.77	128.00	2.24	0.78	0.78
43.64	119.26	57.95	2.03	117.82	2.33	0.75	0.75
43.80	91.86	42.36	2.58	109.31	2.46	0.71	0.71
43.97	69.20	30.02	3.41	102.35	2.61	1.92	1.92
44.13	52.61	21.40	4.50	96.27	2.77	1.44	1.44
44.29	40.41	15.46	5.69	87.96	2.90	1.09	1.09
44.46	30.95	11.36	7.04	79.92	3.03	0.81	0.81
44.62	32.62	12.00	6.30	75.66	2.96	0.86	0.86
44.79	43.92	17.61	4.38	77.23	2.75	1.18	1.18
44.95	56.74	24.09	3.44	82.81	2.62	1.54	1.54
45.11	53.51	22.18	3.83	84.90	2.68	1.45	1.45
45.28	39.25	14.92	5.43	80.99	2.87	1.04	1.04
45.44	23.51	8.25	8.28	68.30	3.13	0.32	0.59
45.61	16.16	5.31	10.62	56.41	3.29	0.16	0.38
45.77	14.20	4.52	11.36	51.36	3.34	0.16	0.32
45.93	15.81	5.15	10.66	54.88	3.30	0.20	0.37
46.10	18.65	6.26	9.16	57.36	3.19	0.24	0.45
46.26	20.01	6.78	8.51	57.69	3.15	0.20	0.48
46.43	20.32	6.89	8.93	61.50	3.18	0.20	0.49
46.59	20.05	6.77	10.34	69.93	3.27	0.35	0.48
46.75	37.35	13.54	6.33	85.69	2.96	0.97	0.97
46.92	67.08	28.34	3.30	93.65	2.60	0.66	0.66
47.08	104.48	49.08	2.02	99.18	2.32	0.73	0.73
47.25	132.51	65.90	1.59	104.53	2.17	0.77	0.77
47.41	141.46	71.56	1.48	106.04	2.11	0.78	0.78

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
47.57	140.89	70.95	1.50	106.34	2.12	0.78	0.78
47.74	134.77	66.50	1.61	107.08	2.18	0.77	0.77
47.90	138.59	67.67	1.68	113.55	2.20	0.77	0.77
48.07	145.29	70.95	1.67	118.62	2.20	0.78	0.78
48.23	148.50	72.50	1.67	120.75	2.20	0.78	0.78
48.39	148.33	72.27	1.67	120.61	2.20	0.78	0.78
48.56	148.06	72.07	1.66	119.90	2.20	0.78	0.78
48.72	147.86	71.92	1.66	119.21	2.20	0.78	0.78
48.89	145.16	69.94	1.71	119.72	2.22	0.78	0.78
49.05	140.84	66.93	1.80	120.64	2.25	0.77	0.77
49.22	138.82	65.33	1.87	122.00	2.27	0.77	0.77
49.38	140.19	66.12	1.84	121.49	2.26	0.77	0.77
49.54	142.23	67.58	1.77	119.39	2.24	0.77	0.77
49.71	143.72	68.74	1.71	117.27	2.22	0.78	0.78
49.87	143.39	68.62	1.69	115.99	2.21	0.78	0.78
50.04	139.96	66.32	1.75	115.88	2.23	0.77	0.77
50.20	133.72	62.48	1.84	114.91	2.26	0.76	0.76
50.36	123.69	56.55	2.00	113.16	2.32	0.75	0.75
50.53	106.43	47.00	2.30	108.20	2.40	0.73	0.73
50.69	83.33	34.64	2.98	103.28	2.54	0.69	0.69
50.86	62.50	24.17	4.01	97.04	2.70	1.58	1.58
51.02	47.60	17.15	5.22	89.54	2.85	1.18	1.18
51.18	37.06	12.60	6.35	80.03	2.96	0.90	0.90
51.35	27.07	8.87	7.99	70.86	3.10	0.63	0.63
51.51	21.82	6.91	9.34	64.53	3.21	0.26	0.49
51.68	23.60	7.55	8.31	62.74	3.13	0.26	0.54
51.84	25.33	8.17	7.70	62.95	3.08	0.26	0.58
52.00	24.14	7.72	7.98	61.59	3.10	0.26	0.55
52.17	19.53	6.01	9.85	59.20	3.24	0.22	0.43
52.33	17.13	5.11	11.33	57.94	3.34	0.22	0.37
52.50	17.59	5.27	11.04	58.17	3.32	0.26	0.38
52.66	20.03	6.15	9.63	59.25	3.23	0.22	0.44
52.82	26.74	8.59	7.17	61.64	3.04	0.22	0.61
52.99	35.03	11.85	5.63	66.70	2.89	0.29	0.83
53.15	37.99	13.01	5.46	71.07	2.88	0.90	0.90
53.32	32.95	10.79	6.54	70.56	2.98	0.77	0.77
53.48	24.12	7.57	8.66	65.58	3.16	0.29	0.54
53.64	19.27	5.80	10.12	58.66	3.26	0.22	0.41
53.81	17.96	5.31	10.29	54.63	3.27	0.18	0.38
53.97	17.94	5.29	10.08	53.38	3.26	0.18	0.38
54.14	17.87	5.26	10.14	53.31	3.26	0.18	0.38
54.30	18.85	5.60	9.58	53.67	3.22	0.18	0.40
54.46	22.02	6.73	8.47	57.00	3.14	0.18	0.48
54.63	23.64	7.29	8.49	61.94	3.14	0.25	0.52
54.79	25.38	7.90	8.41	66.49	3.14	0.32	0.56
54.96	32.40	10.40	7.13	74.11	3.03	0.74	0.74
55.12	44.86	15.28	5.42	82.85	2.87	1.06	1.06
55.28	55.90	19.83	4.77	94.51	2.80	1.34	1.34

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
55.45	62.18	22.40	4.52	101.18	2.77	1.50	1.50
55.61	70.86	26.33	4.00	105.37	2.70	1.71	1.71
55.78	88.50	35.15	3.00	105.47	2.54	0.69	0.69
55.94	109.52	46.18	2.31	106.70	2.40	0.72	0.72
56.11	127.60	55.94	1.96	109.64	2.30	0.75	0.75
56.27	142.23	63.76	1.79	114.19	2.25	0.77	0.77
56.43	153.26	69.68	1.69	117.99	2.21	0.78	0.78
56.60	157.19	71.66	1.67	119.61	2.20	0.78	0.78
56.76	149.66	67.14	1.76	118.24	2.24	0.77	0.77
56.93	133.44	57.77	2.01	116.22	2.32	0.75	0.75
57.09	111.25	45.51	2.53	115.17	2.45	0.72	0.72
57.25	86.18	32.74	3.43	112.30	2.62	2.06	2.06
57.42	60.78	20.95	4.94	103.57	2.82	1.42	1.42
57.58	42.06	13.39	6.74	90.26	3.00	0.96	0.96
57.75	30.43	9.33	8.29	77.37	3.13	0.67	0.67
57.91	24.37	7.21	9.43	68.04	3.21	0.31	0.52
58.07	20.74	5.94	10.26	60.95	3.27	0.24	0.42
58.24	18.94	5.31	10.74	57.03	3.30	0.21	0.38
58.40	18.55	5.17	10.99	56.78	3.32	0.21	0.37
58.57	19.04	5.32	10.90	58.01	3.31	0.24	0.38
58.73	20.72	5.89	10.48	61.73	3.28	0.24	0.42
58.89	25.42	7.49	8.83	66.13	3.17	0.31	0.53
59.06	28.84	8.65	8.26	71.42	3.13	0.62	0.62
59.22	36.12	11.12	7.03	78.20	3.03	0.79	0.79
59.39	50.93	16.79	5.24	87.95	2.85	1.15	1.15
59.55	58.89	20.00	4.75	94.95	2.80	1.35	1.35
59.71	56.75	19.06	4.90	93.35	2.81	1.29	1.29
59.88	44.24	13.79	6.37	87.76	2.97	0.98	0.98
60.04	41.33	12.84	6.07	77.96	2.94	0.91	0.91
60.21	43.43	13.82	5.54	76.57	2.88	0.96	0.96
60.37	46.26	15.15	4.95	75.01	2.82	1.03	1.03
60.53	44.03	13.94	5.61	78.19	2.89	0.97	0.97
60.70	41.97	12.89	6.22	80.18	2.95	0.92	0.92
60.86	38.83	11.81	6.93	81.89	3.02	0.84	0.84

Abbreviations

q_t:	Total cone resistance
K_c:	Cone resistance correction factor due to fines
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
I_c:	Soil behavior type index
$S_{u(liq)}/\sigma'_v$:	Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$:	Calculated peak undrained strength ratio

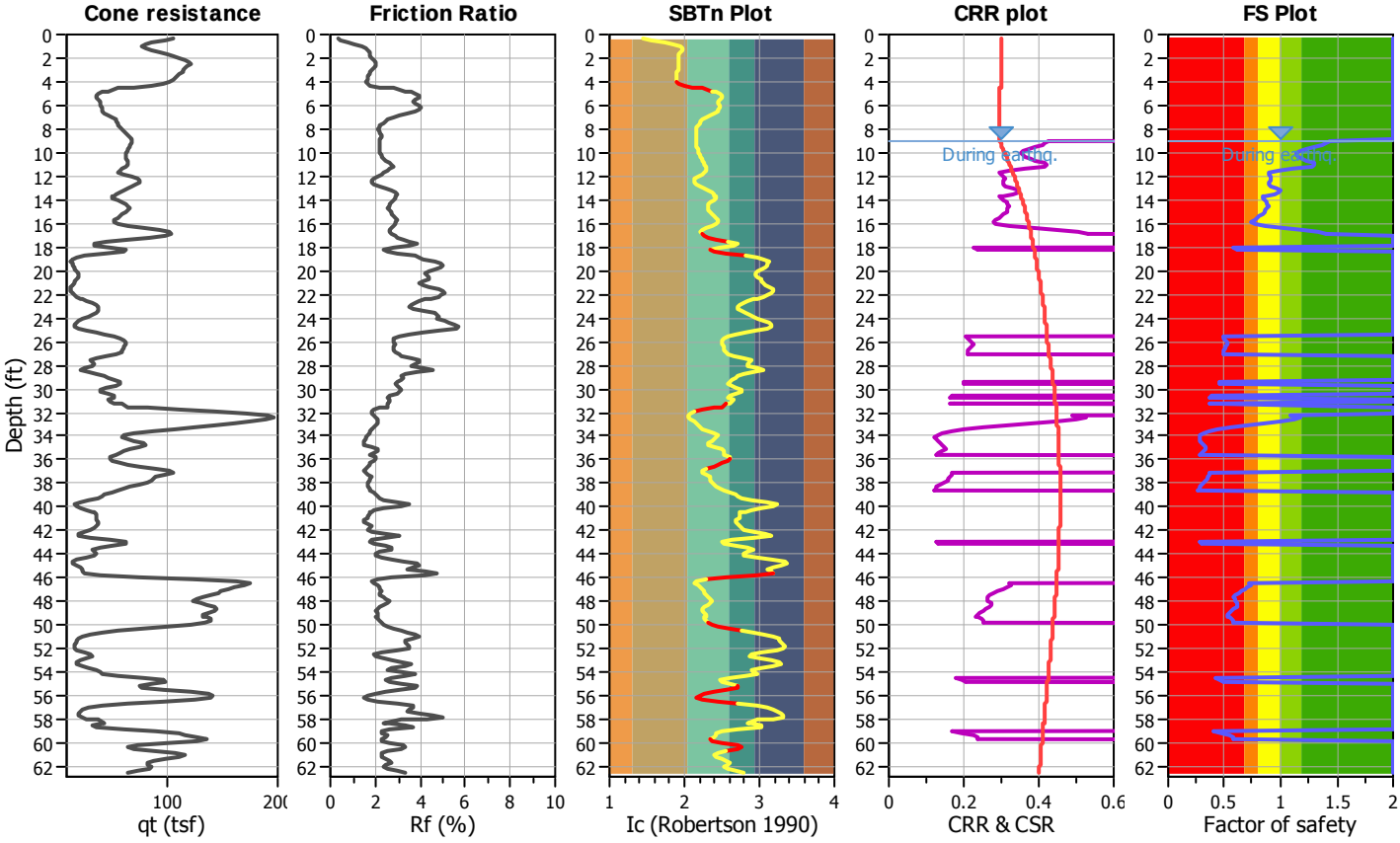
LIQUEFACTION ANALYSIS REPORT

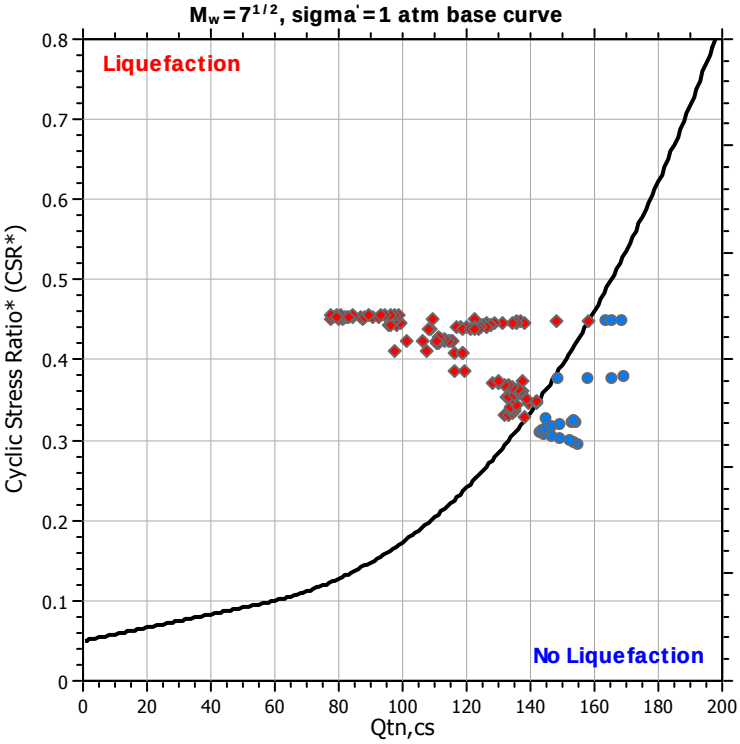
Project title : A9911-06-01 **Location : Bellflower Mixed-Use**

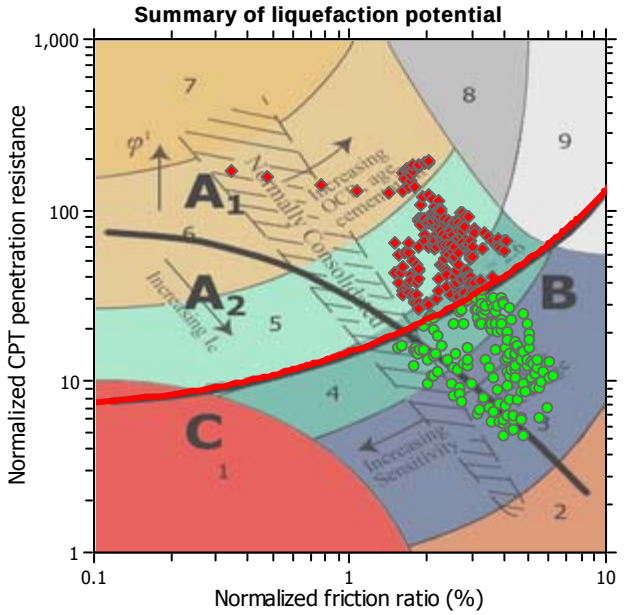
CPT file : CPT-02

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	37.20 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	9.00 ft	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	60.00 ft
Earthquake magnitude M_w:	6.60	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.64	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

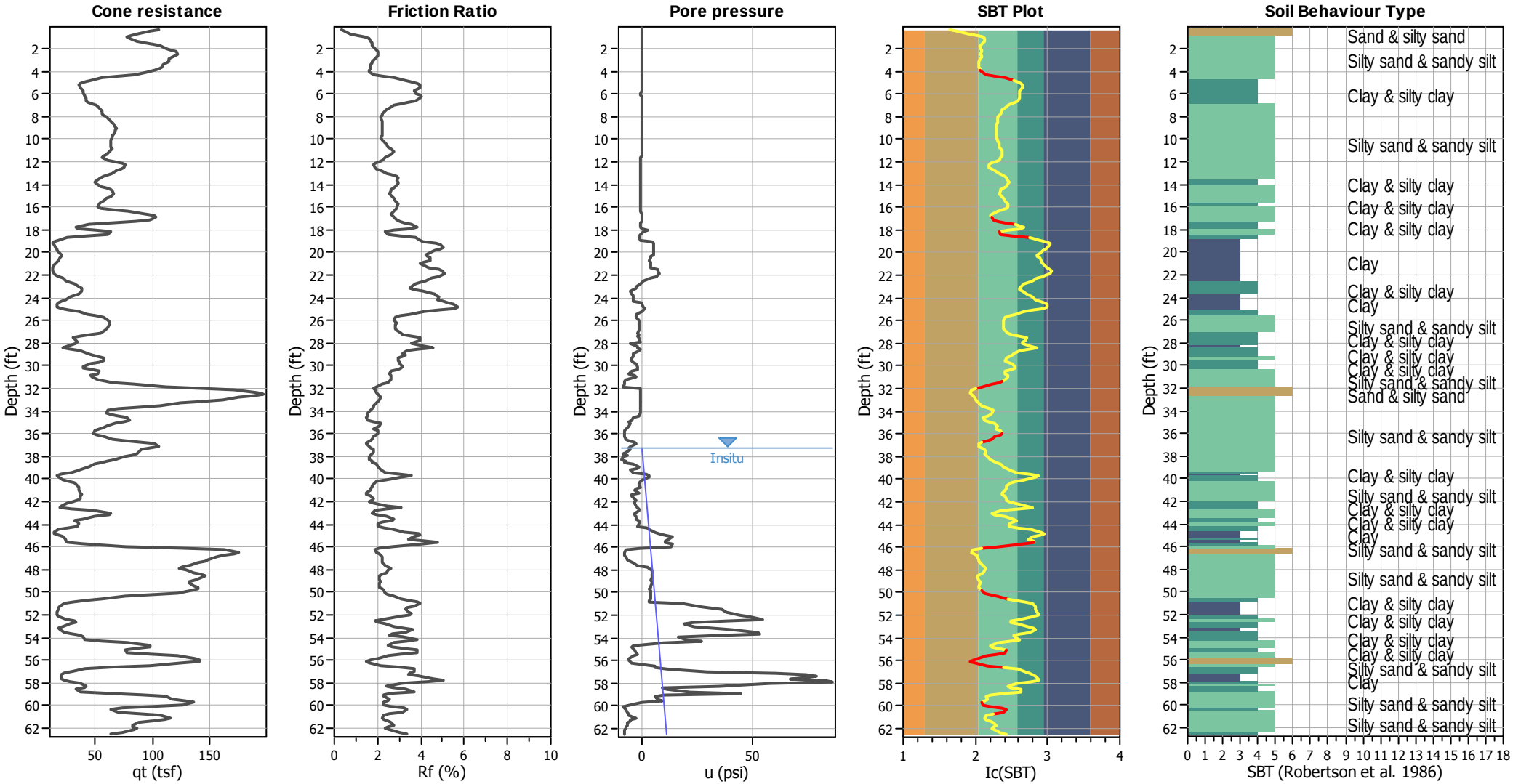






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



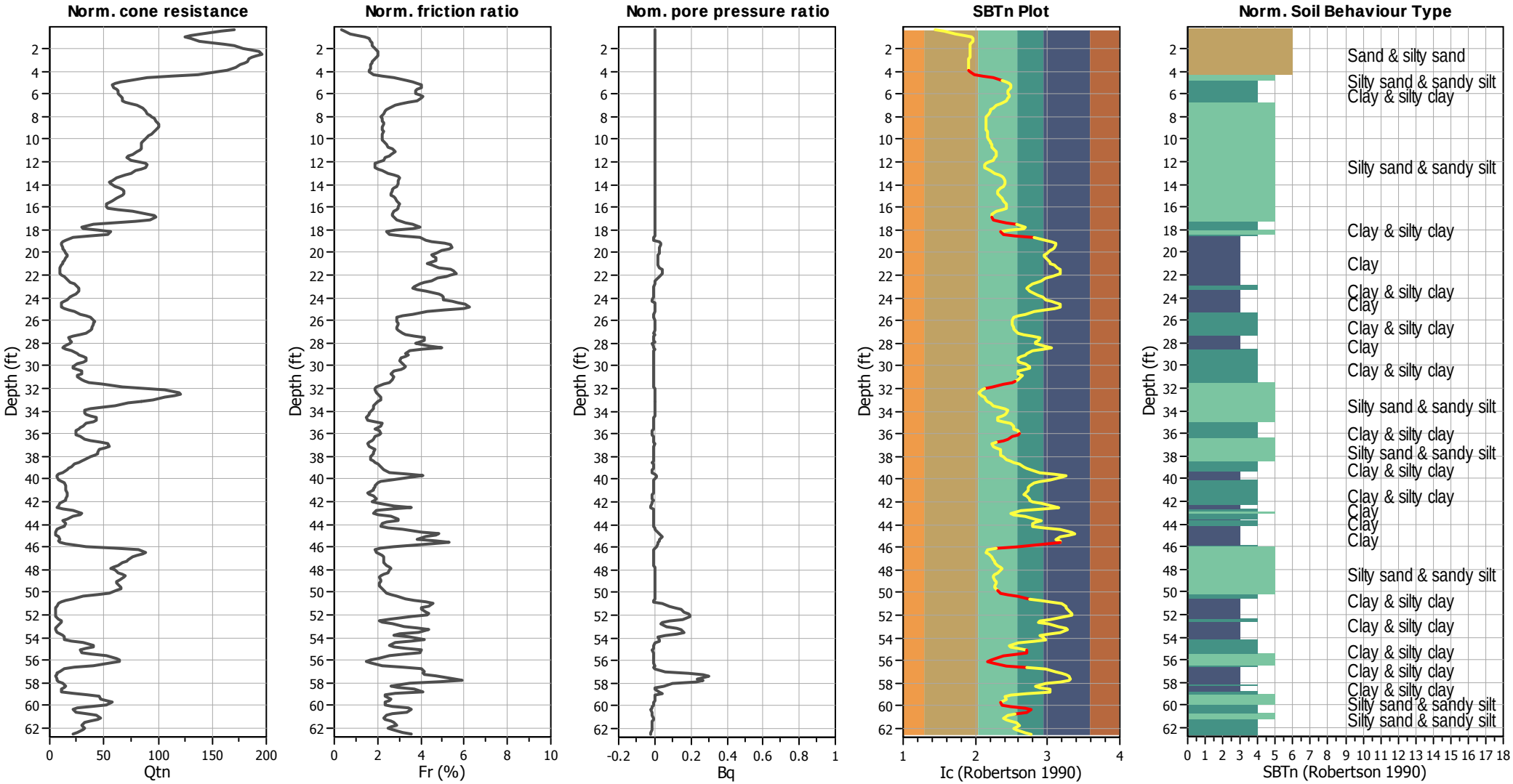
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	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:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.64	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

SBT 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

CPT basic interpretation plots (normalized)



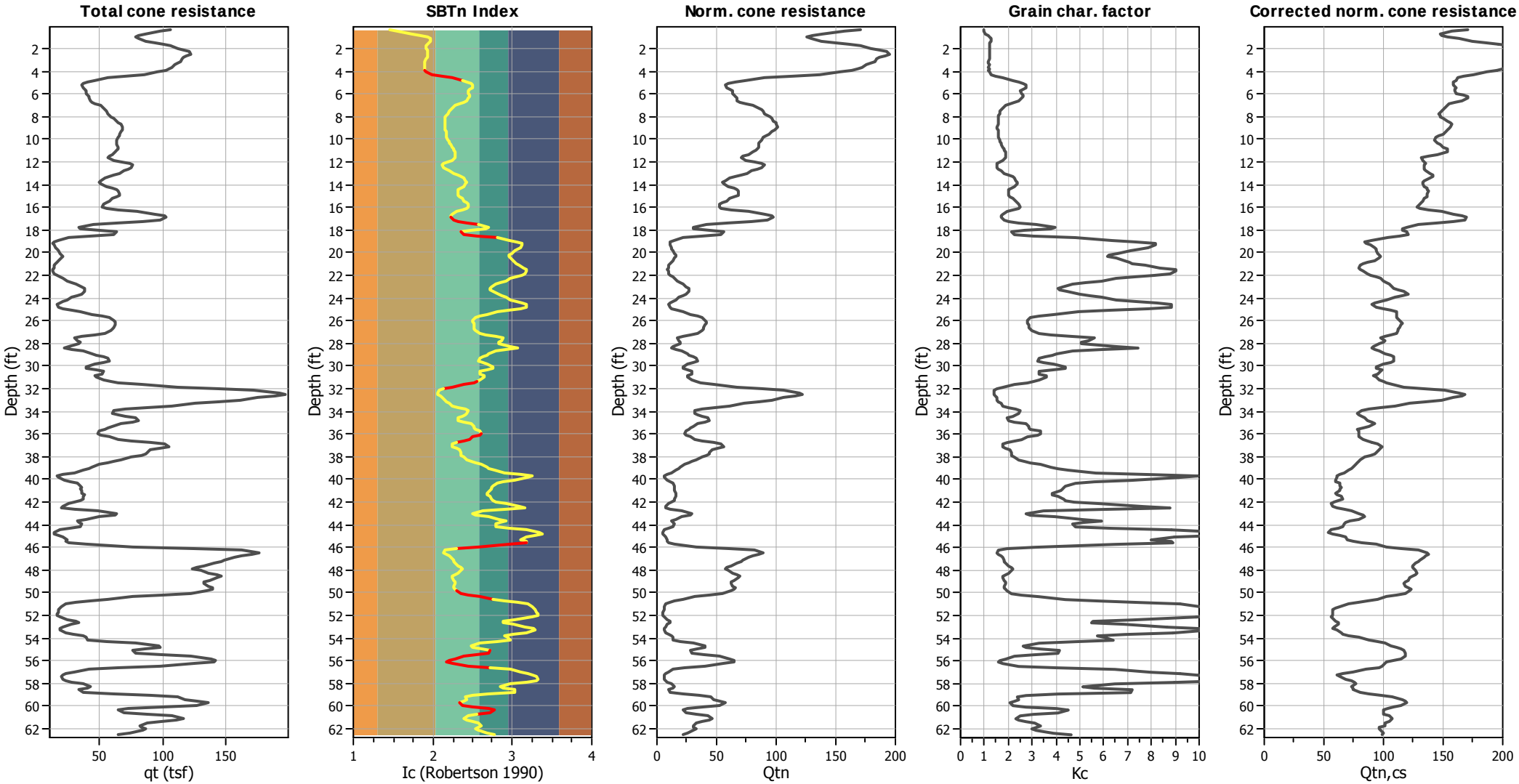
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	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:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.64	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

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

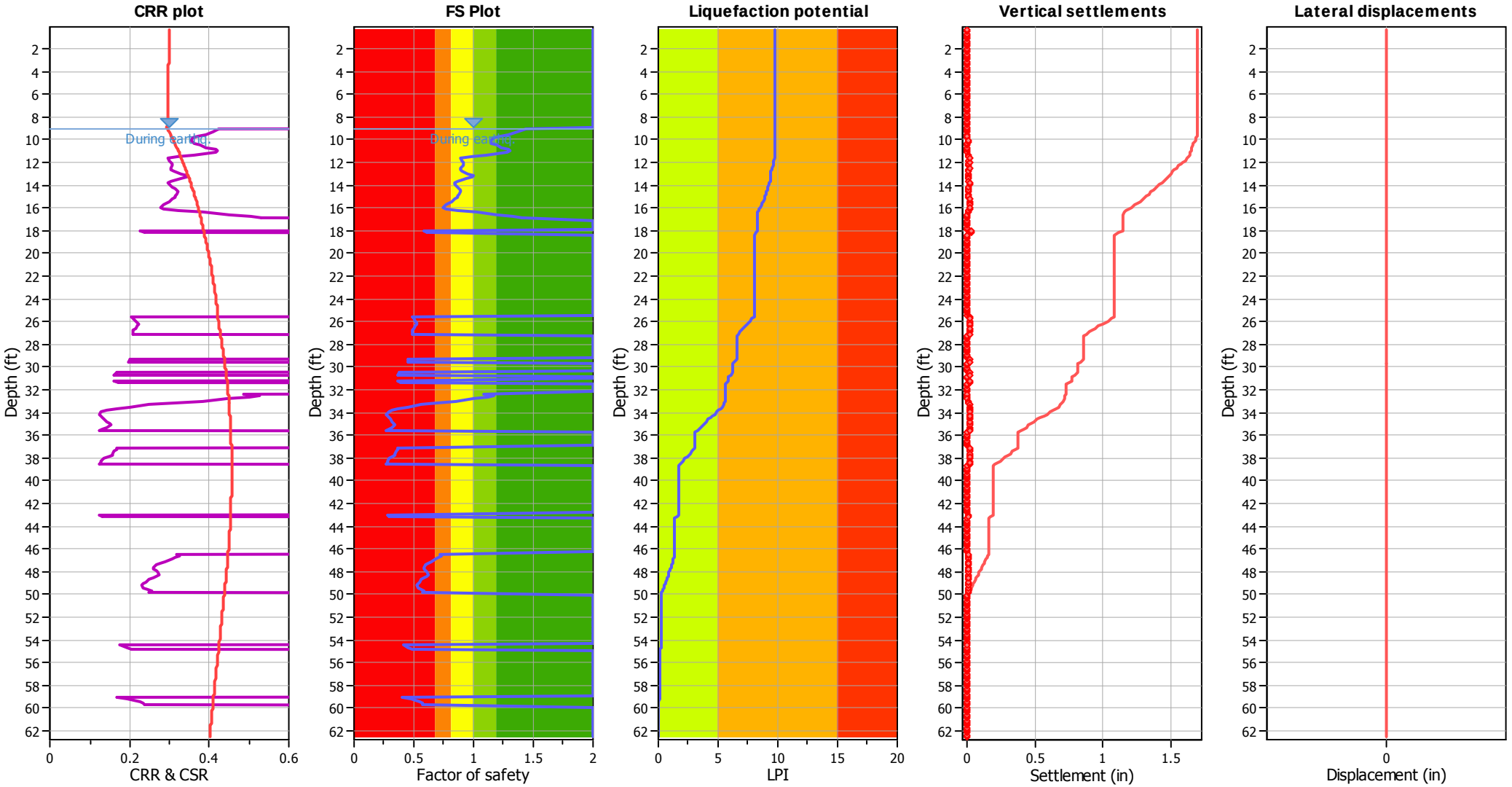
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	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:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.64	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	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:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.64	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

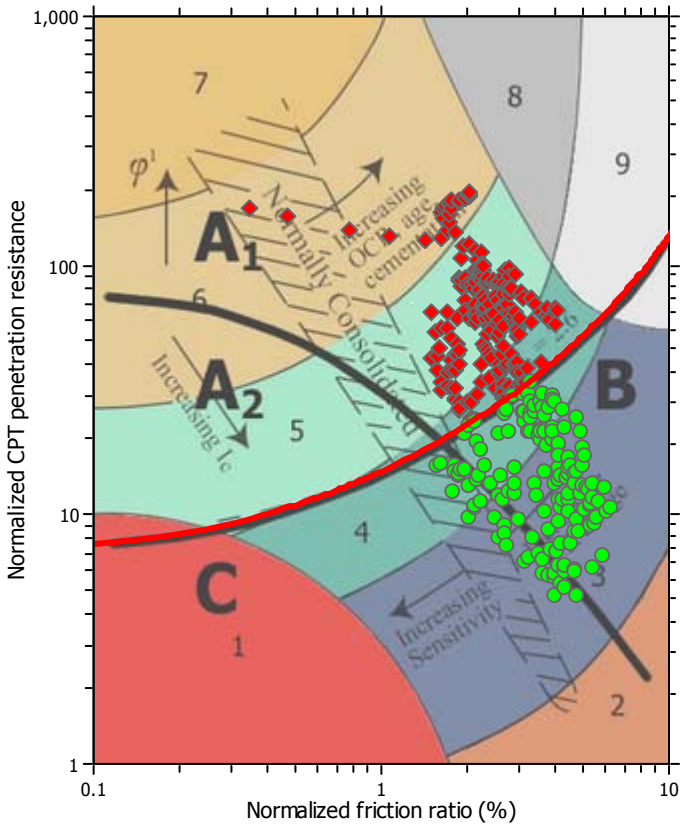
F.S. color scheme

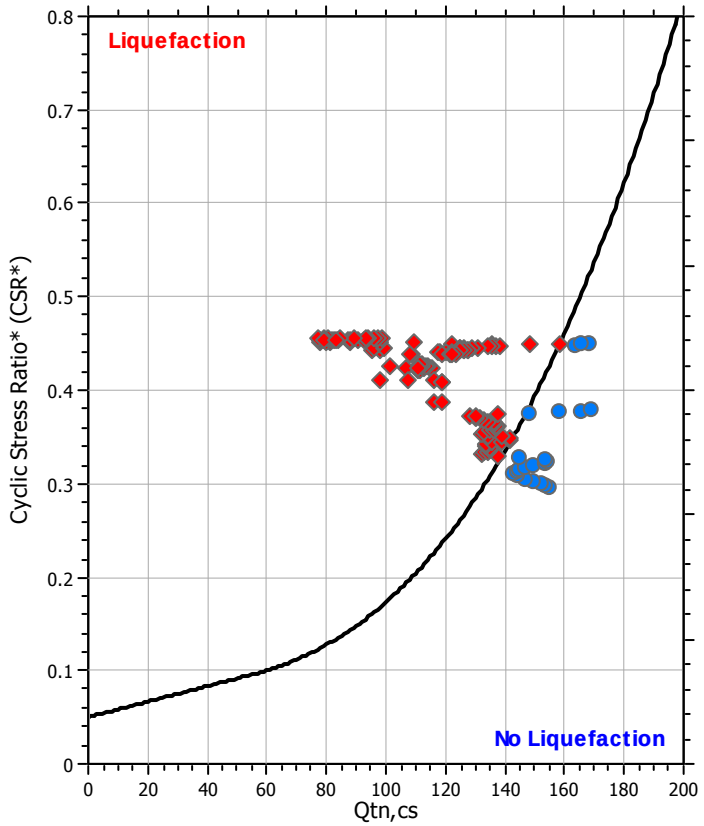
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

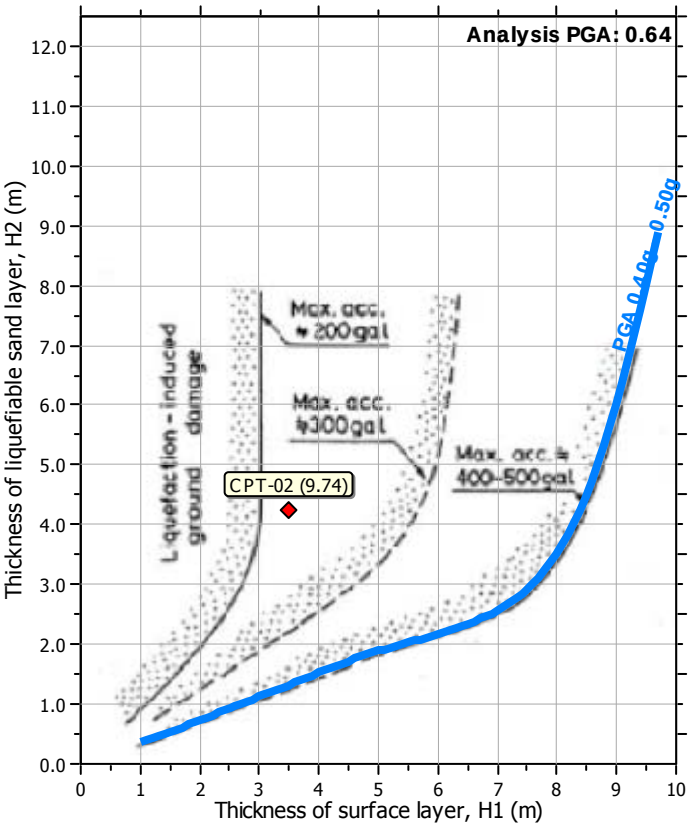
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



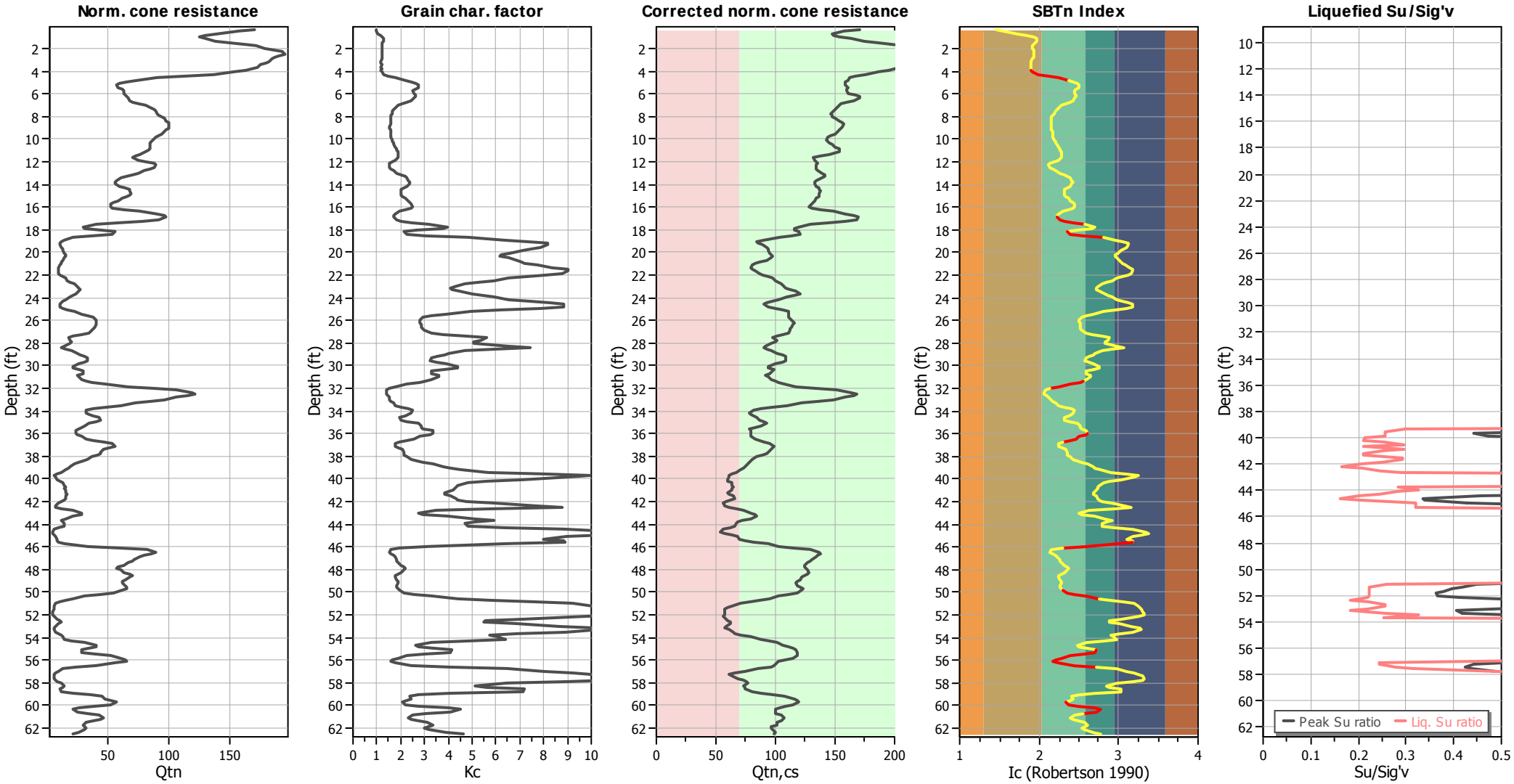




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	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:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.64	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

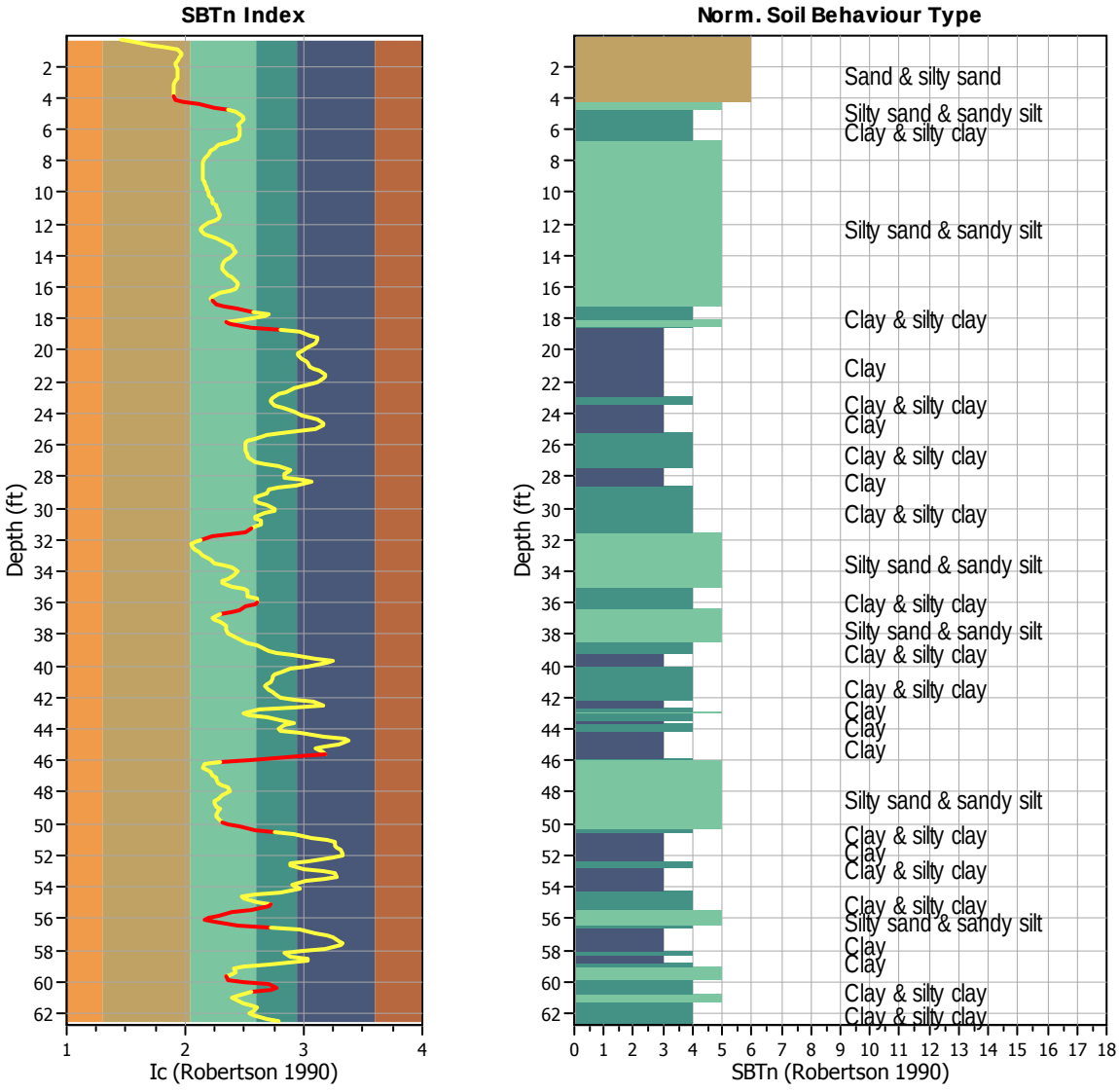
Analysis method:	NCEER (1998)	Depth to water table (erthq.):	9.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.64	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	37.20 ft	Fill height:	N/A	Limit depth:	60.00 ft

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	380
I_c maximum check value:	3.00	Total points excluded:	53
I_c change ratio value:	0.0250	Exclusion percentage:	13.95%
Minimum number of points in layer:	4	Number of layers detected:	11

Transition layer No	Number of points	Depth	SBT_n number	SBT_n description
Transition layer 1	6	Start depth: 4.10 (ft)	6	Sand & silty sand
		End depth: 4.92 (ft)	4	Clay & silty clay
Transition layer 2	5	Start depth: 17.06 (ft)	5	Silty sand & sandy silt
		End depth: 17.72 (ft)	4	Clay & silty clay
Transition layer 3	4	Start depth: 18.37 (ft)	5	Silty sand & sandy silt
		End depth: 18.87 (ft)	3	Clay
Transition layer 4	5	Start depth: 31.50 (ft)	4	Clay & silty clay
		End depth: 32.15 (ft)	5	Silty sand & sandy silt
Transition layer 5	6	Start depth: 36.09 (ft)	4	Clay & silty clay
		End depth: 36.91 (ft)	5	Silty sand & sandy silt
Transition layer 6	4	Start depth: 45.77 (ft)	3	Clay
		End depth: 46.26 (ft)	5	Silty sand & sandy silt
Transition layer 7	5	Start depth: 50.04 (ft)	5	Silty sand & sandy silt
		End depth: 50.69 (ft)	3	Clay
Transition layer 8	5	Start depth: 55.28 (ft)	4	Clay & silty clay
		End depth: 55.94 (ft)	5	Silty sand & sandy silt
Transition layer 9	5	Start depth: 56.11 (ft)	5	Silty sand & sandy silt
		End depth: 56.76 (ft)	3	Clay
Transition layer 10	4	Start depth: 59.88 (ft)	5	Silty sand & sandy silt
		End depth: 60.37 (ft)	4	Clay & silty clay
Transition layer 11	4	Start depth: 60.37 (ft)	4	Clay & silty clay
		End depth: 60.86 (ft)	5	Silty sand & sandy silt

Start depth: Depth where the transition layer begins
End depth: Depth where the transition layer ends

:: Field input data ::

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
1	0.33	112.30	0.30	0.00	2.18	114.31
2	0.49	93.80	0.50	0.00	3.67	115.88
3	0.66	88.50	0.60	0.20	6.62	118.19
4	0.82	78.10	0.90	0.10	9.06	119.95
5	0.98	76.90	1.10	0.10	11.34	121.60
6	1.15	79.10	1.30	0.00	12.14	122.90
7	1.31	86.30	1.50	0.10	12.12	123.94
8	1.48	92.70	1.60	0.10	11.60	124.77
9	1.64	100.20	1.70	0.10	11.13	125.53
10	1.80	107.50	1.90	0.10	10.79	126.23
11	1.97	112.10	2.00	0.00	10.97	127.08
12	2.13	114.40	2.30	0.00	11.10	127.86
13	2.30	122.10	2.50	-0.10	11.17	128.46
14	2.46	124.70	2.50	-0.10	11.10	128.59
15	2.62	118.70	2.40	0.00	11.22	128.33
16	2.79	113.80	2.30	0.10	11.07	127.86
17	2.95	117.00	2.10	0.10	10.76	127.39
18	3.12	114.00	2.00	0.10	10.36	126.89
19	3.28	111.00	1.90	0.10	10.35	126.60
20	3.45	111.00	1.90	0.20	10.42	126.29
21	3.61	106.10	1.80	0.20	10.39	125.98
22	3.77	105.40	1.70	0.20	10.43	125.65
23	3.94	103.70	1.70	0.20	10.38	125.14
24	4.10	97.30	1.50	0.20	10.95	124.69
25	4.27	87.50	1.50	0.20	12.66	124.25
26	4.43	71.40	1.60	0.20	16.17	123.95
27	4.59	53.40	1.60	0.10	20.69	123.40
28	4.76	45.10	1.50	0.10	25.04	122.76
29	4.92	40.60	1.50	0.00	27.50	122.14
30	5.09	37.60	1.40	0.00	29.52	121.75
31	5.25	34.70	1.40	0.00	30.59	121.66
32	5.41	36.30	1.50	0.00	30.50	121.87
33	5.58	39.30	1.50	-0.10	29.16	121.99
34	5.74	40.30	1.40	-0.20	28.48	122.05
35	5.91	39.30	1.50	-0.40	28.58	122.23
36	6.07	40.30	1.60	-0.40	29.12	122.74
37	6.23	41.90	1.70	-0.30	29.17	123.08
38	6.40	41.70	1.70	-0.20	28.64	123.13
39	6.56	42.80	1.60	-0.20	27.84	122.86
40	6.73	43.10	1.50	-0.20	26.14	122.47
41	6.89	46.00	1.40	-0.20	24.05	122.29
42	7.05	51.30	1.40	-0.20	21.99	122.30
43	7.22	54.30	1.40	-0.20	20.43	122.27
44	7.38	55.10	1.30	-0.20	19.60	122.15
45	7.55	55.60	1.30	-0.20	19.03	122.00
46	7.71	56.70	1.30	-0.20	18.44	121.85
47	7.87	57.80	1.20	-0.20	18.01	121.90
48	8.04	59.20	1.30	-0.10	17.49	121.97

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
49	8.20	61.60	1.30	-0.10	17.51	122.42
50	8.37	63.60	1.40	-0.30	17.48	122.86
51	8.53	65.40	1.50	-0.30	17.54	123.27
52	8.69	66.90	1.50	-0.30	17.44	123.49
53	8.86	68.20	1.50	-0.30	17.27	123.53
54	9.02	68.60	1.50	-0.30	17.28	123.54
55	9.19	68.10	1.50	-0.30	17.49	123.53
56	9.35	67.10	1.50	-0.30	17.80	123.50
57	9.51	66.50	1.50	-0.30	17.95	123.30
58	9.68	65.30	1.40	-0.30	18.10	123.10
59	9.84	64.50	1.40	-0.30	18.26	122.90
60	10.01	63.70	1.40	-0.30	18.61	122.87
61	10.17	62.90	1.40	-0.30	19.10	123.02
62	10.34	63.10	1.50	-0.30	19.44	123.19
63	10.50	63.70	1.50	-0.30	19.84	123.53
64	10.66	64.50	1.60	-0.30	20.23	123.86
65	10.83	64.60	1.70	-0.20	20.93	124.31
66	10.99	64.20	1.80	-0.20	21.41	124.44
67	11.16	63.10	1.70	-0.20	22.04	124.38
68	11.32	60.10	1.70	-0.20	21.95	123.54
69	11.48	56.50	1.30	-0.20	22.05	122.78
70	11.65	55.40	1.30	-0.40	21.64	122.22
71	11.81	58.20	1.40	-0.40	20.45	122.58
72	11.98	69.50	1.40	-0.60	18.72	123.01
73	12.14	75.10	1.40	-0.60	17.05	123.23
74	12.30	77.60	1.40	-0.60	16.56	123.31
75	12.47	76.50	1.40	-0.50	16.86	123.28
76	12.63	72.50	1.40	-0.50	17.89	123.36
77	12.80	69.20	1.50	-0.50	19.42	123.57
78	12.96	65.90	1.60	-0.50	21.36	123.91
79	13.12	61.20	1.70	-0.50	23.36	124.05
80	13.29	56.90	1.70	-0.50	24.90	123.90
81	13.45	55.00	1.60	-0.50	25.99	123.45
82	13.62	51.00	1.50	-0.50	26.61	122.85
83	13.78	48.70	1.40	-0.50	27.18	122.62
84	13.94	50.60	1.50	-0.50	26.98	122.84
85	14.11	54.60	1.60	-0.50	25.69	123.35
86	14.27	61.20	1.60	-0.50	24.46	123.84
87	14.44	63.70	1.70	-0.60	23.45	124.13
88	14.60	65.30	1.70	-0.60	23.19	124.34
89	14.76	66.10	1.70	-0.60	22.98	124.37
90	14.93	66.30	1.70	-0.60	23.25	124.35
91	15.09	63.90	1.70	-0.50	24.15	124.27
92	15.26	59.50	1.70	-0.60	25.15	124.01
93	15.42	57.60	1.60	-0.60	26.27	123.74
94	15.58	54.90	1.60	-0.60	27.16	123.49
95	15.75	52.60	1.60	-0.60	27.90	123.25
96	15.91	52.00	1.50	-0.60	27.99	123.07

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
97	16.08	53.40	1.50	-0.60	27.40	123.49
98	16.24	60.30	1.80	-0.50	25.21	124.87
99	16.40	80.30	2.20	-0.40	22.40	126.60
100	16.57	97.70	2.50	-0.30	20.23	127.96
101	16.73	103.80	2.70	-0.30	19.65	128.81
102	16.90	103.10	2.90	-0.30	19.92	129.20
103	17.06	102.60	2.90	-0.30	21.01	129.09
104	17.23	89.70	2.70	-0.30	23.32	128.00
105	17.39	62.20	2.10	-0.50	27.61	125.87
106	17.55	42.30	1.50	-0.60	34.03	123.01
107	17.72	31.40	1.20	-0.40	40.34	120.78
108	17.88	27.90	1.20	-0.20	38.72	120.47
109	18.05	45.20	1.30	2.60	29.70	122.07
110	18.21	75.20	1.60	0.60	24.33	123.37
111	18.37	70.80	1.60	-0.40	25.68	123.43
112	18.54	37.70	1.40	-1.00	33.04	121.39
113	18.70	22.10	0.90	-1.00	46.35	117.94
114	18.87	17.40	0.60	-0.90	56.12	114.67
115	19.03	13.50	0.60	4.40	62.03	113.07
116	19.19	12.80	0.60	5.10	66.91	113.28
117	19.36	14.10	0.70	5.40	66.76	114.13
118	19.52	15.50	0.80	5.50	65.18	114.98
119	19.69	16.10	0.80	5.40	63.15	115.45
120	19.85	17.20	0.80	5.50	60.88	115.58
121	20.01	18.20	0.80	5.40	57.50	116.12
122	20.18	21.40	0.90	5.20	55.23	116.59
123	20.34	21.60	0.90	4.20	55.08	116.92
124	20.51	19.70	0.90	4.10	57.28	116.49
125	20.67	17.60	0.80	3.60	59.49	115.71
126	20.83	17.10	0.70	3.80	60.55	114.56
127	21.00	15.80	0.60	3.70	61.32	113.69
128	21.16	15.00	0.60	3.90	64.58	113.09
129	21.33	13.10	0.60	4.10	67.96	112.93
130	21.49	13.00	0.60	7.30	71.59	113.21
131	21.65	13.10	0.70	7.30	71.75	113.64
132	21.82	13.90	0.70	7.60	70.47	114.50
133	21.98	15.80	0.80	7.50	66.45	115.43
134	22.15	18.60	0.90	6.80	62.03	116.65
135	22.31	21.60	1.00	3.80	57.20	117.52
136	22.47	24.50	1.00	0.60	53.30	118.31
137	22.64	27.20	1.10	-0.30	49.19	119.08
138	22.80	31.90	1.20	-0.90	45.48	120.05
139	22.97	36.80	1.30	-2.60	42.56	120.71
140	23.13	38.00	1.30	-2.90	41.18	121.24
141	23.30	39.10	1.40	-4.00	41.65	121.83
142	23.46	39.50	1.60	-5.00	43.75	122.45
143	23.62	36.40	1.70	-4.80	47.32	122.75
144	23.79	32.20	1.70	-4.00	50.07	121.89

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
145	23.95	28.90	1.20	-3.80	53.56	120.72
146	24.12	24.40	1.20	-3.90	56.98	119.21
147	24.28	20.70	1.10	-3.70	62.32	118.18
148	24.44	18.30	0.90	-0.10	67.09	117.12
149	24.61	16.20	0.90	0.00	70.66	116.67
150	24.77	16.30	1.00	0.60	70.70	117.25
151	24.94	19.90	1.10	1.00	65.14	118.82
152	25.10	26.60	1.40	0.80	55.38	120.48
153	25.26	36.50	1.50	0.20	46.95	121.78
154	25.43	43.30	1.50	-2.40	39.69	122.64
155	25.59	52.70	1.60	-2.90	34.89	123.17
156	25.76	58.90	1.60	-2.70	32.15	123.75
157	25.92	61.20	1.70	-1.60	30.99	124.18
158	26.08	63.30	1.80	-1.20	30.99	124.52
159	26.25	62.70	1.80	-1.20	31.20	124.66
160	26.41	62.10	1.80	-1.60	31.33	124.50
161	26.58	61.40	1.70	-1.30	31.64	124.32
162	26.74	59.70	1.70	-1.50	31.86	124.15
163	26.90	59.70	1.70	-1.60	32.58	124.10
164	27.07	57.70	1.70	-2.10	34.86	123.76
165	27.23	46.40	1.60	-1.50	38.73	122.41
166	27.40	34.10	1.10	-1.80	45.37	120.97
167	27.56	29.30	1.20	-1.50	51.48	119.94
168	27.72	28.20	1.30	-1.60	49.69	120.72
169	27.89	41.70	1.40	-0.40	47.75	120.85
170	28.05	34.50	1.20	-5.00	47.95	120.17
171	28.22	24.50	1.00	-2.00	57.21	118.67
172	28.38	18.50	1.00	-1.70	62.62	118.12
173	28.54	25.00	1.10	-0.40	53.77	119.13
174	28.71	41.90	1.20	-1.50	45.23	120.60
175	28.87	43.50	1.40	-4.10	40.60	121.97
176	29.04	46.90	1.60	-3.80	39.53	122.99
177	29.20	53.30	1.70	-3.90	37.20	123.68
178	29.36	58.20	1.70	-4.80	35.00	124.01
179	29.53	59.60	1.70	-4.90	34.49	124.06
180	29.69	56.50	1.70	-3.70	36.36	123.42
181	29.86	44.60	1.40	-2.70	39.73	122.07
182	30.02	36.80	1.10	-2.10	43.46	120.77
183	30.19	37.00	1.20	-2.20	43.28	120.79
184	30.35	45.50	1.40	-2.30	39.10	122.13
185	30.51	59.00	1.60	-4.90	35.11	122.42
186	30.68	54.90	1.20	-5.90	34.85	122.04
187	30.84	43.80	1.20	-3.10	37.69	120.96
188	31.01	40.30	1.20	-2.80	37.39	121.44
189	31.17	59.80	1.40	-7.10	35.23	122.24
190	31.33	58.80	1.50	-7.70	33.22	123.17
191	31.50	57.80	1.60	-7.90	31.15	124.05
192	31.66	79.60	1.80	-7.80	25.72	125.49

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
193	31.83	112.40	2.10	-8.40	20.24	127.43
194	31.99	143.70	2.60	-0.80	16.91	129.46
195	32.15	172.70	3.20	-0.80	15.15	131.34
196	32.32	199.40	3.80	-0.70	14.41	132.60
197	32.48	203.00	4.00	-0.80	14.65	133.17
198	32.65	187.60	4.00	-0.70	15.49	133.07
199	32.81	175.80	3.80	-0.70	16.49	132.51
200	32.97	162.50	3.40	-0.70	17.23	131.54
201	33.14	144.10	2.90	-0.80	18.08	130.18
202	33.30	125.00	2.40	-0.80	19.20	128.46
203	33.47	106.20	1.90	-0.70	20.57	126.49
204	33.63	89.30	1.50	-0.70	23.30	124.46
205	33.79	66.30	1.30	-0.70	26.44	122.17
206	33.96	54.80	0.90	-0.70	28.47	120.53
207	34.12	61.40	0.90	-0.80	27.77	119.75
208	34.29	63.50	1.00	-1.60	26.64	120.42
209	34.45	67.80	1.10	-1.40	24.94	121.11
210	34.61	79.60	1.10	-3.90	22.82	121.82
211	34.78	87.50	1.20	-4.30	23.10	122.51
212	34.94	74.30	1.40	-6.20	25.92	123.11
213	35.11	65.80	1.50	-5.10	30.21	123.16
214	35.27	61.10	1.40	-5.90	31.76	122.01
215	35.43	55.10	0.90	-6.60	31.74	120.84
216	35.60	55.90	1.00	-7.30	32.07	119.75
217	35.76	51.00	1.00	-7.80	35.37	119.79
218	35.93	42.20	1.00	-7.90	35.76	119.77
219	36.09	54.60	1.00	-7.70	34.65	119.86
220	36.26	56.20	1.00	-7.90	30.93	120.41
221	36.42	63.30	1.10	-7.50	28.75	121.36
222	36.58	75.00	1.30	-5.80	25.88	122.53
223	36.75	87.00	1.40	-3.40	22.30	123.70
224	36.91	107.20	1.50	-2.70	20.20	124.67
225	37.08	111.20	1.70	-5.20	20.38	125.36
226	37.24	96.70	1.80	-5.80	22.17	125.19
227	37.40	85.80	1.50	-5.30	24.18	124.83
228	37.57	87.40	1.60	-7.00	24.51	124.46
229	37.73	88.90	1.60	-8.50	24.37	124.29
230	37.90	85.00	1.40	-6.80	24.68	123.50
231	38.06	74.80	1.20	-8.30	25.95	122.34
232	38.22	65.60	1.10	-9.20	27.79	121.23
233	38.39	61.50	1.00	-7.40	30.03	120.80
234	38.55	58.30	1.10	-7.70	32.09	120.11
235	38.72	49.60	0.90	-4.20	35.63	119.57
236	38.88	42.70	0.90	-1.40	39.08	118.75
237	39.04	40.80	0.90	-2.20	40.97	118.32
238	39.21	41.50	0.80	-5.40	44.22	117.46
239	39.37	29.50	0.70	-4.00	51.68	115.94
240	39.54	18.50	0.60	2.20	65.75	114.38

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
241	39.70	15.70	0.60	3.10	76.69	113.44
242	39.86	16.60	0.60	3.10	72.43	113.16
243	40.03	21.60	0.50	0.10	61.01	113.23
244	40.19	28.20	0.50	-0.80	51.26	113.75
245	40.36	32.50	0.60	-1.40	46.27	114.99
246	40.52	35.60	0.70	-1.30	43.10	115.18
247	40.68	36.00	0.50	-0.70	42.66	115.66
248	40.85	35.90	0.70	-2.80	42.35	115.24
249	41.01	34.50	0.60	-3.30	41.92	115.26
250	41.18	37.30	0.50	-1.60	39.49	114.45
251	41.34	38.20	0.50	-4.70	39.11	114.98
252	41.50	38.20	0.70	-4.40	41.07	115.77
253	41.67	36.30	0.70	-3.60	42.71	116.09
254	41.83	35.80	0.60	-2.60	43.22	115.20
255	42.00	32.80	0.50	-3.00	45.89	113.55
256	42.16	23.70	0.40	-3.30	52.95	112.61
257	42.32	20.60	0.50	-2.80	64.04	112.59
258	42.49	18.00	0.60	-2.30	70.24	113.79
259	42.65	20.20	0.70	-1.60	52.98	116.32
260	42.82	52.60	0.90	-1.50	36.67	118.97
261	42.98	73.10	1.10	-3.00	30.30	121.10
262	43.15	65.40	1.30	-3.30	32.23	121.91
263	43.31	50.40	1.30	-2.90	40.18	121.36
264	43.47	35.40	1.10	-2.50	48.12	119.69
265	43.64	31.70	0.80	-1.30	53.20	117.70
266	43.80	29.90	0.70	-1.00	48.41	116.95
267	43.97	41.40	0.80	-1.00	45.43	116.76
268	44.13	37.40	0.70	-1.70	46.07	116.34
269	44.29	26.50	0.60	2.50	56.18	114.54
270	44.46	15.90	0.50	3.00	70.70	112.32
271	44.62	13.10	0.40	5.60	84.31	111.20
272	44.79	13.90	0.50	8.10	87.86	112.64
273	44.95	16.20	0.80	10.80	80.33	114.66
274	45.11	22.30	0.80	13.80	71.28	116.15
275	45.28	26.20	0.80	12.10	65.90	116.74
276	45.44	24.60	0.90	10.20	70.59	118.02
277	45.61	20.70	1.30	10.40	70.88	119.74
278	45.77	31.90	1.50	13.50	56.68	122.81
279	45.93	64.30	2.10	12.80	33.64	126.02
280	46.10	131.20	2.50	-0.50	22.38	128.91
281	46.26	174.80	3.10	-7.10	17.65	130.81
282	46.43	182.20	3.50	-8.00	17.11	131.76
283	46.59	169.90	3.50	-8.00	18.27	132.04
284	46.75	160.60	3.60	-7.80	19.44	131.84
285	46.92	155.20	3.40	-7.30	20.15	131.69
286	47.08	154.00	3.40	-6.90	20.97	131.28
287	47.25	136.90	3.20	-5.30	21.07	131.01
288	47.41	147.20	3.10	-3.80	21.72	130.68

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
289	47.57	136.70	3.10	-2.20	23.03	130.47
290	47.74	114.30	3.10	2.50	24.52	130.43
291	47.90	128.00	3.20	3.60	25.42	130.53
292	48.07	128.50	3.30	4.50	24.31	130.81
293	48.23	133.70	3.30	4.80	23.21	130.91
294	48.39	144.60	3.20	4.80	21.57	130.80
295	48.56	149.00	3.00	4.60	20.50	130.54
296	48.72	143.70	2.90	4.40	20.62	130.25
297	48.89	136.00	2.90	4.20	21.44	129.98
298	49.05	131.10	2.80	4.30	22.12	129.72
299	49.22	128.90	2.70	4.30	21.80	129.54
300	49.38	136.80	2.70	4.20	21.43	129.79
301	49.54	141.80	3.00	3.90	21.36	130.19
302	49.71	139.50	3.10	3.60	21.91	130.51
303	49.87	136.90	3.10	3.80	22.79	130.34
304	50.04	126.20	2.90	3.90	24.64	129.70
305	50.20	103.30	2.60	3.80	28.63	128.32
306	50.36	72.40	2.10	3.80	35.01	126.40
307	50.53	54.50	1.70	3.80	43.48	124.28
308	50.69	42.90	1.50	3.00	52.72	122.22
309	50.86	30.00	1.20	3.60	62.85	120.02
310	51.02	21.30	0.90	18.70	72.68	117.48
311	51.18	19.00	0.70	25.30	77.49	115.30
312	51.35	18.50	0.60	31.10	78.01	114.09
313	51.51	17.70	0.60	35.80	79.39	113.60
314	51.68	16.60	0.60	37.90	81.70	113.51
315	51.84	16.40	0.60	41.40	83.57	113.44
316	52.00	16.10	0.60	44.00	83.34	113.45
317	52.17	16.70	0.60	48.60	76.33	113.27
318	52.33	21.50	0.50	54.80	61.11	113.98
319	52.50	35.20	0.60	38.30	51.19	114.97
320	52.66	36.80	0.70	22.90	50.68	115.86
321	52.82	26.80	0.70	18.90	58.90	115.43
322	52.99	19.40	0.60	23.90	69.70	114.04
323	53.15	17.90	0.50	32.90	77.80	113.69
324	53.32	17.80	0.70	40.50	79.38	114.89
325	53.48	20.50	0.90	52.30	71.14	115.99
326	53.64	28.90	0.70	53.00	59.47	116.91
327	53.81	37.60	0.80	33.80	52.16	118.56
328	53.97	42.40	1.30	16.60	53.95	120.77
329	54.14	37.50	1.60	20.30	56.41	122.63
330	54.30	42.90	1.80	26.60	46.18	124.64
331	54.46	85.50	2.20	9.80	35.10	126.45
332	54.63	105.90	2.40	-4.00	29.56	127.85
333	54.79	100.90	2.60	-4.80	30.61	128.44
334	54.96	86.90	2.80	-4.20	35.60	128.61
335	55.12	73.10	2.90	-3.50	41.57	128.62
336	55.28	67.60	3.00	-2.80	40.91	128.85

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
337	55.45	93.40	3.00	-1.90	33.16	129.56
338	55.61	131.80	3.10	-4.10	26.03	130.03
339	55.78	140.80	2.90	-5.80	21.55	129.64
340	55.94	140.70	2.20	-5.90	19.12	128.55
341	56.11	142.50	1.90	-5.40	17.81	127.52
342	56.27	138.40	2.00	-4.90	20.63	127.38
343	56.43	97.20	2.30	5.70	27.92	126.88
344	56.60	57.60	2.00	5.90	41.32	125.25
345	56.76	38.10	1.50	10.90	56.81	122.48
346	56.93	27.60	1.10	29.70	65.86	119.26
347	57.09	22.80	0.70	60.30	72.70	116.67
348	57.25	18.70	0.70	73.90	76.80	115.45
349	57.42	19.10	0.80	78.60	80.74	116.00
350	57.58	20.50	0.90	66.70	82.94	117.46
351	57.75	20.50	1.20	82.50	81.35	119.07
352	57.91	25.30	1.40	86.00	71.27	119.74
353	58.07	35.20	1.00	57.50	56.92	120.46
354	58.24	50.20	1.20	34.60	48.32	119.68
355	58.40	41.80	0.90	8.90	51.33	120.04
356	58.57	30.80	1.20	11.40	61.17	119.53
357	58.73	27.00	1.20	21.80	60.69	121.34
358	58.89	51.20	1.70	44.70	40.97	123.73
359	59.06	103.10	1.90	9.60	30.55	126.57
360	59.22	116.30	2.60	6.20	26.80	128.58
361	59.39	115.70	3.10	7.50	27.70	129.93
362	59.55	119.70	3.30	9.10	26.01	130.44
363	59.71	144.90	3.00	-0.10	24.05	130.61
364	59.88	143.40	3.10	-5.70	24.99	129.88
365	60.04	92.90	2.60	-8.60	30.63	128.61
366	60.21	67.20	2.20	-8.10	40.49	127.05
367	60.37	60.10	2.30	-7.30	44.28	126.09
368	60.53	66.10	2.00	-6.50	41.22	126.40
369	60.70	83.60	2.30	-6.20	32.96	127.07
370	60.86	114.30	2.40	-6.20	28.06	128.27
371	61.03	123.00	2.70	-2.70	26.29	128.86
372	61.19	111.40	2.70	-5.50	27.47	128.55
373	61.35	97.20	2.20	-5.40	30.53	128.09
374	61.52	89.00	2.50	-6.40	33.63	127.28
375	61.68	77.30	2.20	-6.90	35.76	127.01
376	61.85	80.60	2.10	-7.20	33.87	126.37
377	62.01	92.40	1.90	-7.30	32.45	126.47
378	62.17	88.00	2.20	-7.70	34.08	126.63
379	62.34	72.30	2.30	-7.90	39.63	126.52
380	62.50	60.50	2.10	-7.70	44.86	126.08

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (ft)
q_c:	Measured cone resistance (tsf)
f_s:	Sleeve friction resistance (tsf)
u:	Pore pressure (tsf)
Fines content:	Percentage of fines in soil (%)
Unit weight:	Bulk soil unit weight (pcf)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	0.33	0.02	0.00	0.02	1.00	0.416	1.39	0.300	1.00	1.00	2.000	No
2	0.49	0.03	0.00	0.03	1.00	0.416	1.39	0.300	1.00	1.00	2.000	No
3	0.66	0.04	0.00	0.04	1.00	0.416	1.39	0.300	1.00	1.00	2.000	No
4	0.82	0.05	0.00	0.05	1.00	0.416	1.39	0.300	1.00	1.00	2.000	No
5	0.98	0.06	0.00	0.06	1.00	0.416	1.39	0.300	1.00	1.00	2.000	No
6	1.15	0.07	0.00	0.07	1.00	0.416	1.39	0.300	1.00	1.00	2.000	No
7	1.31	0.08	0.00	0.08	1.00	0.416	1.39	0.300	1.00	1.00	2.000	No
8	1.48	0.09	0.00	0.09	1.00	0.415	1.39	0.300	1.00	1.00	2.000	No
9	1.64	0.10	0.00	0.10	1.00	0.415	1.39	0.299	1.00	1.00	2.000	No
10	1.80	0.11	0.00	0.11	1.00	0.415	1.39	0.299	1.00	1.00	2.000	No
11	1.97	0.12	0.00	0.12	1.00	0.415	1.39	0.299	1.00	1.00	2.000	No
12	2.13	0.13	0.00	0.13	1.00	0.415	1.39	0.299	1.00	1.00	2.000	No
13	2.30	0.14	0.00	0.14	1.00	0.415	1.39	0.299	1.00	1.00	2.000	No
14	2.46	0.15	0.00	0.15	1.00	0.414	1.39	0.299	1.00	1.00	2.000	No
15	2.62	0.16	0.00	0.16	1.00	0.414	1.39	0.299	1.00	1.00	2.000	No
16	2.79	0.17	0.00	0.17	1.00	0.414	1.39	0.299	1.00	1.00	2.000	No
17	2.95	0.18	0.00	0.18	1.00	0.414	1.39	0.299	1.00	1.00	2.000	No
18	3.12	0.19	0.00	0.19	0.99	0.414	1.39	0.298	1.00	1.00	2.000	No
19	3.28	0.20	0.00	0.20	0.99	0.414	1.39	0.298	1.00	1.00	2.000	No
20	3.45	0.21	0.00	0.21	0.99	0.413	1.39	0.298	1.00	1.00	2.000	No
21	3.61	0.22	0.00	0.22	0.99	0.413	1.39	0.298	1.00	1.00	2.000	No
22	3.77	0.23	0.00	0.23	0.99	0.413	1.39	0.298	1.00	1.00	2.000	No
23	3.94	0.24	0.00	0.24	0.99	0.413	1.39	0.298	1.00	1.00	2.000	No
24	4.10	0.25	0.00	0.25	0.99	0.413	1.39	0.298	1.00	1.00	2.000	Yes
25	4.27	0.27	0.00	0.27	0.99	0.413	1.39	0.298	1.00	1.00	2.000	Yes
26	4.43	0.28	0.00	0.28	0.99	0.412	1.39	0.297	1.00	1.00	2.000	Yes
27	4.59	0.28	0.00	0.28	0.99	0.412	1.39	0.297	1.00	1.00	2.000	Yes
28	4.76	0.30	0.00	0.30	0.99	0.412	1.39	0.297	1.00	1.00	2.000	Yes
29	4.92	0.31	0.00	0.31	0.99	0.412	1.39	0.297	1.00	1.00	2.000	Yes
30	5.09	0.32	0.00	0.32	0.99	0.412	1.39	0.297	1.00	1.00	2.000	No
31	5.25	0.33	0.00	0.33	0.99	0.412	1.39	0.297	1.00	1.00	2.000	No
32	5.41	0.33	0.00	0.33	0.99	0.412	1.39	0.297	1.00	1.00	2.000	No
33	5.58	0.35	0.00	0.35	0.99	0.411	1.39	0.297	1.00	1.00	2.000	No
34	5.74	0.36	0.00	0.36	0.99	0.411	1.39	0.297	1.00	1.00	2.000	No
35	5.91	0.37	0.00	0.37	0.99	0.411	1.39	0.296	1.00	1.00	2.000	No
36	6.07	0.38	0.00	0.38	0.99	0.411	1.39	0.296	1.00	1.00	2.000	No
37	6.23	0.39	0.00	0.39	0.99	0.411	1.39	0.296	1.00	1.00	2.000	No
38	6.40	0.40	0.00	0.40	0.99	0.411	1.39	0.296	1.00	1.00	2.000	No
39	6.56	0.41	0.00	0.41	0.99	0.410	1.39	0.296	1.00	1.00	2.000	No
40	6.73	0.42	0.00	0.42	0.99	0.410	1.39	0.296	1.00	1.00	2.000	No
41	6.89	0.43	0.00	0.43	0.99	0.410	1.39	0.296	1.00	1.00	2.000	No
42	7.05	0.44	0.00	0.44	0.99	0.410	1.39	0.296	1.00	1.00	2.000	No
43	7.22	0.45	0.00	0.45	0.99	0.410	1.39	0.296	1.00	1.00	2.000	No
44	7.38	0.46	0.00	0.46	0.98	0.410	1.39	0.295	1.00	1.00	2.000	No
45	7.55	0.47	0.00	0.47	0.98	0.410	1.39	0.295	1.00	1.00	2.000	No
46	7.71	0.48	0.00	0.48	0.98	0.409	1.39	0.295	1.00	1.00	2.000	No
47	7.87	0.49	0.00	0.49	0.98	0.409	1.39	0.295	1.00	1.00	2.000	No
48	8.04	0.50	0.00	0.50	0.98	0.409	1.39	0.295	1.00	1.00	2.000	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	8.20	0.51	0.00	0.51	0.98	0.409	1.39	0.295	1.00	1.00	2.000	No
50	8.37	0.52	0.00	0.52	0.98	0.409	1.39	0.295	1.00	1.00	2.000	No
51	8.53	0.53	0.00	0.53	0.98	0.409	1.39	0.295	1.00	1.00	2.000	No
52	8.69	0.54	0.00	0.54	0.98	0.408	1.39	0.295	1.00	1.00	2.000	No
53	8.86	0.55	0.00	0.55	0.98	0.408	1.39	0.294	1.00	1.00	2.000	No
54	9.02	0.56	0.00	0.56	0.98	0.409	1.39	0.295	1.00	1.00	0.295	No
55	9.19	0.57	0.01	0.56	0.98	0.412	1.39	0.297	1.00	1.00	0.297	No
56	9.35	0.58	0.01	0.57	0.98	0.416	1.39	0.300	1.00	1.00	0.300	No
57	9.51	0.59	0.02	0.57	0.98	0.419	1.39	0.302	1.00	1.00	0.302	No
58	9.68	0.60	0.02	0.58	0.98	0.423	1.39	0.305	1.00	1.00	0.305	No
59	9.84	0.61	0.03	0.58	0.98	0.426	1.39	0.307	1.00	1.00	0.307	No
60	10.01	0.62	0.03	0.59	0.98	0.429	1.39	0.310	1.00	1.00	0.310	No
61	10.17	0.63	0.04	0.59	0.98	0.432	1.39	0.312	1.00	1.00	0.312	No
62	10.34	0.64	0.04	0.60	0.98	0.436	1.39	0.314	1.00	1.00	0.314	No
63	10.50	0.65	0.05	0.60	0.98	0.439	1.39	0.316	1.00	1.00	0.316	No
64	10.66	0.66	0.05	0.61	0.98	0.442	1.39	0.318	1.00	1.00	0.318	No
65	10.83	0.67	0.06	0.61	0.98	0.445	1.39	0.321	1.00	1.00	0.321	No
66	10.99	0.68	0.06	0.62	0.98	0.447	1.39	0.323	1.00	1.00	0.323	No
67	11.16	0.69	0.07	0.62	0.98	0.450	1.39	0.325	1.00	1.00	0.325	No
68	11.32	0.70	0.07	0.63	0.98	0.453	1.39	0.327	1.00	1.00	0.327	No
69	11.48	0.71	0.08	0.63	0.98	0.456	1.39	0.329	1.00	1.00	0.329	No
70	11.65	0.72	0.08	0.64	0.98	0.459	1.39	0.331	1.00	1.00	0.331	No
71	11.81	0.73	0.09	0.64	0.98	0.461	1.39	0.333	1.00	1.00	0.333	No
72	11.98	0.74	0.09	0.65	0.97	0.464	1.39	0.335	1.00	1.00	0.335	No
73	12.14	0.75	0.10	0.65	0.97	0.466	1.39	0.336	1.00	1.00	0.336	No
74	12.30	0.76	0.10	0.66	0.97	0.469	1.39	0.338	1.00	1.00	0.338	No
75	12.47	0.77	0.11	0.66	0.97	0.472	1.39	0.340	1.00	1.00	0.340	No
76	12.63	0.78	0.11	0.67	0.97	0.474	1.39	0.342	1.00	1.00	0.342	No
77	12.80	0.79	0.12	0.67	0.97	0.476	1.39	0.344	1.00	1.00	0.344	No
78	12.96	0.80	0.12	0.68	0.97	0.479	1.39	0.345	1.00	1.00	0.345	No
79	13.12	0.81	0.13	0.68	0.97	0.481	1.39	0.347	1.00	1.00	0.347	No
80	13.29	0.82	0.13	0.69	0.97	0.483	1.39	0.349	1.00	1.00	0.349	No
81	13.45	0.83	0.14	0.69	0.97	0.486	1.39	0.350	1.00	1.00	0.350	No
82	13.62	0.84	0.14	0.70	0.97	0.488	1.39	0.352	1.00	1.00	0.352	No
83	13.78	0.85	0.15	0.70	0.97	0.490	1.39	0.353	1.00	1.00	0.353	No
84	13.94	0.86	0.15	0.71	0.97	0.492	1.39	0.355	1.00	1.00	0.355	No
85	14.11	0.87	0.16	0.71	0.97	0.494	1.39	0.356	1.00	1.00	0.356	No
86	14.27	0.88	0.16	0.72	0.97	0.496	1.39	0.358	1.00	1.00	0.358	No
87	14.44	0.89	0.17	0.72	0.97	0.498	1.39	0.359	1.00	1.00	0.359	No
88	14.60	0.90	0.17	0.73	0.97	0.500	1.39	0.361	1.00	1.00	0.361	No
89	14.76	0.91	0.18	0.73	0.97	0.502	1.39	0.362	1.00	1.00	0.362	No
90	14.93	0.92	0.19	0.74	0.97	0.504	1.39	0.364	1.00	1.00	0.364	No
91	15.09	0.93	0.19	0.74	0.97	0.506	1.39	0.365	1.00	1.00	0.365	No
92	15.26	0.94	0.20	0.75	0.97	0.508	1.39	0.366	1.00	1.00	0.366	No
93	15.42	0.95	0.20	0.75	0.97	0.510	1.39	0.368	1.00	1.00	0.368	No
94	15.58	0.96	0.21	0.76	0.97	0.512	1.39	0.369	1.00	1.00	0.369	No
95	15.75	0.97	0.21	0.76	0.97	0.514	1.39	0.370	1.00	1.00	0.370	No
96	15.91	0.98	0.22	0.77	0.97	0.515	1.39	0.372	1.00	1.00	0.372	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	16.08	0.99	0.22	0.77	0.97	0.517	1.39	0.373	1.00	1.00	0.373	No
98	16.24	1.00	0.23	0.78	0.97	0.519	1.39	0.374	1.00	1.00	0.374	No
99	16.40	1.01	0.23	0.78	0.97	0.520	1.39	0.375	1.00	1.00	0.375	No
100	16.57	1.02	0.24	0.79	0.97	0.522	1.39	0.376	1.00	1.00	0.376	No
101	16.73	1.03	0.24	0.79	0.96	0.524	1.39	0.378	1.00	1.00	0.378	No
102	16.90	1.04	0.25	0.80	0.96	0.525	1.39	0.379	1.00	1.00	0.379	No
103	17.06	1.05	0.25	0.80	0.96	0.527	1.39	0.380	1.00	1.00	2.000	Yes
104	17.23	1.07	0.26	0.81	0.96	0.528	1.39	0.381	1.00	1.00	2.000	Yes
105	17.39	1.08	0.26	0.81	0.96	0.530	1.39	0.382	1.00	1.00	2.000	Yes
106	17.55	1.09	0.27	0.82	0.96	0.531	1.39	0.383	1.00	1.00	2.000	Yes
107	17.72	1.10	0.27	0.82	0.96	0.533	1.39	0.384	1.00	1.00	2.000	Yes
108	17.88	1.11	0.28	0.83	0.96	0.534	1.39	0.385	1.00	1.00	0.385	No
109	18.05	1.12	0.28	0.83	0.96	0.536	1.39	0.386	1.00	1.00	0.386	No
110	18.21	1.13	0.29	0.84	0.96	0.537	1.39	0.387	1.00	1.00	0.387	No
111	18.37	1.14	0.29	0.84	0.96	0.538	1.39	0.388	1.00	1.00	2.000	Yes
112	18.54	1.15	0.30	0.85	0.96	0.540	1.39	0.389	1.00	1.00	2.000	Yes
113	18.70	1.16	0.30	0.85	0.96	0.541	1.39	0.390	1.00	1.00	2.000	Yes
114	18.87	1.17	0.31	0.86	0.96	0.543	1.39	0.391	1.00	1.00	2.000	Yes
115	19.03	1.17	0.31	0.86	0.96	0.544	1.39	0.392	1.00	1.00	0.392	No
116	19.19	1.18	0.32	0.87	0.96	0.546	1.39	0.393	1.00	1.00	0.393	No
117	19.36	1.19	0.32	0.87	0.96	0.547	1.39	0.394	1.00	1.00	0.394	No
118	19.52	1.20	0.33	0.87	0.96	0.548	1.39	0.395	1.00	1.00	0.395	No
119	19.69	1.21	0.33	0.88	0.96	0.550	1.39	0.396	1.00	1.00	0.396	No
120	19.85	1.22	0.34	0.88	0.96	0.551	1.39	0.397	1.00	1.00	0.397	No
121	20.01	1.23	0.34	0.89	0.96	0.552	1.39	0.398	1.00	1.00	0.398	No
122	20.18	1.24	0.35	0.89	0.96	0.554	1.39	0.399	1.00	1.00	0.399	No
123	20.34	1.25	0.35	0.90	0.96	0.555	1.39	0.400	1.00	1.00	0.400	No
124	20.51	1.26	0.36	0.90	0.96	0.556	1.39	0.401	1.00	1.00	0.401	No
125	20.67	1.27	0.36	0.90	0.96	0.557	1.39	0.402	1.00	1.00	0.402	No
126	20.83	1.28	0.37	0.91	0.95	0.558	1.39	0.403	1.00	1.00	0.403	No
127	21.00	1.29	0.37	0.91	0.95	0.560	1.39	0.404	1.00	1.00	0.404	No
128	21.16	1.30	0.38	0.92	0.95	0.561	1.39	0.404	1.00	1.00	0.404	No
129	21.33	1.31	0.38	0.92	0.95	0.562	1.39	0.405	1.00	1.00	0.405	No
130	21.49	1.32	0.39	0.93	0.95	0.563	1.39	0.406	1.00	1.00	0.406	No
131	21.65	1.32	0.39	0.93	0.95	0.564	1.39	0.407	1.00	1.00	0.407	No
132	21.82	1.33	0.40	0.93	0.95	0.566	1.39	0.408	1.00	1.00	0.408	No
133	21.98	1.34	0.40	0.94	0.95	0.567	1.39	0.409	1.00	1.00	0.409	No
134	22.15	1.35	0.41	0.94	0.95	0.568	1.39	0.409	1.00	1.00	0.409	No
135	22.31	1.36	0.42	0.95	0.95	0.569	1.39	0.410	1.00	1.00	0.410	No
136	22.47	1.37	0.42	0.95	0.95	0.570	1.39	0.411	1.00	1.00	0.411	No
137	22.64	1.38	0.43	0.96	0.95	0.571	1.39	0.412	1.00	1.00	0.412	No
138	22.80	1.39	0.43	0.96	0.95	0.572	1.39	0.412	1.00	1.00	0.412	No
139	22.97	1.40	0.44	0.97	0.95	0.573	1.39	0.413	1.00	1.00	0.413	No
140	23.13	1.41	0.44	0.97	0.95	0.573	1.39	0.414	1.00	1.00	0.414	No
141	23.30	1.42	0.45	0.98	0.95	0.574	1.39	0.414	1.00	1.00	0.414	No
142	23.46	1.43	0.45	0.98	0.95	0.575	1.39	0.415	1.00	1.00	0.415	No
143	23.62	1.44	0.46	0.99	0.95	0.576	1.39	0.415	1.00	1.00	0.415	No
144	23.79	1.45	0.46	0.99	0.95	0.577	1.39	0.416	1.00	1.00	0.416	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
145	23.95	1.46	0.47	1.00	0.95	0.578	1.39	0.417	1.00	1.00	0.417	No
146	24.12	1.47	0.47	1.00	0.94	0.578	1.39	0.417	1.00	1.00	0.417	No
147	24.28	1.48	0.48	1.00	0.94	0.579	1.39	0.418	1.00	1.00	0.418	No
148	24.44	1.49	0.48	1.01	0.94	0.580	1.39	0.418	1.00	1.00	0.418	No
149	24.61	1.50	0.49	1.01	0.94	0.581	1.39	0.419	1.00	1.00	0.419	No
150	24.77	1.51	0.49	1.02	0.94	0.582	1.39	0.419	1.00	1.00	0.419	No
151	24.94	1.52	0.50	1.02	0.94	0.582	1.39	0.420	1.00	1.00	0.420	No
152	25.10	1.53	0.50	1.03	0.94	0.583	1.39	0.421	1.00	1.00	0.421	No
153	25.26	1.54	0.51	1.03	0.94	0.584	1.39	0.421	1.00	1.00	0.421	No
154	25.43	1.55	0.51	1.04	0.94	0.584	1.39	0.421	1.00	1.00	0.421	No
155	25.59	1.56	0.52	1.04	0.94	0.585	1.39	0.422	1.00	1.00	0.422	No
156	25.76	1.57	0.52	1.05	0.94	0.586	1.39	0.422	1.00	1.00	0.422	No
157	25.92	1.58	0.53	1.05	0.94	0.586	1.39	0.423	1.00	1.00	0.423	No
158	26.08	1.59	0.53	1.06	0.94	0.587	1.39	0.423	1.00	1.00	0.423	No
159	26.25	1.60	0.54	1.06	0.94	0.587	1.39	0.424	1.00	1.00	0.424	No
160	26.41	1.61	0.54	1.07	0.94	0.588	1.39	0.424	1.00	1.00	0.425	No
161	26.58	1.62	0.55	1.07	0.94	0.588	1.39	0.424	1.00	1.00	0.426	No
162	26.74	1.63	0.55	1.08	0.94	0.589	1.39	0.425	1.00	1.00	0.426	No
163	26.90	1.64	0.56	1.08	0.93	0.589	1.39	0.425	0.99	1.00	0.427	No
164	27.07	1.65	0.56	1.09	0.93	0.590	1.39	0.425	0.99	1.00	0.428	No
165	27.23	1.66	0.57	1.09	0.93	0.590	1.39	0.426	0.99	1.00	0.429	No
166	27.40	1.67	0.57	1.10	0.93	0.591	1.39	0.426	0.99	1.00	0.430	No
167	27.56	1.68	0.58	1.10	0.93	0.591	1.39	0.426	0.99	1.00	0.430	No
168	27.72	1.69	0.58	1.11	0.93	0.592	1.39	0.427	0.99	1.00	0.431	No
169	27.89	1.70	0.59	1.11	0.93	0.592	1.39	0.427	0.99	1.00	0.432	No
170	28.05	1.71	0.59	1.12	0.93	0.593	1.39	0.427	0.99	1.00	0.433	No
171	28.22	1.72	0.60	1.12	0.93	0.593	1.39	0.428	0.99	1.00	0.434	No
172	28.38	1.73	0.60	1.13	0.93	0.594	1.39	0.428	0.99	1.00	0.434	No
173	28.54	1.74	0.61	1.13	0.93	0.594	1.39	0.428	0.98	1.00	0.435	No
174	28.71	1.75	0.61	1.14	0.93	0.594	1.39	0.429	0.98	1.00	0.436	No
175	28.87	1.76	0.62	1.14	0.93	0.595	1.39	0.429	0.98	1.00	0.436	No
176	29.04	1.77	0.63	1.15	0.93	0.595	1.39	0.429	0.98	1.00	0.437	No
177	29.20	1.78	0.63	1.15	0.92	0.595	1.39	0.429	0.98	1.00	0.438	No
178	29.36	1.79	0.64	1.16	0.92	0.596	1.39	0.430	0.98	1.00	0.438	No
179	29.53	1.80	0.64	1.16	0.92	0.596	1.39	0.430	0.98	1.00	0.439	No
180	29.69	1.81	0.65	1.17	0.92	0.596	1.39	0.430	0.98	1.00	0.440	No
181	29.86	1.82	0.65	1.17	0.92	0.596	1.39	0.430	0.98	1.00	0.440	No
182	30.02	1.83	0.66	1.17	0.92	0.597	1.39	0.430	0.98	1.00	0.441	No
183	30.19	1.84	0.66	1.18	0.92	0.597	1.39	0.430	0.98	1.00	0.441	No
184	30.35	1.85	0.67	1.18	0.92	0.597	1.39	0.431	0.97	1.00	0.442	No
185	30.51	1.86	0.67	1.19	0.92	0.597	1.39	0.431	0.97	1.00	0.443	No
186	30.68	1.87	0.68	1.19	0.92	0.598	1.39	0.431	0.97	1.00	0.443	No
187	30.84	1.88	0.68	1.20	0.92	0.598	1.39	0.431	0.97	1.00	0.444	No
188	31.01	1.89	0.69	1.20	0.92	0.598	1.39	0.431	0.97	1.00	0.444	No
189	31.17	1.90	0.69	1.21	0.91	0.598	1.39	0.431	0.97	1.00	0.445	No
190	31.33	1.91	0.70	1.21	0.91	0.598	1.39	0.431	0.97	1.00	0.445	No
191	31.50	1.92	0.70	1.22	0.91	0.598	1.39	0.431	0.97	1.00	2.000	Yes
192	31.66	1.93	0.71	1.22	0.91	0.598	1.39	0.431	0.97	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
193	31.83	1.94	0.71	1.23	0.91	0.598	1.39	0.431	0.97	1.00	2.000	Yes
194	31.99	1.95	0.72	1.24	0.91	0.598	1.39	0.431	0.97	1.00	2.000	Yes
195	32.15	1.96	0.72	1.24	0.91	0.598	1.39	0.431	0.96	1.00	2.000	Yes
196	32.32	1.97	0.73	1.25	0.91	0.598	1.39	0.431	0.96	1.00	0.448	No
197	32.48	1.98	0.73	1.25	0.91	0.598	1.39	0.431	0.96	1.00	0.448	No
198	32.65	2.00	0.74	1.26	0.91	0.598	1.39	0.431	0.96	1.00	0.449	No
199	32.81	2.01	0.74	1.26	0.90	0.598	1.39	0.431	0.96	1.00	0.449	No
200	32.97	2.02	0.75	1.27	0.90	0.598	1.39	0.431	0.96	1.00	0.449	No
201	33.14	2.03	0.75	1.28	0.90	0.597	1.39	0.431	0.96	1.00	0.450	No
202	33.30	2.04	0.76	1.28	0.90	0.597	1.39	0.431	0.96	1.00	0.450	No
203	33.47	2.05	0.76	1.29	0.90	0.597	1.39	0.431	0.96	1.00	0.450	No
204	33.63	2.06	0.77	1.29	0.90	0.597	1.39	0.431	0.96	1.00	0.451	No
205	33.79	2.07	0.77	1.30	0.90	0.597	1.39	0.431	0.95	1.00	0.451	No
206	33.96	2.08	0.78	1.30	0.90	0.597	1.39	0.431	0.95	1.00	0.451	No
207	34.12	2.09	0.78	1.31	0.90	0.597	1.39	0.431	0.95	1.00	0.452	No
208	34.29	2.10	0.79	1.31	0.90	0.597	1.39	0.430	0.95	1.00	0.452	No
209	34.45	2.11	0.79	1.31	0.89	0.597	1.39	0.430	0.95	1.00	0.452	No
210	34.61	2.12	0.80	1.32	0.89	0.597	1.39	0.430	0.95	1.00	0.453	No
211	34.78	2.13	0.80	1.32	0.89	0.596	1.39	0.430	0.95	1.00	0.453	No
212	34.94	2.14	0.81	1.33	0.89	0.596	1.39	0.430	0.95	1.00	0.453	No
213	35.11	2.15	0.81	1.33	0.89	0.596	1.39	0.430	0.95	1.00	0.453	No
214	35.27	2.16	0.82	1.34	0.89	0.596	1.39	0.430	0.95	1.00	0.454	No
215	35.43	2.17	0.82	1.34	0.89	0.596	1.39	0.430	0.95	1.00	0.454	No
216	35.60	2.18	0.83	1.35	0.89	0.596	1.39	0.430	0.95	1.00	0.454	No
217	35.76	2.19	0.83	1.35	0.89	0.595	1.39	0.429	0.94	1.00	0.454	No
218	35.93	2.20	0.84	1.36	0.88	0.595	1.39	0.429	0.94	1.00	0.455	No
219	36.09	2.21	0.85	1.36	0.88	0.595	1.39	0.429	0.94	1.00	2.000	Yes
220	36.26	2.22	0.85	1.37	0.88	0.595	1.39	0.429	0.94	1.00	2.000	Yes
221	36.42	2.23	0.86	1.37	0.88	0.594	1.39	0.429	0.94	1.00	2.000	Yes
222	36.58	2.24	0.86	1.38	0.88	0.594	1.39	0.428	0.94	1.00	2.000	Yes
223	36.75	2.25	0.87	1.38	0.88	0.594	1.39	0.428	0.94	1.00	2.000	Yes
224	36.91	2.26	0.87	1.39	0.88	0.593	1.39	0.428	0.94	1.00	2.000	Yes
225	37.08	2.27	0.88	1.39	0.88	0.593	1.39	0.428	0.94	1.00	0.456	No
226	37.24	2.28	0.88	1.40	0.87	0.593	1.39	0.427	0.94	1.00	0.456	No
227	37.40	2.29	0.89	1.40	0.87	0.592	1.39	0.427	0.94	1.00	0.456	No
228	37.57	2.30	0.89	1.41	0.87	0.592	1.39	0.427	0.94	1.00	0.456	No
229	37.73	2.31	0.90	1.41	0.87	0.592	1.39	0.427	0.94	1.00	0.456	No
230	37.90	2.32	0.90	1.42	0.87	0.591	1.39	0.426	0.93	1.00	0.456	No
231	38.06	2.33	0.91	1.42	0.87	0.591	1.39	0.426	0.93	1.00	0.456	No
232	38.22	2.34	0.91	1.43	0.87	0.590	1.39	0.426	0.93	1.00	0.456	No
233	38.39	2.35	0.92	1.43	0.86	0.590	1.39	0.425	0.93	1.00	0.456	No
234	38.55	2.36	0.92	1.44	0.86	0.590	1.39	0.425	0.93	1.00	0.456	No
235	38.72	2.37	0.93	1.44	0.86	0.589	1.39	0.425	0.93	1.00	0.456	No
236	38.88	2.38	0.93	1.45	0.86	0.589	1.39	0.425	0.93	1.00	0.456	No
237	39.04	2.39	0.94	1.45	0.86	0.588	1.39	0.424	0.93	1.00	0.456	No
238	39.21	2.40	0.94	1.46	0.86	0.588	1.39	0.424	0.93	1.00	0.456	No
239	39.37	2.41	0.95	1.46	0.86	0.587	1.39	0.424	0.93	1.00	0.456	No
240	39.54	2.42	0.95	1.46	0.86	0.587	1.39	0.423	0.93	1.00	0.456	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
241	39.70	2.43	0.96	1.47	0.85	0.587	1.39	0.423	0.93	1.00	0.456	No
242	39.86	2.44	0.96	1.47	0.85	0.586	1.39	0.423	0.93	1.00	0.456	No
243	40.03	2.45	0.97	1.48	0.85	0.586	1.39	0.423	0.93	1.00	0.456	No
244	40.19	2.45	0.97	1.48	0.85	0.585	1.39	0.422	0.93	1.00	0.456	No
245	40.36	2.46	0.98	1.49	0.85	0.585	1.39	0.422	0.92	1.00	0.456	No
246	40.52	2.47	0.98	1.49	0.85	0.584	1.39	0.422	0.92	1.00	0.456	No
247	40.68	2.48	0.99	1.49	0.84	0.584	1.39	0.421	0.92	1.00	0.456	No
248	40.85	2.49	0.99	1.50	0.84	0.583	1.39	0.421	0.92	1.00	0.456	No
249	41.01	2.50	1.00	1.50	0.84	0.583	1.39	0.420	0.92	1.00	0.456	No
250	41.18	2.51	1.00	1.51	0.84	0.582	1.39	0.420	0.92	1.00	0.456	No
251	41.34	2.52	1.01	1.51	0.84	0.582	1.39	0.420	0.92	1.00	0.456	No
252	41.50	2.53	1.01	1.52	0.84	0.581	1.39	0.419	0.92	1.00	0.455	No
253	41.67	2.54	1.02	1.52	0.84	0.581	1.39	0.419	0.92	1.00	0.455	No
254	41.83	2.55	1.02	1.52	0.83	0.580	1.39	0.418	0.92	1.00	0.455	No
255	42.00	2.56	1.03	1.53	0.83	0.580	1.39	0.418	0.92	1.00	0.455	No
256	42.16	2.57	1.03	1.53	0.83	0.579	1.39	0.418	0.92	1.00	0.455	No
257	42.32	2.58	1.04	1.54	0.83	0.579	1.39	0.417	0.92	1.00	0.455	No
258	42.49	2.59	1.04	1.54	0.83	0.578	1.39	0.417	0.92	1.00	0.455	No
259	42.65	2.60	1.05	1.55	0.83	0.577	1.39	0.416	0.92	1.00	0.454	No
260	42.82	2.61	1.06	1.55	0.83	0.577	1.39	0.416	0.92	1.00	0.454	No
261	42.98	2.62	1.06	1.56	0.82	0.576	1.39	0.415	0.92	1.00	0.454	No
262	43.15	2.63	1.07	1.56	0.82	0.575	1.39	0.415	0.91	1.00	0.454	No
263	43.31	2.64	1.07	1.57	0.82	0.575	1.39	0.414	0.91	1.00	0.453	No
264	43.47	2.65	1.08	1.57	0.82	0.574	1.39	0.414	0.91	1.00	0.453	No
265	43.64	2.66	1.08	1.57	0.82	0.573	1.39	0.413	0.91	1.00	0.453	No
266	43.80	2.66	1.09	1.58	0.82	0.573	1.39	0.413	0.91	1.00	0.453	No
267	43.97	2.67	1.09	1.58	0.81	0.572	1.39	0.412	0.91	1.00	0.452	No
268	44.13	2.68	1.10	1.59	0.81	0.571	1.39	0.412	0.91	1.00	0.452	No
269	44.29	2.69	1.10	1.59	0.81	0.571	1.39	0.411	0.91	1.00	0.452	No
270	44.46	2.70	1.11	1.60	0.81	0.570	1.39	0.411	0.91	1.00	0.452	No
271	44.62	2.71	1.11	1.60	0.81	0.569	1.39	0.410	0.91	1.00	0.451	No
272	44.79	2.72	1.12	1.60	0.81	0.568	1.39	0.410	0.91	1.00	0.451	No
273	44.95	2.73	1.12	1.61	0.80	0.568	1.39	0.409	0.91	1.00	0.451	No
274	45.11	2.74	1.13	1.61	0.80	0.567	1.39	0.409	0.91	1.00	0.451	No
275	45.28	2.75	1.13	1.62	0.80	0.566	1.39	0.408	0.91	1.00	0.450	No
276	45.44	2.76	1.14	1.62	0.80	0.566	1.39	0.408	0.91	1.00	0.450	No
277	45.61	2.77	1.14	1.63	0.80	0.565	1.39	0.407	0.91	1.00	0.450	No
278	45.77	2.78	1.15	1.63	0.80	0.564	1.39	0.407	0.91	1.00	2.000	Yes
279	45.93	2.79	1.15	1.64	0.79	0.563	1.39	0.406	0.90	1.00	2.000	Yes
280	46.10	2.80	1.16	1.64	0.79	0.562	1.39	0.405	0.90	1.00	2.000	Yes
281	46.26	2.81	1.16	1.65	0.79	0.561	1.39	0.405	0.90	1.00	2.000	Yes
282	46.43	2.82	1.17	1.65	0.79	0.560	1.39	0.404	0.90	1.00	0.448	No
283	46.59	2.83	1.17	1.66	0.79	0.559	1.39	0.403	0.90	1.00	0.447	No
284	46.75	2.84	1.18	1.66	0.79	0.558	1.39	0.403	0.90	1.00	0.447	No
285	46.92	2.85	1.18	1.67	0.78	0.557	1.39	0.402	0.90	1.00	0.446	No
286	47.08	2.86	1.19	1.68	0.78	0.556	1.39	0.401	0.90	1.00	0.446	No
287	47.25	2.88	1.19	1.68	0.78	0.555	1.39	0.400	0.90	1.00	0.446	No
288	47.41	2.89	1.20	1.69	0.78	0.554	1.39	0.400	0.90	1.00	0.445	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
289	47.57	2.90	1.20	1.69	0.78	0.553	1.39	0.399	0.90	1.00	0.445	No
290	47.74	2.91	1.21	1.70	0.78	0.552	1.39	0.398	0.90	1.00	0.444	No
291	47.90	2.92	1.21	1.70	0.77	0.551	1.39	0.398	0.90	1.00	0.444	No
292	48.07	2.93	1.22	1.71	0.77	0.550	1.39	0.397	0.90	1.00	0.443	No
293	48.23	2.94	1.22	1.72	0.77	0.549	1.39	0.396	0.89	1.00	0.443	No
294	48.39	2.95	1.23	1.72	0.77	0.548	1.39	0.396	0.89	1.00	0.442	No
295	48.56	2.96	1.23	1.73	0.77	0.547	1.39	0.395	0.89	1.00	0.442	No
296	48.72	2.97	1.24	1.73	0.77	0.546	1.39	0.394	0.89	1.00	0.441	No
297	48.89	2.98	1.24	1.74	0.76	0.545	1.39	0.393	0.89	1.00	0.441	No
298	49.05	2.99	1.25	1.74	0.76	0.545	1.39	0.393	0.89	1.00	0.440	No
299	49.22	3.00	1.25	1.75	0.76	0.543	1.39	0.392	0.89	1.00	0.440	No
300	49.38	3.01	1.26	1.75	0.76	0.543	1.39	0.391	0.89	1.00	0.439	No
301	49.54	3.02	1.26	1.76	0.76	0.542	1.39	0.391	0.89	1.00	0.439	No
302	49.71	3.04	1.27	1.77	0.76	0.541	1.39	0.390	0.89	1.00	0.439	No
303	49.87	3.05	1.28	1.77	0.75	0.540	1.39	0.389	0.89	1.00	0.438	No
304	50.04	3.06	1.28	1.78	0.75	0.539	1.39	0.388	0.89	1.00	2.000	Yes
305	50.20	3.07	1.29	1.78	0.75	0.538	1.39	0.388	0.89	1.00	2.000	Yes
306	50.36	3.08	1.29	1.79	0.75	0.537	1.39	0.387	0.89	1.00	2.000	Yes
307	50.53	3.09	1.30	1.79	0.75	0.536	1.39	0.386	0.89	1.00	2.000	Yes
308	50.69	3.10	1.30	1.80	0.75	0.535	1.39	0.386	0.89	1.00	2.000	Yes
309	50.86	3.11	1.31	1.80	0.74	0.534	1.39	0.385	0.88	1.00	0.435	No
310	51.02	3.12	1.31	1.81	0.74	0.533	1.39	0.384	0.88	1.00	0.435	No
311	51.18	3.13	1.32	1.81	0.74	0.532	1.39	0.384	0.88	1.00	0.434	No
312	51.35	3.14	1.32	1.82	0.74	0.531	1.39	0.383	0.88	1.00	0.434	No
313	51.51	3.15	1.33	1.82	0.74	0.530	1.39	0.383	0.88	1.00	0.433	No
314	51.68	3.16	1.33	1.82	0.74	0.530	1.39	0.382	0.88	1.00	0.433	No
315	51.84	3.16	1.34	1.83	0.73	0.529	1.39	0.381	0.88	1.00	0.432	No
316	52.00	3.17	1.34	1.83	0.73	0.528	1.39	0.381	0.88	1.00	0.432	No
317	52.17	3.18	1.35	1.84	0.73	0.527	1.39	0.380	0.88	1.00	0.431	No
318	52.33	3.19	1.35	1.84	0.73	0.526	1.39	0.379	0.88	1.00	0.431	No
319	52.50	3.20	1.36	1.84	0.73	0.525	1.39	0.379	0.88	1.00	0.431	No
320	52.66	3.21	1.36	1.85	0.73	0.525	1.39	0.378	0.88	1.00	0.430	No
321	52.82	3.22	1.37	1.85	0.72	0.524	1.39	0.378	0.88	1.00	0.430	No
322	52.99	3.23	1.37	1.86	0.72	0.523	1.39	0.377	0.88	1.00	0.429	No
323	53.15	3.24	1.38	1.86	0.72	0.522	1.39	0.376	0.88	1.00	0.429	No
324	53.32	3.25	1.38	1.87	0.72	0.521	1.39	0.376	0.88	1.00	0.428	No
325	53.48	3.26	1.39	1.87	0.72	0.520	1.39	0.375	0.88	1.00	0.428	No
326	53.64	3.27	1.39	1.87	0.72	0.519	1.39	0.375	0.88	1.00	0.427	No
327	53.81	3.28	1.40	1.88	0.71	0.518	1.39	0.374	0.88	1.00	0.427	No
328	53.97	3.29	1.40	1.88	0.71	0.518	1.39	0.373	0.88	1.00	0.426	No
329	54.14	3.30	1.41	1.89	0.71	0.517	1.39	0.373	0.88	1.00	0.426	No
330	54.30	3.31	1.41	1.89	0.71	0.516	1.39	0.372	0.87	1.00	0.425	No
331	54.46	3.32	1.42	1.90	0.71	0.515	1.39	0.371	0.87	1.00	0.425	No
332	54.63	3.33	1.42	1.90	0.71	0.514	1.39	0.371	0.87	1.00	0.424	No
333	54.79	3.34	1.43	1.91	0.71	0.513	1.39	0.370	0.87	1.00	0.424	No
334	54.96	3.35	1.43	1.92	0.70	0.512	1.39	0.369	0.87	1.00	0.423	No
335	55.12	3.36	1.44	1.92	0.70	0.511	1.39	0.368	0.87	1.00	0.423	No
336	55.28	3.37	1.44	1.93	0.70	0.510	1.39	0.368	0.87	1.00	2.000	Yes

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
337	55.45	3.38	1.45	1.93	0.70	0.509	1.39	0.367	0.87	1.00	2.000	Yes
338	55.61	3.39	1.45	1.94	0.70	0.508	1.39	0.366	0.87	1.00	2.000	Yes
339	55.78	3.40	1.46	1.94	0.70	0.507	1.39	0.366	0.87	1.00	2.000	Yes
340	55.94	3.41	1.46	1.95	0.69	0.506	1.39	0.365	0.87	1.00	2.000	Yes
341	56.11	3.42	1.47	1.95	0.69	0.505	1.39	0.364	0.87	1.00	2.000	Yes
342	56.27	3.43	1.47	1.96	0.69	0.504	1.39	0.364	0.87	1.00	2.000	Yes
343	56.43	3.44	1.48	1.96	0.69	0.503	1.39	0.363	0.87	1.00	2.000	Yes
344	56.60	3.45	1.49	1.97	0.69	0.502	1.39	0.362	0.87	1.00	2.000	Yes
345	56.76	3.46	1.49	1.97	0.69	0.502	1.39	0.362	0.87	1.00	2.000	Yes
346	56.93	3.47	1.50	1.98	0.69	0.501	1.39	0.361	0.87	1.00	0.417	No
347	57.09	3.48	1.50	1.98	0.68	0.500	1.39	0.360	0.87	1.00	0.417	No
348	57.25	3.49	1.51	1.99	0.68	0.499	1.39	0.360	0.86	1.00	0.416	No
349	57.42	3.50	1.51	1.99	0.68	0.498	1.39	0.359	0.86	1.00	0.416	No
350	57.58	3.51	1.52	2.00	0.68	0.497	1.39	0.359	0.86	1.00	0.415	No
351	57.75	3.52	1.52	2.00	0.68	0.497	1.39	0.358	0.86	1.00	0.415	No
352	57.91	3.53	1.53	2.01	0.68	0.496	1.39	0.358	0.86	1.00	0.414	No
353	58.07	3.54	1.53	2.01	0.68	0.495	1.39	0.357	0.86	1.00	0.414	No
354	58.24	3.55	1.54	2.02	0.67	0.494	1.39	0.356	0.86	1.00	0.413	No
355	58.40	3.56	1.54	2.02	0.67	0.493	1.39	0.356	0.86	1.00	0.413	No
356	58.57	3.57	1.55	2.03	0.67	0.492	1.39	0.355	0.86	1.00	0.412	No
357	58.73	3.58	1.55	2.03	0.67	0.492	1.39	0.355	0.86	1.00	0.412	No
358	58.89	3.59	1.56	2.04	0.67	0.491	1.39	0.354	0.86	1.00	0.411	No
359	59.06	3.60	1.56	2.04	0.67	0.490	1.39	0.353	0.86	1.00	0.411	No
360	59.22	3.61	1.57	2.05	0.67	0.489	1.39	0.353	0.86	1.00	0.410	No
361	59.39	3.62	1.57	2.05	0.66	0.488	1.39	0.352	0.86	1.00	0.410	No
362	59.55	3.63	1.58	2.06	0.66	0.487	1.39	0.351	0.86	1.00	0.409	No
363	59.71	3.64	1.58	2.06	0.66	0.486	1.39	0.351	0.86	1.00	0.409	No
364	59.88	3.66	1.59	2.07	0.66	0.485	1.39	0.350	0.86	1.00	2.000	Yes
365	60.04	3.67	1.59	2.07	0.66	0.485	1.39	0.349	0.86	1.00	2.000	Yes
366	60.21	3.68	1.60	2.08	0.66	0.484	1.39	0.349	0.86	1.00	2.000	Yes
367	60.37	3.69	1.60	2.08	0.66	0.483	1.39	0.348	0.86	1.00	2.000	Yes
368	60.53	3.70	1.61	2.09	0.65	0.482	1.39	0.348	0.86	1.00	2.000	Yes
369	60.70	3.71	1.61	2.09	0.65	0.481	1.39	0.347	0.85	1.00	2.000	Yes
370	60.86	3.72	1.62	2.10	0.65	0.480	1.39	0.346	0.85	1.00	2.000	Yes
371	61.03	3.73	1.62	2.11	0.65	0.480	1.39	0.346	0.85	1.00	2.000	No
372	61.19	3.74	1.63	2.11	0.65	0.479	1.39	0.345	0.85	1.00	2.000	No
373	61.35	3.75	1.63	2.12	0.65	0.478	1.39	0.345	0.85	1.00	2.000	No
374	61.52	3.76	1.64	2.12	0.65	0.477	1.39	0.344	0.85	1.00	2.000	No
375	61.68	3.77	1.64	2.13	0.65	0.476	1.39	0.344	0.85	1.00	2.000	No
376	61.85	3.78	1.65	2.13	0.64	0.476	1.39	0.343	0.85	1.00	2.000	No
377	62.01	3.79	1.65	2.14	0.64	0.475	1.39	0.342	0.85	1.00	2.000	No
378	62.17	3.80	1.66	2.14	0.64	0.474	1.39	0.342	0.85	1.00	2.000	No
379	62.34	3.81	1.66	2.15	0.64	0.473	1.39	0.341	0.85	1.00	2.000	No
380	62.50	3.82	1.67	2.15	0.64	0.472	1.39	0.341	0.85	1.00	2.000	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (ft)	σ_v (tsf)	u_0 (tsf)	σ_v' (tsf)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
σ_v: Total overburden pressure at test point (tsf)
u_0: Water pressure at test point (tsf)
σ_v': Effective overburden pressure based on GWT during earthquake (tsf)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.33	106.13	1.45	0.35	0.50	170.49	1.00	170.49	4.000	No	No	2.00
2	0.49	98.20	1.56	0.48	0.50	157.73	1.00	157.73	4.000	No	No	2.00
3	0.66	86.80	1.73	0.77	0.53	139.40	1.06	147.14	4.000	No	No	2.00
4	0.82	81.17	1.84	1.07	0.58	130.33	1.14	148.46	4.000	No	No	2.00
5	0.98	78.03	1.94	1.41	0.61	125.28	1.23	153.78	4.000	No	No	2.00
6	1.15	80.77	1.97	1.61	0.63	129.66	1.26	163.63	4.000	No	No	2.00
7	1.31	86.03	1.97	1.71	0.63	138.10	1.26	174.22	4.000	No	No	2.00
8	1.48	93.07	1.95	1.72	0.62	149.38	1.24	185.03	4.000	No	No	2.00
9	1.64	100.13	1.93	1.73	0.61	160.72	1.22	195.86	4.000	No	No	2.00
10	1.80	106.60	1.92	1.75	0.61	171.10	1.20	206.10	4.000	No	No	2.00
11	1.97	111.33	1.92	1.86	0.61	178.68	1.21	216.57	4.000	No	No	2.00
12	2.13	116.20	1.93	1.95	0.61	186.48	1.22	227.01	4.000	No	No	2.00
13	2.30	120.40	1.93	2.02	0.61	193.21	1.22	235.72	4.000	No	No	2.00
14	2.46	121.83	1.93	2.03	0.61	195.50	1.22	238.01	4.000	No	No	2.00
15	2.62	119.07	1.93	2.02	0.61	191.04	1.22	233.50	4.000	No	No	2.00
16	2.79	116.50	1.93	1.95	0.61	186.90	1.22	227.25	4.000	No	No	2.00
17	2.95	114.93	1.92	1.86	0.60	184.37	1.20	221.90	4.000	No	No	2.00
18	3.12	114.00	1.90	1.76	0.60	182.85	1.19	217.15	4.000	No	No	2.00
19	3.28	112.00	1.90	1.73	0.60	179.62	1.19	213.24	4.000	No	No	2.00
20	3.45	109.37	1.90	1.71	0.60	175.37	1.19	208.68	4.000	No	No	2.00
21	3.61	107.50	1.90	1.68	0.60	172.36	1.19	204.87	4.000	No	No	2.00
22	3.77	105.07	1.90	1.65	0.60	168.43	1.19	200.47	4.000	No	No	2.00
23	3.94	102.14	1.90	1.60	0.60	163.70	1.19	194.53	4.000	No	No	2.00
24	4.10	96.17	1.92	1.63	0.61	154.10	1.21	186.66	4.000	Yes	No	2.00
25	4.27	85.40	1.99	1.80	0.63	136.79	1.29	175.91	4.000	Yes	No	2.00
26	4.43	70.77	2.11	2.22	0.68	113.26	1.48	167.24	4.000	Yes	No	2.00
27	4.59	56.64	2.25	2.78	0.73	90.53	1.80	162.60	4.000	Yes	No	2.00
28	4.76	46.37	2.37	3.33	0.78	74.02	2.18	161.25	4.000	Yes	No	2.00
29	4.92	41.10	2.43	3.60	0.80	65.54	2.42	158.82	4.000	Yes	No	2.00
30	5.09	37.63	2.47	3.84	0.82	59.96	2.64	158.23	4.000	No	No	2.00
31	5.25	36.20	2.50	4.00	0.83	57.64	2.76	158.97	4.000	No	No	2.00
32	5.41	36.77	2.50	4.03	0.83	58.53	2.75	160.80	4.000	No	No	2.00
33	5.58	38.63	2.47	3.83	0.81	61.51	2.60	159.88	4.000	No	No	2.00
34	5.74	39.63	2.45	3.73	0.81	63.10	2.53	159.43	4.000	No	No	2.00
35	5.91	39.96	2.45	3.79	0.81	63.62	2.54	161.36	4.000	No	No	2.00
36	6.07	40.49	2.46	3.99	0.81	64.46	2.59	167.25	4.000	No	No	2.00
37	6.23	41.30	2.47	4.07	0.81	65.73	2.60	170.91	4.000	No	No	2.00
38	6.40	42.13	2.45	3.99	0.81	67.05	2.54	170.54	4.000	No	No	2.00
39	6.56	42.53	2.43	3.80	0.80	67.68	2.46	166.40	4.000	No	No	2.00
40	6.73	43.96	2.39	3.44	0.79	69.97	2.29	159.92	4.000	No	No	2.00
41	6.89	46.80	2.34	3.09	0.77	74.50	2.09	155.35	4.000	No	No	2.00
42	7.05	50.53	2.29	2.79	0.75	80.48	1.90	153.17	4.000	No	No	2.00
43	7.22	53.56	2.24	2.57	0.73	85.34	1.78	151.55	4.000	No	No	2.00
44	7.38	55.00	2.22	2.44	0.72	87.63	1.71	150.00	4.000	No	No	2.00
45	7.55	55.80	2.20	2.35	0.71	88.90	1.67	148.42	4.000	No	No	2.00
46	7.71	56.70	2.18	2.25	0.71	90.33	1.63	146.92	4.000	No	No	2.00
47	7.87	57.90	2.17	2.21	0.70	92.24	1.60	147.32	4.000	No	No	2.00
48	8.04	59.53	2.15	2.15	0.70	94.56	1.56	147.66	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	8.20	61.46	2.15	2.19	0.70	96.34	1.56	150.53	4.000	No	No	2.00
50	8.37	63.53	2.15	2.22	0.70	98.17	1.56	153.24	4.000	No	No	2.00
51	8.53	65.30	2.16	2.26	0.70	99.63	1.56	155.87	4.000	No	No	2.00
52	8.69	66.83	2.15	2.26	0.70	100.59	1.56	156.71	4.000	No	No	2.00
53	8.86	67.90	2.15	2.23	0.69	100.70	1.55	155.74	4.000	No	No	2.00
54	9.02	68.30	2.15	2.21	0.69	99.99	1.55	154.70	0.424	No	No	1.44
55	9.19	67.93	2.15	2.23	0.70	98.31	1.56	153.52	0.416	No	No	1.40
56	9.35	67.23	2.16	2.25	0.70	96.32	1.58	152.39	0.409	No	No	1.36
57	9.51	66.30	2.17	2.23	0.70	93.94	1.59	149.64	0.392	No	No	1.30
58	9.68	65.43	2.17	2.21	0.70	91.63	1.60	146.89	0.375	No	No	1.23
59	9.84	64.50	2.18	2.19	0.70	89.36	1.61	144.23	0.359	No	No	1.17
60	10.01	63.70	2.19	2.22	0.71	87.37	1.64	143.22	0.353	No	No	1.14
61	10.17	63.23	2.20	2.29	0.71	85.99	1.67	143.97	0.358	No	No	1.15
62	10.34	63.23	2.21	2.34	0.72	85.13	1.70	144.73	0.362	No	No	1.15
63	10.50	63.76	2.22	2.43	0.72	85.08	1.73	147.17	0.376	No	No	1.19
64	10.66	64.26	2.24	2.52	0.73	84.98	1.76	149.55	0.391	No	No	1.23
65	10.83	64.43	2.26	2.67	0.73	84.50	1.82	153.43	0.416	No	No	1.30
66	10.99	63.96	2.27	2.74	0.74	83.15	1.85	154.21	0.421	No	No	1.30
67	11.16	62.46	2.29	2.81	0.75	80.47	1.91	153.48	0.416	No	No	1.28
68	11.32	59.90	2.28	2.65	0.75	76.27	1.90	144.91	0.363	No	No	1.11
69	11.48	57.33	2.29	2.53	0.75	72.23	1.91	137.85	0.324	No	No	0.98
70	11.65	56.70	2.28	2.38	0.74	70.52	1.87	132.15	0.295	No	No	0.89
71	11.81	61.03	2.24	2.27	0.73	74.84	1.78	133.01	0.299	No	No	0.90
72	11.98	67.59	2.19	2.09	0.71	81.55	1.65	134.30	0.305	No	No	0.91
73	12.14	74.06	2.14	1.91	0.69	87.99	1.53	134.82	0.308	No	No	0.92
74	12.30	76.39	2.12	1.85	0.68	89.78	1.50	134.74	0.307	No	No	0.91
75	12.47	75.53	2.13	1.87	0.69	88.01	1.52	133.78	0.303	No	No	0.89
76	12.63	72.73	2.17	1.99	0.70	84.28	1.59	133.86	0.303	No	No	0.89
77	12.80	69.19	2.21	2.19	0.72	79.80	1.70	135.51	0.311	No	No	0.91
78	12.96	65.43	2.27	2.48	0.74	75.17	1.85	139.12	0.330	No	No	0.96
79	13.12	61.33	2.32	2.75	0.76	70.13	2.02	141.84	0.345	No	No	1.00
80	13.29	57.69	2.36	2.93	0.78	65.52	2.16	141.84	0.345	No	No	0.99
81	13.45	54.29	2.39	2.99	0.79	61.18	2.27	138.91	0.329	No	No	0.94
82	13.62	51.56	2.40	2.96	0.79	57.55	2.33	134.21	0.305	No	No	0.87
83	13.78	50.09	2.42	2.98	0.80	55.42	2.39	132.46	0.296	No	No	0.84
84	13.94	51.29	2.41	2.97	0.79	56.22	2.37	133.21	0.300	No	No	0.84
85	14.11	55.46	2.38	2.87	0.78	60.13	2.24	134.74	0.307	No	No	0.86
86	14.27	59.83	2.35	2.77	0.77	64.22	2.12	136.38	0.316	No	No	0.88
87	14.44	63.39	2.32	2.67	0.76	67.35	2.03	136.76	0.318	No	No	0.88
88	14.60	65.02	2.32	2.65	0.76	68.49	2.01	137.46	0.322	No	No	0.89
89	14.76	65.89	2.31	2.62	0.76	68.80	1.99	136.83	0.318	No	No	0.88
90	14.93	65.43	2.32	2.64	0.76	67.73	2.01	136.30	0.316	No	No	0.87
91	15.09	63.23	2.34	2.73	0.77	64.95	2.09	136.03	0.314	No	No	0.86
92	15.26	60.33	2.37	2.81	0.78	61.46	2.19	134.50	0.306	No	No	0.84
93	15.42	57.32	2.40	2.90	0.79	57.93	2.30	133.14	0.299	No	No	0.81
94	15.58	55.02	2.42	2.96	0.80	55.15	2.39	131.72	0.293	No	No	0.79
95	15.75	53.16	2.44	3.00	0.80	52.81	2.47	130.20	0.285	No	No	0.77
96	15.91	52.66	2.44	2.97	0.80	51.88	2.47	128.37	0.277	No	No	0.74

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	16.08	55.23	2.42	2.95	0.80	53.96	2.41	130.22	0.285	No	No	0.77
98	16.24	64.66	2.37	2.88	0.78	62.76	2.19	137.71	0.323	No	No	0.86
99	16.40	79.43	2.30	2.76	0.75	76.62	1.94	148.48	0.384	No	No	1.02
100	16.57	93.93	2.24	2.66	0.73	89.98	1.76	158.39	0.450	No	No	1.19
101	16.73	101.53	2.22	2.69	0.72	96.61	1.72	165.71	0.503	No	No	1.33
102	16.90	103.16	2.23	2.77	0.72	97.43	1.74	169.14	0.530	No	No	1.40
103	17.06	98.46	2.26	2.91	0.74	92.28	1.82	168.10	4.000	Yes	No	2.00
104	17.23	84.83	2.32	3.06	0.76	78.74	2.02	158.97	4.000	Yes	No	2.00
105	17.39	64.73	2.43	3.30	0.80	59.37	2.43	144.54	4.000	Yes	No	2.00
106	17.55	45.29	2.57	3.62	0.86	40.88	3.16	129.27	4.000	Yes	No	2.00
107	17.72	33.86	2.70	3.97	0.90	30.00	3.98	119.43	4.000	Yes	Yes	2.00
108	17.88	34.84	2.67	3.66	0.89	30.67	3.76	115.37	4.000	No	Yes	2.00
109	18.05	49.45	2.48	2.83	0.82	43.73	2.66	116.28	0.226	No	No	0.59
110	18.21	63.75	2.35	2.40	0.77	56.43	2.11	119.12	0.237	No	No	0.61
111	18.37	61.23	2.38	2.55	0.78	53.74	2.24	120.36	4.000	Yes	No	2.00
112	18.54	43.52	2.55	3.07	0.85	37.44	3.04	113.93	4.000	Yes	No	2.00
113	18.70	25.72	2.81	3.94	0.94	21.37	4.84	103.36	4.000	Yes	Yes	2.00
114	18.87	17.68	2.96	4.24	1.00	14.17	6.36	90.10	4.000	Yes	Yes	2.00
115	19.03	14.61	3.05	4.47	1.00	11.44	7.34	83.94	4.000	No	Yes	2.00
116	19.19	13.54	3.12	5.13	1.00	10.44	8.18	85.37	4.000	No	Yes	2.00
117	19.36	14.21	3.12	5.38	1.00	10.91	8.15	88.93	4.000	No	Yes	2.00
118	19.52	15.31	3.10	5.43	1.00	11.74	7.87	92.43	4.000	No	Yes	2.00
119	19.69	16.35	3.07	5.29	1.00	12.49	7.53	93.99	4.000	No	Yes	2.00
120	19.85	17.24	3.04	4.99	1.00	13.12	7.14	93.74	4.000	No	Yes	2.00
121	20.01	19.01	2.99	4.69	1.00	14.45	6.58	95.11	4.000	No	Yes	2.00
122	20.18	20.47	2.95	4.51	1.00	15.51	6.21	96.34	4.000	No	Yes	2.00
123	20.34	20.96	2.95	4.57	1.00	15.78	6.19	97.66	4.000	No	Yes	2.00
124	20.51	19.69	2.98	4.70	1.00	14.63	6.55	95.78	4.000	No	Yes	2.00
125	20.67	18.19	3.01	4.73	1.00	13.34	6.91	92.15	4.000	No	Yes	2.00
126	20.83	16.89	3.03	4.48	1.00	12.21	7.09	86.57	4.000	No	Yes	2.00
127	21.00	16.02	3.04	4.30	1.00	11.44	7.22	82.58	4.000	No	Yes	2.00
128	21.16	14.69	3.09	4.48	1.00	10.33	7.77	80.28	4.000	No	Yes	2.00
129	21.33	13.77	3.13	4.81	1.00	9.54	8.36	79.76	4.000	No	Yes	2.00
130	21.49	13.16	3.18	5.35	1.00	9.00	9.00	81.01	4.000	No	Yes	2.00
131	21.65	13.44	3.18	5.50	1.00	9.15	9.03	82.58	4.000	No	Yes	2.00
132	21.82	14.37	3.17	5.62	1.00	9.77	8.80	86.01	4.000	No	Yes	2.00
133	21.98	16.21	3.11	5.38	1.00	11.06	8.09	89.54	4.000	No	Yes	2.00
134	22.15	18.75	3.05	5.17	1.00	12.86	7.34	94.34	4.000	No	Yes	2.00
135	22.31	21.62	2.98	4.77	1.00	14.87	6.53	97.11	4.000	No	Yes	2.00
136	22.47	24.45	2.92	4.48	0.99	16.87	5.90	99.62	4.000	No	Yes	2.00
137	22.64	27.86	2.85	4.15	0.96	19.35	5.26	101.86	4.000	No	Yes	2.00
138	22.80	31.95	2.79	3.93	0.94	22.33	4.71	105.14	4.000	No	Yes	2.00
139	22.97	35.54	2.74	3.71	0.92	24.91	4.29	106.83	4.000	No	Yes	2.00
140	23.13	37.92	2.71	3.65	0.91	26.55	4.10	108.73	4.000	No	Yes	2.00
141	23.30	38.81	2.72	3.83	0.91	26.98	4.16	112.25	4.000	No	Yes	2.00
142	23.46	38.27	2.76	4.25	0.93	26.30	4.46	117.25	4.000	No	Yes	2.00
143	23.62	35.97	2.82	4.83	0.95	24.31	4.98	121.10	4.000	No	Yes	2.00
144	23.79	32.44	2.87	4.95	0.97	21.55	5.40	116.36	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
145	23.95	28.44	2.92	5.07	0.99	18.52	5.95	110.10	4.000	No	Yes	2.00
146	24.12	24.61	2.98	5.04	1.00	15.72	6.50	102.13	4.000	No	Yes	2.00
147	24.28	21.10	3.06	5.44	1.00	13.24	7.39	97.79	4.000	No	Yes	2.00
148	24.44	18.38	3.12	5.72	1.00	11.33	8.21	92.97	4.000	No	Yes	2.00
149	24.61	16.94	3.17	6.05	1.00	10.29	8.83	90.85	4.000	No	Yes	2.00
150	24.77	17.47	3.17	6.26	1.00	10.57	8.84	93.45	4.000	No	Yes	2.00
151	24.94	20.94	3.10	6.01	1.00	12.78	7.87	100.53	4.000	No	Yes	2.00
152	25.10	27.68	2.95	5.10	1.00	17.09	6.24	106.59	4.000	No	Yes	2.00
153	25.26	35.46	2.82	4.32	0.95	22.46	4.93	110.65	4.000	No	Yes	2.00
154	25.43	44.14	2.69	3.60	0.90	28.56	3.89	111.18	4.000	No	Yes	2.00
155	25.59	51.59	2.59	3.13	0.86	33.84	3.27	110.57	0.206	No	No	0.49
156	25.76	57.57	2.53	2.92	0.84	37.98	2.94	111.56	0.209	No	No	0.50
157	25.92	61.11	2.51	2.86	0.83	40.31	2.80	113.03	0.214	No	No	0.51
158	26.08	62.38	2.51	2.91	0.83	40.96	2.80	114.82	0.221	No	No	0.52
159	26.25	62.68	2.51	2.95	0.83	40.90	2.83	115.61	0.224	No	No	0.53
160	26.41	62.05	2.51	2.92	0.83	40.24	2.84	114.35	0.219	No	No	0.52
161	26.58	61.05	2.52	2.92	0.84	39.30	2.88	113.12	0.215	No	No	0.50
162	26.74	60.25	2.53	2.90	0.84	38.54	2.90	111.89	0.210	No	No	0.49
163	26.90	59.01	2.54	2.96	0.84	37.43	2.99	111.84	0.210	No	No	0.49
164	27.07	54.58	2.59	3.15	0.86	34.07	3.26	111.21	0.208	No	No	0.49
165	27.23	46.04	2.67	3.30	0.89	28.05	3.76	105.55	4.000	No	Yes	2.00
166	27.40	36.58	2.79	3.72	0.94	21.48	4.69	100.78	4.000	No	Yes	2.00
167	27.56	30.51	2.89	4.16	0.98	17.33	5.62	97.34	4.000	No	Yes	2.00
168	27.72	33.05	2.86	4.15	0.97	18.84	5.34	100.63	4.000	No	Yes	2.00
169	27.89	34.77	2.83	3.93	0.95	19.87	5.05	100.25	4.000	No	Yes	2.00
170	28.05	33.53	2.83	3.77	0.95	19.01	5.08	96.46	4.000	No	Yes	2.00
171	28.22	25.79	2.98	4.43	1.00	13.99	6.54	91.40	4.000	No	Yes	2.00
172	28.38	22.65	3.06	4.94	1.00	12.09	7.44	89.88	4.000	No	Yes	2.00
173	28.54	28.45	2.93	4.12	0.99	15.42	5.98	92.17	4.000	No	Yes	2.00
174	28.71	36.77	2.79	3.52	0.94	20.65	4.67	96.49	4.000	No	Yes	2.00
175	28.87	44.05	2.70	3.31	0.91	25.22	4.02	101.28	4.000	No	Yes	2.00
176	29.04	47.84	2.68	3.40	0.90	27.43	3.87	106.18	4.000	No	Yes	2.00
177	29.20	52.74	2.64	3.27	0.88	30.46	3.56	108.48	4.000	No	Yes	2.00
178	29.36	56.97	2.59	3.08	0.86	33.11	3.28	108.69	0.199	No	No	0.45
179	29.53	58.04	2.58	3.02	0.86	33.65	3.22	108.30	0.198	No	No	0.45
180	29.69	53.51	2.62	3.09	0.87	30.55	3.45	105.52	4.000	No	Yes	2.00
181	29.86	45.93	2.69	3.17	0.90	25.58	3.90	99.70	4.000	No	Yes	2.00
182	30.02	39.43	2.76	3.28	0.93	21.40	4.42	94.50	4.000	No	Yes	2.00
183	30.19	39.73	2.75	3.25	0.92	21.47	4.39	94.26	4.000	No	Yes	2.00
184	30.35	47.12	2.67	3.09	0.89	25.94	3.81	98.93	4.000	No	Yes	2.00
185	30.51	53.07	2.59	2.73	0.86	29.71	3.30	97.91	0.167	No	No	0.38
186	30.68	52.50	2.59	2.63	0.86	29.27	3.26	95.51	0.161	No	No	0.36
187	30.84	46.28	2.65	2.70	0.88	25.23	3.63	91.48	4.000	No	Yes	2.00
188	31.01	47.90	2.64	2.75	0.88	26.06	3.59	93.45	4.000	No	Yes	2.00
189	31.17	52.88	2.60	2.68	0.87	29.02	3.31	96.07	0.162	No	No	0.37
190	31.33	58.69	2.56	2.64	0.85	32.49	3.06	99.59	0.172	No	No	0.39
191	31.50	65.29	2.51	2.58	0.83	36.47	2.82	102.88	4.000	Yes	No	2.00
192	31.66	83.15	2.38	2.26	0.78	47.92	2.24	107.53	4.000	Yes	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
193	31.83	111.82	2.24	1.97	0.73	66.76	1.76	117.59	4.000	Yes	No	2.00
194	31.99	142.89	2.14	1.87	0.69	87.33	1.52	133.05	4.000	Yes	No	2.00
195	32.15	171.92	2.08	1.88	0.67	106.37	1.42	150.61	4.000	Yes	No	2.00
196	32.32	191.69	2.05	1.93	0.66	119.00	1.38	163.63	0.487	No	No	1.09
197	32.48	196.66	2.06	2.02	0.66	121.43	1.39	168.56	0.525	No	No	1.17
198	32.65	188.79	2.09	2.11	0.67	115.29	1.44	165.52	0.502	No	No	1.12
199	32.81	175.29	2.12	2.15	0.68	105.72	1.50	158.18	0.448	No	No	1.00
200	32.97	160.79	2.15	2.12	0.69	95.96	1.54	148.19	0.383	No	No	0.85
201	33.14	143.86	2.17	2.04	0.70	84.84	1.60	135.87	0.313	No	No	0.70
202	33.30	125.09	2.21	1.95	0.72	72.72	1.68	122.32	0.250	No	No	0.56
203	33.47	106.82	2.25	1.85	0.73	61.07	1.79	109.15	0.201	No	No	0.45
204	33.63	87.26	2.32	1.84	0.76	48.56	2.02	97.94	0.167	No	No	0.37
205	33.79	70.12	2.40	1.81	0.79	37.86	2.32	87.68	0.143	No	No	0.32
206	33.96	60.82	2.45	1.76	0.81	32.15	2.53	81.20	0.130	No	No	0.29
207	34.12	59.89	2.43	1.61	0.80	31.65	2.45	77.60	0.123	No	No	0.27
208	34.29	64.22	2.41	1.61	0.79	34.13	2.34	79.71	0.127	No	No	0.28
209	34.45	70.27	2.36	1.56	0.78	37.73	2.17	81.83	0.131	No	No	0.29
210	34.61	78.25	2.31	1.49	0.75	42.61	1.97	84.15	0.135	No	No	0.30
211	34.78	80.40	2.32	1.58	0.76	43.55	2.00	87.09	0.141	No	No	0.31
212	34.94	75.79	2.39	1.86	0.79	40.06	2.26	90.69	0.149	No	No	0.33
213	35.11	66.98	2.49	2.21	0.82	34.18	2.72	92.80	0.154	No	No	0.34
214	35.27	60.58	2.52	2.17	0.84	30.40	2.89	87.92	0.143	No	No	0.32
215	35.43	57.27	2.52	2.00	0.84	28.57	2.89	82.55	0.132	No	No	0.29
216	35.60	53.90	2.53	1.87	0.84	26.65	2.93	78.04	0.124	No	No	0.27
217	35.76	49.59	2.60	2.11	0.87	23.88	3.33	79.46	4.000	No	Yes	2.00
218	35.93	49.15	2.61	2.13	0.87	23.50	3.38	79.37	4.000	No	Yes	2.00
219	36.09	50.89	2.59	2.05	0.86	24.43	3.24	79.11	4.000	Yes	No	2.00
220	36.26	57.92	2.51	1.86	0.83	28.48	2.80	79.63	4.000	Yes	No	2.00
221	36.42	64.73	2.46	1.81	0.81	32.29	2.55	82.50	4.000	Yes	No	2.00
222	36.58	75.02	2.39	1.74	0.78	38.21	2.26	86.35	4.000	Yes	No	2.00
223	36.75	89.68	2.29	1.60	0.75	46.97	1.93	90.64	4.000	Yes	No	2.00
224	36.91	101.75	2.24	1.54	0.73	54.18	1.76	95.22	4.000	Yes	No	2.00
225	37.08	104.97	2.24	1.62	0.73	55.65	1.77	98.60	0.169	No	No	0.37
226	37.24	97.82	2.29	1.74	0.75	50.88	1.92	97.61	0.167	No	No	0.37
227	37.40	89.88	2.34	1.86	0.77	45.85	2.10	96.15	0.163	No	No	0.36
228	37.57	87.27	2.35	1.84	0.77	44.29	2.13	94.24	0.158	No	No	0.35
229	37.73	86.99	2.35	1.81	0.77	44.11	2.11	93.29	0.156	No	No	0.34
230	37.90	82.79	2.36	1.74	0.77	41.74	2.14	89.49	0.147	No	No	0.32
231	38.06	75.02	2.39	1.70	0.79	37.29	2.27	84.52	0.136	No	No	0.30
232	38.22	67.18	2.43	1.70	0.80	32.78	2.45	80.42	0.128	No	No	0.28
233	38.39	61.68	2.49	1.80	0.82	29.48	2.70	79.45	0.127	No	No	0.28
234	38.55	56.37	2.53	1.85	0.84	26.43	2.93	77.46	0.123	No	No	0.27
235	38.72	50.14	2.61	2.02	0.87	22.82	3.36	76.68	4.000	No	Yes	2.00
236	38.88	44.33	2.67	2.15	0.89	19.60	3.81	74.68	4.000	No	Yes	2.00
237	39.04	41.62	2.71	2.21	0.91	18.09	4.07	73.57	4.000	No	Yes	2.00
238	39.21	37.21	2.77	2.30	0.93	15.74	4.53	71.25	4.000	No	Yes	2.00
239	39.37	29.80	2.89	2.56	0.98	11.91	5.65	67.27	4.000	No	Yes	2.00
240	39.54	21.24	3.10	3.36	1.00	8.03	7.97	64.01	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
241	39.70	16.97	3.25	4.12	1.00	6.19	9.92	61.41	4.000	No	Yes	2.00
242	39.86	18.00	3.19	3.64	1.00	6.61	9.15	60.50	4.000	No	Yes	2.00
243	40.03	22.14	3.04	2.71	1.00	8.36	7.16	59.88	4.000	No	Yes	2.00
244	40.19	27.42	2.89	2.14	0.98	10.78	5.58	60.20	4.000	No	Yes	2.00
245	40.36	32.08	2.80	2.03	0.94	13.09	4.83	63.18	4.000	No	Yes	2.00
246	40.52	34.68	2.75	1.86	0.92	14.46	4.37	63.12	4.000	No	Yes	2.00
247	40.68	35.81	2.74	1.90	0.92	14.97	4.30	64.43	4.000	No	Yes	2.00
248	40.85	35.43	2.74	1.82	0.92	14.80	4.26	63.02	4.000	No	Yes	2.00
249	41.01	35.86	2.73	1.80	0.92	15.00	4.20	62.97	4.000	No	Yes	2.00
250	41.18	36.62	2.68	1.56	0.90	15.54	3.87	60.06	4.000	No	Yes	2.00
251	41.34	37.85	2.67	1.60	0.89	16.10	3.81	61.42	4.000	No	Yes	2.00
252	41.50	37.51	2.71	1.81	0.91	15.72	4.08	64.17	4.000	No	Yes	2.00
253	41.67	36.72	2.74	1.95	0.92	15.19	4.31	65.49	4.000	No	Yes	2.00
254	41.83	34.92	2.75	1.85	0.92	14.33	4.38	62.79	4.000	No	Yes	2.00
255	42.00	30.72	2.80	1.78	0.94	12.26	4.77	58.48	4.000	No	Yes	2.00
256	42.16	25.66	2.92	2.02	0.99	9.68	5.85	56.61	4.000	No	Yes	2.00
257	42.32	20.73	3.08	2.75	1.00	7.51	7.68	57.67	4.000	No	Yes	2.00
258	42.49	19.57	3.16	3.53	1.00	7.01	8.76	61.43	4.000	No	Yes	2.00
259	42.65	30.24	2.92	2.65	0.99	11.53	5.85	67.48	4.000	No	Yes	2.00
260	42.82	48.60	2.63	1.96	0.88	20.98	3.49	73.30	4.000	No	Yes	2.00
261	42.98	63.66	2.49	1.80	0.82	29.02	2.73	79.08	0.126	No	No	0.28
262	43.15	62.92	2.53	2.05	0.84	28.23	2.95	83.16	0.133	No	No	0.29
263	43.31	50.36	2.69	2.58	0.90	21.17	3.96	83.82	4.000	No	Yes	2.00
264	43.47	39.13	2.84	2.92	0.96	15.45	5.10	78.84	4.000	No	Yes	2.00
265	43.64	32.31	2.92	2.92	0.99	12.21	5.89	71.90	4.000	No	Yes	2.00
266	43.80	34.32	2.84	2.42	0.96	13.34	5.14	68.62	4.000	No	Yes	2.00
267	43.97	36.22	2.79	2.19	0.94	14.34	4.70	67.41	4.000	No	Yes	2.00
268	44.13	35.10	2.80	2.16	0.94	13.78	4.80	66.11	4.000	No	Yes	2.00
269	44.29	26.62	2.97	2.51	1.00	9.68	6.37	61.62	4.000	No	Yes	2.00
270	44.46	18.55	3.17	3.15	1.00	6.40	8.84	56.59	4.000	No	Yes	2.00
271	44.62	14.38	3.34	4.00	1.00	4.71	11.32	53.26	4.000	No	Yes	2.00
272	44.79	14.52	3.38	4.80	1.00	4.75	11.98	56.90	4.000	No	Yes	2.00
273	44.95	17.62	3.29	4.70	1.00	5.99	10.58	63.33	4.000	No	Yes	2.00
274	45.11	21.74	3.18	4.21	1.00	7.62	8.94	68.18	4.000	No	Yes	2.00
275	45.28	24.54	3.11	3.82	1.00	8.73	8.00	69.80	4.000	No	Yes	2.00
276	45.44	23.99	3.17	4.71	1.00	8.49	8.82	74.87	4.000	No	Yes	2.00
277	45.61	25.90	3.17	5.33	1.00	9.23	8.87	81.87	4.000	No	Yes	2.00
278	45.77	39.14	2.97	4.49	1.00	14.48	6.45	93.36	4.000	Yes	Yes	2.00
279	45.93	75.92	2.56	2.78	0.85	33.03	3.12	102.90	4.000	Yes	No	2.00
280	46.10	123.46	2.30	2.13	0.75	59.43	1.94	115.08	4.000	Yes	No	2.00
281	46.26	162.66	2.16	1.90	0.70	82.26	1.57	129.35	4.000	Yes	No	2.00
282	46.43	175.52	2.14	1.95	0.69	89.23	1.54	137.09	0.320	No	No	0.71
283	46.59	170.79	2.18	2.10	0.71	85.61	1.62	138.27	0.326	No	No	0.73
284	46.75	161.79	2.21	2.20	0.72	79.95	1.70	135.91	0.313	No	No	0.70
285	46.92	156.49	2.23	2.26	0.73	76.63	1.75	134.37	0.306	No	No	0.68
286	47.08	148.61	2.26	2.29	0.74	72.01	1.82	130.95	0.289	No	No	0.65
287	47.25	145.96	2.26	2.26	0.74	70.50	1.83	128.81	0.279	No	No	0.63
288	47.41	140.21	2.28	2.28	0.74	67.15	1.88	126.29	0.267	No	No	0.60

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
289	47.57	132.72	2.31	2.39	0.76	62.62	1.99	124.85	0.261	No	No	0.59
290	47.74	126.35	2.35	2.54	0.77	58.67	2.13	124.90	0.261	No	No	0.59
291	47.90	123.65	2.38	2.65	0.78	56.84	2.22	125.91	0.266	No	No	0.60
292	48.07	130.13	2.35	2.57	0.77	60.36	2.11	127.33	0.272	No	No	0.61
293	48.23	135.67	2.32	2.46	0.76	63.50	2.01	127.60	0.273	No	No	0.62
294	48.39	142.50	2.27	2.27	0.74	67.68	1.87	126.44	0.268	No	No	0.61
295	48.56	145.83	2.24	2.12	0.73	69.89	1.78	124.52	0.260	No	No	0.59
296	48.72	142.96	2.25	2.10	0.73	68.30	1.79	122.31	0.250	No	No	0.57
297	48.89	137.00	2.27	2.14	0.74	64.76	1.86	120.27	0.242	No	No	0.55
298	49.05	132.06	2.29	2.17	0.75	61.88	1.91	118.43	0.234	No	No	0.53
299	49.22	132.33	2.28	2.11	0.74	62.09	1.89	117.15	0.230	No	No	0.52
300	49.38	135.89	2.27	2.11	0.74	63.92	1.86	118.65	0.235	No	No	0.54
301	49.54	139.42	2.27	2.15	0.74	65.56	1.85	121.31	0.246	No	No	0.56
302	49.71	139.45	2.28	2.25	0.75	65.12	1.90	123.50	0.255	No	No	0.58
303	49.87	134.25	2.31	2.31	0.75	62.02	1.97	122.29	0.250	No	No	0.57
304	50.04	122.19	2.36	2.41	0.77	55.27	2.14	118.28	4.000	Yes	No	2.00
305	50.20	100.69	2.45	2.60	0.81	43.70	2.54	111.10	4.000	Yes	No	2.00
306	50.36	76.79	2.59	2.89	0.86	31.36	3.28	102.96	4.000	Yes	No	2.00
307	50.53	56.65	2.76	3.30	0.93	21.47	4.42	94.88	4.000	Yes	Yes	2.00
308	50.69	42.52	2.91	3.72	0.98	14.94	5.81	86.81	4.000	Yes	Yes	2.00
309	50.86	31.52	3.06	4.22	1.00	10.59	7.48	79.21	4.000	No	Yes	2.00
310	51.02	23.66	3.20	4.54	1.00	7.65	9.19	70.31	4.000	No	Yes	2.00
311	51.18	19.96	3.26	4.36	1.00	6.26	10.06	62.94	4.000	No	Yes	2.00
312	51.35	18.84	3.26	4.03	1.00	5.83	10.16	59.19	4.000	No	Yes	2.00
313	51.51	18.10	3.28	4.01	1.00	5.54	10.41	57.68	4.000	No	Yes	2.00
314	51.68	17.45	3.31	4.20	1.00	5.29	10.83	57.30	4.000	No	Yes	2.00
315	51.84	16.96	3.33	4.35	1.00	5.09	11.18	56.96	4.000	No	Yes	2.00
316	52.00	17.04	3.33	4.33	1.00	5.12	11.14	56.97	4.000	No	Yes	2.00
317	52.17	18.81	3.24	3.63	1.00	5.75	9.85	56.66	4.000	No	Yes	2.00
318	52.33	25.15	3.04	2.58	1.00	8.07	7.18	57.97	4.000	No	Yes	2.00
319	52.50	31.72	2.89	2.10	0.98	10.71	5.57	59.70	4.000	No	Yes	2.00
320	52.66	33.32	2.88	2.21	0.97	11.33	5.49	62.21	4.000	No	Yes	2.00
321	52.82	27.98	3.01	2.69	1.00	9.06	6.81	61.73	4.000	No	Yes	2.00
322	52.99	21.73	3.16	3.24	1.00	6.76	8.66	58.55	4.000	No	Yes	2.00
323	53.15	18.83	3.26	3.85	1.00	5.69	10.12	57.55	4.000	No	Yes	2.00
324	53.32	19.34	3.28	4.35	1.00	5.86	10.41	60.97	4.000	No	Yes	2.00
325	53.48	23.10	3.18	3.86	1.00	7.21	8.92	64.34	4.000	No	Yes	2.00
326	53.64	29.67	3.01	3.03	1.00	9.58	6.91	66.20	4.000	No	Yes	2.00
327	53.81	36.80	2.90	2.78	0.98	12.37	5.72	70.78	4.000	No	Yes	2.00
328	53.97	39.51	2.93	3.41	0.99	13.19	6.01	79.27	4.000	No	Yes	2.00
329	54.14	41.24	2.97	4.13	1.00	13.70	6.40	87.75	4.000	No	Yes	2.00
330	54.30	55.57	2.80	3.57	0.94	19.89	4.81	95.69	4.000	No	Yes	2.00
331	54.46	78.26	2.59	2.85	0.86	30.75	3.29	101.30	0.177	No	No	0.42
332	54.63	97.44	2.47	2.55	0.82	40.29	2.64	106.49	0.192	No	No	0.45
333	54.79	97.84	2.50	2.75	0.83	40.04	2.76	110.52	0.206	No	No	0.49
334	54.96	86.91	2.61	3.31	0.87	33.98	3.36	114.10	4.000	No	Yes	2.00
335	55.12	75.82	2.72	4.00	0.91	28.16	4.15	116.86	4.000	No	Yes	2.00
336	55.28	77.99	2.71	3.98	0.91	29.08	4.06	118.01	4.000	Yes	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
337	55.45	97.56	2.55	3.22	0.85	38.84	3.06	118.72	4.000	Yes	No	2.00
338	55.61	121.94	2.39	2.53	0.79	51.87	2.27	117.98	4.000	Yes	No	2.00
339	55.78	137.69	2.27	2.04	0.74	61.29	1.87	114.37	4.000	Yes	No	2.00
340	55.94	141.25	2.20	1.69	0.72	64.48	1.68	108.05	4.000	Yes	No	2.00
341	56.11	140.46	2.16	1.48	0.70	64.97	1.58	102.84	4.000	Yes	No	2.00
342	56.27	126.01	2.25	1.69	0.73	56.25	1.79	100.76	4.000	Yes	No	2.00
343	56.43	97.77	2.44	2.23	0.80	40.26	2.47	99.33	4.000	Yes	No	2.00
344	56.60	64.41	2.72	3.17	0.91	23.38	4.12	96.22	4.000	Yes	Yes	2.00
345	56.76	41.32	2.97	4.05	1.00	13.26	6.47	85.79	4.000	Yes	Yes	2.00
346	56.93	29.98	3.11	4.15	1.00	9.27	7.99	74.10	4.000	No	Yes	2.00
347	57.09	23.82	3.20	4.10	1.00	7.10	9.20	65.31	4.000	No	Yes	2.00
348	57.25	21.22	3.25	4.14	1.00	6.18	9.94	61.42	4.000	No	Yes	2.00
349	57.42	20.49	3.30	4.71	1.00	5.91	10.66	63.00	4.000	No	Yes	2.00
350	57.58	21.13	3.32	5.49	1.00	6.12	11.06	67.74	4.000	No	Yes	2.00
351	57.75	23.23	3.30	5.92	1.00	6.84	10.77	73.65	4.000	No	Yes	2.00
352	57.91	28.08	3.18	4.89	1.00	8.51	8.94	76.06	4.000	No	Yes	2.00
353	58.07	37.75	2.98	3.51	1.00	11.83	6.49	76.77	4.000	No	Yes	2.00
354	58.24	42.88	2.84	2.63	0.96	14.17	5.13	72.72	4.000	No	Yes	2.00
355	58.40	41.20	2.89	2.92	0.98	13.29	5.59	74.34	4.000	No	Yes	2.00
356	58.57	33.40	3.04	3.69	1.00	10.27	7.19	73.84	4.000	No	Yes	2.00
357	58.73	36.71	3.03	4.13	1.00	11.38	7.11	80.95	4.000	No	Yes	2.00
358	58.89	60.80	2.71	2.80	0.91	21.55	4.07	87.65	4.000	No	Yes	2.00
359	59.06	90.49	2.50	2.38	0.83	35.47	2.75	97.67	0.167	No	No	0.41
360	59.22	111.81	2.41	2.34	0.79	45.62	2.35	107.28	0.195	No	No	0.47
361	59.39	117.34	2.43	2.64	0.80	47.48	2.44	116.04	0.225	No	No	0.55
362	59.55	126.85	2.39	2.54	0.79	52.19	2.27	118.60	0.235	No	No	0.57
363	59.71	136.02	2.34	2.37	0.77	57.08	2.09	119.03	0.237	No	No	0.58
364	59.88	127.00	2.36	2.35	0.78	52.61	2.17	114.34	4.000	Yes	No	2.00
365	60.04	101.06	2.50	2.70	0.83	39.36	2.76	108.75	4.000	Yes	No	2.00
366	60.21	73.28	2.70	3.40	0.90	25.96	4.00	103.86	4.000	Yes	Yes	2.00
367	60.37	64.36	2.77	3.57	0.93	21.97	4.53	99.59	4.000	Yes	Yes	2.00
368	60.53	69.84	2.71	3.33	0.91	24.46	4.10	100.31	4.000	Yes	Yes	2.00
369	60.70	87.91	2.55	2.65	0.85	33.16	3.03	100.58	4.000	Yes	No	2.00
370	60.86	106.89	2.44	2.39	0.81	42.37	2.48	105.14	4.000	Yes	No	2.00
371	61.03	116.16	2.40	2.31	0.79	46.88	2.30	107.84	4.000	No	No	2.00
372	61.19	110.47	2.43	2.37	0.80	43.94	2.42	106.34	4.000	No	No	2.00
373	61.35	99.12	2.50	2.59	0.83	38.12	2.75	104.90	4.000	No	No	2.00
374	61.52	87.74	2.56	2.74	0.85	32.64	3.11	101.63	4.000	No	No	2.00
375	61.68	82.20	2.61	2.89	0.87	29.91	3.38	100.99	4.000	No	Yes	2.00
376	61.85	83.33	2.57	2.60	0.85	30.76	3.14	96.67	4.000	No	No	2.00
377	62.01	86.89	2.54	2.49	0.84	32.47	2.97	96.54	4.000	No	No	2.00
378	62.17	84.12	2.57	2.66	0.86	30.91	3.17	97.96	4.000	No	No	2.00
379	62.34	73.49	2.68	3.16	0.90	25.61	3.88	99.48	4.000	No	Yes	2.00
380	62.50	64.32	2.78	3.58	0.94	21.35	4.62	98.60	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (ft)	q_t (tsf)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS

Abbreviations

Depth: Depth from free surface, at which CPT was performed (ft)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
0.33	2.00	0.00	9.95	0.16	0.00	0.49	2.00	0.00	9.93	0.16	0.00
0.66	2.00	0.00	9.90	0.17	0.00	0.82	2.00	0.00	9.88	0.16	0.00
0.98	2.00	0.00	9.85	0.16	0.00	1.15	2.00	0.00	9.82	0.17	0.00
1.31	2.00	0.00	9.80	0.16	0.00	1.48	2.00	0.00	9.77	0.17	0.00
1.64	2.00	0.00	9.75	0.16	0.00	1.80	2.00	0.00	9.73	0.16	0.00
1.97	2.00	0.00	9.70	0.17	0.00	2.13	2.00	0.00	9.68	0.16	0.00
2.30	2.00	0.00	9.65	0.17	0.00	2.46	2.00	0.00	9.63	0.16	0.00
2.62	2.00	0.00	9.60	0.16	0.00	2.79	2.00	0.00	9.57	0.17	0.00
2.95	2.00	0.00	9.55	0.16	0.00	3.12	2.00	0.00	9.52	0.17	0.00
3.28	2.00	0.00	9.50	0.16	0.00	3.45	2.00	0.00	9.47	0.17	0.00
3.61	2.00	0.00	9.45	0.16	0.00	3.77	2.00	0.00	9.43	0.16	0.00
3.94	2.00	0.00	9.40	0.17	0.00	4.10	2.00	0.00	9.38	0.16	0.00
4.27	2.00	0.00	9.35	0.17	0.00	4.43	2.00	0.00	9.32	0.16	0.00
4.59	2.00	0.00	9.30	0.16	0.00	4.76	2.00	0.00	9.27	0.17	0.00
4.92	2.00	0.00	9.25	0.16	0.00	5.09	2.00	0.00	9.22	0.17	0.00
5.25	2.00	0.00	9.20	0.16	0.00	5.41	2.00	0.00	9.18	0.16	0.00
5.58	2.00	0.00	9.15	0.17	0.00	5.74	2.00	0.00	9.13	0.16	0.00
5.91	2.00	0.00	9.10	0.17	0.00	6.07	2.00	0.00	9.07	0.16	0.00
6.23	2.00	0.00	9.05	0.16	0.00	6.40	2.00	0.00	9.02	0.17	0.00
6.56	2.00	0.00	9.00	0.16	0.00	6.73	2.00	0.00	8.97	0.17	0.00
6.89	2.00	0.00	8.95	0.16	0.00	7.05	2.00	0.00	8.93	0.16	0.00
7.22	2.00	0.00	8.90	0.17	0.00	7.38	2.00	0.00	8.88	0.16	0.00
7.55	2.00	0.00	8.85	0.17	0.00	7.71	2.00	0.00	8.82	0.16	0.00
7.87	2.00	0.00	8.80	0.16	0.00	8.04	2.00	0.00	8.77	0.17	0.00
8.20	2.00	0.00	8.75	0.16	0.00	8.37	2.00	0.00	8.72	0.17	0.00
8.53	2.00	0.00	8.70	0.16	0.00	8.69	2.00	0.00	8.68	0.16	0.00
8.86	2.00	0.00	8.65	0.17	0.00	9.02	1.44	0.00	8.63	0.16	0.00
9.19	1.40	0.00	8.60	0.17	0.00	9.35	1.36	0.00	8.58	0.16	0.00
9.51	1.30	0.00	8.55	0.16	0.00	9.68	1.23	0.00	8.52	0.17	0.00
9.84	1.17	0.00	8.50	0.16	0.00	10.01	1.14	0.00	8.47	0.17	0.00
10.17	1.15	0.00	8.45	0.16	0.00	10.34	1.15	0.00	8.42	0.17	0.00
10.50	1.19	0.00	8.40	0.16	0.00	10.66	1.23	0.00	8.38	0.16	0.00
10.83	1.30	0.00	8.35	0.17	0.00	10.99	1.30	0.00	8.33	0.16	0.00
11.16	1.28	0.00	8.30	0.17	0.00	11.32	1.11	0.00	8.27	0.16	0.00
11.48	0.98	0.02	8.25	0.16	0.01	11.65	0.89	0.11	8.22	0.17	0.05
11.81	0.90	0.10	8.20	0.16	0.04	11.98	0.91	0.09	8.17	0.17	0.04
12.14	0.92	0.08	8.15	0.16	0.03	12.30	0.91	0.09	8.13	0.16	0.04
12.47	0.89	0.11	8.10	0.17	0.05	12.63	0.89	0.11	8.08	0.16	0.04
12.80	0.91	0.09	8.05	0.17	0.04	12.96	0.96	0.04	8.02	0.16	0.02
13.12	1.00	0.00	8.00	0.16	0.00	13.29	0.99	0.01	7.97	0.17	0.00
13.45	0.94	0.06	7.95	0.16	0.02	13.62	0.87	0.13	7.92	0.17	0.05
13.78	0.84	0.16	7.90	0.16	0.06	13.94	0.84	0.16	7.88	0.16	0.06
14.11	0.86	0.14	7.85	0.17	0.06	14.27	0.88	0.12	7.83	0.16	0.04
14.44	0.88	0.12	7.80	0.17	0.05	14.60	0.89	0.11	7.77	0.16	0.04
14.76	0.88	0.12	7.75	0.16	0.05	14.93	0.87	0.13	7.72	0.17	0.05
15.09	0.86	0.14	7.70	0.16	0.05	15.26	0.84	0.16	7.67	0.17	0.07
15.42	0.81	0.19	7.65	0.16	0.07	15.58	0.79	0.21	7.63	0.16	0.08
15.75	0.77	0.23	7.60	0.17	0.09	15.91	0.74	0.26	7.58	0.16	0.09

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
16.08	0.77	0.23	7.55	0.17	0.09	16.24	0.86	0.14	7.53	0.16	0.05
16.40	1.02	0.00	7.50	0.16	0.00	16.57	1.19	0.00	7.47	0.17	0.00
16.73	1.33	0.00	7.45	0.16	0.00	16.90	1.40	0.00	7.42	0.17	0.00
17.06	2.00	0.00	7.40	0.16	0.00	17.23	2.00	0.00	7.37	0.17	0.00
17.39	2.00	0.00	7.35	0.16	0.00	17.55	2.00	0.00	7.33	0.16	0.00
17.72	2.00	0.00	7.30	0.17	0.00	17.88	2.00	0.00	7.28	0.16	0.00
18.05	0.59	0.41	7.25	0.17	0.16	18.21	0.61	0.39	7.22	0.16	0.14
18.37	2.00	0.00	7.20	0.16	0.00	18.54	2.00	0.00	7.17	0.17	0.00
18.70	2.00	0.00	7.15	0.16	0.00	18.87	2.00	0.00	7.12	0.17	0.00
19.03	2.00	0.00	7.10	0.16	0.00	19.19	2.00	0.00	7.08	0.16	0.00
19.36	2.00	0.00	7.05	0.17	0.00	19.52	2.00	0.00	7.03	0.16	0.00
19.69	2.00	0.00	7.00	0.17	0.00	19.85	2.00	0.00	6.97	0.16	0.00
20.01	2.00	0.00	6.95	0.16	0.00	20.18	2.00	0.00	6.92	0.17	0.00
20.34	2.00	0.00	6.90	0.16	0.00	20.51	2.00	0.00	6.87	0.17	0.00
20.67	2.00	0.00	6.85	0.16	0.00	20.83	2.00	0.00	6.83	0.16	0.00
21.00	2.00	0.00	6.80	0.17	0.00	21.16	2.00	0.00	6.78	0.16	0.00
21.33	2.00	0.00	6.75	0.17	0.00	21.49	2.00	0.00	6.72	0.16	0.00
21.65	2.00	0.00	6.70	0.16	0.00	21.82	2.00	0.00	6.67	0.17	0.00
21.98	2.00	0.00	6.65	0.16	0.00	22.15	2.00	0.00	6.62	0.17	0.00
22.31	2.00	0.00	6.60	0.16	0.00	22.47	2.00	0.00	6.58	0.16	0.00
22.64	2.00	0.00	6.55	0.17	0.00	22.80	2.00	0.00	6.53	0.16	0.00
22.97	2.00	0.00	6.50	0.17	0.00	23.13	2.00	0.00	6.47	0.16	0.00
23.30	2.00	0.00	6.45	0.17	0.00	23.46	2.00	0.00	6.42	0.16	0.00
23.62	2.00	0.00	6.40	0.16	0.00	23.79	2.00	0.00	6.37	0.17	0.00
23.95	2.00	0.00	6.35	0.16	0.00	24.12	2.00	0.00	6.32	0.17	0.00
24.28	2.00	0.00	6.30	0.16	0.00	24.44	2.00	0.00	6.28	0.16	0.00
24.61	2.00	0.00	6.25	0.17	0.00	24.77	2.00	0.00	6.23	0.16	0.00
24.94	2.00	0.00	6.20	0.17	0.00	25.10	2.00	0.00	6.17	0.16	0.00
25.26	2.00	0.00	6.15	0.16	0.00	25.43	2.00	0.00	6.12	0.17	0.00
25.59	0.49	0.51	6.10	0.16	0.15	25.76	0.50	0.50	6.07	0.17	0.16
25.92	0.51	0.49	6.05	0.16	0.15	26.08	0.52	0.48	6.03	0.16	0.14
26.25	0.53	0.47	6.00	0.17	0.15	26.41	0.52	0.48	5.98	0.16	0.14
26.58	0.50	0.50	5.95	0.17	0.15	26.74	0.49	0.51	5.92	0.16	0.15
26.90	0.49	0.51	5.90	0.16	0.15	27.07	0.49	0.51	5.87	0.17	0.16
27.23	2.00	0.00	5.85	0.16	0.00	27.40	2.00	0.00	5.82	0.17	0.00
27.56	2.00	0.00	5.80	0.16	0.00	27.72	2.00	0.00	5.78	0.16	0.00
27.89	2.00	0.00	5.75	0.17	0.00	28.05	2.00	0.00	5.73	0.16	0.00
28.22	2.00	0.00	5.70	0.17	0.00	28.38	2.00	0.00	5.67	0.16	0.00
28.54	2.00	0.00	5.65	0.16	0.00	28.71	2.00	0.00	5.62	0.17	0.00
28.87	2.00	0.00	5.60	0.16	0.00	29.04	2.00	0.00	5.57	0.17	0.00
29.20	2.00	0.00	5.55	0.16	0.00	29.36	0.45	0.55	5.53	0.16	0.15
29.53	0.45	0.55	5.50	0.17	0.16	29.69	2.00	0.00	5.48	0.16	0.00
29.86	2.00	0.00	5.45	0.17	0.00	30.02	2.00	0.00	5.42	0.16	0.00
30.19	2.00	0.00	5.40	0.17	0.00	30.35	2.00	0.00	5.37	0.16	0.00
30.51	0.38	0.62	5.35	0.16	0.16	30.68	0.36	0.64	5.32	0.17	0.18
30.84	2.00	0.00	5.30	0.16	0.00	31.01	2.00	0.00	5.27	0.17	0.00
31.17	0.37	0.63	5.25	0.16	0.16	31.33	0.39	0.61	5.23	0.16	0.16
31.50	2.00	0.00	5.20	0.17	0.00	31.66	2.00	0.00	5.18	0.16	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
31.83	2.00	0.00	5.15	0.17	0.00	31.99	2.00	0.00	5.12	0.16	0.00
32.15	2.00	0.00	5.10	0.16	0.00	32.32	1.09	0.00	5.07	0.17	0.00
32.48	1.17	0.00	5.05	0.16	0.00	32.65	1.12	0.00	5.02	0.17	0.00
32.81	1.00	0.00	5.00	0.16	0.00	32.97	0.85	0.15	4.98	0.16	0.04
33.14	0.70	0.30	4.95	0.17	0.08	33.30	0.56	0.44	4.93	0.16	0.11
33.47	0.45	0.55	4.90	0.17	0.14	33.63	0.37	0.63	4.87	0.16	0.15
33.79	0.32	0.68	4.85	0.16	0.16	33.96	0.29	0.71	4.82	0.17	0.18
34.12	0.27	0.73	4.80	0.16	0.17	34.29	0.28	0.72	4.77	0.17	0.18
34.45	0.29	0.71	4.75	0.16	0.16	34.61	0.30	0.70	4.73	0.16	0.16
34.78	0.31	0.69	4.70	0.17	0.17	34.94	0.33	0.67	4.68	0.16	0.15
35.11	0.34	0.66	4.65	0.17	0.16	35.27	0.32	0.68	4.62	0.16	0.15
35.43	0.29	0.71	4.60	0.16	0.16	35.60	0.27	0.73	4.57	0.17	0.17
35.76	2.00	0.00	4.55	0.16	0.00	35.93	2.00	0.00	4.52	0.17	0.00
36.09	2.00	0.00	4.50	0.16	0.00	36.26	2.00	0.00	4.47	0.17	0.00
36.42	2.00	0.00	4.45	0.16	0.00	36.58	2.00	0.00	4.43	0.16	0.00
36.75	2.00	0.00	4.40	0.17	0.00	36.91	2.00	0.00	4.37	0.16	0.00
37.08	0.37	0.63	4.35	0.17	0.14	37.24	0.37	0.63	4.32	0.16	0.13
37.40	0.36	0.64	4.30	0.16	0.13	37.57	0.35	0.65	4.27	0.17	0.14
37.73	0.34	0.66	4.25	0.16	0.14	37.90	0.32	0.68	4.22	0.17	0.15
38.06	0.30	0.70	4.20	0.16	0.14	38.22	0.28	0.72	4.18	0.16	0.15
38.39	0.28	0.72	4.15	0.17	0.16	38.55	0.27	0.73	4.12	0.16	0.15
38.72	2.00	0.00	4.10	0.17	0.00	38.88	2.00	0.00	4.07	0.16	0.00
39.04	2.00	0.00	4.05	0.16	0.00	39.21	2.00	0.00	4.02	0.17	0.00
39.37	2.00	0.00	4.00	0.16	0.00	39.54	2.00	0.00	3.97	0.17	0.00
39.70	2.00	0.00	3.95	0.16	0.00	39.86	2.00	0.00	3.93	0.16	0.00
40.03	2.00	0.00	3.90	0.17	0.00	40.19	2.00	0.00	3.88	0.16	0.00
40.36	2.00	0.00	3.85	0.17	0.00	40.52	2.00	0.00	3.82	0.16	0.00
40.68	2.00	0.00	3.80	0.16	0.00	40.85	2.00	0.00	3.77	0.17	0.00
41.01	2.00	0.00	3.75	0.16	0.00	41.18	2.00	0.00	3.72	0.17	0.00
41.34	2.00	0.00	3.70	0.16	0.00	41.50	2.00	0.00	3.68	0.16	0.00
41.67	2.00	0.00	3.65	0.17	0.00	41.83	2.00	0.00	3.63	0.16	0.00
42.00	2.00	0.00	3.60	0.17	0.00	42.16	2.00	0.00	3.57	0.16	0.00
42.32	2.00	0.00	3.55	0.16	0.00	42.49	2.00	0.00	3.52	0.17	0.00
42.65	2.00	0.00	3.50	0.16	0.00	42.82	2.00	0.00	3.47	0.17	0.00
42.98	0.28	0.72	3.45	0.16	0.12	43.15	0.29	0.71	3.42	0.17	0.13
43.31	2.00	0.00	3.40	0.16	0.00	43.47	2.00	0.00	3.38	0.16	0.00
43.64	2.00	0.00	3.35	0.17	0.00	43.80	2.00	0.00	3.32	0.16	0.00
43.97	2.00	0.00	3.30	0.17	0.00	44.13	2.00	0.00	3.27	0.16	0.00
44.29	2.00	0.00	3.25	0.16	0.00	44.46	2.00	0.00	3.22	0.17	0.00
44.62	2.00	0.00	3.20	0.16	0.00	44.79	2.00	0.00	3.17	0.17	0.00
44.95	2.00	0.00	3.15	0.16	0.00	45.11	2.00	0.00	3.13	0.16	0.00
45.28	2.00	0.00	3.10	0.17	0.00	45.44	2.00	0.00	3.07	0.16	0.00
45.61	2.00	0.00	3.05	0.17	0.00	45.77	2.00	0.00	3.02	0.16	0.00
45.93	2.00	0.00	3.00	0.16	0.00	46.10	2.00	0.00	2.97	0.17	0.00
46.26	2.00	0.00	2.95	0.16	0.00	46.43	0.71	0.29	2.92	0.17	0.04
46.59	0.73	0.27	2.90	0.16	0.04	46.75	0.70	0.30	2.88	0.16	0.04
46.92	0.68	0.32	2.85	0.17	0.05	47.08	0.65	0.35	2.83	0.16	0.05
47.25	0.63	0.37	2.80	0.17	0.05	47.41	0.60	0.40	2.77	0.16	0.05

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI
47.57	0.59	0.41	2.75	0.16	0.06	47.74	0.59	0.41	2.72	0.17	0.06
47.90	0.60	0.40	2.70	0.16	0.05	48.07	0.61	0.39	2.67	0.17	0.05
48.23	0.62	0.38	2.65	0.16	0.05	48.39	0.61	0.39	2.63	0.16	0.05
48.56	0.59	0.41	2.60	0.17	0.06	48.72	0.57	0.43	2.58	0.16	0.05
48.89	0.55	0.45	2.55	0.17	0.06	49.05	0.53	0.47	2.52	0.16	0.06
49.22	0.52	0.48	2.50	0.17	0.06	49.38	0.54	0.46	2.47	0.16	0.06
49.54	0.56	0.44	2.45	0.16	0.05	49.71	0.58	0.42	2.42	0.17	0.05
49.87	0.57	0.43	2.40	0.16	0.05	50.04	2.00	0.00	2.37	0.17	0.00
50.20	2.00	0.00	2.35	0.16	0.00	50.36	2.00	0.00	2.33	0.16	0.00
50.53	2.00	0.00	2.30	0.17	0.00	50.69	2.00	0.00	2.27	0.16	0.00
50.86	2.00	0.00	2.25	0.17	0.00	51.02	2.00	0.00	2.22	0.16	0.00
51.18	2.00	0.00	2.20	0.16	0.00	51.35	2.00	0.00	2.17	0.17	0.00
51.51	2.00	0.00	2.15	0.16	0.00	51.68	2.00	0.00	2.12	0.17	0.00
51.84	2.00	0.00	2.10	0.16	0.00	52.00	2.00	0.00	2.08	0.16	0.00
52.17	2.00	0.00	2.05	0.17	0.00	52.33	2.00	0.00	2.02	0.16	0.00
52.50	2.00	0.00	2.00	0.17	0.00	52.66	2.00	0.00	1.97	0.16	0.00
52.82	2.00	0.00	1.95	0.16	0.00	52.99	2.00	0.00	1.92	0.17	0.00
53.15	2.00	0.00	1.90	0.16	0.00	53.32	2.00	0.00	1.87	0.17	0.00
53.48	2.00	0.00	1.85	0.16	0.00	53.64	2.00	0.00	1.83	0.16	0.00
53.81	2.00	0.00	1.80	0.17	0.00	53.97	2.00	0.00	1.77	0.16	0.00
54.14	2.00	0.00	1.75	0.17	0.00	54.30	2.00	0.00	1.72	0.16	0.00
54.46	0.42	0.58	1.70	0.16	0.05	54.63	0.45	0.55	1.67	0.17	0.05
54.79	0.49	0.51	1.65	0.16	0.04	54.96	2.00	0.00	1.62	0.17	0.00
55.12	2.00	0.00	1.60	0.16	0.00	55.28	2.00	0.00	1.58	0.16	0.00
55.45	2.00	0.00	1.55	0.17	0.00	55.61	2.00	0.00	1.53	0.16	0.00
55.78	2.00	0.00	1.50	0.17	0.00	55.94	2.00	0.00	1.47	0.16	0.00
56.11	2.00	0.00	1.45	0.17	0.00	56.27	2.00	0.00	1.42	0.16	0.00
56.43	2.00	0.00	1.40	0.16	0.00	56.60	2.00	0.00	1.37	0.17	0.00
56.76	2.00	0.00	1.35	0.16	0.00	56.93	2.00	0.00	1.32	0.17	0.00
57.09	2.00	0.00	1.30	0.16	0.00	57.25	2.00	0.00	1.28	0.16	0.00
57.42	2.00	0.00	1.25	0.17	0.00	57.58	2.00	0.00	1.22	0.16	0.00
57.75	2.00	0.00	1.20	0.17	0.00	57.91	2.00	0.00	1.17	0.16	0.00
58.07	2.00	0.00	1.15	0.16	0.00	58.24	2.00	0.00	1.12	0.17	0.00
58.40	2.00	0.00	1.10	0.16	0.00	58.57	2.00	0.00	1.07	0.17	0.00
58.73	2.00	0.00	1.05	0.16	0.00	58.89	2.00	0.00	1.03	0.16	0.00
59.06	0.41	0.59	1.00	0.17	0.03	59.22	0.47	0.53	0.97	0.16	0.02
59.39	0.55	0.45	0.95	0.17	0.02	59.55	0.57	0.43	0.92	0.16	0.02
59.71	0.58	0.42	0.90	0.16	0.02	59.88	2.00	0.00	0.87	0.17	0.00
60.04	2.00	0.00	0.85	0.16	0.00	60.21	2.00	0.00	0.82	0.17	0.00
60.37	2.00	0.00	0.80	0.16	0.00	60.53	2.00	0.00	0.78	0.16	0.00
60.70	2.00	0.00	0.75	0.17	0.00	60.86	2.00	0.00	0.72	0.16	0.00
61.03	2.00	0.00	0.70	0.17	0.00	61.19	2.00	0.00	0.67	0.16	0.00
61.35	2.00	0.00	0.65	0.16	0.00	61.52	2.00	0.00	0.62	0.17	0.00
61.68	2.00	0.00	0.60	0.16	0.00	61.85	2.00	0.00	0.57	0.17	0.00
62.01	2.00	0.00	0.55	0.16	0.00	62.17	2.00	0.00	0.53	0.16	0.00
62.34	2.00	0.00	0.50	0.17	0.00	62.50	2.00	0.00	0.48	0.16	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI	Depth (ft)	FS	F_L	w_z	d_z	LPI

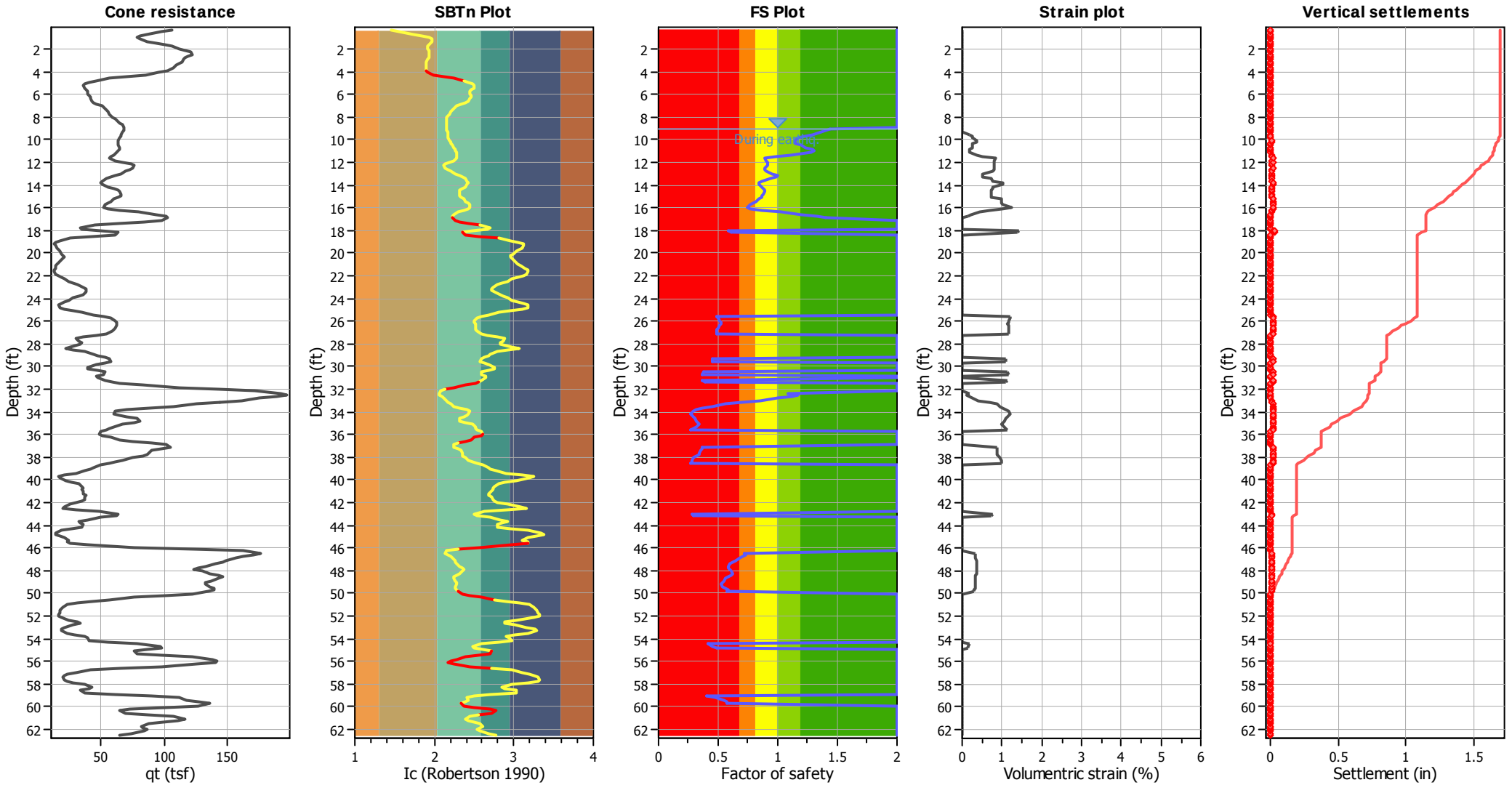
Overall liquefaction potential: 9.74

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (ft)
LPI: Liquefaction potential index value for test point

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 due to soil liquefaction ::

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
9.02	154.70	1.44	0.00	0.85	0.00	9.19	153.52	1.40	0.00	0.84	0.00
9.35	152.39	1.36	0.00	0.84	0.00	9.51	149.64	1.30	0.18	0.84	0.00
9.68	146.89	1.23	0.26	0.84	0.01	9.84	144.23	1.17	0.26	0.83	0.01
10.01	143.22	1.14	0.36	0.83	0.01	10.17	143.97	1.15	0.36	0.83	0.01
10.34	144.73	1.15	0.26	0.82	0.01	10.50	147.17	1.19	0.25	0.82	0.00
10.66	149.55	1.23	0.25	0.82	0.00	10.83	153.43	1.30	0.17	0.82	0.00
10.99	154.21	1.30	0.17	0.81	0.00	11.16	153.48	1.28	0.17	0.81	0.00
11.32	144.91	1.11	0.35	0.81	0.01	11.48	137.85	0.98	0.53	0.81	0.01
11.65	132.15	0.89	0.83	0.80	0.02	11.81	133.01	0.90	0.82	0.80	0.02
11.98	134.30	0.91	0.81	0.80	0.02	12.14	134.82	0.92	0.80	0.79	0.02
12.30	134.74	0.91	0.80	0.79	0.02	12.47	133.78	0.89	0.80	0.79	0.02
12.63	133.86	0.89	0.80	0.79	0.02	12.80	135.51	0.91	0.78	0.78	0.02
12.96	139.12	0.96	0.51	0.78	0.01	13.12	141.84	1.00	0.50	0.78	0.01
13.29	141.84	0.99	0.49	0.77	0.01	13.45	138.91	0.94	0.74	0.77	0.01
13.62	134.21	0.87	0.78	0.77	0.02	13.78	132.46	0.84	1.03	0.77	0.02
13.94	133.21	0.84	1.02	0.76	0.02	14.11	134.74	0.86	0.77	0.76	0.02
14.27	136.38	0.88	0.75	0.76	0.01	14.44	136.76	0.88	0.75	0.76	0.02
14.60	137.46	0.89	0.74	0.75	0.01	14.76	136.83	0.88	0.74	0.75	0.01
14.93	136.30	0.87	0.74	0.75	0.02	15.09	136.03	0.86	0.74	0.74	0.01
15.26	134.50	0.84	0.98	0.74	0.02	15.42	133.14	0.81	0.99	0.74	0.02
15.58	131.72	0.79	1.00	0.74	0.02	15.75	130.20	0.77	1.01	0.73	0.02
15.91	128.37	0.74	1.26	0.73	0.02	16.08	130.22	0.77	1.01	0.73	0.02
16.24	137.71	0.86	0.71	0.72	0.01	16.40	148.48	1.02	0.44	0.72	0.01
16.57	158.39	1.19	0.21	0.72	0.00	16.73	165.71	1.33	0.14	0.72	0.00
16.90	169.14	1.40	0.00	0.71	0.00	17.06	168.10	2.00	0.00	0.71	0.00
17.23	158.97	2.00	0.00	0.71	0.00	17.39	144.54	2.00	0.00	0.71	0.00
17.55	129.27	2.00	0.00	0.70	0.00	17.72	119.43	2.00	0.00	0.70	0.00
17.88	115.37	2.00	0.00	0.70	0.00	18.05	116.28	0.59	1.43	0.69	0.03
18.21	119.12	0.61	1.40	0.69	0.03	18.37	120.36	2.00	0.00	0.69	0.00
18.54	113.93	2.00	0.00	0.69	0.00	18.70	103.36	2.00	0.00	0.68	0.00
18.87	90.10	2.00	0.00	0.68	0.00	19.03	83.94	2.00	0.00	0.68	0.00
19.19	85.37	2.00	0.00	0.67	0.00	19.36	88.93	2.00	0.00	0.67	0.00
19.52	92.43	2.00	0.00	0.67	0.00	19.69	93.99	2.00	0.00	0.67	0.00
19.85	93.74	2.00	0.00	0.66	0.00	20.01	95.11	2.00	0.00	0.66	0.00
20.18	96.34	2.00	0.00	0.66	0.00	20.34	97.66	2.00	0.00	0.66	0.00
20.51	95.78	2.00	0.00	0.65	0.00	20.67	92.15	2.00	0.00	0.65	0.00
20.83	86.57	2.00	0.00	0.65	0.00	21.00	82.58	2.00	0.00	0.64	0.00
21.16	80.28	2.00	0.00	0.64	0.00	21.33	79.76	2.00	0.00	0.64	0.00
21.49	81.01	2.00	0.00	0.64	0.00	21.65	82.58	2.00	0.00	0.63	0.00
21.82	86.01	2.00	0.00	0.63	0.00	21.98	89.54	2.00	0.00	0.63	0.00
22.15	94.34	2.00	0.00	0.62	0.00	22.31	97.11	2.00	0.00	0.62	0.00
22.47	99.62	2.00	0.00	0.62	0.00	22.64	101.86	2.00	0.00	0.62	0.00
22.80	105.14	2.00	0.00	0.61	0.00	22.97	106.83	2.00	0.00	0.61	0.00
23.13	108.73	2.00	0.00	0.61	0.00	23.30	112.25	2.00	0.00	0.61	0.00
23.46	117.25	2.00	0.00	0.60	0.00	23.62	121.10	2.00	0.00	0.60	0.00
23.79	116.36	2.00	0.00	0.60	0.00	23.95	110.10	2.00	0.00	0.59	0.00
24.12	102.13	2.00	0.00	0.59	0.00	24.28	97.79	2.00	0.00	0.59	0.00
24.44	92.97	2.00	0.00	0.59	0.00	24.61	90.85	2.00	0.00	0.58	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
24.77	93.45	2.00	0.00	0.58	0.00	24.94	100.53	2.00	0.00	0.58	0.00
25.10	106.59	2.00	0.00	0.57	0.00	25.26	110.65	2.00	0.00	0.57	0.00
25.43	111.18	2.00	0.00	0.57	0.00	25.59	110.57	0.49	1.22	0.57	0.02
25.76	111.56	0.50	1.20	0.56	0.02	25.92	113.03	0.51	1.18	0.56	0.02
26.08	114.82	0.52	1.16	0.56	0.02	26.25	115.61	0.53	1.15	0.56	0.02
26.41	114.35	0.52	1.16	0.55	0.02	26.58	113.12	0.50	1.16	0.55	0.02
26.74	111.89	0.49	1.17	0.55	0.02	26.90	111.84	0.49	1.16	0.54	0.02
27.07	111.21	0.49	1.16	0.54	0.02	27.23	105.55	2.00	0.00	0.54	0.00
27.40	100.78	2.00	0.00	0.54	0.00	27.56	97.34	2.00	0.00	0.53	0.00
27.72	100.63	2.00	0.00	0.53	0.00	27.89	100.25	2.00	0.00	0.53	0.00
28.05	96.46	2.00	0.00	0.52	0.00	28.22	91.40	2.00	0.00	0.52	0.00
28.38	89.88	2.00	0.00	0.52	0.00	28.54	92.17	2.00	0.00	0.52	0.00
28.71	96.49	2.00	0.00	0.51	0.00	28.87	101.28	2.00	0.00	0.51	0.00
29.04	106.18	2.00	0.00	0.51	0.00	29.20	108.48	2.00	0.00	0.51	0.00
29.36	108.69	0.45	1.10	0.50	0.02	29.53	108.30	0.45	1.09	0.50	0.02
29.69	105.52	2.00	0.00	0.50	0.00	29.86	99.70	2.00	0.00	0.49	0.00
30.02	94.50	2.00	0.00	0.49	0.00	30.19	94.26	2.00	0.00	0.49	0.00
30.35	98.93	2.00	0.00	0.49	0.00	30.51	97.91	0.38	1.15	0.48	0.02
30.68	95.51	0.36	1.16	0.48	0.02	30.84	91.48	2.00	0.00	0.48	0.00
31.01	93.45	2.00	0.00	0.47	0.00	31.17	96.07	0.37	1.14	0.47	0.02
31.33	99.59	0.39	1.10	0.47	0.02	31.50	102.88	2.00	0.00	0.47	0.00
31.66	107.53	2.00	0.00	0.46	0.00	31.83	117.59	2.00	0.00	0.46	0.00
31.99	133.05	2.00	0.00	0.46	0.00	32.15	150.61	2.00	0.00	0.46	0.00
32.32	163.63	1.09	0.18	0.45	0.00	32.48	168.56	1.17	0.13	0.45	0.00
32.65	165.52	1.12	0.18	0.45	0.00	32.81	158.18	1.00	0.26	0.44	0.00
32.97	148.19	0.85	0.39	0.44	0.01	33.14	135.87	0.70	0.70	0.44	0.01
33.30	122.32	0.56	0.86	0.44	0.02	33.47	109.15	0.45	0.94	0.43	0.02
33.63	97.94	0.37	1.02	0.43	0.02	33.79	87.68	0.32	1.11	0.43	0.02
33.96	81.20	0.29	1.18	0.42	0.02	34.12	77.60	0.27	1.21	0.42	0.02
34.29	79.71	0.28	1.18	0.42	0.02	34.45	81.83	0.29	1.15	0.42	0.02
34.61	84.15	0.30	1.11	0.41	0.02	34.78	87.09	0.31	1.07	0.41	0.02
34.94	90.69	0.33	1.03	0.41	0.02	35.11	92.80	0.34	1.01	0.40	0.02
35.27	87.92	0.32	1.04	0.40	0.02	35.43	82.55	0.29	1.09	0.40	0.02
35.60	78.04	0.27	1.14	0.40	0.02	35.76	79.46	2.00	0.00	0.39	0.00
35.93	79.37	2.00	0.00	0.39	0.00	36.09	79.11	2.00	0.00	0.39	0.00
36.26	79.63	2.00	0.00	0.39	0.00	36.42	82.50	2.00	0.00	0.38	0.00
36.58	86.35	2.00	0.00	0.38	0.00	36.75	90.64	2.00	0.00	0.38	0.00
36.91	95.22	2.00	0.00	0.37	0.00	37.08	98.60	0.37	0.88	0.37	0.02
37.24	97.61	0.37	0.88	0.37	0.02	37.40	96.15	0.36	0.88	0.37	0.02
37.57	94.24	0.35	0.89	0.36	0.02	37.73	93.29	0.34	0.89	0.36	0.02
37.90	89.49	0.32	0.92	0.36	0.02	38.06	84.52	0.30	0.95	0.35	0.02
38.22	80.42	0.28	0.98	0.35	0.02	38.39	79.45	0.28	0.99	0.35	0.02
38.55	77.46	0.27	1.00	0.35	0.02	38.72	76.68	2.00	0.00	0.34	0.00
38.88	74.68	2.00	0.00	0.34	0.00	39.04	73.57	2.00	0.00	0.34	0.00
39.21	71.25	2.00	0.00	0.34	0.00	39.37	67.27	2.00	0.00	0.33	0.00
39.54	64.01	2.00	0.00	0.33	0.00	39.70	61.41	2.00	0.00	0.33	0.00
39.86	60.50	2.00	0.00	0.32	0.00	40.03	59.88	2.00	0.00	0.32	0.00
40.19	60.20	2.00	0.00	0.32	0.00	40.36	63.18	2.00	0.00	0.32	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
40.52	63.12	2.00	0.00	0.31	0.00	40.68	64.43	2.00	0.00	0.31	0.00
40.85	63.02	2.00	0.00	0.31	0.00	41.01	62.97	2.00	0.00	0.30	0.00
41.18	60.06	2.00	0.00	0.30	0.00	41.34	61.42	2.00	0.00	0.30	0.00
41.50	64.17	2.00	0.00	0.30	0.00	41.67	65.49	2.00	0.00	0.29	0.00
41.83	62.79	2.00	0.00	0.29	0.00	42.00	58.48	2.00	0.00	0.29	0.00
42.16	56.61	2.00	0.00	0.29	0.00	42.32	57.67	2.00	0.00	0.28	0.00
42.49	61.43	2.00	0.00	0.28	0.00	42.65	67.48	2.00	0.00	0.28	0.00
42.82	73.30	2.00	0.00	0.27	0.00	42.98	79.08	0.28	0.77	0.27	0.01
43.15	83.16	0.29	0.73	0.27	0.01	43.31	83.82	2.00	0.00	0.27	0.00
43.47	78.84	2.00	0.00	0.26	0.00	43.64	71.90	2.00	0.00	0.26	0.00
43.80	68.62	2.00	0.00	0.26	0.00	43.97	67.41	2.00	0.00	0.25	0.00
44.13	66.11	2.00	0.00	0.25	0.00	44.29	61.62	2.00	0.00	0.25	0.00
44.46	56.59	2.00	0.00	0.25	0.00	44.62	53.26	2.00	0.00	0.24	0.00
44.79	56.90	2.00	0.00	0.24	0.00	44.95	63.33	2.00	0.00	0.24	0.00
45.11	68.18	2.00	0.00	0.24	0.00	45.28	69.80	2.00	0.00	0.23	0.00
45.44	74.87	2.00	0.00	0.23	0.00	45.61	81.87	2.00	0.00	0.23	0.00
45.77	93.36	2.00	0.00	0.22	0.00	45.93	102.90	2.00	0.00	0.22	0.00
46.10	115.08	2.00	0.00	0.22	0.00	46.26	129.35	2.00	0.00	0.22	0.00
46.43	137.09	0.71	0.33	0.21	0.01	46.59	138.27	0.73	0.33	0.21	0.01
46.75	135.91	0.70	0.33	0.21	0.01	46.92	134.37	0.68	0.33	0.20	0.01
47.08	130.95	0.65	0.38	0.20	0.01	47.25	128.81	0.63	0.38	0.20	0.01
47.41	126.29	0.60	0.38	0.20	0.01	47.57	124.85	0.59	0.38	0.19	0.01
47.74	124.90	0.59	0.37	0.19	0.01	47.90	125.91	0.60	0.36	0.19	0.01
48.07	127.33	0.61	0.36	0.19	0.01	48.23	127.60	0.62	0.35	0.18	0.01
48.39	126.44	0.61	0.35	0.18	0.01	48.56	124.52	0.59	0.35	0.18	0.01
48.72	122.31	0.57	0.35	0.17	0.01	48.89	120.27	0.55	0.34	0.17	0.01
49.05	118.43	0.53	0.34	0.17	0.01	49.22	117.15	0.52	0.34	0.17	0.01
49.38	118.65	0.54	0.33	0.16	0.01	49.54	121.31	0.56	0.32	0.16	0.01
49.71	123.50	0.58	0.31	0.16	0.01	49.87	122.29	0.57	0.31	0.15	0.01
50.04	118.28	2.00	0.00	0.15	0.00	50.20	111.10	2.00	0.00	0.15	0.00
50.36	102.96	2.00	0.00	0.15	0.00	50.53	94.88	2.00	0.00	0.14	0.00
50.69	86.81	2.00	0.00	0.14	0.00	50.86	79.21	2.00	0.00	0.14	0.00
51.02	70.31	2.00	0.00	0.14	0.00	51.18	62.94	2.00	0.00	0.13	0.00
51.35	59.19	2.00	0.00	0.13	0.00	51.51	57.68	2.00	0.00	0.13	0.00
51.68	57.30	2.00	0.00	0.12	0.00	51.84	56.96	2.00	0.00	0.12	0.00
52.00	56.97	2.00	0.00	0.12	0.00	52.17	56.66	2.00	0.00	0.12	0.00
52.33	57.97	2.00	0.00	0.11	0.00	52.50	59.70	2.00	0.00	0.11	0.00
52.66	62.21	2.00	0.00	0.11	0.00	52.82	61.73	2.00	0.00	0.10	0.00
52.99	58.55	2.00	0.00	0.10	0.00	53.15	57.55	2.00	0.00	0.10	0.00
53.32	60.97	2.00	0.00	0.10	0.00	53.48	64.34	2.00	0.00	0.09	0.00
53.64	66.20	2.00	0.00	0.09	0.00	53.81	70.78	2.00	0.00	0.09	0.00
53.97	79.27	2.00	0.00	0.09	0.00	54.14	87.75	2.00	0.00	0.08	0.00
54.30	95.69	2.00	0.00	0.08	0.00	54.46	101.30	0.42	0.18	0.08	0.00
54.63	106.49	0.45	0.16	0.07	0.00	54.79	110.52	0.49	0.15	0.07	0.00
54.96	114.10	2.00	0.00	0.07	0.00	55.12	116.86	2.00	0.00	0.07	0.00
55.28	118.01	2.00	0.00	0.06	0.00	55.45	118.72	2.00	0.00	0.06	0.00
55.61	117.98	2.00	0.00	0.06	0.00	55.78	114.37	2.00	0.00	0.05	0.00
55.94	108.05	2.00	0.00	0.05	0.00	56.11	102.84	2.00	0.00	0.05	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
56.27	100.76	2.00	0.00	0.05	0.00	56.43	99.33	2.00	0.00	0.04	0.00
56.60	96.22	2.00	0.00	0.04	0.00	56.76	85.79	2.00	0.00	0.04	0.00
56.93	74.10	2.00	0.00	0.04	0.00	57.09	65.31	2.00	0.00	0.03	0.00
57.25	61.42	2.00	0.00	0.03	0.00	57.42	63.00	2.00	0.00	0.03	0.00
57.58	67.74	2.00	0.00	0.02	0.00	57.75	73.65	2.00	0.00	0.02	0.00
57.91	76.06	2.00	0.00	0.02	0.00	58.07	76.77	2.00	0.00	0.02	0.00
58.24	72.72	2.00	0.00	0.01	0.00	58.40	74.34	2.00	0.00	0.01	0.00
58.57	73.84	2.00	0.00	0.01	0.00	58.73	80.95	2.00	0.00	0.00	0.00
58.89	87.65	2.00	0.00	0.00	0.00	59.06	97.67	0.41	0.00	0.00	0.00
59.22	107.28	0.47	0.00	0.00	0.00	59.39	116.04	0.55	0.00	0.00	0.00
59.55	118.60	0.57	0.00	0.00	0.00	59.71	119.03	0.58	0.00	0.00	0.00
59.88	114.34	2.00	0.00	0.00	0.00	60.04	108.75	2.00	0.00	0.00	0.00
60.21	103.86	2.00	0.00	0.00	0.00	60.37	99.59	2.00	0.00	0.00	0.00
60.53	100.31	2.00	0.00	0.00	0.00	60.70	100.58	2.00	0.00	0.00	0.00
60.86	105.14	2.00	0.00	0.00	0.00	61.03	107.84	2.00	0.00	0.00	0.00
61.19	106.34	2.00	0.00	0.00	0.00	61.35	104.90	2.00	0.00	0.00	0.00
61.52	101.63	2.00	0.00	0.00	0.00	61.68	100.99	2.00	0.00	0.00	0.00
61.85	96.67	2.00	0.00	0.00	0.00	62.01	96.54	2.00	0.00	0.00	0.00
62.17	97.96	2.00	0.00	0.00	0.00	62.34	99.48	2.00	0.00	0.00	0.00
62.50	98.60	2.00	0.00	0.00	0.00						

Total estimated settlement: 1.70

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

:: Strength loss calculation (Robertson (2009) ::

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.33	106.13	170.49	1.00	170.49	1.45	N/A	N/A
0.49	98.20	157.73	1.00	157.73	1.56	N/A	N/A
0.66	86.80	139.40	1.06	147.14	1.73	N/A	N/A
0.82	81.17	130.33	1.14	148.46	1.84	N/A	N/A
0.98	78.03	125.28	1.23	153.78	1.94	N/A	N/A
1.15	80.77	129.66	1.26	163.63	1.97	N/A	N/A
1.31	86.03	138.10	1.26	174.22	1.97	N/A	N/A
1.48	93.07	149.38	1.24	185.03	1.95	N/A	N/A
1.64	100.13	160.72	1.22	195.86	1.93	N/A	N/A
1.80	106.60	171.10	1.20	206.10	1.92	N/A	N/A
1.97	111.33	178.68	1.21	216.57	1.92	N/A	N/A
2.13	116.20	186.48	1.22	227.01	1.93	N/A	N/A
2.30	120.40	193.21	1.22	235.72	1.93	N/A	N/A
2.46	121.83	195.50	1.22	238.01	1.93	N/A	N/A
2.62	119.07	191.04	1.22	233.50	1.93	N/A	N/A
2.79	116.50	186.90	1.22	227.25	1.93	N/A	N/A
2.95	114.93	184.37	1.20	221.90	1.92	N/A	N/A
3.12	114.00	182.85	1.19	217.15	1.90	N/A	N/A
3.28	112.00	179.62	1.19	213.24	1.90	N/A	N/A
3.45	109.37	175.37	1.19	208.68	1.90	N/A	N/A
3.61	107.50	172.36	1.19	204.87	1.90	N/A	N/A
3.77	105.07	168.43	1.19	200.47	1.90	N/A	N/A
3.94	102.14	163.70	1.19	194.53	1.90	N/A	N/A
4.10	96.17	154.10	1.21	186.66	1.92	N/A	N/A
4.27	85.40	136.79	1.29	175.91	1.99	N/A	N/A
4.43	70.77	113.26	1.48	167.24	2.11	N/A	N/A
4.59	56.64	90.53	1.80	162.60	2.25	N/A	N/A
4.76	46.37	74.02	2.18	161.25	2.37	N/A	N/A
4.92	41.10	65.54	2.42	158.82	2.43	N/A	N/A
5.09	37.63	59.96	2.64	158.23	2.47	N/A	N/A
5.25	36.20	57.64	2.76	158.97	2.50	N/A	N/A
5.41	36.77	58.53	2.75	160.80	2.50	N/A	N/A
5.58	38.63	61.51	2.60	159.88	2.47	N/A	N/A
5.74	39.63	63.10	2.53	159.43	2.45	N/A	N/A
5.91	39.96	63.62	2.54	161.36	2.45	N/A	N/A
6.07	40.49	64.46	2.59	167.25	2.46	N/A	N/A
6.23	41.30	65.73	2.60	170.91	2.47	N/A	N/A
6.40	42.13	67.05	2.54	170.54	2.45	N/A	N/A
6.56	42.53	67.68	2.46	166.40	2.43	N/A	N/A
6.73	43.96	69.97	2.29	159.92	2.39	N/A	N/A
6.89	46.80	74.50	2.09	155.35	2.34	N/A	N/A
7.05	50.53	80.48	1.90	153.17	2.29	N/A	N/A
7.22	53.56	85.34	1.78	151.55	2.24	N/A	N/A
7.38	55.00	87.63	1.71	150.00	2.22	N/A	N/A
7.55	55.80	88.90	1.67	148.42	2.20	N/A	N/A
7.71	56.70	90.33	1.63	146.92	2.18	N/A	N/A
7.87	57.90	92.24	1.60	147.32	2.17	N/A	N/A
8.04	59.53	94.56	1.56	147.66	2.15	N/A	N/A

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.20	61.46	96.34	1.56	150.53	2.15	N/A	N/A
8.37	63.53	98.17	1.56	153.24	2.15	N/A	N/A
8.53	65.30	99.63	1.56	155.87	2.16	N/A	N/A
8.69	66.83	100.59	1.56	156.71	2.15	N/A	N/A
8.86	67.90	100.70	1.55	155.74	2.15	N/A	N/A
9.02	68.30	99.99	1.55	154.70	2.15	0.83	0.83
9.19	67.93	98.31	1.56	153.52	2.15	0.82	0.82
9.35	67.23	96.32	1.58	152.39	2.16	0.82	0.82
9.51	66.30	93.94	1.59	149.64	2.17	0.82	0.82
9.68	65.43	91.63	1.60	146.89	2.17	0.82	0.82
9.84	64.50	89.36	1.61	144.23	2.18	0.81	0.81
10.01	63.70	87.37	1.64	143.22	2.19	0.81	0.81
10.17	63.23	85.99	1.67	143.97	2.20	0.81	0.81
10.34	63.23	85.13	1.70	144.73	2.21	0.80	0.80
10.50	63.76	85.08	1.73	147.17	2.22	0.80	0.80
10.66	64.26	84.98	1.76	149.55	2.24	0.80	0.80
10.83	64.43	84.50	1.82	153.43	2.26	0.80	0.80
10.99	63.96	83.15	1.85	154.21	2.27	0.80	0.80
11.16	62.46	80.47	1.91	153.48	2.29	0.80	0.80
11.32	59.90	76.27	1.90	144.91	2.28	0.79	0.79
11.48	57.33	72.23	1.91	137.85	2.29	0.78	0.78
11.65	56.70	70.52	1.87	132.15	2.28	0.78	0.78
11.81	61.03	74.84	1.78	133.01	2.24	0.79	0.79
11.98	67.59	81.55	1.65	134.30	2.19	0.80	0.80
12.14	74.06	87.99	1.53	134.82	2.14	0.81	0.81
12.30	76.39	89.78	1.50	134.74	2.12	0.81	0.81
12.47	75.53	88.01	1.52	133.78	2.13	0.81	0.81
12.63	72.73	84.28	1.59	133.86	2.17	0.80	0.80
12.80	69.19	79.80	1.70	135.51	2.21	0.80	0.80
12.96	65.43	75.17	1.85	139.12	2.27	0.79	0.79
13.12	61.33	70.13	2.02	141.84	2.32	0.78	0.78
13.29	57.69	65.52	2.16	141.84	2.36	0.77	0.77
13.45	54.29	61.18	2.27	138.91	2.39	0.76	0.76
13.62	51.56	57.55	2.33	134.21	2.40	0.75	0.75
13.78	50.09	55.42	2.39	132.46	2.42	0.75	0.75
13.94	51.29	56.22	2.37	133.21	2.41	0.75	0.75
14.11	55.46	60.13	2.24	134.74	2.38	0.76	0.76
14.27	59.83	64.22	2.12	136.38	2.35	0.77	0.77
14.44	63.39	67.35	2.03	136.76	2.32	0.77	0.77
14.60	65.02	68.49	2.01	137.46	2.32	0.78	0.78
14.76	65.89	68.80	1.99	136.83	2.31	0.78	0.78
14.93	65.43	67.73	2.01	136.30	2.32	0.77	0.77
15.09	63.23	64.95	2.09	136.03	2.34	0.77	0.77
15.26	60.33	61.46	2.19	134.50	2.37	0.76	0.76
15.42	57.32	57.93	2.30	133.14	2.40	0.75	0.75
15.58	55.02	55.15	2.39	131.72	2.42	0.75	0.75
15.75	53.16	52.81	2.47	130.20	2.44	0.74	0.74
15.91	52.66	51.88	2.47	128.37	2.44	0.74	0.74

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
16.08	55.23	53.96	2.41	130.22	2.42	0.74	0.74
16.24	64.66	62.76	2.19	137.71	2.37	0.76	0.76
16.40	79.43	76.62	1.94	148.48	2.30	0.79	0.79
16.57	93.93	89.98	1.76	158.39	2.24	0.81	0.81
16.73	101.53	96.61	1.72	165.71	2.22	0.82	0.82
16.90	103.16	97.43	1.74	169.14	2.23	0.82	0.82
17.06	98.46	92.28	1.82	168.10	2.26	0.82	0.82
17.23	84.83	78.74	2.02	158.97	2.32	0.79	0.79
17.39	64.73	59.37	2.43	144.54	2.43	0.76	0.76
17.55	45.29	40.88	3.16	129.27	2.57	0.71	0.71
17.72	33.86	30.00	3.98	119.43	2.70	2.14	2.14
17.88	34.84	30.67	3.76	115.37	2.67	2.18	2.18
18.05	49.45	43.73	2.66	116.28	2.48	0.72	0.72
18.21	63.75	56.43	2.11	119.12	2.35	0.75	0.75
18.37	61.23	53.74	2.24	120.36	2.38	0.74	0.74
18.54	43.52	37.44	3.04	113.93	2.55	0.70	0.70
18.70	25.72	21.37	4.84	103.36	2.81	1.52	1.52
18.87	17.68	14.17	6.36	90.10	2.96	1.01	1.01
19.03	14.61	11.44	7.34	83.94	3.05	0.82	0.82
19.19	13.54	10.44	8.18	85.37	3.12	0.75	0.75
19.36	14.21	10.91	8.15	88.93	3.12	0.78	0.78
19.52	15.31	11.74	7.87	92.43	3.10	0.84	0.84
19.69	16.35	12.49	7.53	93.99	3.07	0.89	0.89
19.85	17.24	13.12	7.14	93.74	3.04	0.94	0.94
20.01	19.01	14.45	6.58	95.11	2.99	1.03	1.03
20.18	20.47	15.51	6.21	96.34	2.95	1.11	1.11
20.34	20.96	15.78	6.19	97.66	2.95	1.13	1.13
20.51	19.69	14.63	6.55	95.78	2.98	1.05	1.05
20.67	18.19	13.34	6.91	92.15	3.01	0.95	0.95
20.83	16.89	12.21	7.09	86.57	3.03	0.87	0.87
21.00	16.02	11.44	7.22	82.58	3.04	0.82	0.82
21.16	14.69	10.33	7.77	80.28	3.09	0.74	0.74
21.33	13.77	9.54	8.36	79.76	3.13	0.68	0.68
21.49	13.16	9.00	9.00	81.01	3.18	0.64	0.64
21.65	13.44	9.15	9.03	82.58	3.18	0.65	0.65
21.82	14.37	9.77	8.80	86.01	3.17	0.70	0.70
21.98	16.21	11.06	8.09	89.54	3.11	0.79	0.79
22.15	18.75	12.86	7.34	94.34	3.05	0.92	0.92
22.31	21.62	14.87	6.53	97.11	2.98	1.06	1.06
22.47	24.45	16.87	5.90	99.62	2.92	1.20	1.20
22.64	27.86	19.35	5.26	101.86	2.85	1.37	1.37
22.80	31.95	22.33	4.71	105.14	2.79	1.57	1.57
22.97	35.54	24.91	4.29	106.83	2.74	1.74	1.74
23.13	37.92	26.55	4.10	108.73	2.71	1.85	1.85
23.30	38.81	26.98	4.16	112.25	2.72	1.88	1.88
23.46	38.27	26.30	4.46	117.25	2.76	1.84	1.84
23.62	35.97	24.31	4.98	121.10	2.82	1.71	1.71
23.79	32.44	21.55	5.40	116.36	2.87	1.52	1.52

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
23.95	28.44	18.52	5.95	110.10	2.92	1.32	1.32
24.12	24.61	15.72	6.50	102.13	2.98	1.12	1.12
24.28	21.10	13.24	7.39	97.79	3.06	0.95	0.95
24.44	18.38	11.33	8.21	92.97	3.12	0.81	0.81
24.61	16.94	10.29	8.83	90.85	3.17	0.73	0.73
24.77	17.47	10.57	8.84	93.45	3.17	0.76	0.76
24.94	20.94	12.78	7.87	100.53	3.10	0.91	0.91
25.10	27.68	17.09	6.24	106.59	2.95	1.22	1.22
25.26	35.46	22.46	4.93	110.65	2.82	1.57	1.57
25.43	44.14	28.56	3.89	111.18	2.69	1.96	1.96
25.59	51.59	33.84	3.27	110.57	2.59	0.69	0.69
25.76	57.57	37.98	2.94	111.56	2.53	0.70	0.70
25.92	61.11	40.31	2.80	113.03	2.51	0.71	0.71
26.08	62.38	40.96	2.80	114.82	2.51	0.71	0.71
26.25	62.68	40.90	2.83	115.61	2.51	0.71	0.71
26.41	62.05	40.24	2.84	114.35	2.51	0.71	0.71
26.58	61.05	39.30	2.88	113.12	2.52	0.70	0.70
26.74	60.25	38.54	2.90	111.89	2.53	0.70	0.70
26.90	59.01	37.43	2.99	111.84	2.54	0.70	0.70
27.07	54.58	34.07	3.26	111.21	2.59	0.69	0.69
27.23	46.04	28.05	3.76	105.55	2.67	1.91	1.91
27.40	36.58	21.48	4.69	100.78	2.79	1.49	1.49
27.56	30.51	17.33	5.62	97.34	2.89	1.22	1.22
27.72	33.05	18.84	5.34	100.63	2.86	1.32	1.32
27.89	34.77	19.87	5.05	100.25	2.83	1.39	1.39
28.05	33.53	19.01	5.08	96.46	2.83	1.33	1.33
28.22	25.79	13.99	6.54	91.40	2.98	1.00	1.00
28.38	22.65	12.09	7.44	89.88	3.06	0.86	0.86
28.54	28.45	15.42	5.98	92.17	2.93	1.10	1.10
28.71	36.77	20.65	4.67	96.49	2.79	1.43	1.43
28.87	44.05	25.22	4.02	101.28	2.70	1.72	1.72
29.04	47.84	27.43	3.87	106.18	2.68	1.86	1.86
29.20	52.74	30.46	3.56	108.48	2.64	2.04	2.04
29.36	56.97	33.11	3.28	108.69	2.59	0.68	0.68
29.53	58.04	33.65	3.22	108.30	2.58	0.68	0.68
29.69	53.51	30.55	3.45	105.52	2.62	2.04	2.04
29.86	45.93	25.58	3.90	99.70	2.69	1.73	1.73
30.02	39.43	21.40	4.42	94.50	2.76	1.47	1.47
30.19	39.73	21.47	4.39	94.26	2.75	1.47	1.47
30.35	47.12	25.94	3.81	98.93	2.67	1.75	1.75
30.51	53.07	29.71	3.30	97.91	2.59	0.67	0.67
30.68	52.50	29.27	3.26	95.51	2.59	0.67	0.67
30.84	46.28	25.23	3.63	91.48	2.65	1.69	1.69
31.01	47.90	26.06	3.59	93.45	2.64	1.74	1.74
31.17	52.88	29.02	3.31	96.07	2.60	0.67	0.67
31.33	58.69	32.49	3.06	99.59	2.56	0.68	0.68
31.50	65.29	36.47	2.82	102.88	2.51	0.69	0.69
31.66	83.15	47.92	2.24	107.53	2.38	0.73	0.73

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
31.83	111.82	66.76	1.76	117.59	2.24	0.77	0.77
31.99	142.89	87.33	1.52	133.05	2.14	0.81	0.81
32.15	171.92	106.37	1.42	150.61	2.08	0.84	0.84
32.32	191.69	119.00	1.38	163.63	2.05	0.85	0.85
32.48	196.66	121.43	1.39	168.56	2.06	0.85	0.85
32.65	188.79	115.29	1.44	165.52	2.09	0.85	0.85
32.81	175.29	105.72	1.50	158.18	2.12	0.84	0.84
32.97	160.79	95.96	1.54	148.19	2.15	0.82	0.82
33.14	143.86	84.84	1.60	135.87	2.17	0.80	0.80
33.30	125.09	72.72	1.68	122.32	2.21	0.78	0.78
33.47	106.82	61.07	1.79	109.15	2.25	0.76	0.76
33.63	87.26	48.56	2.02	97.94	2.32	0.73	0.73
33.79	70.12	37.86	2.32	87.68	2.40	0.70	0.70
33.96	60.82	32.15	2.53	81.20	2.45	0.68	0.68
34.12	59.89	31.65	2.45	77.60	2.43	0.68	0.68
34.29	64.22	34.13	2.34	79.71	2.41	0.69	0.69
34.45	70.27	37.73	2.17	81.83	2.36	0.70	0.70
34.61	78.25	42.61	1.97	84.15	2.31	0.71	0.71
34.78	80.40	43.55	2.00	87.09	2.32	0.72	0.72
34.94	75.79	40.06	2.26	90.69	2.39	0.71	0.71
35.11	66.98	34.18	2.72	92.80	2.49	0.69	0.69
35.27	60.58	30.40	2.89	87.92	2.52	0.67	0.67
35.43	57.27	28.57	2.89	82.55	2.52	0.66	0.66
35.60	53.90	26.65	2.93	78.04	2.53	0.66	0.66
35.76	49.59	23.88	3.33	79.46	2.60	1.55	1.55
35.93	49.15	23.50	3.38	79.37	2.61	1.53	1.53
36.09	50.89	24.43	3.24	79.11	2.59	0.65	0.65
36.26	57.92	28.48	2.80	79.63	2.51	0.66	0.66
36.42	64.73	32.29	2.55	82.50	2.46	0.68	0.68
36.58	75.02	38.21	2.26	86.35	2.39	0.70	0.70
36.75	89.68	46.97	1.93	90.64	2.29	0.73	0.73
36.91	101.75	54.18	1.76	95.22	2.24	0.74	0.74
37.08	104.97	55.65	1.77	98.60	2.24	0.75	0.75
37.24	97.82	50.88	1.92	97.61	2.29	0.74	0.74
37.40	89.88	45.85	2.10	96.15	2.34	0.72	0.72
37.57	87.27	44.29	2.13	94.24	2.35	0.72	0.72
37.73	86.99	44.11	2.11	93.29	2.35	0.72	0.72
37.90	82.79	41.74	2.14	89.49	2.36	0.71	0.71
38.06	75.02	37.29	2.27	84.52	2.39	0.70	0.70
38.22	67.18	32.78	2.45	80.42	2.43	0.68	0.68
38.39	61.68	29.48	2.70	79.45	2.49	0.67	0.67
38.55	56.37	26.43	2.93	77.46	2.53	0.66	0.66
38.72	50.14	22.82	3.36	76.68	2.61	1.47	1.47
38.88	44.33	19.60	3.81	74.68	2.67	1.29	1.29
39.04	41.62	18.09	4.07	73.57	2.71	1.20	1.20
39.21	37.21	15.74	4.53	71.25	2.77	1.06	1.06
39.37	29.80	11.91	5.65	67.27	2.89	0.30	0.84
39.54	21.24	8.03	7.97	64.01	3.10	0.26	0.57

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
39.70	16.97	6.19	9.92	61.41	3.25	0.26	0.44
39.86	18.00	6.61	9.15	60.50	3.19	0.26	0.47
40.03	22.14	8.36	7.16	59.88	3.04	0.21	0.60
40.19	27.42	10.78	5.58	60.20	2.89	0.21	0.76
40.36	32.08	13.09	4.83	63.18	2.80	0.25	0.89
40.52	34.68	14.46	4.37	63.12	2.75	0.30	0.97
40.68	35.81	14.97	4.30	64.43	2.74	0.21	1.00
40.85	35.43	14.80	4.26	63.02	2.74	0.29	0.99
41.01	35.86	15.00	4.20	62.97	2.73	0.25	1.00
41.18	36.62	15.54	3.87	60.06	2.68	0.21	1.02
41.34	37.85	16.10	3.81	61.42	2.67	0.21	1.06
41.50	37.51	15.72	4.08	64.17	2.71	0.29	1.04
41.67	36.72	15.19	4.31	65.49	2.74	0.29	1.02
41.83	34.92	14.33	4.38	62.79	2.75	0.25	0.96
42.00	30.72	12.26	4.77	58.48	2.80	0.21	0.84
42.16	25.66	9.68	5.85	56.61	2.92	0.17	0.68
42.32	20.73	7.51	7.68	57.67	3.08	0.21	0.54
42.49	19.57	7.01	8.76	61.43	3.16	0.25	0.50
42.65	30.24	11.53	5.85	67.48	2.92	0.29	0.81
42.82	48.60	20.98	3.49	73.30	2.63	1.35	1.35
42.98	63.66	29.02	2.73	79.08	2.49	0.67	0.67
43.15	62.92	28.23	2.95	83.16	2.53	0.66	0.66
43.31	50.36	21.17	3.96	83.82	2.69	1.39	1.39
43.47	39.13	15.45	5.10	78.84	2.84	1.06	1.06
43.64	32.31	12.21	5.89	71.90	2.92	0.86	0.86
43.80	34.32	13.34	5.14	68.62	2.84	0.28	0.92
43.97	36.22	14.34	4.70	67.41	2.79	0.32	0.97
44.13	35.10	13.78	4.80	66.11	2.80	0.28	0.94
44.29	26.62	9.68	6.37	61.62	2.97	0.24	0.69
44.46	18.55	6.40	8.84	56.59	3.17	0.20	0.46
44.62	14.38	4.71	11.32	53.26	3.34	0.16	0.34
44.79	14.52	4.75	11.98	56.90	3.38	0.20	0.34
44.95	17.62	5.99	10.58	63.33	3.29	0.32	0.43
45.11	21.74	7.62	8.94	68.18	3.18	0.32	0.54
45.28	24.54	8.73	8.00	69.80	3.11	0.32	0.62
45.44	23.99	8.49	8.82	74.87	3.17	0.61	0.61
45.61	25.90	9.23	8.87	81.87	3.17	0.66	0.66
45.77	39.14	14.48	6.45	93.36	2.97	1.03	1.03
45.93	75.92	33.03	3.12	102.90	2.56	0.68	0.68
46.10	123.46	59.43	1.94	115.08	2.30	0.76	0.76
46.26	162.66	82.26	1.57	129.35	2.16	0.80	0.80
46.43	175.52	89.23	1.54	137.09	2.14	0.81	0.81
46.59	170.79	85.61	1.62	138.27	2.18	0.81	0.81
46.75	161.79	79.95	1.70	135.91	2.21	0.80	0.80
46.92	156.49	76.63	1.75	134.37	2.23	0.79	0.79
47.08	148.61	72.01	1.82	130.95	2.26	0.78	0.78
47.25	145.96	70.50	1.83	128.81	2.26	0.78	0.78
47.41	140.21	67.15	1.88	126.29	2.28	0.77	0.77

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
47.57	132.72	62.62	1.99	124.85	2.31	0.76	0.76
47.74	126.35	58.67	2.13	124.90	2.35	0.75	0.75
47.90	123.65	56.84	2.22	125.91	2.38	0.75	0.75
48.07	130.13	60.36	2.11	127.33	2.35	0.76	0.76
48.23	135.67	63.50	2.01	127.60	2.32	0.77	0.77
48.39	142.50	67.68	1.87	126.44	2.27	0.77	0.77
48.56	145.83	69.89	1.78	124.52	2.24	0.78	0.78
48.72	142.96	68.30	1.79	122.31	2.25	0.78	0.78
48.89	137.00	64.76	1.86	120.27	2.27	0.77	0.77
49.05	132.06	61.88	1.91	118.43	2.29	0.76	0.76
49.22	132.33	62.09	1.89	117.15	2.28	0.76	0.76
49.38	135.89	63.92	1.86	118.65	2.27	0.77	0.77
49.54	139.42	65.56	1.85	121.31	2.27	0.77	0.77
49.71	139.45	65.12	1.90	123.50	2.28	0.77	0.77
49.87	134.25	62.02	1.97	122.29	2.31	0.76	0.76
50.04	122.19	55.27	2.14	118.28	2.36	0.75	0.75
50.20	100.69	43.70	2.54	111.10	2.45	0.72	0.72
50.36	76.79	31.36	3.28	102.96	2.59	0.68	0.68
50.53	56.65	21.47	4.42	94.88	2.76	1.43	1.43
50.69	42.52	14.94	5.81	86.81	2.91	1.05	1.05
50.86	31.52	10.59	7.48	79.21	3.06	0.76	0.76
51.02	23.66	7.65	9.19	70.31	3.20	0.55	0.55
51.18	19.96	6.26	10.06	62.94	3.26	0.26	0.45
51.35	18.84	5.83	10.16	59.19	3.26	0.22	0.42
51.51	18.10	5.54	10.41	57.68	3.28	0.22	0.40
51.68	17.45	5.29	10.83	57.30	3.31	0.22	0.38
51.84	16.96	5.09	11.18	56.96	3.33	0.22	0.36
52.00	17.04	5.12	11.14	56.97	3.33	0.22	0.37
52.17	18.81	5.75	9.85	56.66	3.24	0.22	0.41
52.33	25.15	8.07	7.18	57.97	3.04	0.18	0.58
52.50	31.72	10.71	5.57	59.70	2.89	0.22	0.75
52.66	33.32	11.33	5.49	62.21	2.88	0.26	0.79
52.82	27.98	9.06	6.81	61.73	3.01	0.26	0.65
52.99	21.73	6.76	8.66	58.55	3.16	0.22	0.48
53.15	18.83	5.69	10.12	57.55	3.26	0.18	0.41
53.32	19.34	5.86	10.41	60.97	3.28	0.25	0.42
53.48	23.10	7.21	8.92	64.34	3.18	0.33	0.52
53.64	29.67	9.58	6.91	66.20	3.01	0.25	0.68
53.81	36.80	12.37	5.72	70.78	2.90	0.87	0.87
53.97	39.51	13.19	6.01	79.27	2.93	0.94	0.94
54.14	41.24	13.70	6.40	87.75	2.97	0.98	0.98
54.30	55.57	19.89	4.81	95.69	2.80	1.35	1.35
54.46	78.26	30.75	3.29	101.30	2.59	0.67	0.67
54.63	97.44	40.29	2.64	106.49	2.47	0.71	0.71
54.79	97.84	40.04	2.76	110.52	2.50	0.71	0.71
54.96	86.91	33.98	3.36	114.10	2.61	2.13	2.13
55.12	75.82	28.16	4.15	116.86	2.72	1.85	1.85
55.28	77.99	29.08	4.06	118.01	2.71	1.90	1.90

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
55.45	97.56	38.84	3.06	118.72	2.55	0.70	0.70
55.61	121.94	51.87	2.27	117.98	2.39	0.74	0.74
55.78	137.69	61.29	1.87	114.37	2.27	0.76	0.76
55.94	141.25	64.48	1.68	108.05	2.20	0.77	0.77
56.11	140.46	64.97	1.58	102.84	2.16	0.77	0.77
56.27	126.01	56.25	1.79	100.76	2.25	0.75	0.75
56.43	97.77	40.26	2.47	99.33	2.44	0.71	0.71
56.60	64.41	23.38	4.12	96.22	2.72	1.53	1.53
56.76	41.32	13.26	6.47	85.79	2.97	0.95	0.95
56.93	29.98	9.27	7.99	74.10	3.11	0.66	0.66
57.09	23.82	7.10	9.20	65.31	3.20	0.24	0.51
57.25	21.22	6.18	9.94	61.42	3.25	0.24	0.44
57.42	20.49	5.91	10.66	63.00	3.30	0.28	0.42
57.58	21.13	6.12	11.06	67.74	3.32	0.31	0.44
57.75	23.23	6.84	10.77	73.65	3.30	0.49	0.49
57.91	28.08	8.51	8.94	76.06	3.18	0.61	0.61
58.07	37.75	11.83	6.49	76.77	2.98	0.85	0.85
58.24	42.88	14.17	5.13	72.72	2.84	0.97	0.97
58.40	41.20	13.29	5.59	74.34	2.89	0.93	0.93
58.57	33.40	10.27	7.19	73.84	3.04	0.73	0.73
58.73	36.71	11.38	7.11	80.95	3.03	0.81	0.81
58.89	60.80	21.55	4.07	87.65	2.71	1.40	1.40
59.06	90.49	35.47	2.75	97.67	2.50	0.69	0.69
59.22	111.81	45.62	2.35	107.28	2.41	0.72	0.72
59.39	117.34	47.48	2.44	116.04	2.43	0.73	0.73
59.55	126.85	52.19	2.27	118.60	2.39	0.74	0.74
59.71	136.02	57.08	2.09	119.03	2.34	0.75	0.75
59.88	127.00	52.61	2.17	114.34	2.36	0.74	0.74
60.04	101.06	39.36	2.76	108.75	2.50	0.70	0.70
60.21	73.28	25.96	4.00	103.86	2.70	1.68	1.68
60.37	64.36	21.97	4.53	99.59	2.77	1.46	1.46
60.53	69.84	24.46	4.10	100.31	2.71	1.59	1.59
60.70	87.91	33.16	3.03	100.58	2.55	0.68	0.68
60.86	106.89	42.37	2.48	105.14	2.44	0.71	0.71
61.03	116.16	46.88	2.30	107.84	2.40	0.73	0.73
61.19	110.47	43.94	2.42	106.34	2.43	0.72	0.72
61.35	99.12	38.12	2.75	104.90	2.50	0.70	0.70
61.52	87.74	32.64	3.11	101.63	2.56	0.68	0.68
61.68	82.20	29.91	3.38	100.99	2.61	1.86	1.86
61.85	83.33	30.76	3.14	96.67	2.57	0.67	0.67
62.01	86.89	32.47	2.97	96.54	2.54	0.68	0.68
62.17	84.12	30.91	3.17	97.96	2.57	0.67	0.67
62.34	73.49	25.61	3.88	99.48	2.68	1.64	1.64
62.50	64.32	21.35	4.62	98.60	2.78	1.42	1.42

:: Strength loss calculation (Robertson (2009) :: (continued)

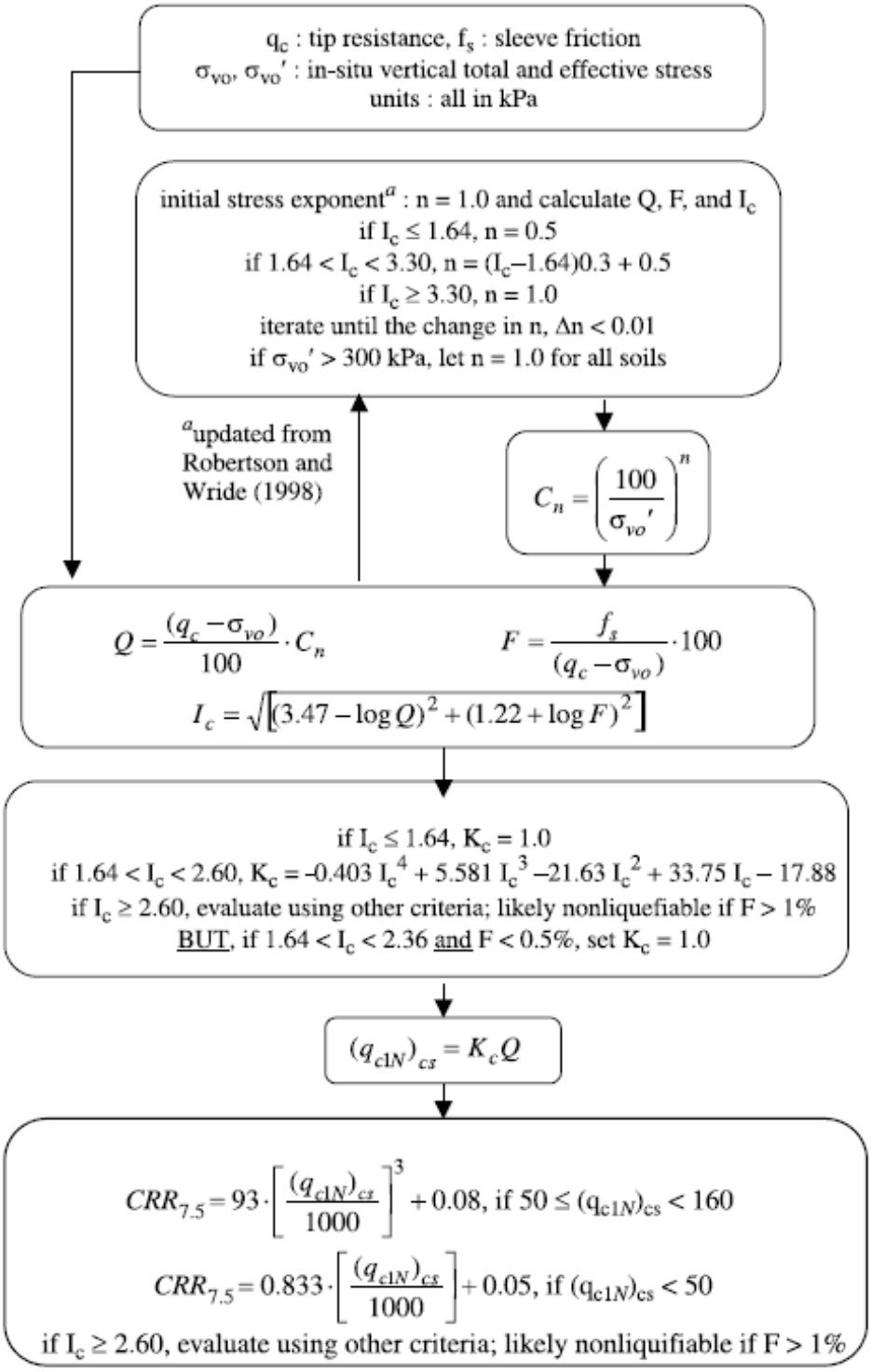
Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$

Abbreviations

q_t:	Total cone resistance
K_c:	Cone resistance correction factor due to fines
$Q_{tn,cs}$:	Adjusted and corrected cone resistance due to fines
I_c:	Soil behavior type index
$S_{u(liq)}/\sigma'_v$:	Calculated liquefied undrained strength ratio
$S_{u(peak)}/\sigma'_v$:	Calculated peak undrained strength ratio

Procedure for the evaluation of soil liquefaction resistance, NCEER (1998)

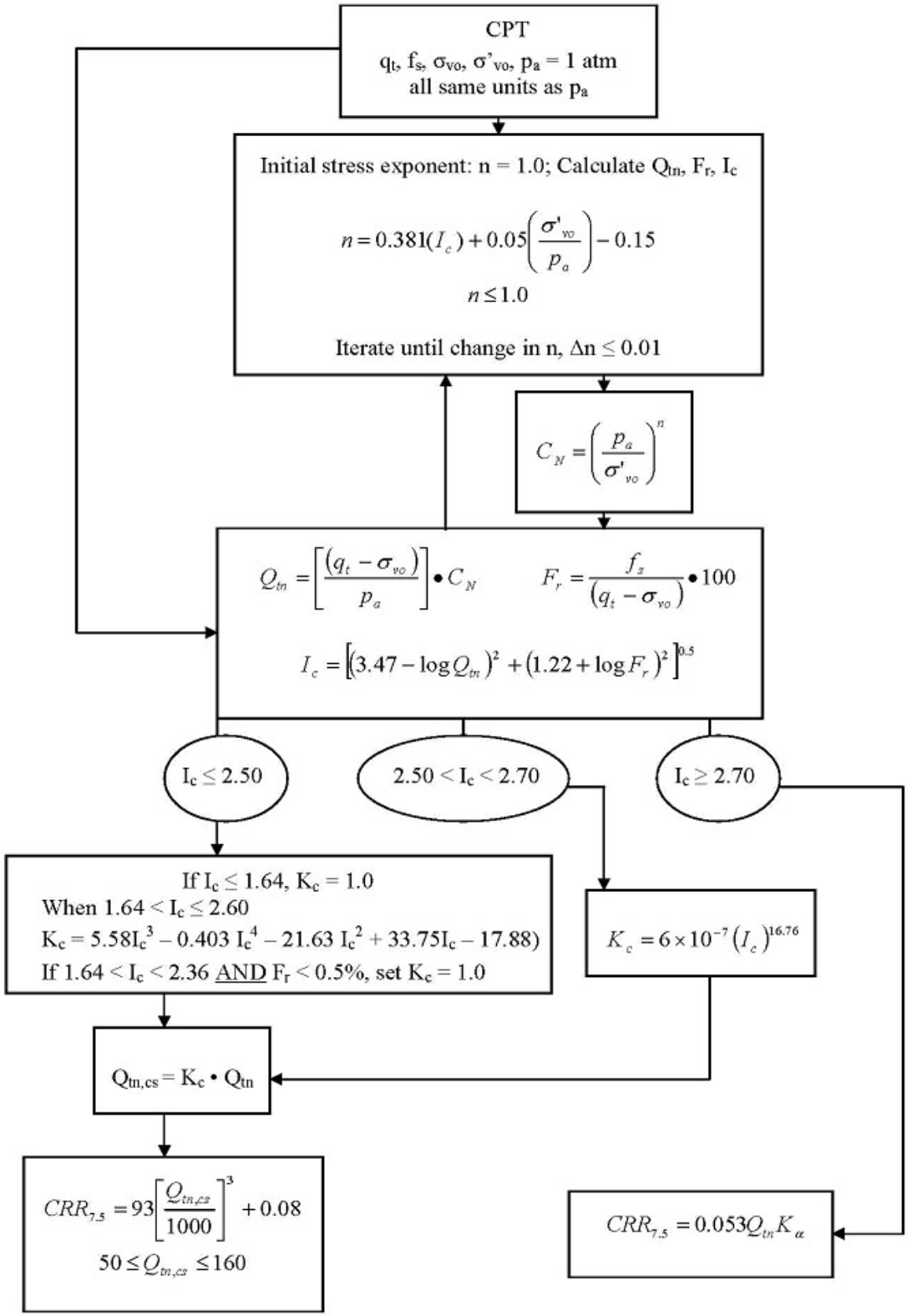
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:



[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

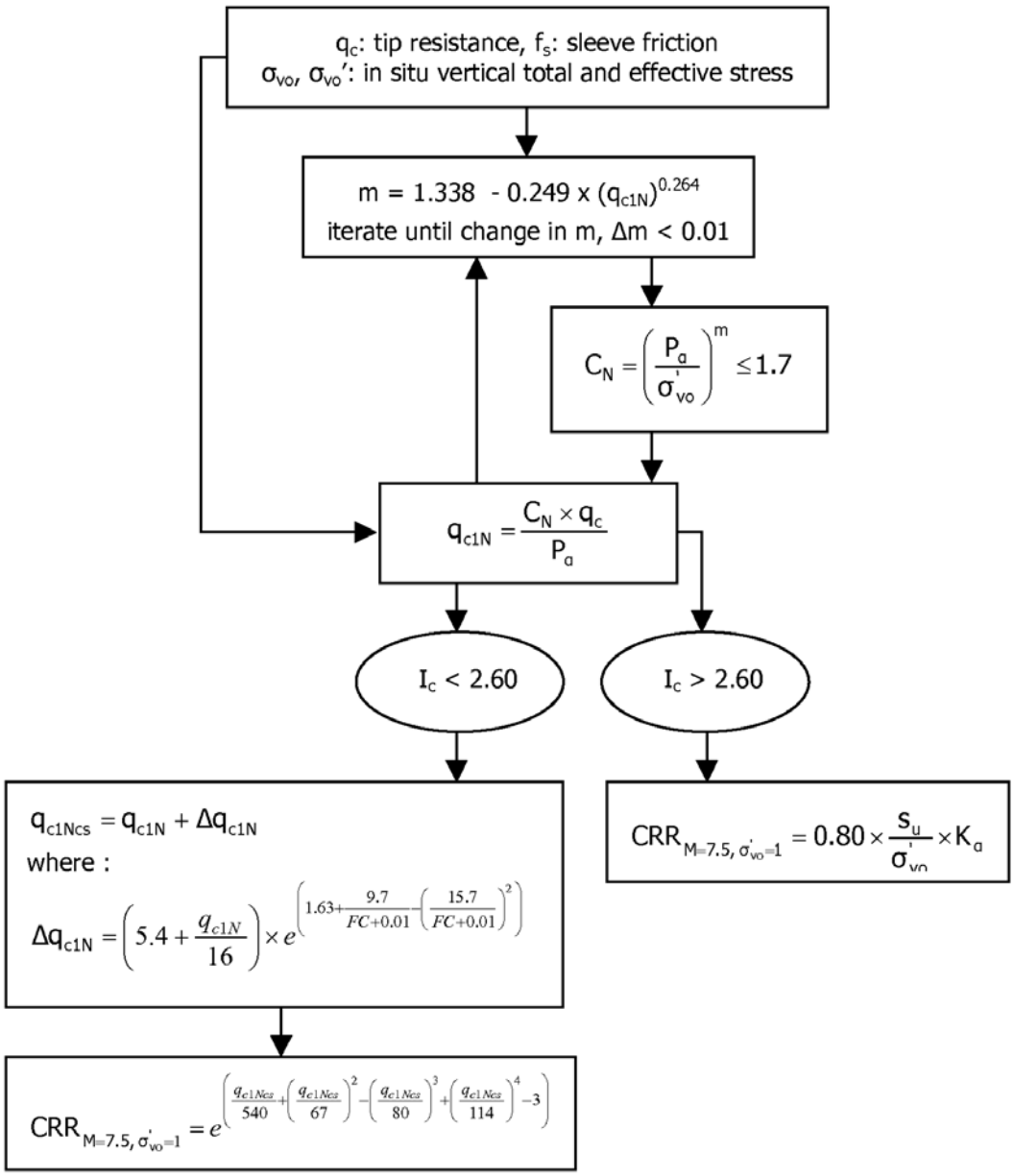
Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. This procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils). The revised procedure is presented below in the form of a flowchart[1]:

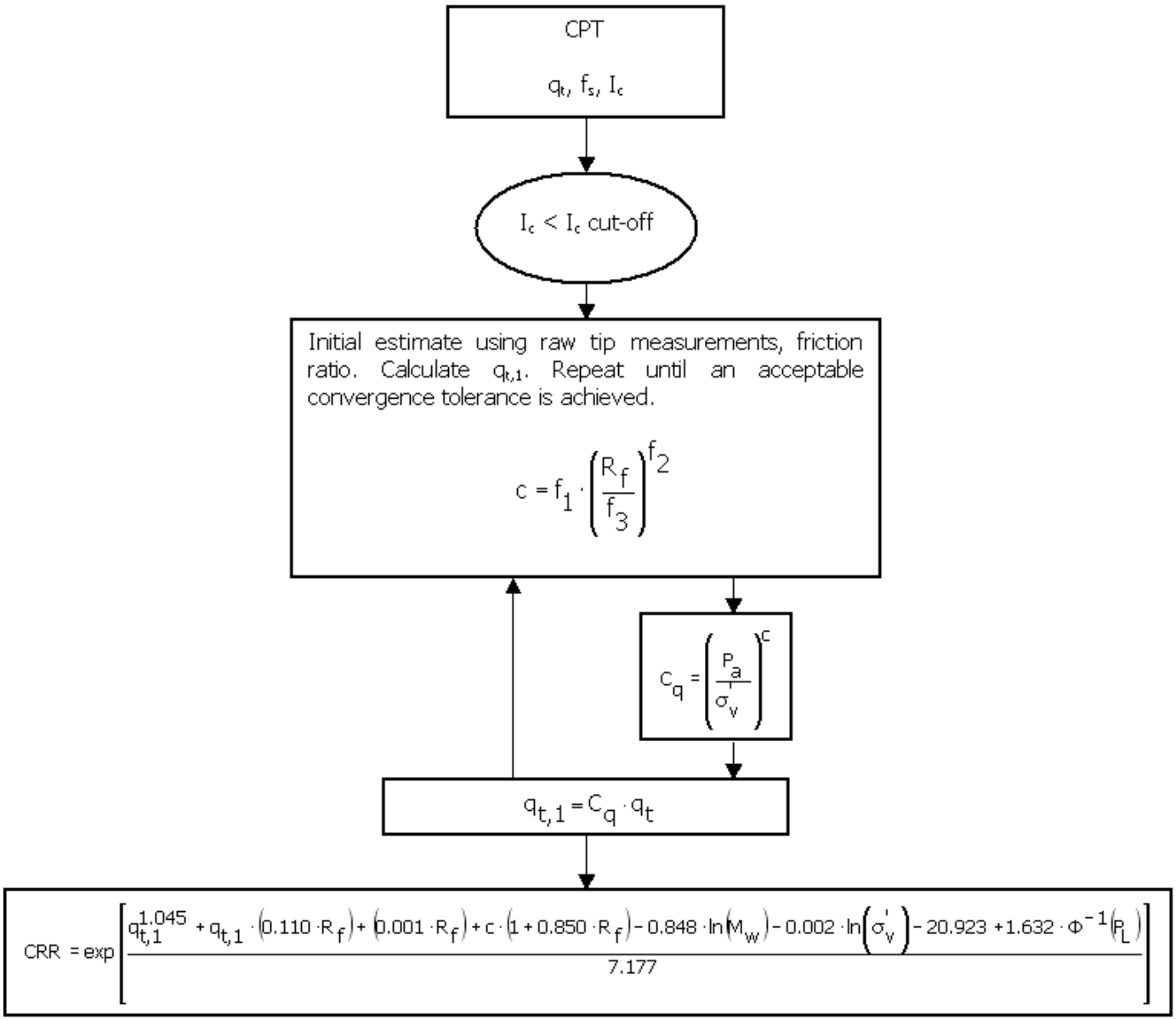


[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

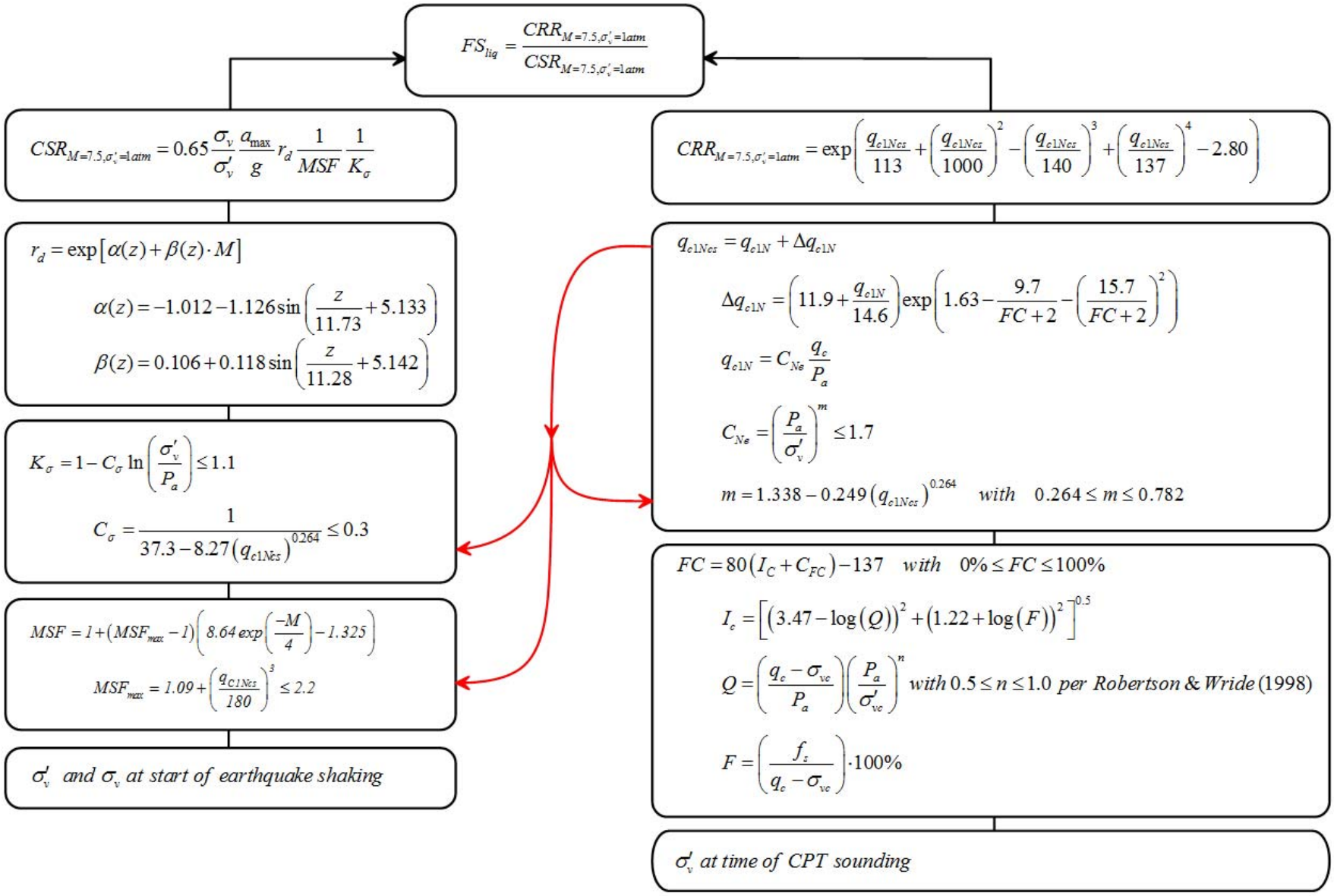
Procedure for the evaluation of soil liquefaction resistance, Idriss & Boulanger (2008)



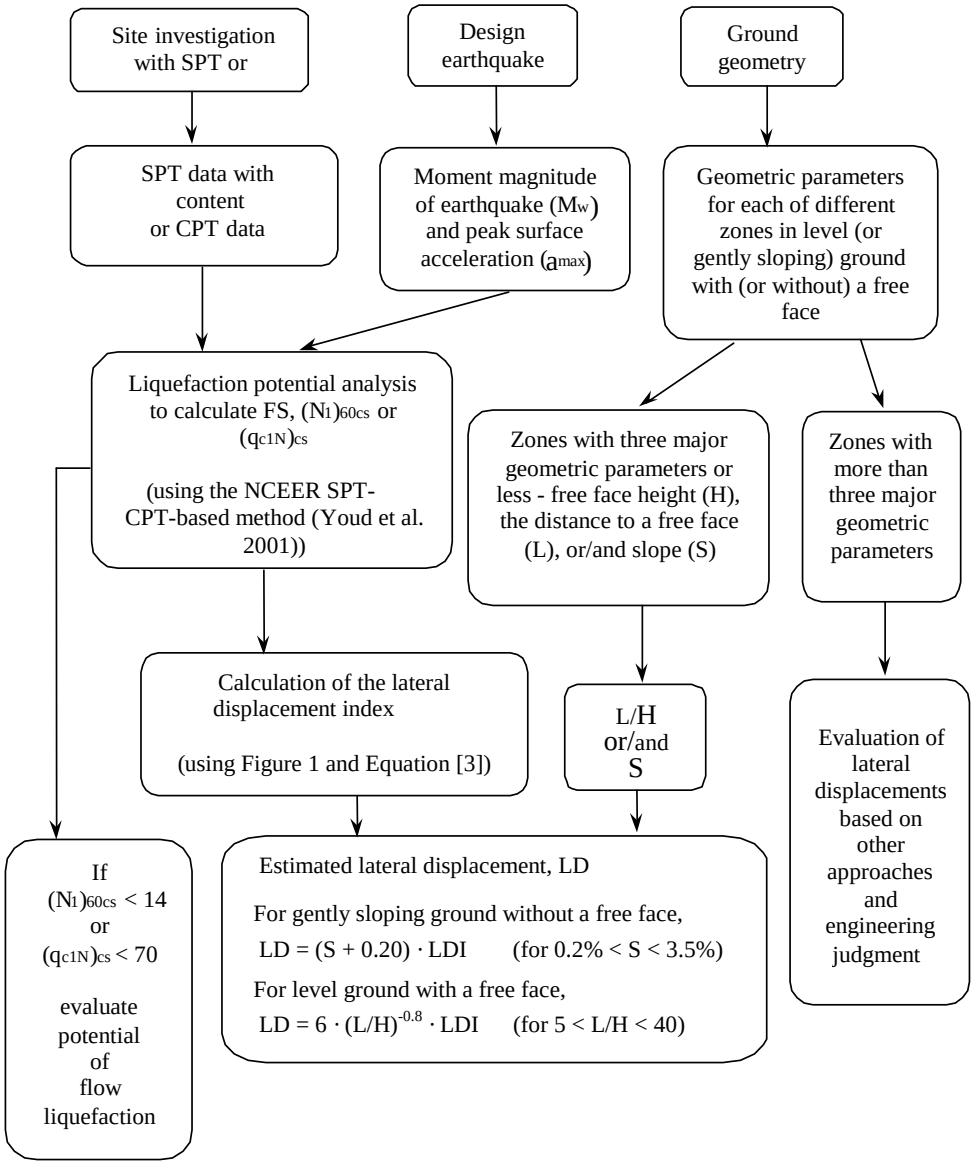
Procedure for the evaluation of soil liquefaction resistance (sandy soils), Moss et al. (2006)



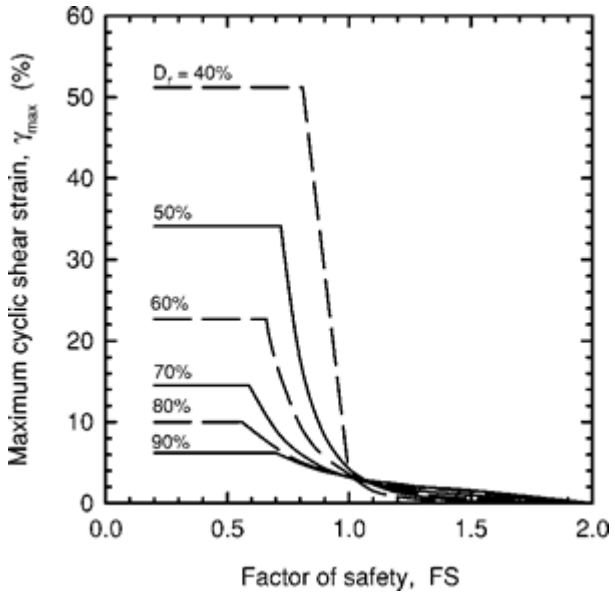
Procedure for the evaluation of soil liquefaction resistance, Boulanger & Idriss(2014)



Procedure for the evaluation of liquefaction-induced lateral spreading displacements



[1] Flow chart illustrating major steps in estimating liquefaction-induced lateral spreading displacements using the proposed approach



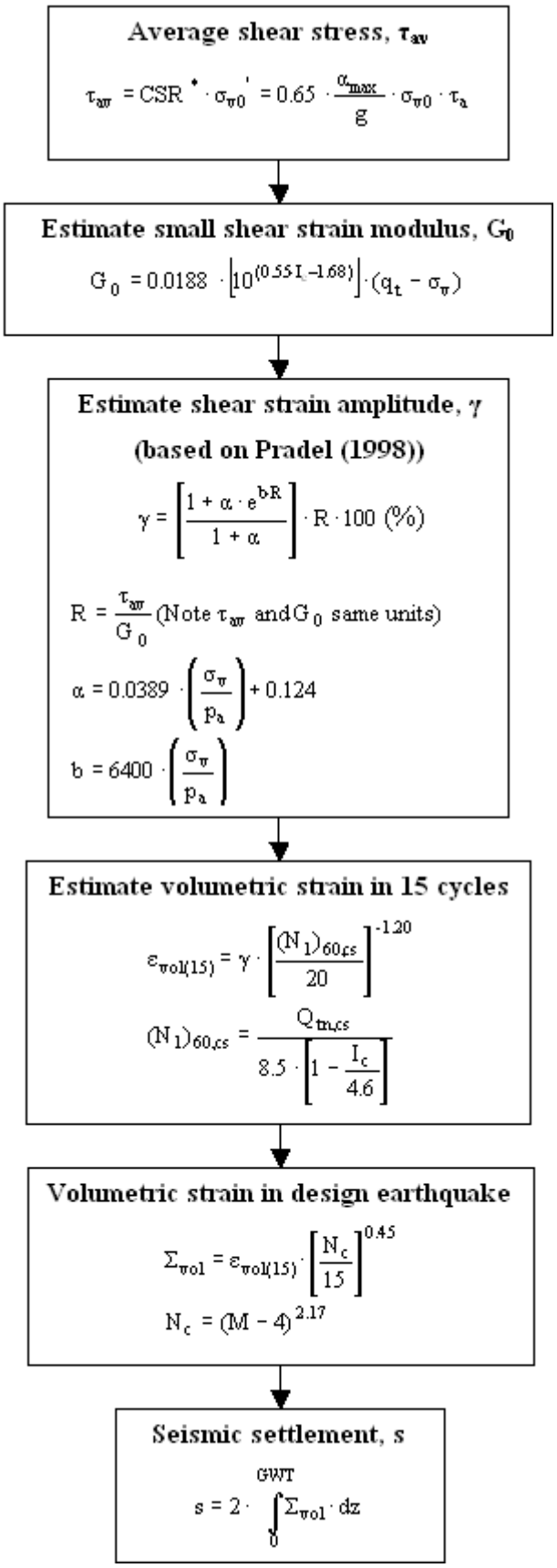
[1] **Figure 1**

$$LDI = \int_0^{z_{max}} \gamma_{max} dz$$

[1] **Equation [3]**

[1] "Estimating liquefaction-induced ground settlements from CPT for level ground", G. Zhang, P.K. Robertson, and R.W.I. Brachman

Procedure for the estimation of seismic induced settlements in dry sands



Robertson, P.K. and Lisheng, S., 2010, "Estimation of seismic compression in dry soils using the CPT" FIFTH INTERNATIONAL CONFERENCE ON RECENT ADVANCES IN GEOTECHNICAL EARTHQUAKE ENGINEERING AND SOIL DYNAMICS, Symposium in honor of professor I. M. Idriss, San Diego, CA

Liquefaction Potential Index (LPI) calculation procedure

Calculation of the Liquefaction Potential Index (LPI) is used to interpret the liquefaction assessment calculations in terms of severity over depth. The calculation procedure is based on the methology developed by Iwasaki (1982) and is adopted by AFPS.

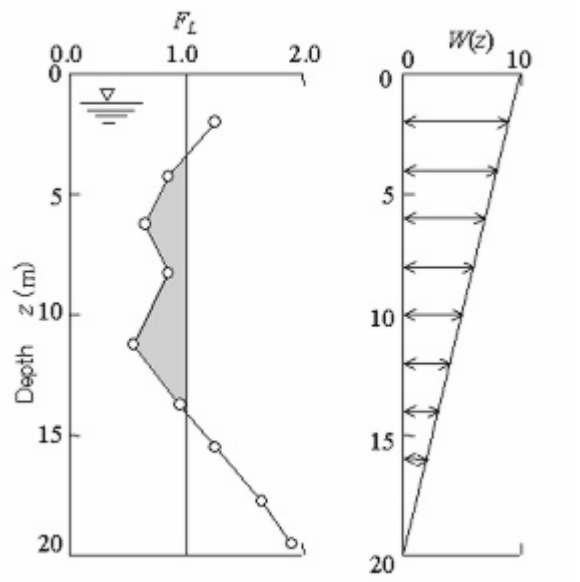
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\mathbf{LPI} = \int_0^{20} (10 - 0{,}5z) \times F_L \times dz$$

where:
F_L = 1 - F.S. when F.S. less than 1
F_L = 0 when F.S. greater than 1
z depth of measurment in meters

Values of LPI range between zero (0) when no test point is characterized as liquefiable and 100 when all points are characterized as susceptible to liquefaction. Iwasaki proposed four (4) discrete categories based on the numeric value of LPI:

- LPI = 0 : Liquefaction risk is very low
- 0 < LPI <= 5 : Liquefaction risk is low
- 5 < LPI <= 15 : Liquefaction risk is high
- LPI > 15 : Liquefaction risk is very high



Graphical presentation of the LPI calculation procedure

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Appendix C2

Liquefaction Analysis Summary

Gmail by Google

William Jacobs <wjacobs@leaveycorp.com>

RE: Bellflower - New Project

1 message

Petrina Zen <zen@geoconinc.com> Tue, Feb 19, 2019 at 5:08 PM
To: William Jacobs <wjacobs@serranodevelopment.com>
Cc: Jelisa Thomas Adams <jelisa@geoconinc.com>, Kurt Fischer <kfischer@kfseng.com>, Neal Berliner <berliner@geoconinc.com>, Ryan Corcoran <rcorcoran@serranodevelopment.com>

Hi Will,

The results of our preliminary liquefaction analyses is discussed below.

Based on our analyses of the CPTs performed onsite, our liquefaction settlement analyses indicate that the site soils could be susceptible to approximately 1.26 inches of settlement during a Design Earthquake event. The differential settlement at the foundation level is anticipated to be less than 0.63 inches over a distance of 40 feet. These settlements are in addition to the static settlements and must be considered in the structural design.

Due to the potential for liquefaction, we recommend that the new development be supported on a mat foundation. Based on our analyses, potentially liquefiable soils start at a depth of 9 feet. Therefore, we recommend that the proposed development be on-grade rather that with a subterranean level to avoid the foundations being in potentially liquefiable soils.

For the renovation of the existing structure, we believe that a conventional foundation system can work for the proposed improvements. However, we will need to coordinate with the structural engineer on tolerable settlements. The foundations would have to be designed for the seismic settlements indicated above, as well as static settlements. We can recommend reduced bearing pressures for these footings, which may result in larger foundations, but will minimize static settlements.

Let us know if there are any questions.

Thank you,

Petrina Zen, PE | ***Project Engineer***
Geocon West, Inc.
15520 Rockfield Blvd., Suite J, Irvine, CA 92618
Tel 949.491.6570 Cell 909.525.6716
Visit our website at www.geoconinc.com.

Los Angeles | *Orange County* | *Riverside County* | *San Bernardino County* | *Coachella Valley* | *San Diego* | *Bay Area* | *Fairfield* | *Sacramento*

Appendix D

Phase I Environmental Site Assessment

ENVIRONMENTAL HELP, INC.

Phase I Environmental Site Assessment (ESA)

EHI **Project #: BELF618A**

Property Identification:

9735 Oak Street, Bellflower, CA 90706
APN No. 7106-020-900

16411 Bellflower Boulevard, Bellflower, CA 90706
APN No. 7106-020-901

9742 Mayne Street, Bellflower, CA 90706
APN No. 7106-020-902

Prepared for:

16411 Bellflower, LLC
% ***Serrano Development Group***
500 N. Brand Blvd.
Suite 2120
Glendale, CA 91203

Prepared by:

Environmental HELP, Inc. (EHI)
P.O. Box 222320
Santa Clarita, CA 91322-2320
(800) 750-0622

December 20, 2018

EXECUTIVE SUMMARY

Environmental HELP, Inc. (EHI) has performed a Phase I Environmental Site Assessment in conformance with Title 40 of the Code of Federal Regulations (CFR) § 312 and the ASTM Standard Practice E1527-13 covering the Phase I Environmental Site Assessment process. This Executive Summary includes the findings and conclusions in connection with the target property: **16411 Bellflower Blvd. [APN No. 7106-020-901], 9742 Mayne St. [APN No. 7106-020-902], and 9735 Oak St. [APN NO. 7106-020-900] in the City of Bellflower, California**.

The following sources were evaluated for their potential to constitute *Recognized Environmental Conditions (RECs)*, *Controlled Recognized Environmental Conditions (CRECs)*, *Historical Recognized Environmental Conditions (HRECs)*, and *de minimis* conditions among other environmental conditions:

- Historical Aerial Photographs (minimum of the last 40 years, but from as early as possible = 1903);
- Federal, State, Local, and Tribal Environmental and Governmental Database(s);
- Records Searches
- Site Inspection(s);
- Personal Interviews with past and present owners, operators, and occupants;
- Historical Topographic and Other Maps, Drawings or Reports; and
- Searches of Recorded Environmental Cleanup liens.

Findings

Sec. #	Report Section	*REC*	*CREC*	*HREC*	*de minimis*	Other Environmental Considerations	No Further Action	N/A
1.1	Site Location and Description	☐	☐	☐	☐	☐	☒	☐
2.6	Previous Reports and Other Provided Documentation	☐	☐	☐	☐	☐	☒	☐
3.5	Regulatory Agency Records / Database Review	☐	☐	☐	☐	☐	☒	☐
4.0	Site Reconnaissance	☐	☐	☐	☐	☒	☐	☐
4.3	Site and Vicinity Characteristics	☐	☐	☐	☐	☐	☒	☐
4.9	Historical Summary	☐	☐	☐	☐	☐	☒	☐
4.10	Usage, Handling & Disposal of Oil & Hazmat (OHM)	☐	☐	☐	☐	☒	☐	☐
4.11	Asbestos Containing Materials	☐	☐	☐	☐	☒	☐	☐
4.11	Lead-Based Paint	☐	☐	☐	☐	☒	☐	☐
4.11	Radon	☐	☐	☐	☐	☐	☒	☐
4.11	Lead in Drinking Water	☐	☐	☐	☐	☐	☒	☐
4.11	Mold (Indoor Air Quality)	☐	☐	☐	☐	☐	☒	☐
7.2	Vapor Migration	☐	☐	☐	☐	☐	☒	☐

Based on the information gained pursuant to this investigation:

☐ **NO ADDITIONAL SAMPLING** (subsurface investigation) and/or related analyses are needed.

☒ Additional sampling and/or analysis may be needed[1].

This assessment has:

☐ Revealed **NO EVIDENCE** or *Recognized Environmental Conditions (RECs)*, *Controlled Recognized Environmental Conditions (CRECs)*, *Historical Recognized Environmental Conditions (HRECs)*, *de minimis* conditions or other environmental considerations in connection with this property.

Revealed evidence of:

☒ *Recognized Environmental Conditions (RECs)*
☐ *Controlled Recognized Environmental Conditions (CRECs)*
☐ *Historical Recognized Environmental Conditions (HRECs)*
☐ *de minimis* conditions
☐ Other environmental concerns (see below)

Opinion(s)

The site inspection and records review indicates this is a developed parcel of land. It is an area of commercial / retail land use, including two larger buildings and a parking lot, in downtown Bellflower, California. In the opinion of the environmental professional responsible for this site assessment, previous land use does not appear to have resulted in surface or subsurface hydrocarbon impact. The presence of approximately 10 five gallon paint / oil / tar containers in the rear trash enclosure is a *Recognized Environmental Condition (REC)*. Following removal of these hazardous material containers, this *REC* should be able to be ruled out based on the low migration potential for the presumed contents of these containers. They have been stored in a rain exposed paved area. Once cleanup is affected (i.e., removal of these 10 containers) any residual hydrocarbon impact should be able to be considered *de minimis*.

Conclusions

There was observable evidence of previous land use (the property was issued building permits in May of 1952 for a furniture stockroom (which became a retail grocery in about 2002; with an integrated kitchen in 2003). Now this site is vacant with a parking lot serving other nearby businesses with some incidental staining. For the most part, these site activities resulted in what is considered *de minimis* residual contamination or surface staining impact. Several containers in the rear trash enclosure are filled or filled partially with unused paint, related compounds or roof patch (tar). An elevator hydraulic power unit filled partially under the stairway, leading to the mezzanine in the front building (16411 Bellflower Blvd.) remains. It appears to be intact and there was no observed evidence of leaks. Eliminating the hydraulic fluid and this power unit will eliminate this *REC*.

[1] Such additional sampling and/or analysis (if any) will be identified in Section 6.2 and 6.4 of this report.

One other *REC* was identified; a plume in the subsurface with the presence of tetrachloroethylene (PCE) and trichloroethene (TCE) near the southeast corner of the site. This "plume" is related to the former *Bryan Dry Cleaners* at 9751 E. Oak Street in Bellflower, some 150' to the southeast of the center of the target properties. This contamination plume is from the previous dry cleaning operation at 9751 E. Oak Street which maintained at least one dry cleaning machine, with associated PCE / TCE storage. These previous activities resulted in a PCE / TCE plume in the vadose zone and shallow groundwater beneath the extreme southeast corner of the target properties.

This chlorinated Volatile Organic Compound (VOC) release was first reported in January 1965. Work to assess and cleanup the site began in the early 2000s, along with installation of an array of groundwater monitoring wells. In early 2004, a soil vapor extraction system began operating which ran for an eight month term reportedly. This resulted in "natural attenuation of the PCE and TCE in the groundwater;" [Reference: *Leymaster Environmental Consulting, LLC*: Report of Groundwater Monitoring Well Sampling, dated January 2, 2009]. Since this time, the Los Angeles Regional Water Quality Control Board (LARWQCB) has issued a series of annual estimation letters for the site cleanup cost recovery program. The estimated cost for the LARWQCB staff to review the work associated with investigation and cleanup was set at $3,750 in a 7/8/2010 letter to Mrs. Loren Ferris; dropped to $2,250 in similar letters to Mr. Jack Ferris (dated 7/14/2011 and 8/3/2012). It appears the LARWQCB remains prepared to review this case file and decide on next steps. Commitment to pay the cost recovery fees is required in order to move this case forward. Until this occurs, the proximity and condition of the *Bryan Dry Cleaners* Water Board case (No. 0932) will remain a *REC* relative to the target properties.

In the opinion of this environmental professional, the presence of such a plume (which has diminished significantly over time) should not create unhealthful conditions on the target property as a function of the contemplated redevelopment; mixed use parking, independent movie theater, and multi-tenant housing (or condos).

There are no known *CREC*s, or *HREC*s related to the target property. The only other environmental conditions identified relate to the presence of lead-based paint and/or asbestos, and their potential for release to the environment or worker exposure during building renovation, demolition, and/or disposal.

Every Environmental Site Assessment (ESA) has uncertainties; and every user relying on an ESA has a risk tolerance level with which they are comfortable.

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1.0 INTRODUCTION

16411 Bellflower, LLC / Serrano Development Group engaged the services of ***Environmental HELP, Inc. (EHI)*** to establish whether entering chain-of-title as owner or mortgage holder for the subject property located **in the city of Bellflower, California (Assessor's Parcel Nos. 7106-020-0900, 7106-020-901, and 7106-020-902)**, represents the potential for significant environmental liability. The scope of work involved a Phase I Environmental Site Assessment (ESA) following the standard practice for such assessments including any **limiting conditions, deviations, exceptions, significant assumptions, special terms and conditions** found in the American Society for Testing and Materials (ASTM International) Designation E1527-13; or in the body of 40 CFR §312 – All Appropriate Inquiry.

Following a site reconnaissance visit and interviews with knowledgeable parties regarding the parcel, this report was completed and findings presented.

1.1 Location and Legal Description

- A copy of the legal description:

  ☐ was not reasonably ascertainable.
  ☒ is included in Section A.4 (A.4.5).

- A copy of the parcel map (or a reasonable facsimile):

  ☐ was not reasonably ascertainable.
  ☒ is included in Section A.3 of this report.

1.2 Purpose

The purpose of this Phase I Environmental Site Assessment is to identify, to the extent feasible pursuant to the methods and processes prescribed in 40 CFR § 312 – All Appropriate Inquiry and ASTM Standard Designation E1527-13, the different types of *Recognized Environmental Conditions* in connection with the target property.

1.3 Scope of Work

This Phase I Environmental Site Assessment was conducted in accordance with standards of practice for environmental due diligence as established by the American Society for Testing Materials (ASTM International) E1527-13: Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.

The ASTM standard states, "A Phase I Environmental Site Assessment shall have four components, as described as follows:"

1) Records Review – Review of Records;
2) Site Reconnaissance – A visit to the property;
3) Interviews – Interviews with present and past owners, operators, and occupants of the property and with local government officials; and
4) Report – Evaluation and report.

The records review, site reconnaissance, and interviews are intended to be used in concert with each other.

Property assessment activities focused on:

- A review of federal, state, tribal, and local databases which identify and describe underground fuel tank sites, leaking underground fuel tank sites, hazardous waste generation sites, plus hazardous waste storage and disposal facility sites within the ASTM approximate minimum search distance;

- A property and surrounding site reconnaissance,

- Interviews with the past and present owners or current occupants / operators to identify potential environmental contamination; plus

- A review of historical sources in order to ascertain previous land use at the site and in the surrounding area.

In the completion of this project, every reasonable effort was used to also comply with the following sections of 40 CFR Part 312 Subpart C – Standards and Practices:

Citation	Title Description
§ 312.20	All appropriate inquiries.
§ 312.21	Results of inquiry by an environmental professional.
§ 312.22	Additional Inquiries.
§ 312.23	Interviews with past and present owners, operators, and occupants.
§ 312.24	Reviews of historical sources information.
§ 312.25	Searches for recorded environmental cleanup liens.
§ 312.26	Reviews of Federal, State, Tribal, and local government records.
§ 312.27	Visual inspections of the facility and of adjoining properties.
§ 312.28	Specialized knowledge or experience on the part of the defendant.
§ 312.29	The relationship of the purchase price to the value of the property, if the property was not contaminated.
§ 312.30	Commonly known or reasonably ascertainable information about the property.
§ 312.31	The degree of obviousness of the presence or likely presence of contamination at the property, and the ability to detect the contamination by appropriate investigation.

1.4 Limiting Conditions / Deviations

All limiting conditions, deletions, and deviations from ASTM Standard E1527-13 or EPA Regulation 40 CFR Part 312 – All Appropriate Inquiries (if any) are listed below individually, in detail, including client-imposed constraints. All additions are also listed.

- Deletions:
  - ☒ There are **NO** deletions from this practice.
  - ☐ The following are deletions from this practice:

    1) _____ Page ___
    2) _____ Page ___
    3) _____ Page ___

- Deviations:
  - ☒ There are **NO** deviations from this practice.
  - ☐ The following are deviations from this practice:

    1) _____ Page ___
    2) _____ Page ___
    3) _____ Page ___

- Additions:
  - ☐ There are **NO** additions to this practice.
  - ☒ The following are additions to this practice:

    1) Section 5.1 and 5.2 are expected to contain the name and current phone number of the property owner, key site manager and occupant(s). This is in addition to customary practice (see section 10.5.1 of ASTM Standard E1527-13), which calls for identifying and interviewing a person with good knowledge of the uses and physical characteristics of the target property only. This was done in an effort to enable another party to reconstruct the data and findings (if necessary) consistent with Section 12.2 of ASTM Standard E1527-13 – Evaluation and Report Preparation.
    2) _____ Page ___
    3) _____ Page ___

Property conditions, as well as local, state, tribal and federal regulations can change significantly over time. Therefore, the recommendations and conclusions presented as a result of this assessment apply strictly to the environmental regulations and property conditions existing at the time the assessment was performed. Available information has been analyzed using assessment techniques accepted currently and it is believed the inferences made are reasonably representative of the property. *EHI* makes no warranty, expressed or implied. The services have been performed in accordance with generally accepted environmental property assessment practices applicable at the time and location of the assessment.

Considerations identified by ASTM as beyond the scope of a Phase I ESA which may affect business environmental risk at a given property involve impacts including: Asbestos containing materials (ACMs), radon, lead-based paint (LBP), lead in drinking water, wetlands, regulatory compliance, cultural and historical resources damage, industrial hygiene plus worker health and safety concerns, ecological resources, endangered species, indoor air quality, mold, high voltage lines among other considerations (see Section 7.2). These environmental issues or conditions may warrant assessment based on the type of the property transaction; however, they are considered non-scope issues under ASTM Standard Practice E1527-13.

If requested by the client, these non-scope issues are discussed herein. Otherwise, the purpose of this assessment is to satisfy one of the requirements for qualification of the innocent landowner defense, contiguous property owner or bona fide prospective purchaser under CERCLA. ASTM Standard Practice E1527-13 and the United Sates EPA Standards and Practices for All Appropriate Inquiries (40 CFR Part 312) constitute "all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice" as defined in:

- 42 U.S.C. § 9601(35)(B), reference in the ASTM Standard Practice E1527-13.
- Sections 101(35)(B)(ii) and (iii) of CERCLA and referenced in the EPA Standards and Practices for All Appropriate Inquiries (40 CFR Part 312).
- 42 U.S.C. § 9601(40) and 42 U.S.C. § 9607(q).

This Phase I Environmental Site Assessment is not, and should not be construed as, a warranty or guarantee about the presence or absence of environmental contaminants which may affect this property. Neither is this assessment intended to assure clear title to the property in question. The sole purpose of assessment into property title records is to ascertain a historical basis of prior land use. All findings, conclusions, and recommendations stated in this report are based upon facts, circumstances, and industry-accepted procedures for such services as they existed at the time this report was prepared (i.e., federal, state, and local laws, rules, regulations, market conditions, economic conditions, political climate, and other applicable matters). All findings, conclusions, and recommendations stated in this report are further based on data and information provided. They reflect observations and conditions which existed on the date and time of the site reconnaissance.

Responses received from local, state, or federal agencies or other secondary sources of information after the issuance of this report may change certain facts, findings, conclusions, or circumstances to the report. A change in any fact, circumstance, or industry-accepted procedure upon which this report was based may affect the findings, conclusions, and recommendations expressed in this report adversely.

1.5 Exceptions

This Phase I Environmental Site Assessment was conducted in accordance with the proposal by and between ***EHI*** and ***16411 Bellflower, LLC / Serrano Development Group***. No other exceptions are known to be part of this agreement / proposal.

1.6 Significant Assumptions

No site assessment can be considered exhaustive. There is a point at which the cost of information obtained or the time required to gather it outweighs the usefulness of the information and, in fact, may be a material detriment to the orderly completion of transactions. One of the assumptions made in preparing this site assessment is information provided through interviews and other resources is accurate and offered in good faith.

No environmental site assessment can wholly eliminate uncertainty regarding the potential for *Recognized Environmental Conditions* in connection with a property. Performance of this site assessment is intended to reduce, but not eliminate, uncertainty regarding the potential for *Recognized Environmental Conditions* in connection with this property, recognizing reasonable limits of time and cost.

This assessment is intended to identify the environmental condition of the subject parcels or lots of real estate. It is intended to constitute appropriate inquiry for purposes of the CERCLAs[2] *innocent landowner defense*, but is not intended as this defense.

This assessment is intended primarily as an approach to conducting an inquiry designed to identify *Recognized Environmental Conditions* in connection with a property. No implication is intended that a person must use or rely on this assessment in order to be deemed to have conducted inquiry in a prudent or reasonable manner in any particular commercial transaction.

This report has been prepared for the exclusive use of ***16411 Bellflower, LLC / Serrano Development Group*** as it pertains to the subject property. These services have been performed in accordance with applicable state laws, local ordinances, and generally accepted practices in the environmental sciences. No other warranty, either expressed or implied, is made.

Groundwater flow, unless otherwise specified by on-site well data or well data from nearby sites, is inferred from contour information depicted on USGS topographic maps or contact with the Watermaster, if applicable.

1.7 Special Terms and Conditions

No special terms or conditions were agreed to between ***16411 Bellflower, LLC / Serrano Development Group*** and ***EHI***.

[2] Comprehensive Environmental Response, Compensation and Liability Act of 1980 (as amended, 42 USC § 9601 *et seq.*)

2.0 USER PROVIDED INFORMATION

This section presents information under E1527-13 Section 6 - User's Responsibilities.

2.1 Title and Judicial Records

To meet the requirements of 40 CFR 312.20 and 312.23, a search for the existence of Environmental Liens plus Activity and Use Limitations (AULs) which are filed or recorded against the property must be conducted.

The Recorded land title records for the property were:

☒ provided by ***ERS*** and practically reviewable by ***EHI***.
☐ not practically reviewable.

As a result:

Environmental Liens:
☒ Environmental liens **DO NOT** exist.
☐ Environmental liens include: _____

Activity and Use Limitations (AULs):
☒ Use limitations **DO NOT** exist (or are not known to exist).
☐ Use limitations include: _____

2.2 Specialized Knowledge

☒ **NO SPECIALIZED KNOWLEDGE** or experience on the part of the environmental professional responsible for preparing this Environmental Site Assessment exists or is material to *Recognized Environmental Conditions* in connection with this property.

☐ The environmental professional responsible for preparing this Environmental Site Assessment has specialized knowledge or experience which is material to *Recognized Environmental Conditions* in connection with the property.

16411 Bellflower, LLC / Serrano Development Group was obligated to communicate any information which constitutes specialized knowledge or experience to the environmental professional before the environmental professional performs the site reconnaissance.

NOTE: *The environmental professional is not required to verify independently **16411 Bellflower, LLC / Serrano Development Group** information provided but may rely on information provided unless he or she has actual knowledge certain information is incorrect or it is obvious such information is incorrect based on other data obtained in the Phase I Environmental Site Assessment process or otherwise actually known to the environmental professional.*

2.3 Valuation Reduction for Environmental Issues

Based on the information identified in this Phase I Environmental Site Assessment, an attempt to identify whether there should be a valuation reduction for environmental issues was made. This is consistent with the purpose of this site assessment which is to follow good commercial and customary practice in the United States of America for performing an environmental site assessment on a parcel of real estate with respect to the range of contaminants within the scope of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and petroleum products.

As such, this assessment is intended to permit the user to satisfy one of the requirements to qualify for the *innocent landowner defense* to CERCLA liability. This assessment constitutes "all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice" as defined in 42 USC § 9601(35)(B).

An evaluation of *business environmental risk* associated with a parcel of commercial real estate may necessitate investigation beyond that identified in this assessment. In defining a standard of good commercial and customary practice for conducting an environmental site assessment of a parcel of property, the goal of the process is to identify *Recognized Environmental Conditions* (defined further in 6.1 below).

The environmental professional (author of this document) is not also practicing in real estate, and, therefore, is not in a position to render a professional opinion regarding the appraised value of a given piece of property relative to the value of other nearby parcels. The information presented here is simply a professional judgment as to whether or not there is a significant differential in purchase price and fair market value based on the presence of releases or threatened releases of hazardous substances.

Valuation Reduction:

☒ No significant differential between purchase price and fair market value exists.

☐ Significant differential exists which may be due to the presence of one or more hazardous substance release(s). [40 CFR § 312.29(c)]

Valuation Opinion based on:

☒ Information gained by the environmental professional(s) pursuant to this assessment.

☐ Environmental professional's actual knowledge the price of the property is significantly less than comparable properties.

2.4 Owner, Property Manager, and Occupant Information

	Owner	Property Manager (Key Site Manager)	Occupant(s) ☐ Major (up to 5) ☐ Multi-family/Residential
Name	*City of Bellflower* 16411 Bellflower Boulevard & 9742 Mayne Street *Privately Owned* (José and Sandra Gutierrez) 9735 Oak Street	Ms. Catherine Jun City of Bellflower	1) _____ 2) _____ 3) _____ 4) _____ 5) _____
Address	City of Bellflower Economic Development 16600 Civic Center Drive Bellflower, CA 90706	City of Bellflower Economic Development 16600 Civic Center Drive Bellflower, CA 90706	1) _____ 2) _____ 3) _____ 4) _____ 5) _____
Phone #	Ms. Catherine Jun City of Bellflower (562) 804-1424 x2270 cjun@bellflower.org	Ms. Catherine Jun City of Bellflower (562) 804-1424 x2270 cjun@bellflower.org	1) _____ 2) _____ 3) _____ 4) _____ 5) _____
Duration of Responsibility / Occupancy (years)	2± years (acquired by City of Bellflower in 2016)	2± years (acquired by City of Bellflower in 2016)	1) _____ 2) _____ 3) _____ 4) _____ 5) _____

2.5 Reason for Performing Phase I

The purpose of this Environmental Site Assessment is to enable the user to satisfy one of the requirements to qualify for the *innocent landowner defense* to CERCLA liability and is intended to constitute "all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice". The purpose is also intended to satisfy compliance with 40 CFR §312 - All Appropriate Inquiry regulations enforced by USEPA.

The goal of the processes involved in this Environmental Site Assessment is to identify *recognized environmental conditions, controlled recognized environmental conditions, and historical recognized environmental conditions* as defined in Section 6.1. Identifying *business environmental risk* through the due diligence process is the reason for performing this Phase I Environmental Site Assessment.

2.6 Summary of Previous Environmental Reports

The summary of previous Environmental Site Assessment's is included below:

☒ No previous Environmental Site Assessments are known to exist for the target property.

☐ Previous Environmental Site Assessments or related environmental documents reviewed for the project included:

Date	Type	Author	Summary	REC	CREC	HREC	Other
	☐ Phase I ☐ Phase II ☐ Other			☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
	☐ Phase I ☐ Phase II ☐ Other			☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

2.7 Other

☐ NO other information material to *RECs, CRECs, HRECs, de minimis* or other environmental concerns was made available by the user.

☒ Information material to *RECs, CRECs, HRECs, de minimis* or other environmental concerns was made available by the user or other(s) as described below:

Information Provider	Information Material to *RECs, CRECs, HRECs, de minimis* or Other Environmental Conditions
Mr. William Jacobs Serrano Development Group	Leymaster Environmental Consulting, LLC: *Report of Groundwater Monitoring Well Sampling* [December 9, 2008]

3.0 RECORDS REVIEW

The purpose of the records review is to obtain and review records which will help identify *recognized environmental conditions*, *controlled recognized environmental conditions*, *historical recognized environmental conditions*, and other environmental concerns in connection with the property.

Standard, Federal, State, and Tribal Environmental Record Sources were reviewed. The complete list of record sources used as the basis of this report can be found in the sections 3.2, 3.3, 3.4, and 3.5 below. The report from Environmental Record Search (ERS) is hereby incorporated by reference. Please see Appendix A.5 (Regulatory Records Documentation) for a copy of the database search results.

3.1 Physical Setting Sources

☒ The Mandatory Standard current USGS 7.5-minute Topographic Map (or equivalent) showing the area on which the property is located was reviewed. This Topographic Map is the only standard physical setting source required to be obtained. Such sources provide information regarding geologic, hydrogeologic, hydrologic, and topographic characteristics of the target property.

The findings are presented in Section 6.2 of this report. Copies of the topographic maps can be found in Appendix A.4.3 of this report. Other sources were not deemed necessary to identify accurately the physical setting with relation to hazardous substances or the migration of petroleum products in, on, or under the property, or from or within the property, into the groundwater or soil.

Review of the 7.5-minute topographic map is considered good commercial and customary practice in initial environmental site assessments. It can assist in assessing the impact of contaminant migration, should it exist with regard to *RECs, CRECs, HRECs* and other environmental considerations in connection with the property.

☐ Discretionary (Non-Mandatory) or Non-Standard Physical Setting Sources were also reviewed. This review included:

- ☐ USGS or California Geological Survey – Ground Water Maps
- ☐ USGS or California Geological Survey – Bedrock Geology Maps
- ☐ USGS or California Geological Survey – Surficial Geology Maps
- ☐ Soil Conservation Service – Soil Maps
- ☐ Other: _____

3.2 Standard Environmental Records Sources

Whether available standard environmental records sources indicate the potential for past activities on or near the target property to represent a *REC*, *CREC*, *HREC*, *de minimis* or other environmental concern on, in, or under the target property is presented below:

Standard Environmental Records Sources ASTM E1527-13, Section 8.1.4 and 40 CFR § 312.20	Target Property: *REC, CREC, HREC, de minimis* or other environmental concerns are:			Surrounding Area: *REC, CREC, HREC, de minimis* or other environmental concerns are:		
	N/A	Not Likely	Likely	N/A	Not Likely	Likely
*Aerial Photographs	☐	☒	☐	☐	☒	☐
Building Permit / Inspection Department Records	☐	☐	☒	☐	☒	☐
Fire Insurance (Sanborn®) Maps	☐	☒	☐	☐	☒	☐
Local Street Directories	☐	☒	☐	☐	☒	☐
Prior Assessment Usage	☐	☒	☐	☐	☒	☐
Property Tax Files	☐	☒	☐	☐	☒	☐
Recorded Land Title Records	☐	☒	☐	☐	☒	☐
*USGS Topographic Maps	☐	☒	☐	☐	☒	☐
**Zoning / Land Use Records	☐	☒	☐	☐	☒	☐
Other Historical Sources:						
☐ Community Organizations	☐	☐	☐	☐	☐	☐
☐ Historical Society	☐	☐	☐	☐	☐	☐
☒ Internet Sites (i.e. Google Maps)	☐	☒	☐	☐	☒	☐
☐ Local Libraries	☐	☐	☐	☐	☐	☐
☐ Miscellaneous Maps	☐	☐	☐	☐	☐	☐
☐ Newspaper Archives	☐	☐	☐	☐	☐	☐
☐ Owner Files / Records	☐	☐	☐	☐	☐	☐
☐ Occupant Files / Records	☐	☐	☐	☐	☐	☐

* Including historical – back a minimum of 40 years
**For activity and use limitations (AULs)

3.3 Additional Environmental Records Sources

Whether available additional environmental records sources indicate the potential for past activities on or near the target property to represent a *REC*, *CREC*, *HREC*, *de minimis* or other environmental concern on, in, or under the target property is presented below:

Additional Environmental Records Sources ASTM E1527-13, Section 8.2.3 and 40 CFR § 312.20	Target Property: *REC, CREC, HREC, de minimis* or other environmental concerns are:			Surrounding Area: *REC, CREC, HREC, de minimis* or other environmental concerns are:		
	N/A	Not Likely	Likely	N/A	Not Likely	Likely
Local Brownfield Lists	☒	☐	☐	☐	☒	☐
Local Lists of Landfill / Solid Waste Disposal Sites	☒	☐	☐	☐	☒	☐
Local Lists of Hazardous Waste / Contaminated Sites	☒	☐	☐	☐	☒	☐
Local Lists of Registered Storage Tanks	☒	☐	☐	☐	☒	☐
Records of Emergency Release Reports	☒	☐	☐	☐	☒	☐
Records of Contaminated Public Wells	☒	☐	☐	☐	☒	☐
Department of Health / Environmental Division	☒	☐	☐	☐	☒	☐
Fire Department / CUPA	☒	☐	☐	☐	☒	☐
Planning Department	☒	☐	☐	☐	☒	☐
Local / Regional Pollution Control Agency	☐	☒	☐	☐	☒	☐
Local / Regional Water Quality Agency	☐	☒	☐	☐	☐	☒
Local Electric Utility Companies (for PCBs)	☐	☒	☐	☐	☒	☐
EnviroStor (Department of Toxic Substances Control)	☐	☒	☐	☐	☒	☐
GeoTracker (State Water Resources Control Board)	☐	☒	☐	☐	☒	☐

3.4 Environmental Information - Standard, Federal, State & Tribal Sources

A review of databases maintained by local, state, and federal offices was completed through Environmental Record Search (ERS). The databases were searched for properties with reported environmental issues within radii specified by ASTM Standard Designation E 1527-13 (incorporated by the All Appropriate Inquiry regulations found in 40 CFR §312), either by using geocoding information which identified the coordinates of the properties in the databases or by checking the street addresses of practically reviewable non-geocoded or orphan properties within the same zip code. Orphan properties which are determined to be located within the specified search radii will be identified.

In the opinion of the Environmental Professional (author) of this Phase I Environmental Site Assessment, the information obtained was deemed sufficient to evaluate whether past or present activities on or near the target property represent a *REC*, *CREC*, *HREC*, *de minimis*, or other environmental concern on, in, or under the target property is noted below:

ASTM / AAI Standard Environmental Record Sources

DATABASE	Search Distance (miles)	# of Sites Within Search Distance	LIKELY REC	LIKELY CREC	LIKELY HREC	LIKELY Other	NOT LIKELY REC	NOT LIKELY CREC	NOT LIKELY HREC	NOT LIKELY Other
Federal NPL site list										
NPL-US	1.0	0					✓	✓	✓	✓
Proposed-NPL-US	1.0	0					✓	✓	✓	✓
Federal Delisted NPL site list										
Delisted NPL-US	1.0	0					✓	✓	✓	✓
Federal CERCLIS list										
CERCLIS-US	0.5	0					✓	✓	✓	✓
Federal CERCLIS NFRAP site list										
CERCLIS-Archived-US	0.5	0					✓	✓	✓	✓
Federal RCRA CORRACTS facilities list										
RCRA-COR-US	1.0	0					✓	✓	✓	✓
Federal RCRA non-CORRACTS TSD facilities list										
RCRA-TSDF-US	0.5	0					✓	✓	✓	✓
Federal RCRA generators list										
RCRA-CESQG-US	0.25	1					✓	✓	✓	✓
RCRA-LQG-US	0.25	1					✓	✓	✓	✓
RCRA-NON-US	0.25	1					✓	✓	✓	✓
RCRA-SQG-US	0.25	5					✓	✓	✓	✓
Federal Institutional controls / Engineering control registries										
Controls-RCRA-US	0.25	0					✓	✓	✓	✓
Controls-US	0.25	0					✓	✓	✓	✓
Hist-US-EC	0.25	0					✓	✓	✓	✓
Hist-US-IC	0.25	0					✓	✓	✓	✓
LIENS-US	0.25	0					✓	✓	✓	✓
Federal ERNS list										
ERNS-US	0.0625	0					✓	✓	✓	✓
State and Tribal – Equivalent NPL										
Response-CA	1.0	0					✓	✓	✓	✓
State-Response-Active-CA	1.0	0					✓	✓	✓	✓
State-Response-NFA-CA	1.0	0					✓	✓	✓	✓
State-Response-Other-CA	1.0	0					✓	✓	✓	✓
State and Tribal – Equivalent CERCLIS										
Superfund-Active-CA	0.5	0					✓	✓	✓	✓
Superfund-NFA-CA	0.5	0					✓	✓	✓	✓
Superfund-Other-CA	0.5	0					✓	✓	✓	✓
State and Tribal landfill and / or solid waste disposal sites										
County-SWF-CA	0.5	0					✓	✓	✓	✓
Debris-US	0.5	0					✓	✓	✓	✓
Hist-Dumps-US	0.5	0					✓	✓	✓	✓
Land-Disposal-CA	0.5	0					✓	✓	✓	✓
SWIS-CA	0.5	1					✓	✓	✓	✓
SWLF-US	0.5	1					✓	✓	✓	✓
Tribal-ODI-US	0.5	0					✓	✓	✓	✓
State and Tribal Leaking Storage Tank Lists										
County-LUST-CA	0.5	0					✓	✓	✓	✓
County-LUST-Closed-CA	0.5	0					✓	✓	✓	✓
County-LUST-Open-CA	0.5	0					✓	✓	✓	✓
Hist-UST-Cleanup-CA	0.5	1					✓	✓	✓	✓
LUST-Closed-CA	0.5	11					✓	✓	✓	✓

ASTM / AAI Standard Environmental Record Sources

DATABASE	Search Distance (miles)	# of Sites Within Search Distance	LIKELY REC	LIKELY CREC	LIKELY HREC	LIKELY Other	NOT LIKELY REC	NOT LIKELY CREC	NOT LIKELY HREC	NOT LIKELY Other
LUST-Open-CA	0.5	0					✓	✓	✓	✓
Tribal-LUST-Closed-Reg9	0.5	0					✓	✓	✓	✓
Tribal-LUST-Open-Reg9	0.5	0					✓	✓	✓	✓
State and Tribal Registered Storage Tank Lists										
AST-CA	0.25	0					✓	✓	✓	✓
AST-CRSP-CA	0.25	0					✓	✓	✓	✓
City-AST-CA	0.25	0					✓	✓	✓	✓
City-UST-CA	0.25	0					✓	✓	✓	✓
County-AST-CA	0.25	0					✓	✓	✓	✓
County-UST-CA	0.25	5					✓	✓	✓	✓
FEMA-UST-US	0.25	0					✓	✓	✓	✓
Hist-UST-CA	0.25	2					✓	✓	✓	✓
Tribal-UST-Reg9	0.25	0					✓	✓	✓	✓
UST-Abandoned-CA	0.25	0					✓	✓	✓	✓
UST-CA	0.25	1					✓	✓	✓	✓
UST-Closed-CA	0.25	1					✓	✓	✓	✓
USTComp-CA	0.25	0					✓	✓	✓	✓
UST-CRSP-CA	0.25	1					✓	✓	✓	✓
UST-Priority-CA	0.25	0					✓	✓	✓	✓
UST-Proposed-CA	0.25	0					✓	✓	✓	✓
State and Tribal Inst / Eng Control Registries										
Controls-CA	0.5	0					✓	✓	✓	✓
Deed-CA	0.5	0					✓	✓	✓	✓
Hist-Controls-CA	0.5	0					✓	✓	✓	✓
HWMP-Controls-CA	0.5	0					✓	✓	✓	✓
Liens-CA	0.5	0					✓	✓	✓	✓
State and Tribal Voluntary Cleanup Sites										
Eval-Hist-CA	0.5	0					✓	✓	✓	✓
Eval-Hist-NFA-CA	0.5	0					✓	✓	✓	✓
Military-Active-CA	0.5	0					✓	✓	✓	✓
Military-NFA-CA	0.5	0					✓	✓	✓	✓
Military-Other-CA	0.5	0					✓	✓	✓	✓
School-Active-CA	0.5	0					✓	✓	✓	✓
School-NFA-CA	0.5	0					✓	✓	✓	✓
School-Other-CA	0.5	0					✓	✓	✓	✓
Tribal-VCP-US	0.5	0					✓	✓	✓	✓
VCP-Active-CA	0.5	0					✓	✓	✓	✓
VCP-NFA-CA	0.5	0					✓	✓	✓	✓
VCP-Other-CA	0.5	0					✓	✓	✓	✓
State and Tribal Brownfield Sites										
BF-MOA-CA	0.5	0					✓	✓	✓	✓
BF-Tribal-US	0.5	0					✓	✓	✓	✓

Supplemental Database Records

DATABASE	Search Distance (miles)	# of Sites Within Search Distance	LIKELY REC	LIKELY CREC	LIKELY HREC	LIKELY Other	NOT LIKELY REC	NOT LIKELY CREC	NOT LIKELY HREC	NOT LIKELY Other
Air-CA	0.25	2					✓	✓	✓	✓
AIR-DIST-CA	0.25	30					✓	✓	✓	✓
BioFuel-US	0.25	0					✓	✓	✓	✓
CAF-CA	0.25	0					✓	✓	✓	✓
CDL-CA	0.0625	0					✓	✓	✓	✓
CDL-US	0.0625	0					✓	✓	✓	✓
CHWF-CA	0.5	0					✓	✓	✓	✓
Cleaners-CA	0.25	5	✓					✓	✓	✓
Coal-Ash-Dams-US	0.5	0					✓	✓	✓	✓
County-BI-CA	0.25	0					✓	✓	✓	✓
Dams-CA	0.25	0					✓	✓	✓	✓
DPR-CA	0.25	1					✓	✓	✓	✓
DryCleaners-CA	0.25	7	✓					✓	✓	✓
EGRID-US	0.5	0					✓	✓	✓	✓
EPA-Watch-List-US	0.25	0					✓	✓	✓	✓
FA-HW-CA	0.0625	0					✓	✓	✓	✓
FA-HW-US	0.0625	0					✓	✓	✓	✓
FA-SWF-CA	0.0625	0					✓	✓	✓	✓
FRS-US	0.0625	1					✓	✓	✓	✓
FTTS-INSP-US	0.0625	0					✓	✓	✓	✓
FUDS-US	1	0					✓	✓	✓	✓
FUSRAP-US	0.25	0					✓	✓	✓	✓
Haulers-CA	0.0625	0					✓	✓	✓	✓
Hist-AFS2-US	0.25	0					✓	✓	✓	✓
Hist-AFS-US	0.25	0					✓	✓	✓	✓
Hist-AST-CA	0.25	0					✓	✓	✓	✓
Hist-AWS-CA	0.25	0					✓	✓	✓	✓
Hist-CA	0.0625	1					✓	✓	✓	✓
Hist-CalFID-CA	0.25	11					✓	✓	✓	✓
Hist-CALSITES-CA	0.25	0					✓	✓	✓	✓
Hist-CERCLIS-NFRAP-US	0.25	0					✓	✓	✓	✓

Supplemental Database Records

DATABASE	Search Distance (miles)	# of Sites Within Search Distance	LIKELY REC	LIKELY CREC	LIKELY HREC	LIKELY Other	NOT LIKELY REC	NOT LIKELY CREC	NOT LIKELY HREC	NOT LIKELY Other
Hist-CERCLIS-US	0.25	0					✓	✓	✓	✓
Hist-City-UST-CA	0.25	4					✓	✓	✓	✓
Hist-Deed-CA	0.25	0					✓	✓	✓	✓
Hist-DTG-CA	0.25	0					✓	✓	✓	✓
Hist-ERNS-US	0.0625	0					✓	✓	✓	✓
Hist-FIFRA-US	0.25	0					✓	✓	✓	✓
Hist-FINDS-US	0.0625	0					✓	✓	✓	✓
Hist-HWS-CA	0.25	0					✓	✓	✓	✓
Hist-LUSTIS-CA	0.25	1					✓	✓	✓	✓
HIST-MLTS-US	0.25	0					✓	✓	✓	✓
HIST-MTBE-CA	0.25	0					✓	✓	✓	✓
Hist-NPL-US	0.25	0					✓	✓	✓	✓
Hist-Orange-County-LF-CA	0.25	0					✓	✓	✓	✓
Historical-CA	0.5	0					✓	✓	✓	✓
Hist-Prop65-CA	0.25	0					✓	✓	✓	✓
Hist-RCRIS-US	0.25	0					✓	✓	✓	✓
Hist-Regional-LUST-CA	0.25	0					✓	✓	✓	✓
Hist-Regional-Other-CA	0.25	0					✓	✓	✓	✓
Hist-Regional-SLIC-CA	0.25	0					✓	✓	✓	✓
Hist-Regional-Spills-CA	0.25	0					✓	✓	✓	✓
Hist-Regional-SWLF-CA	0.25	0					✓	✓	✓	✓
Hist-Regional-UST-CA	0.25	0					✓	✓	✓	✓
Hist-SCL-CA	0.25	0					✓	✓	✓	✓
Hist-SWIS-CA	0.25	0					✓	✓	✓	✓
Hist-ToxicPits-CA	0.25	0					✓	✓	✓	✓
Hist-TRIS-US	0.25	0					✓	✓	✓	✓
Hist-US	0.0625	0					✓	✓	✓	✓
Hist-USGS-WaterWells-CA	0.0625	0					✓	✓	✓	✓
Hist-USTReg-CA	0.25	2					✓	✓	✓	✓
Hist-WaterWells-US	0.0625	0					✓	✓	✓	✓
Hist-WMUDS-CA	0.25	0					✓	✓	✓	✓
HWT-CA	0.25	0					✓	✓	✓	✓
ICIS-Air-US	0.0625	0					✓	✓	✓	✓
ICIS-FEC-US	0.0625	0					✓	✓	✓	✓
ICIS-NPDES-US	0.0625	0					✓	✓	✓	✓
LA-Waste-Haulers-CA	0.0625	0					✓	✓	✓	✓
Lead-Smelter-2-US	0.25	0					✓	✓	✓	✓
Lead-US	0.25	0					✓	✓	✓	✓
LMOP-US	0.5	0					✓	✓	✓	✓
Mines2-CA	0.0625	0					✓	✓	✓	✓
Mines-CA	0.0625	0					✓	✓	✓	✓
Mines-CDMG-CA	0.0625	0					✓	✓	✓	✓
MINES-US	0.0625	0					✓	✓	✓	✓
MLTS-US	0.0625	0					✓	✓	✓	✓
Mortgage-CA	0.25	0					✓	✓	✓	✓
MRDS-US	0.25	0					✓	✓	✓	✓
MWMP-CA	0.25	0					✓	✓	✓	✓
NCI-CA	0.25	0					✓	✓	✓	✓
NEI-LF-CA	0.25	0					✓	✓	✓	✓
NPDES-CA	0.0625	0					✓	✓	✓	✓
NPDES-SW-CA	0.0625	0					✓	✓	✓	✓
OGM-CA	0.0625	0					✓	✓	✓	✓
OGW-CA	0.0625	0					✓	✓	✓	✓
OSCF-CA	0.5	0					✓	✓	✓	✓
PCS-US	0.25	0					✓	✓	✓	✓
Perch1-CA	0.25	0					✓	✓	✓	✓
Perch2-CA	0.25	0					✓	✓	✓	✓
Project-CA	0.25	0					✓	✓	✓	✓
RADINFO-US	0.0625	0					✓	✓	✓	✓
RFG-Lab-US	0.25	0					✓	✓	✓	✓
RMP-US	0.0625	0					✓	✓	✓	✓
ROD-US	0.5	0					✓	✓	✓	✓
SDWIS-US	0.25	2					✓	✓	✓	✓
SP-CA	0.25	0					✓	✓	✓	✓
Spills-SSO-CA	0.25	0					✓	✓	✓	✓
SSTS-US	0.0625	0					✓	✓	✓	✓
TierPer-CA	0.0625	0					✓	✓	✓	✓
TOMS-CA	0.0625	0					✓	✓	✓	✓
Tribal-Air-US	0.25	0					✓	✓	✓	✓
TRIS2000-US	0.0625	0					✓	✓	✓	✓
TRIS2010-US	0.0625	0					✓	✓	✓	✓
TRIS80-US	0.0625	0					✓	✓	✓	✓
TRIS90-US	0.0625	0					✓	✓	✓	✓
TSCA-US	0.0625	0					✓	✓	✓	✓
UIC2-CA	0.0625	0					✓	✓	✓	✓
UIC-CA	0.0625	0					✓	✓	✓	✓
UMTRA-US	0.0625	0					✓	✓	✓	✓
USGS-Waterwells-US	0.0625	0					✓	✓	✓	✓
Vapor-Intrusions-US	0.5	0					✓	✓	✓	✓
WDR-CA	0.25	0					✓	✓	✓	✓

ERS Proprietary Historic Database Records

DATABASE	Search Distance (miles)	# of Sites Within Search Distance	LIKELY REC	LIKELY CREC	LIKELY HREC	LIKELY Other	NOT LIKELY REC	NOT LIKELY CREC	NOT LIKELY HREC	NOT LIKELY Other
Hist-Agriculture	0.0625	0					✓	✓	✓	✓
Hist-AutoDealers	0.0625	0					✓	✓	✓	✓
Hist-Auto Repair	0.25	1					✓	✓	✓	✓
Hist-Chemical Manufacturing	0.0625	0					✓	✓	✓	✓
Hist-Chemical-Storage	0.0625	0					✓	✓	✓	✓
HIst-Cleaners	0.25	5					✓	✓	✓	✓
Hist-Convenience	0.0625	0					✓	✓	✓	✓
Hist-Disposal-Recycle	0.0625	0					✓	✓	✓	✓
Hist-Food-Processors	0.0625	0					✓	✓	✓	✓
Hist-Gun-Ranges	0.0625	0					✓	✓	✓	✓
Hist-Machine Shop	0.0625	0					✓	✓	✓	✓
Hist-Manufacturing	0.0625	0					✓	✓	✓	✓
Hist-Metal Plating	0.0625	0					✓	✓	✓	✓
Hist-Mining	0.0625	0					✓	✓	✓	✓
Hist-Mortuaries	0.0625	0					✓	✓	✓	✓
Hist-Oil-Gas	0.0625	0					✓	✓	✓	✓
Hist-OilGas-Refiners	0.0625	0					✓	✓	✓	✓
Hist-Other	0.0625	0					✓	✓	✓	✓
Hist-Paint-Stores	0.0625	0					✓	✓	✓	✓
Hist-Petroleum	0.0625	0					✓	✓	✓	✓
Hist-Post-Offices	0.0625	0					✓	✓	✓	✓
Hist-Printers	0.0625	2					✓	✓	✓	✓
Hist-Rental	0.0625	0					✓	✓	✓	✓
Hist-RV-Dealers	0.0625	0					✓	✓	✓	✓
Hist-Salvage	0.0625	0					✓	✓	✓	✓
Hist-Service Stations	0.25	2					✓	✓	✓	✓
Hist-Steel-Metals	0.0625	0					✓	✓	✓	✓
Hist-Textile	0.0625	0					✓	✓	✓	✓
Hist-Transportation	0.0625	0					✓	✓	✓	✓
Hist-Trucking	0.0625	0					✓	✓	✓	✓
Hist-Vehicle-Parts	0.0625	0					✓	✓	✓	✓
Hist-Vehicle-Washing	0.0625	0					✓	✓	✓	✓

4.0 SITE RECONNAISSANCE

4.1 General Site Setting

The environmental professional(s) conducting the site reconnaissance noted the uses and conditions in connection with the property specified in Sections 4.5.1, 4.5.2, and 4.9.

To the extent visually and / or physically observed during the site visit, the uses and conditions specified above were the subject of questions asked as part of interviews of owners and occupants (see Section 5.0). Uses and conditions were recorded in field notes of the environmental professional(s) conducting the site reconnaissance and are described more fully in this report.

4.2 Site Description

The subject property is comprised of three (3) developed parcels; two with one structure each and a third which is a parking lot (paved with asphalt). These three parcels are known as:

1) APN No. 7106-020-900 – 9735 Oak Street (35,841±ft^2)
2) APN No. 7106-020-901 – 16411 Bellflower Boulevard (19,210±ft^2)
3) APN No. 7106-020-902 – 9742 Mayne Street (13,015±ft^2)

The parcels are located north of “Oak Street”, south of “Mayne Street”, east of “Orchard Avenue”, and west of “Bellflower Boulevard” in the city of Bellflower, California.

Township, Section and Range:
Township: **03S** Range: **12W** Section: **27**
Base & Meridian: **San Bernardino**

The target property is approximately ~76 feet above mean sea level. It is flat, essentially.

The following maps or drawings are included:

Type	Section
Site (Vicinity) Map	A.1
Site/(Plot) Plan (if available)	A.2
Parcel Map (if available)	A.3

4.3 Site and Vicinity General Characteristics

The site is comprised of two developed parcels each with an idle commercial building on it. The third is a parking lot (paved with asphalt) serving all the business fronting Bellflower Blvd. and Oak St. The east half of this city block is predominated by commercial / retail property (land uses). To the south is more commercial / retail development. To the west is residential development (single family dwellings mostly with at least four multi-tenant structures). To the east is Bellflower Blvd. and more commercial / retail land use. North, across Mayne St., is a vacant lot slated to become a multi-story parking structure within the next 12-36 months.

Based on a review of the Overview Map provided by Environmental Data Resources (EDR) the site is:

☐ within a 500-year flood zone.

☐ within a 100-year flood zone.

☒ not within a flood zone.
Per ERS "RecCheck" report: Zone X – Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level.

4.4 Observation

The objective of the site reconnaissance is to obtain information indicating the likelihood of identifying *Recognized Environmental Conditions* in connection with this property.

Environmental HELP, Inc. staff conducted site reconnaissance on **December 11, 2018**. The target property appears to have had previous residential then commercial / retail land use. From 1952 to about 1963 it remained mostly residential. Sometime before 1963, the single family dwellings on the property were replaced by two commercial / retail buildings present today (building permits indicate construction in 1952 and 1968). This land use appears to have remained until 2010 when these buildings became vacant (reportedly). They remain so today. No *CREC*s or *HREC*s are known to apply to this site.

Previous dry cleaning activities on adjacent property or in the surrounding area may have resulted in degradation of groundwater or the vadose zone in, on, or under the target property. This condition has been verified by further investigation. Further monitoring / verification is likely to be required by the LARWQCB.

A PCE / TCE plume is known to exist in the subsurface at the extreme southeast corner of the property (having migrated southwest). Groundwater was impacted. Soil vapor extraction was installed in 2004, and after only about 8 months of 24/7 operation was removed. The result was a significant decrease in contaminant concentrations and enhancement to natural attenuation processes (as reported by the project manager, *Leymaster Environmental Consulting, LLC* in their report dated January 2, 2009).

4.5 Interior and Exterior Observations

EXTERIOR

YES	NO	N/A	
☒	☐	☐	The periphery of the property was visually and / or physically observed.
☒	☐	☐	The periphery of all structures on the property was visually and / or physically observed.
☒	☐	☐	The property was viewed from all adjacent public thoroughfares.
☒	☐	☐	Roads or paths with no apparent outlet were observed on the property (this is to be sure no hazardous substances or petroleum products had been disposed in, on, or under the land).

Explanation: _____

INTERIOR

YES	NO	N/A	
☒	☐	☐	Accessible common areas expected to be used by occupants or the public were visually and / or physically observed.
☒	☐	☐	Maintenance and repair areas, including boiler rooms, were visually and / or physically observed.
☒	☐	☐	A representative sample of occupant spaces was visually and / or physically observed.

Explanation: _____

4.5.1 Site Physical Conditions - Interior and Exterior Observations

Visually and/or physically observed or identified from interviews or records review.

Condition Type	Condition Exists? N/A	YES	NO	Condition Location INT = Interior EXT = Exterior INT	EXT	Identified by: I = Interview, R = Records Review O = Observed I	R	O	Comments	Recognized Environmental Condition? YES	NO
1) Odors	☐	☐	☒	☐	☐	☐	☐	☒	1) N/A	☐	☒
Water Management											
1) Pools of Liquid	☐	☐	☒	☐	☐	☐	☐	☒	1) N/A	☐	☒
2) Standing Surface Water	☐	☐	☒	☐	☐	☐	☐	☒	2) N/A	☐	☒
3) Sumps/Pools	☐	☐	☒	☐	☐	☐	☐	☒	3) N/A	☐	☒
4) Drains	☐	☐	☒	☐	☐	☐	☐	☒	4) N/A	☐	☒
5) Pits	☐	☐	☒	☐	☐	☐	☐	☒	5) N/A	☐	☒
6) Ponds	☐	☐	☒	☐	☐	☐	☐	☒	6) N/A	☐	☒
7) Lagoons	☐	☐	☒	☐	☐	☐	☐	☒	7) N/A	☐	☒
1) PCBs (i.e. Transformers)	☐	☐	☒	☐	☐	☐	☐	☒	1) N/A	☐	☒
Residual Contamination											
1) Stains	☐	☐	☒	☐	☐	☐	☐	☒	1) N/A	☐	☒
2) Corrosion	☐	☐	☒	☐	☐	☐	☐	☒	2) N/A	☐	☒
3) Stained Flooring	☐	☐	☒	☐	☐	☐	☐	☒	3) N/A	☐	☒
4) Stained Soil (hydrocarbons)	☐	☐	☒	☐	☐	☐	☐	☒	4) N/A	☐	☒
5) Stained Pavement	☐	☐	☒	☐	☐	☐	☐	☒	5) N/A	☐	☒
6) Stressed Vegetation	☐	☐	☒	☐	☐	☐	☐	☒	6) N/A	☐	☒
Solid Waste											
1) Mounds	☐	☐	☒	☐	☐	☐	☐	☒	1) N/A	☐	☒
2) Depressions (disposal indicated)	☐	☐	☒	☐	☐	☐	☐	☒	2) N/A	☐	☒
Waste Water Discharge (includes storm water)											
1) To Drain	☐	☐	☒	☐	☐	☐	☐	☒	1) N/A	☐	☒
2) To Ditch	☐	☐	☒	☐	☐	☐	☐	☒	2) N/A	☐	☒
3) To Stream	☐	☐	☒	☐	☐	☐	☐	☒	3) N/A	☐	☒
Wells											
1) Dry Wells	☐	☐	☒	☐	☐	☐	☐	☒	1) N/A	☐	☒
2) Irrigation	☐	☐	☒	☐	☐	☐	☐	☒	2) N/A	☐	☒
3) Injection	☐	☐	☒	☐	☐	☐	☐	☒	3) N/A	☐	☒
4) Abandoned	☐	☐	☒	☐	☐	☐	☐	☒	4) N/A	☐	☒
5) Other: _____	☐	☐	☒	☐	☐	☐	☐	☒	5) N/A	☐	☒
Septic Systems											
1) Cesspool	☐	☐	☒	☐	☐	☐	☐	☒	1) N/A	☐	☒
2) Seepage Pit	☐	☐	☒	☐	☐	☐	☐	☒	2) N/A	☐	☒
3) Septic Tank & Leach Field	☐	☐	☒	☐	☐	☐	☐	☒	3) N/A	☐	☒
Other (describe) 1) _____	☐	☐	☒	☐	☐	☐	☐	☒	1) N/A	☐	☒

4.5.2 Site Hazardous Substance Containers - Interior and Exterior

Visually and/or physically observed or identified from interviews or records review.

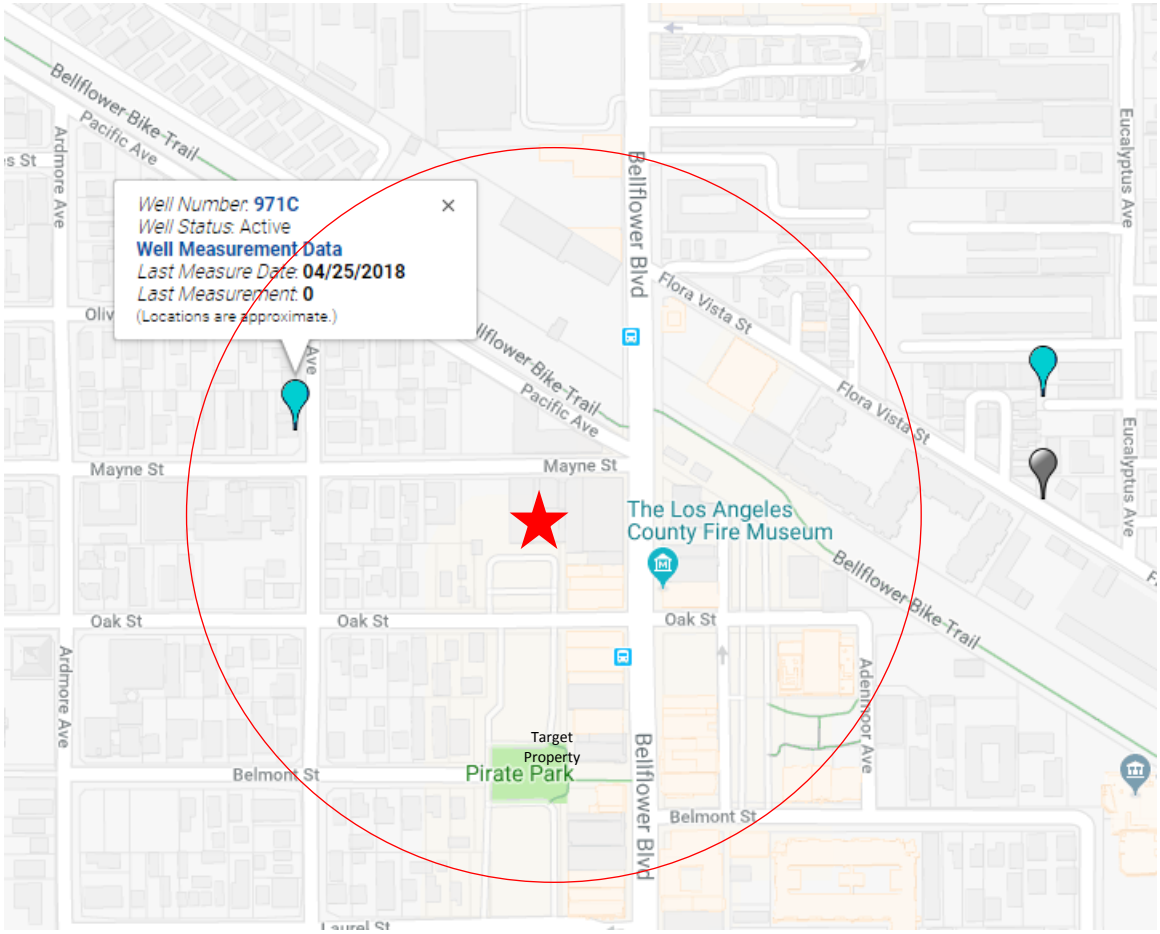
Category	Condition Exists? YES	Condition Exists? NO	Condition Location INT	Condition Location EXT	Container Type(s): Metal	Plastic	Glass	Fiber	Container Capacity (gal.): 5	30	55	Oth	Storage Conditions (*N/I = Needs Improvement): OK	N/I*	Identified by: I = Interview	R = Records Reviewed	O = Observed	Comments	Recognized Environmental Condition? YES	NO
Hazardous Substances 1) Petroleum Products 2) Leaking Drums 3) Identified, used, treated, stored, disposed of, or generated	☐ ☐ ☒	☒ ☒ ☐	☐ ☐ ☐	☐ ☐ ☒	☐ ☐ ☐	☐ ☐ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☒	☐ ☐ ☐	☐ ☐ ☐	☒ ☒ ☒	1) N/A 2) N/A 3) Eight 5-gallon plastic paint (?) roof tar (?) containers in rear trash storage area (no cover, no secondary containment)	☐ ☐ ☒	☒ ☒ ☐
Storage Tanks 1) Aboveground 2) Underground 3) Vent Pipes 4) Fill Pipes 5) Accessways	☒ ☐ ☐ ☐ ☐	☐ ☒ ☒ ☒ ☒	☒ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☒ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☒ ☐ ☐ ☐ ☐	☒ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐	☒ ☒ ☒ ☒ ☒	1) Hydraulic elevator power unit contains hydraulic fluid. Tank contains ~100 gallons of hydraulic fluid (~135 gallon capacity) Located under stairwell (near southwest corner of building fronting Bellflower Blvd.) 2) N/A 4) N/A 5) N/A	☐ ☐ ☐ ☐ ☐	☒ ☒ ☒ ☒ ☒
Unidentified Substance Containers	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	1) N/A	☐	☒
Other (describe) 1) _____ 2) _____ 3) _____	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	1) N/A 2) N/A 3) N/A	☐ ☐ ☐	☐ ☐ ☐

4.6 Methodology and Limiting Conditions

No limiting conditions were made part of the scope of work for this site assessment. No limitations imposed by physical obstructions such as adjacent buildings, bodies of water, asphalt, or other paved areas, and other physical constraints (for example, snow, rain) were experienced during site reconnaissance. The methodology used included standard practice for a Phase I Environmental Site Assessment (ASTM E1527-13 and the US EPA Regulations found in Title 40 of the Code of Federal Regulations (CFR) Part 312 – All Appropriate Inquiries), e.g., governmental database research, site reconnaissance, interviews, file and document review, followed by report preparation.

4.7 Geologic, Hydrogeologic, Hydrologic, and Topographic Conditions

The topographic conditions of the property are noted in Section 4.3 above. This was verified to the extent possible, visually and / or physically with site reconnaissance observations confirmed by interviews.



Reporting Agency: **Department of Public Works / Water Resources**

Well ID:	*971C*
State Well Number:	*3S12W27C02*
Elevation:	*72 ft.*
Estimated Distance:	*355 ft. from NW corner of property*
Approximate Direction:	*Northwest*
Thomas Page:	*Not Available*
Well Status:	*Active*
Depth to Groundwater:	***Most Recent Measure = 116 on 01/13/2011*** ***High Measure = 125 on 06/01/1961*** ***Low Measure = 35 on 01/31/1950***

☒ The geologic, hydrogeologic, hydrologic, and topographic information obtained indicates hazardous substances or petroleum products on the property or nearby properties **DO NOT** exist or are **NOT LIKELY** to migrate (not capable of impacting the property and / or representing a *Recognized Environmental Condition*).

☐ The geologic, hydrogeologic, hydrologic, and topographic information obtained shows there are **LIKELY** to be hazardous substances or petroleum products on the property or nearby properties which **COULD** migrate. The substances found on the target property appear to be limited to waste oil which has a very limited migration potential in soil. Accordingly, the needed site cleanup appears to also be very limited in scope. For this reason, further evaluation of geologic, hydrogeologic, hydrologic, and topographic information does not seem necessary.

A Texaco station some 300' east has an open UST remediation project (vapor extraction system). This release of fuel into the subsurface may well have generated a contamination plume which, given the shallow depth to groundwater, could have migrated under the target property. This condition represents a *REC* but is not expected to impede the proposed use of the target property as a truck parking lot.

4.8 Structures, Roads, and Other Improvements on the Property

- General Description of Structures:

Number of Structures	0	1	2	3	4	5
Number of Buildings	☐	☐	☒	☐	☐	☐
Number of Stories	--	☐	☒	☐	☐	☐
Approximate age (years)	--		**55-66**			

Number of Ancillary Structures with Description	0	☒	
	1	☐	
	2	☐	
	3	☐	
	4	☐	
	5	☐	

- Roads, Streets, and Parking Facilities:

Public Thoroughfares adjoining the property include:

Direction	Description
⇧ North:	**Mayne Street**
⇨ East:	**Bellflower Boulevard**
⇦ West:	**Residential, followed by Orchard Avenue**
⇩ South:	**Oak Street**

- Other Improvements:

The following other improvements are provided to the site:

Service	Provider
Electricity	**Southern California Edison**
Natural Gas	**SoCalGas**
Potable Water Supply	**Bellflower Comerset MWC**
Heating, Ventilation & A/C	**Private**
Sewage Disposal System	**County Sanitation Districts of LA County**
Solid Waste	**CR&R Waste**

Approximate age of the Sewage Disposal System: **N/A**

4.9 Current & Past Uses & Conditions of the Property, Adjoining Properties, & Surrounding Area

	Past Uses *of the Property*		Past Uses *of Adjoining Properties*		Current Uses *in the Surrounding Area*		Past Uses *in the Surrounding Area*	
General Land Use	**Specific Use** (i.e., grocery, bakery, etc.)	**Earliest Date Identified**	**Specific Use** (i.e., grocery, bakery, etc.)	**Earliest Date Identified**	**Specific Use** (i.e., grocery, bakery, etc.)	**Earliest Date Identified**	**Specific Use** (i.e., grocery, bakery, etc.)	**Earliest Date Identified**
☐ Agricultural								
☒ Commercial	Various	1952	Various	1952	Various	1952	Various	1952
☒ Government					City of Bellflower	1968	City of Bellflower	1968
☐ Industrial / Heavy Mfg.								
☐ Light Industrial								
☐ Office Building(s)								
☐ Recreational								
☒ Residential (Single-Family Dwellings)	Private houses	1928	Private houses	1928	Private houses	1928	Private houses	1928
☒ Residential (Multi-Family Dwellings)	Apartments	1952	Apartments	1952	Apartments	1952	Apartments	1952
☒ Retail	Various	1952	Various	1952	Various	1952	Various	1952
☒ Undeveloped / Open Space	Vacant Land	1928	Vacant Land	1928	Vacant Land	1928	Vacant Land	1928
☐ Unoccupied Occupant Spaces								
☐ Other:								
	☒ **NO GAPS** in development history exist. ☐ **GAPS** in the history of use were identified and explained below:		☒ **NO GAPS** in development history exist. ☐ **GAPS** in the history of use were identified and explained below:		☒ **NO GAPS** in development history exist. ☐ **GAPS** in the history of use were identified and explained below:		☒ **NO GAPS** in development history exist. ☐ **GAPS** in the history of use were identified and explained below:	
	Past uses of the property include: ☐ **NO SIGNS of STRUCTURE(s)** indicating past use. ☒ **SIGNS or STRUCTURE(s)** indicating a past use were: Identified		Past uses of adjoining properties are: ☐ **NOT LIKELY** to indicate *recognized environmental conditions*; ☒ **LIKELY** to indicate *recognized environmental conditions on or affecting the target property*.		Past uses of adjoining properties are: ☒ **NOT LIKELY** to indicate *recognized environmental conditions*. ☐ **LIKELY** to indicate *recognized environmental conditions on or affecting the target property*.		Past uses in the surrounding area are: ☒ **NOT LIKELY** to indicate *recognized environmental conditions*. ☐ **LIKELY** to indicate *recognized environmental conditions on or affecting the target property*.	
	Current and past uses of the property are: ☐ **NOT LIKELY** to involve the use, treatment, storage, disposal or generation of hazardous substances or petroleum products. ☒ **LIKELY** to involve the use, treatment, storage, disposal, or generation of hazardous substances or petroleum products.							

4.10 Usage, Handling & Disposal of Oil & Hazardous Materials (OHM)

This property was unimproved vacant land from before 1928. Private residences predominated the area until 1952 when it started being used as commercial / retail property. It has remained in these land uses since.

At the southeast corner of this city block was *Bryan Dry Cleaners*. This tenant used, handled, and stored hazardous materials (i.e., Perchloroethylene, Trichloroethylene, and other chlorinated hydrocarbons). Evidence of PCE / TCE mismanagement was observed (subsurface investigative work confirmed unauthorized releases of these substances starting as early as 1965). Much work to remedy this situation has been performed by several firms over the years, but site closure does not appear to have been sought.

At least eight (8) 5-gallon containers (full or partially full) of surface coatings (paint) and/or perhaps roofing tar are present in the rear or western trash enclosure. These represent a *REC*; but can be removed.

A freight elevator exists in the southwest corner of the larger front building (16411 Bellflower Blvd.). This elevator appears to have been powered by a hydraulic unit located under the stairs across the hall from this freight elevator. This hydraulic unit has what appears to be a ~135 gallon hydraulic fluid reservoir which is about 80% full (i.e., ~100 gallons). This unit and its contents will require attention / disposal prior to redevelopment.

Since the structures on the target properties were built before 1980, lead-based paint and asbestos must be addressed as concerns prior to any renovation, demolition and/or disposal.

No record of underground storage tanks (USTs) on this property was found.

The potential for subsurface impact still exists and is related to the unauthorized release of at least PCE and TCE from previous dry cleaning activities at an adjacent property. A plume in groundwater under the southeast corner of the target properties also exists (as described above) and is considered a *REC*.

High risk hydrocarbon impact sites related to previous land use on other adjacent properties or in the surrounding area were also identified and evaluated carefully. Other than what is described here, none were considered *REC*s with respect to the target property.

Among other record sources, the local agency or Consolidated Unified Program Agency (CUPA) website was consulted to determine whether permitted hazardous material / hazardous waste storage violations exist for the target properties. The records reviewed also involved the adjacent dry cleaning operation. No violations were found on the target properties. The former dry cleaning operation indicated a series of hazardous materials and hazardous waste problems and related violations.

4.11 Building Related Concerns

Evaluating building related concerns can complete an environmental site assessment (ESA). The following table will discuss the findings of this evaluation or describe why this assessment did not occur.

Description of Building Related Concern	Evaluation Requested by *Client*?	Environmental Professional's Evaluation and Recommendation for Further Assessment	Comments
Indoor Air Quality *Indoor Environmental Assessment (IEA)*[3]	☐ Yes ☒ No	☒ N/A – No structures on property ☐ NOT Recommended ☐ Recommended (may represent a *REC*)	
Asbestos Containing Materials (ACM) *Asbestos Survey*	☐ Yes ☒ No	☐ N/A – No structures on property ☐ NOT Recommended ☒ Recommended (may represent a *REC*)	
Radon *Radon Survey*	☐ Yes ☒ No	☒ N/A – No structures on property ☐ NOT Recommended ☐ Recommended (may represent a *REC*)	
Lead-Based Paint *Lead-Based Paint Survey*	☐ Yes ☒ No	☐ N/A – No structures on property ☐ NOT Recommended ☒ Recommended (may represent a *REC*)	
Lead in Drinking Water *Lead in Drinking Water Survey*	☐ Yes ☒ No	☒ N/A – No structures on property ☐ NOT Recommended ☐ Recommended (may represent a *REC*)	

[3] Generally, indoor air quality problems are relatively easy to discern upon entry and are typically related to ventilation problems. This form of assessment is not part of this scope of work.

5.0 INTERVIEWS

The objective of interviews is to obtain information indicating *recognized environmental conditions* in connection with the property. The tables below document the personal interviews performed in support of this Phase I Environmental Site Assessment.

5.1 Interview with Owner

Name	*City of Bellflower*, represented by Ms. Catherine Jun		
Phone	(562) 804-1424 x2270		
Duration of Responsibility	2± years (City of Bellflower acquired the properties in 2016)		
Medium	☒ In person	☐ Telephone	☐ Writing
Timing (Relating to the Site Visit)	☐ Before	☒ During	☐ After
New Information	☒ Yes	☐ No (from prior assessment)	
Communication Completed	☒ Yes	☐ No (but reasonable attempts made)	
Site Use and Condition: The owner was asked a series of questions pertaining to the use and condition of the property. Specifically, the questions focused on industrial processes, containers, hazardous substances, physically observed or identified and past spills, fires, or explosions. The owner's responses in the judgment of this environmental professional indicate potential *recognized environmental conditions* (*REC*) are either:		☒ **REC Not Likely**	☐ **REC Likely**
Legal Issues: The owner was also questioned regarding past or current legal proceedings. Specifically, whether: (1) any pending, threatened, or past litigation relevant to hazardous substances or petroleum products in, on or from the property; (2) any pending, threatened or past administrative proceedings relevant to hazardous substances or petroleum products on or from the property, and (3) any notices from any government entity regarding any possible violation of environmental laws or possible liability to hazardous substances or petroleum products. The owner's responses in the judgment of this environmental professional indicate potential *recognized environmental conditions* (*REC*) are either:		☒ **REC Not Likely**	☐ **REC Likely**

5.2 Interview with Key Site Manager

Name	Ms. Catherine Jun		
Phone	(562) 804-1424 x2270		
Title / Company	Senior Management Analyst / City of Bellflower		
Duration of Responsibility	2± years (City of Bellflower acquired the properties in 2016)		
Medium	☒ In person	☐ Telephone	☐ Writing
Timing (Relating to the Site Visit)	☐ Before	☒ During	☐ After
New Information	☒ Yes	☐ No (from prior assessment)	
Communication Completed	☒ Yes	☐ No (but reasonable attempts made)	
Site Use and Condition: The key site manager was asked a series of questions pertaining to the use and condition of the property. Specifically, the questions focused on industrial processes, containers, hazardous substances, physically observed or identified and past spills, fires, or explosions. The key site managers responses in the judgment of this environmental professional indicate potential *recognized environmental conditions* (*REC*) are either:		☒ **REC Not Likely**	☐ **REC Likely**
Legal Issues: The key site manager was also questioned regarding past or current legal proceedings. Specifically, whether: (1) any pending, threatened, or past litigation relevant to hazardous substances or petroleum products in, on or from the property; (2) any pending, threatened or past administrative proceedings relevant to hazardous substances or petroleum products on or from the property, and (3) any notices from any government entity regarding any possible violation of environmental laws or possible liability to hazardous substances or petroleum products. The key site manager's responses in the judgment of this environmental professional indicate potential *recognized environmental conditions* (*REC*) are either:		☒ **REC Not Likely**	☐ **REC Likely**

5.3 Interview with Occupants

Name	N/A (Commercial buildings are vacant / unoccupied currently)		
Phone			
Title / Company			
Duration of Occupancy			
Medium	☐ In person	☐ Telephone	☐ Writing
Timing (Relating to the Site Visit)	☐ Before	☐ During	☐ After
New Information	☐ Yes	☐ No (from prior assessment)	
Communication Completed	☐ Yes	☐ No (but reasonable attempts made)	

Additionally, the following documents (if they exist) were requested prior to the site visit and each was reviewed (or reasonable attempts to review each were made):

Reports:
- ☐ Environmental audits
- ☐ Geotechnical reports
- ☐ Hazardous waste reports
- ☐ Hydrogeologic conditions (on or near property)
- ☐ Notices of violation / notices to comply (any agency)
- ☐ Other: _____
- ☐ Other: _____

Permits:
- ☐ Air quality
- ☐ Hazardous waste disposal
- ☐ HazMat underground storage (UST registration)
- ☐ Industrial waste water discharge
- ☐ Waste discharge requirements (beneficial reuse)
- ☐ Other: _____
- ☐ Other: _____

Programs:
- ☐ California accidental release program (Cal ARP)
- ☐ Hazardous waste minimization (SB 14)
- ☐ OSHA HazCom (SDS)
- ☐ Other: _____
- ☐ Other: _____

Plans:
- ☐ Emergency action/evacuation
- ☐ Fire prevention
- ☐ Hazardous waste contingency
- ☐ HazMat Inventory Disclosure / Contingency Plan (CUPA / CERS)
- ☐ Spill prevention control and countermeasure
- ☐ Other: _____

Site Use and Condition: The occupant was asked a series of questions pertaining to the use and condition of the property. Specifically, the questions focused on industrial processes, containers, hazardous substances, physically observed or identified and past spills, fires, or explosions. The occupant's responses in the judgment of this environmental professional indicate potential *recognized environmental conditions* (*REC*) are either:	☐ **REC Not Likely**	☐ **REC Likely**
Legal Issues: The occupant was also questioned regarding past or current legal proceedings. Specifically, whether: (1) any pending, threatened, or past litigation relevant to hazardous substances or petroleum products in, on or from the property; (2) any pending, threatened or past administrative proceedings relevant to hazardous substances or petroleum products on or from the property, and (3) any notices from any government entity regarding any possible violation of environmental laws or possible liability to hazardous substances or petroleum products. The occupant's responses in the judgment of this environmental professional indicate potential *recognized environmental conditions* (*REC*) are either:	☐ **REC Not Likely**	☐ **REC Likely**

5.4 Interview with State and / or Local Government Officials

☐ This is vacant / undeveloped land where no physical street address exists upon which government records are based. As a result, interviews with local government officials could not be performed (i.e., not reasonably ascertainable).

☒ A physical street address exists so inquiry letters were sent to the corresponding local agencies as part of the record search process. The findings are presented below:

		RESULTS			
REQUIREMENT[4]	**AGENCY CONTACTED**	**No Records Found**	***No Response Received**	**Records Indicate REC not likely**	**Records Indicate Potential for a REC**
Local Fire Department which serves the property.	Consolidated Unified Program Agency (CUPA) responsible for Hazmat, UST, AST, CalARP, Hazardous Waste generators, Hazardous Waste Treatment, etc.	☒ No records exist	☐	☐	☐
State and / or local health agency or local / regional office of state health agency serving the area in which the property is located.	County Department of Health Services (Public Health Investigations)	☒ No records exist	☐	☐	☐
State and / or local agency or local / regional office of state agency having jurisdiction over hazardous waste, treatment, storage, and disposal or other environmental matters in the area which the property is located.	Department of Toxic Substances Control (DTSC) and / or CUPA (responsible for Hazmat, UST, AST, CalARP, Hazardous Waste generators, Hazardous Waste Treatment, etc.)	☒ No records exist	☐	☐	☐
Local agencies responsible for the issuance of building permits or groundwater use permits that document the presence of AULs which may identify a *recognized environmental condition* in the area in which the property is located.	LA City Department of Public Works, Board of Public Works and / or local Building & Safety	☒	☐	☐	☐
State and / or Regional Agency having jurisdiction over surface (including storm water) and groundwater quality at the target property.	Local Region - California Regional Water Quality Control Board	☒ No records exist	☐	☐	☐
Regional or local Agency having jurisdiction over air quality.	Local Air Quality Management District ☒ SCAQMD ☐ Santa Barbara APCD ☐VCAPCD ☐ SJVAPCD ☐ Other _____	☒ No records exist	☐	☐	☐
Regional or local agency with jurisdiction over discharge of industrial waste water.	☒ LA County Sanitation Districts ☐ LA City Bureau of Sanitation ☐ Other _____	☒ No discharge / No records exist	☐	☐	☐

*Not reasonably ascertainable

[4] 40 CFR §312.30(c)(2) and ASTM E1527-13, Section 11, including 11.1-11.5.1.4

6.0 EVALUATION

6.1 Definitions – RECs, CRECs, HRECs, and de minimis Conditions

Recognized Environmental Conditions (REC):

"The presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. *De minimis* conditions are not *recognized environmental conditions*."

[ASTM Standard Practice E1527-13 (3.2.78)]

Controlled Recognized Environmental Condition (CREC):

"A *recognized environmental condition* resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority (for example, as evidenced by the issuance of a no further action letter or equivalent, or meeting risk-based criteria established by regulatory authority), with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls (for example, property use restrictions, activity and use limitations, institutional controls, or engineering controls)."

[ASTM Standard Practice E1527-13 (3.2.18)]

Historical Recognized Environmental Condition (HREC):

"A past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted use criteria established by a regulatory authority, without subjecting the property to any required controls (for example, property use restrictions, activity and use limitations, institutional controls, or engineering controls)."

[ASTM Standard Practice E1527-13 (3.2.42)]

de minimis Condition:

"A 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. Conditions determined to be *de minimis conditions* are not *recognized environmental conditions* nor *controlled recognized environmental conditions*."

[ASTM Standard Practice E1527-13 (3.2.22)]

6.2 Findings

This section identifies known or suspect *recognized environmental conditions*, *controlled recognized environmental conditions*, *historical recognized environmental conditions*, *de minimis* and other environmental conditions. The following sources were evaluated for their potential to constitute *REC*s, *CREC*s, *HREC*s, and *de minimis* conditions among other environmental conditions:

- Historical Aerial Photographs (minimum of the last 40 years, but from as early as possible = 1928);
- Federal, State, Local, and Tribal Environmental and Governmental Database(s);
- Records Searches
- Site Inspection(s);
- Personal Interviews with past and present owners, operators, and occupants;
- Historical Topographic and Other Maps, Drawings or Reports; and
- Searches of Recorded Environmental Cleanup liens.

Information gained from this detailed scope of services performed as a Phase I Environmental Site Assessment for the **target property** indicates:

Condition Description	No Evidence in connection with the target property	Evidence in connection with the target property, as follows:
Recognized Environmental Condition	☐	Eight full or partially filled 5-gallon paint / tar containers
Controlled Recognized Environmental Condition	☒	
Historical Recognized Environmental Condition	☒	
de minimis Condition	☒	
Other Environmental Considerations	☐	(Presumed) asbestos and lead-based paint releases possible during building renovation, demolition and/or disposal. Elevator hydraulic drive unit with ~135 gallon tank contains ~100 gallons of hydraulic fluid presently.

Information gained from this detailed scope of services performed as a Phase I Environmental Site Assessment for **nearby properties** indicates:

Condition Description	No Evidence in connection with nearby properties	Evidence in connection with nearby properties, as follows:
Recognized Environmental Condition	☐	*Bryan Dry Cleaners* PCE / TCE monitoring verification and closure not completed.
Controlled Recognized Environmental Condition	☒	
Historical Recognized Environmental Condition	☒	
de minimis Condition	☒	
Other Environmental Considerations	☒	

6.3 Opinion(s)

The logic and reasoning used by the environmental professional in evaluating information collected during the course of the investigation as it relates to *recognized environmental conditions* is discussed below:

- Recognized Environmental Conditions:

  Known or suspected environmental conditions on or near the target property indicate current or known previous activities are:

☐ **NOT** expected to constitute the potential for *recognized environmental conditions*.

☒ **EXPECTED** to represent at least one actual or the potential for at least one *recognized environmental condition*.

- Business Environmental Risk[5]:

☒ The nature and extent of current and known previous operations on this property are **NOT** expected to constitute the potential for *business environmental risk*.

☐ The nature and extent of current and known previous operations on this property **ARE** expected to constitute the potential for *business environmental risk*.

- Material Threat[6]:

☒ The subject site **DOES NOT** constitute a *material threat* to public health or the environment.

☐ The subject site **DOES** potentially constitute a *material threat* to public health or the environment.

[5] *Business Environmental Risk* – A risk which can have a material environmental or environmentally-driven impact on the business associated with the current or planned use of a parcel of commercial real estate, not necessarily limited to those environmental issues required to be investigated in this practice. Consideration of business environmental risk issues may involve addressing one or more non-scope considerations, some of which are identified in Section 13 (Non-Scope Considerations). [ASTM E1527-13 3.2.11]

[6] *Material Threat* – A physically observable or obvious threat which is reasonable likely to lead to a release that, in the opinion of the environmental professional, is threatening and might result in impact to public health or the environment. An example might include an aboveground storage tank system that contains a hazardous substance and which shows evidence of damage. The damage would represent a material threat if it is deemed serious enough that it may cause or contribute to tank integrity failure with a release of contents to the environment. [ASTM E1527-13 3.2.55]

6.4 Conclusions

Environmental HELP, Inc. (EHI) has performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of EPA Regulation found in 40 CFR Part 312 – All Appropriate Inquiries and the ASTM Standard Practice E1527-13 of: **1124 E. Anaheim Street in the city of Wilmington, California (Assessor's Parcel No. 7424-022-006)**. Any exceptions or additions to, or deletions from, this practice are described in Section 1.4 and 6.5 of this report.

☐ Revealed **NO EVIDENCE** or *recognized environmental conditions (RECs)*, *Controlled Recognized Environmental Conditions (CRECs)*, *Historical Recognized Environmental Conditions (HRECs)*, *de minimis* conditions or other environmental considerations in connection with this property.

☒ Revealed evidence of *recognized environmental conditions (RECs)*, *Controlled Recognized Environmental Conditions (CRECs)*, *Historical Recognized Environmental Conditions (HRECs)*, and *de minimis* conditions among other environmental conditions as follows:

PCE / TCE:
The potential for subsurface impact still exists and is related to the unauthorized release of at least PCE and TCE from previous dry cleaning activities at an adjacent property. A plume in groundwater under the southeast corner of the target properties also exists (as described above) and is considered a *REC*.

High risk hydrocarbon impact sites related to previous land use on other adjacent properties or in the surrounding area were also identified and evaluated carefully. Other than what is described here, none were considered *RECs* with respect to the target property.

With swift issuance of a NFA regarding *Bryan Cleaners* (should this be possible) comes the ability to consider subterranean parking in the southeast corner of the property. If a NFA is ***not*** forthcoming out of the LARWQCB, subterranean parking in the southeast corner of the target properties is ***not*** advised; lack of the ability to get *Bryan Cleaners* to site closure may also bring the obligation to prevent the potential for vapor intrusion concerns if subterranean parking is made part of the redevelopment project.

Asbestos / Lead-based Paint
Since the structures on the target properties were built before 1980, lead-based paint and asbestos must be addressed as concerns prior to any renovation, demolition and/or disposal.

Hydraulic Fluid
A freight elevator exists in the southwest corner of the larger front building (16411 Bellflower Blvd.). This elevator appears to have been powered by a hydraulic unit located under the stairs across the hall from this freight elevator. This hydraulic unit has what appears to be a ~135 gallon hydraulic fluid reservoir which is about 80% full (i.e., ~100 gallons). This unit and its contents will require attention / disposal prior to redevelopment.

No *CRECs*, *HRECs*, *de minimis*, or "other" environmental conditions exist on nearby properties (not including *Bryan Cleaners*) which are considered a significant or material threat to the target property (i.e., subsurface impact may exist but is not expected to have migrated in, on, or under the target property).

Environmental Status of Nearby Sites of Concern

Map ID	Company Name and Address	Database(s)	Environmental Status	Environmental Condition Exists? REC Yes	REC No	HREC Yes	HREC No	CREC Yes	CREC No	Has resulted in AUL? Yes	Has resulted in AUL? No
3, 4	BRYAN CLEANERS, Bryan's Cleaners	AIR-DIST-CA	Listed	☐	☒	☐	☒	☐	☒	☐	☒
		Cleaners-CA	Listed	☐	☒	☐	☒	☐	☒	☐	☒
		County-Others-CA	Listed	☐	☒	☐	☒	☐	☒	☐	☒
		CRSP-CA	Listed	☐	☒	☐	☒	☐	☒	☐	☒
		DryCleaners-CA	Listed	☒	☐	☐	☒	☐	☒	☐	☒
		ENF-CA	Listed	☐	☒	☐	☒	☐	☒	☐	☒
		FRS-US	Listed	☐	☒	☐	☒	☐	☒	☐	☒
		Hist-CA	No Longer Listed	☐	☒	☐	☒	☐	☒	☐	☒
		Hist-Cleaners	Listed	☐	☒	☐	☒	☐	☒	☐	☒
		HIST-R4-CA	Listed	☒	☐	☐	☒	☐	☒	☐	☒
		HWIS-CA	Listed	☐	☒	☐	☒	☐	☒	☐	☒
		SLIC-Open-CA	Open – Verification Monitoring	☒	☐	☐	☒	☐	☒	☐	☒
		ENF-Wastewater-CA	Historical	☐	☒	☐	☒	☐	☒	☐	☒

REC = Recognized Environmental Condition
CREC = Controlled Recognized Environmental Condition
HREC = Historical Recognized Environmental Condition
AUL = Activity & Use Limitations

EHI's review of the Environmental Record Search (ERS) RecCheck report results identified 20 nearby sites of potential concern. Careful evaluation of each of these sites was performed. Of the 20 sites reviewed, only one (Map ID #3, listed in the table above) is considered a *REC*[7] in connection with the target property. For further details on the other sites identified, please refer to the ERS RecCheck report included in the appendices of this Phase I ESA report.

If *Recognized Environmental Conditions (RECs)*, *Controlled Recognized Environmental Conditions (CRECs)*, *Historical Recognized Environmental Conditions (HRECs)*, *de minimis conditions* or other environmental considerations are found:

Each party to a transaction must establish its own level of risk tolerance in accordance with internal policies. By EPA rule, one of the primary ways to avoid liability is to consistently follow acceptable and appropriate environmental due diligence procedures. The purpose of this assessment is to satisfy the "all appropriate inquiry" requirement and due diligence procedures so the law can protect "innocent purchasers". After thorough evaluation of the information collected during the course of this investigation related to known or suspect environmental conditions, it is the opinion of the environmental professional(s) involved, based solely on the information gained:

☒ A solution is likely and able to be implemented at reasonable time and cost, or the risk may be subject to indemnification.

☐ The *recognized environmental condition(s)* constitutes a significant concern which may require commitment of significant resources to delineate or resolve.

[7] As defined, a *REC* = "The presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. *De minimis* conditions are not *recognized environmental conditions*." [ASTM Standard Practice E1527-13 (3.2.78)]

6.5 Additional Investigations, Data Gaps, and Deletions

According to ASTM E1527-13, data gaps can occur when the environmental professional is unable to obtain information required by ASTM Standard Designation E1527-13, despite good faith efforts to gather such information. Pursuant to 40 CFR §312 and ASTM E1527-13, only significant data gaps, defined as those which affect the ability of the environmental professional to identify RECs, need to be documented.

Pursuant to ASTM E1527-13, historical sources are required to document property use at five year intervals back to when the property was first developed or back to 1940, whichever is earlier. Data failure is considered a data gap. According to ASTM E1527-13, data failure occurs when all of the standard historical sources which are ascertainable with reasonable effort have been reviewed but the objectives have not been met.

Data gaps affect the ability of the environmental professional to identify *recognized environmental conditions*, and identify for example, say sources of information which were consulted to address the gaps. A property's historical use is not identified back to 1940 because of data failure, but the earliest source reviewed shows the property was undeveloped. This data gap by itself would not be significant.

A data gap is only significant if other information and / or professional experience raises reasonable concerns involving the data gap. For example, if a building on the property is inaccessible during the site visit, and the environmental professional's experience indicates such a building often involves activity which leads to a *recognized environmental condition*, the inability to inspect the building would be a significant data gap warranting comment.

Notwithstanding a data failure, standard historical sources may be excluded if:

1) the sources are not reasonably ascertainable, or

2) past experience indicates the sources are not likely to be useful, accurate, or complete in terms of satisfying the objectives sufficiently. Other historical sources specified in ASTM E1527-13 8.3.4.9 may be used to satisfy the objectives, but are not required to comply with this practice. If data failure is encountered, the report shall document the failure and, if any of the standard historical sources were excluded, give the reasons for their exclusion. If the data failure represents a significant data gap, the report shall comment on the impact of the data gap with regard to how such a data failure might influence the environmental professional's ability to identify *recognized environmental conditions (RECs)*, *Controlled Recognized Environmental Conditions (CRECs)*, *Historical Recognized Environmental Conditions (HRECs)*, *de minimis* conditions or other environmental considerations.

☒ ***EHI*** did not identify any significant data gaps which may affect the ability to identify *RECs*, *CRECs*, *HRECs*, *de minimis* or other environmental conditions.

☐ ***EHI*** identified the following data gaps which may affect the ability to identify *RECs*, *CRECs*, *HRECs*, *de minimis* or other environmental conditions:

1) _____
2) _____
3) _____

6.6 Statement of Conformance, Signature, and References

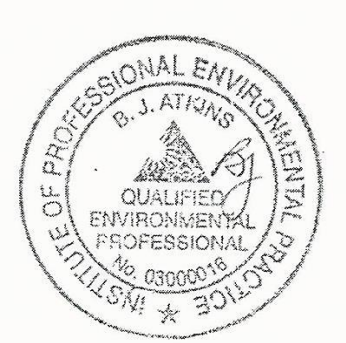
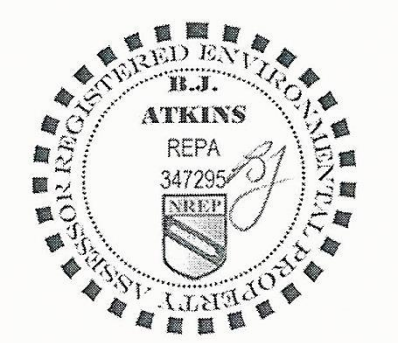
6.6.1 Statement of Conformance

As required by 40 CFR § 312.21(d), **I declare, to the best of my professional knowledge and belief, I meet the definition of *Environmental Professional* as defined in §312.10 of 40 CFR § 312 and ASTM E1527-13 3.2.32.**

I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. I have developed and performed the all appropriate inquires in conformance with the standards and practices set forth in 40 CFR Part 312 and ASTM E1527-13.

6.6.2 Signature

Signature: B.J. Atkins
President
Environmental HELP, Inc. (EHI)

Professional Seal / Stamp:	*Professional Seal / Stamp:*
	
Qualified Environmental Professional QEP No. 03000016	Registered Environmental Property Assessor REPA No. 347295

6.6.3 References

Published referenced sources relied upon in preparing this Phase I Environmental Site Assessment include but are not limited to:

	Reference	Source
1)	*ASTM Standards*: E-1528-93 (5/93) Practice for Environmental Site Assessments: Transaction Screen Process	Annual Book of ASTM Standards (Section 11)
2)	*ASTM Standards*: E-1527-94 (6/94) Practice for Environmental Site Assessments: Transaction Screen Process	Annual Book of ASTM Standards (Section 11)
3)	*ASTM Standards*: E-1527-05 (7/96) Practice for Environmental Site Assessments: Phase II Environmental Site Assessment Process	Annual Book of ASTM Standards (Section 11)
4)	*ASTM Standards*: E-1527-97 (5/97) Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process	Annual Book of ASTM Standards (Section 11)
5)	*ASTM Standards*: E-1527-13 (11/13) Practice for Environmental Site Assessments: Transaction Screen Process	Annual Book of ASTM Standards (Section 11)
6)	*ASTM Standards*: Draft Guide for: Phase I Environmental Site Assessment Process	Annual Book of ASTM Standards (Section 11)
7)	*Site Auditing: Environmental* (1991) Assessment of Property as Revised by Laura McHugh, P.E., R.E.A.	Specialty Technical Publishers
8)	Environmental Site Assessment Fourth Edition (11/94) by George R. Harrison, Ph.D.	Real Estate Law Institute and Lincoln Graduate Center
9)	Real Estate Environmental Screening Third Edition (11/94) by Marvin T. Deane, J.D.	Real Estate Law Institute and Lincoln Graduate Center
10)	ENVIROSTOR Website Maintained by the California Department of Toxic Substances Control (DTSC)	envirostor.dtsc.ca.gov
11)	Standard Handbook of Environmental Engineering (1989) by Robert A. Corbitt	McGraw-Hill, Inc.
12)	*Guide to Environmental Risk Management Policies & Procedures for Financial Institutions* (1993)	Vista Environmental Information, Inc. (Version 1.1)
13)	*40 CFR §312 – All Appropriate Inquiry* (effective November 1, 2006)	Code of Federal Regulations
14)	Air Permits Database	South Coast Air Quality Management District website
15)	Personal Interviews	Owner or representative of the ownership interest(s) of the target property and / or realtor representing sellers.

7.0 NON-SCOPE SERVICES

7.1 Additional Appropriate Investigation or Recommendations

An opinion regarding appropriate further investigation to detect the presence of hazardous substances or petroleum products is provided below. This opinion should be acted upon if greater certainty is required regarding the identified *Recognized Environmental Conditions (RECs)*, *Controlled Recognized Environmental Conditions (CRECs)*, *Historical Recognized Environmental Conditions (HRECs)*, *de minimis* conditions or other environmental considerations.

Further investigation such as sampling, analysis or other non-scope considerations which may be required to provide a complete assessment are:

☐ **NOT** recommended.

☒ Recommended.

An Asbestos Building Inspection survey should be performed. If detected, asbestos abatement by a licensed contractor must be completed.

A lead-based paint survey (XRF) should be performed. If appropriate, lead abatement should also be completed.

Disposal of the ~100 gallons of hydraulic fluid remaining in the freight elevator hydraulic power unit should be completed. Once "empty[8]", the hydraulic power unit can be sent to a scrap metal dealer.

7.2 Non-Scope Considerations

The following are several non-scope considerations which may be required to provide a more complete assessment in connection with this real estate transaction[9]:

☐ **NO ADDITIONAL** issues or non-scope considerations need to be assessed.

☒ The following issues or non-scope considerations are recommended:
(see table below)

[8] "Empty" means no fluid drips in a steady stream from the hydraulic fluid reservoir when held in any orientation.

[9] NOTE: No implication is intended as to the relative importance of inquiry into these items and this list is not all-inclusive.

Is Recommended	Used for this Phase I	Not Applicable	Non-Scope Consideration
☒	☐	☐	*Asbestos Containing Material (ACM): Asbestos Survey
☐	☐	☒	Radon: Radon Survey
☒	☐	☐	*Lead-Based Paint (LBP): Lead-Based Paint Survey
☐	☐	☒	Lead in Drinking Water
☐	☐	☒	Wetlands Delineation and Ecological Integrity Assessment
☐	☐	☒	Regulatory Compliance Inspections / Audits
☐	☐	☒	Cultural and Historical Resources: Archeological Survey
☐	☐	☒	Industrial Hygiene: Employee Exposure Monitoring
☐	☐	☒	Health and Safety: Worker Safety Assessment
☐	☐	☒	Ecological Resources / Endangered Species: Bio Survey
☐	☐	☒	Indoor Air Quality / Indoor Environmental Assessment
☐	☐	☒	High Voltage Power Lines – Electromagnetic Field(s)
☐	☐	☒	Phase II Environmental Site Assessment: Subsurface Investigation
☐	☐	☒	Potential Vapor Intrusion Condition (p-VIC)
☒	☐	☐	Other: Cleanup / removal of hydraulic fluid in elevator drive unit (under stairs).

+*Comprehensive Survey Recommended at Building Renovation or Demolition

7.3 Summary of Additional Services

☒ No additional services were contracted for between ***Environmental HELP, Inc. (EHI)*** and ***16411 Bellflower, LLC / Serrano Development Group***.

☐ Additional services contracted for between ***16411 Bellflower, LLC / Serrano Development Group*** and ***Environmental HELP, Inc. (EHI)***, including, for example, a broader scope of assessment, more detailed conclusions, liability / risk evaluations, a Phase II Environmental Site Assessment with testing or other assessment activities, remediation techniques, etc. are described below:

1) _____

2) _____

3) _____

8.0 QUALIFICATION(S) OF ENVIRONMENTAL PROFESSIONAL(S)

Being responsible environmentally for the acquisition of nearly one billion dollars in petroleum, commercial, industrial, and residential properties, principals at AEH actively participated in this environmental site assessment.

The principal investigator, Mr. B.J. Atkins, is the Principal Owner of ***Environmental HELP, Inc. (EHI)***. He has nearly 39 years of experience with Phase I and Phase II Environmental Site Assessments, industrial environmental compliance consulting, subsurface investigations, and remediation projects. He has performed numerous environmental site assessments for private interests in the petroleum exploration and production industry as well as for purchasers, lenders and municipalities.

His abbreviated list of Registrations / Certifications follows:

- Certified Indoor Air Quality Professional (CIAQP No. 448);
- Certified Indoor Environmental Consultant (CIEC No. 0604003);
- Qualified Environmental Professional (QEP No. 03000016);
- Registered Environmental Property Assessor (REPA No. 347295);
- Certified Waste Management Professional (CWMP No. 413010110170110);
- Certified Environmental and Safety Compliance Officer (CESCO No. 413010111170110);
- Certified Hazardous Material Manager (CHMM No. 3412);
- California Certified Asbestos Consultant (CAC No. 95-1767);
- Certified Asbestos Building Inspector (ABI No. 02181); and
- Qualified Industrial Stormwater Practitioner (QISP) Trainer of Record (ToR) (QISP ToR No. 006)

DISCLAIMER

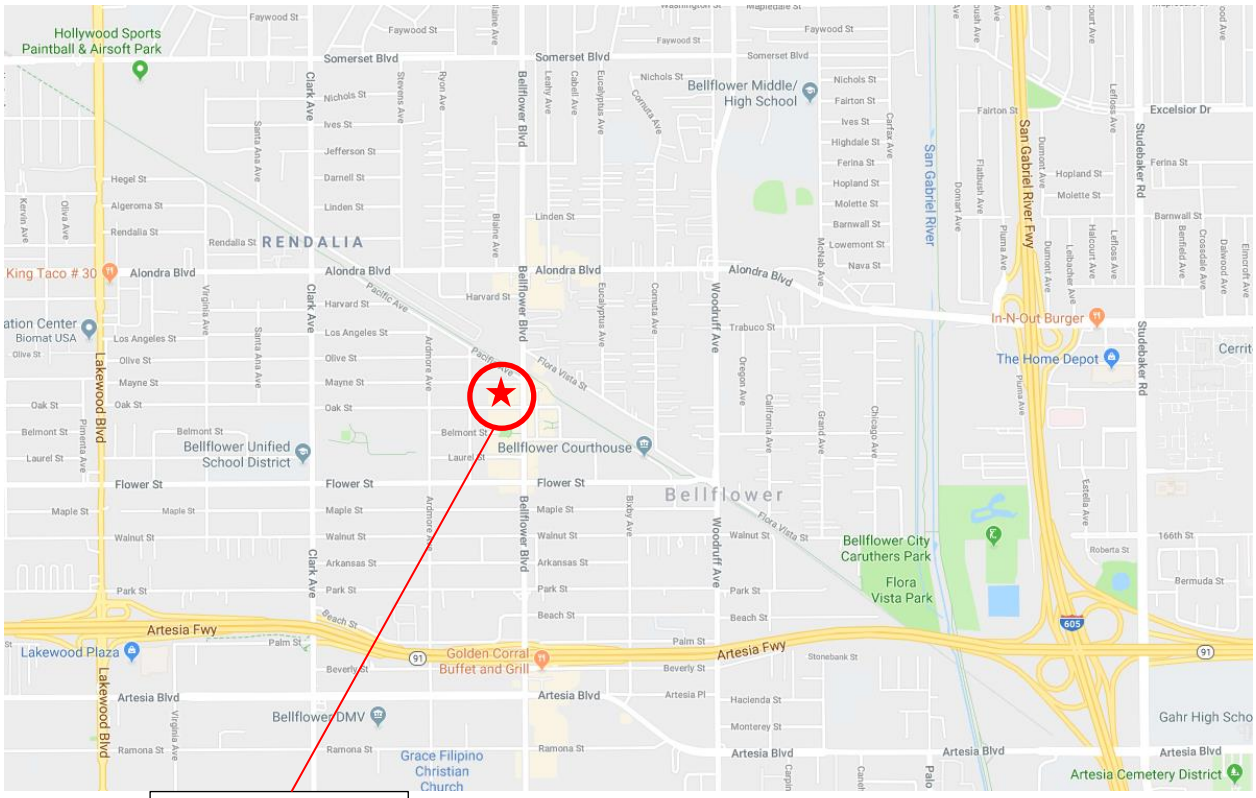
The findings of this report are based on site inspections, discussions/interviews, and review of reasonably available file information from various sources. The accuracy of the findings and conclusions is to the reliability of all these sources of information.

No environmental site assessment can wholly eliminate uncertainty regarding the potential for *recognized environmental conditions* in connection with a property. Performance of this practice (ASTM Standard Designation E-1527-13 and required by the EPA regulation found in 40 CFR §312 – All Appropriate Inquiry) is intended to reduce, but not eliminate, uncertainty regarding the potential for *recognized environmental conditions* in connection with a property, and both practices recognize reasonable limits of time and cost. A subsurface investigation would eliminate a great deal of uncertainty with regard to whether previous industrial activities on this or adjacent properties has resulted in significant residual environmental liability.

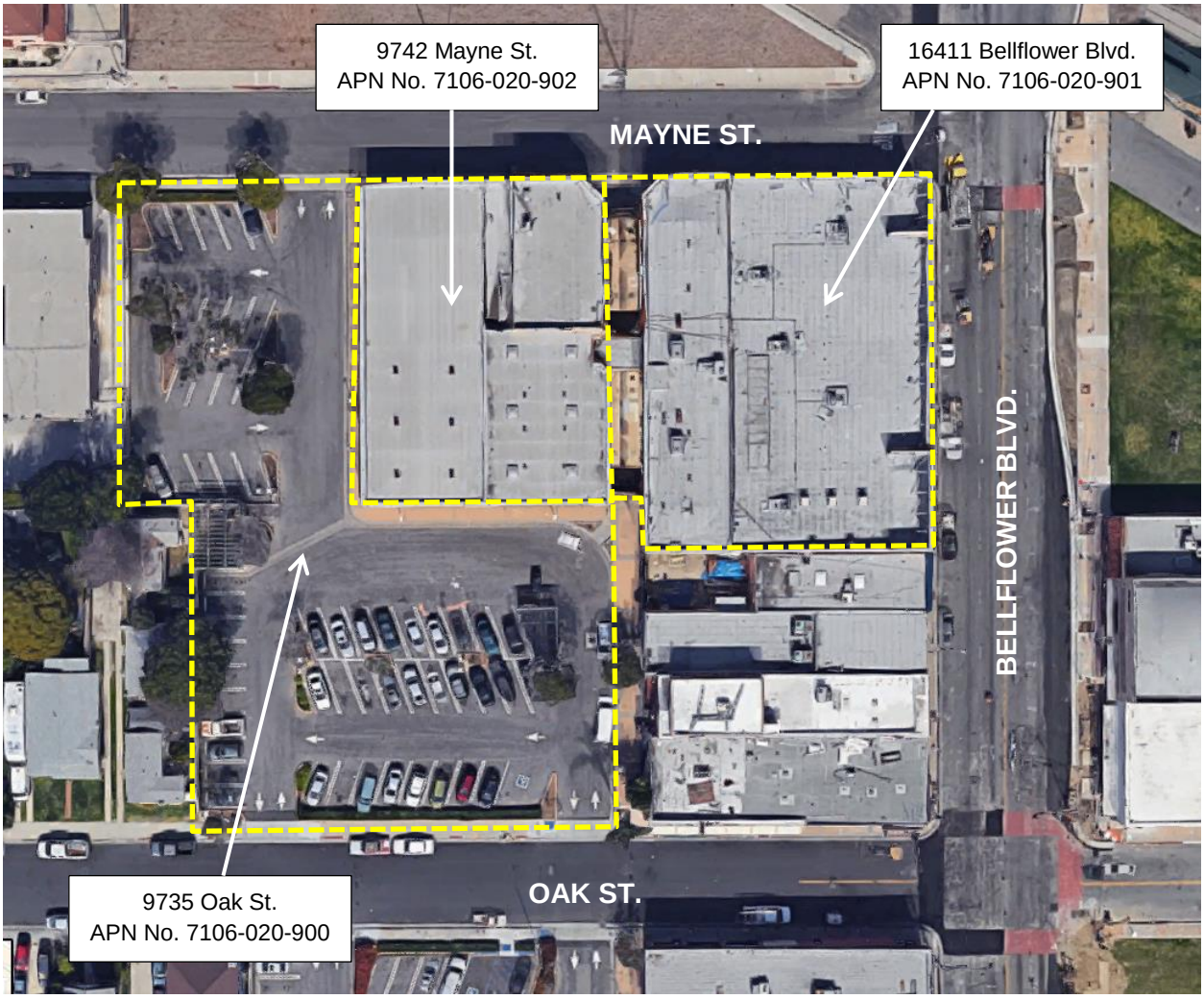
Environmental HELP Inc. shall in no event be liable for any personal injury, property or other damages of any nature whatsoever, whether special, indirect, consequential or compensatory, directly or indirectly resulting from the publication, use or reliance upon these data. These findings are the best professional judgment of the California Registered Environmental Assessor whose signature appears on the document and may be used for the general consideration of the proposed transfer of ownership of this property.

Environmental HELP, Inc. is not responsible for any claims or damages associated with the interpretation of available information. In the event changes in the nature of the property occur, or additional relevant information about the property becomes available, the conclusions and recommendations contained in this report may not be valid unless these changes and additional relevant information are reviewed and the conclusions of this report modified or verified in writing.

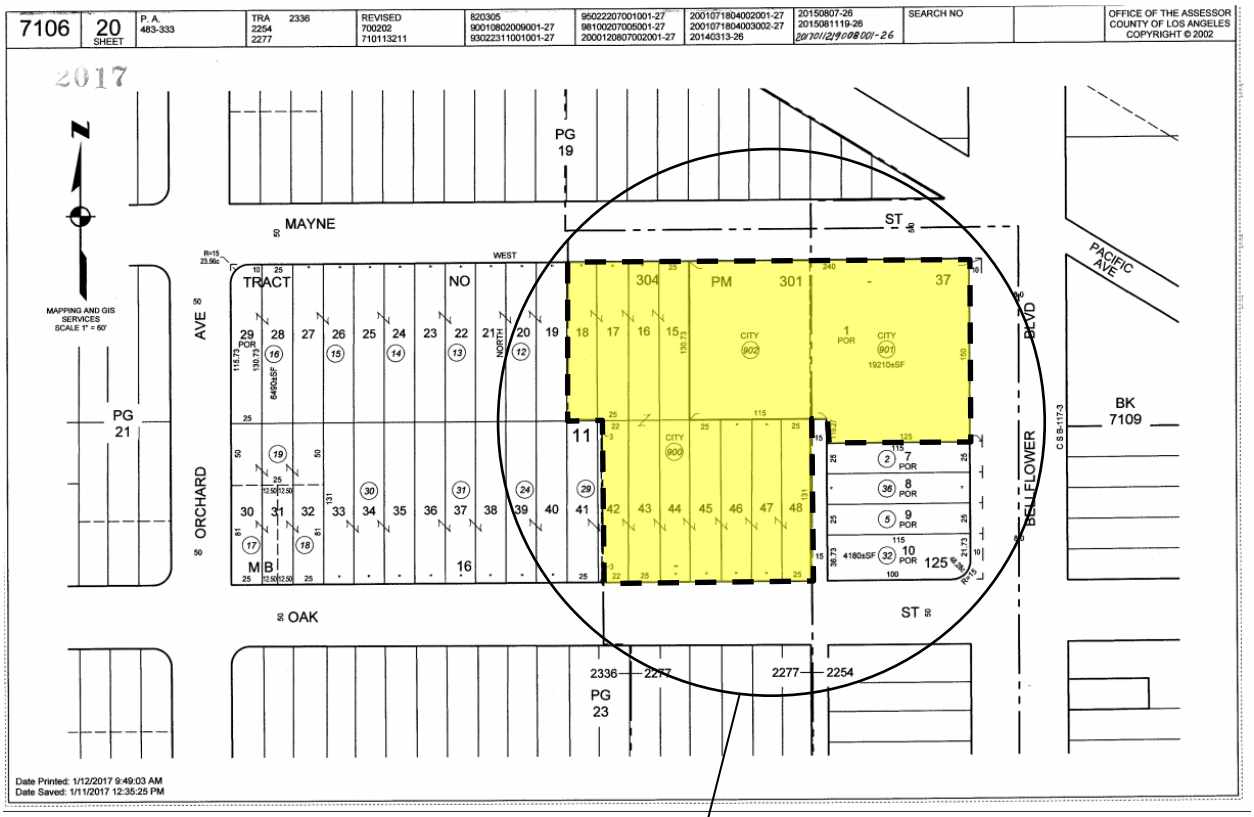
Appendix A.1 Site Vicinity Map

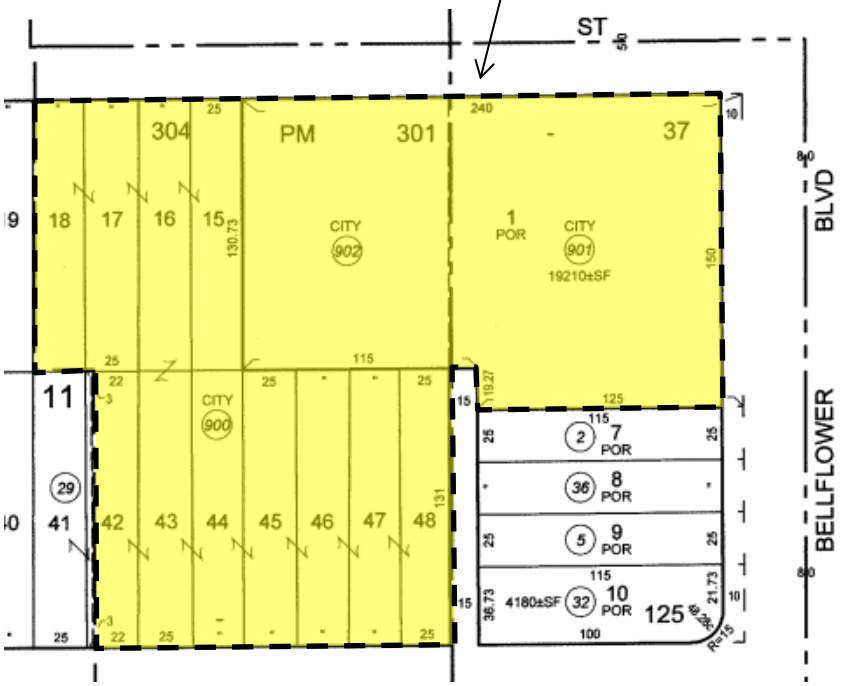


Appendix A.2 Site Plot Plan



Appendix A.3 Parcel Map





Appendix A.4 Historical Research Documentation (if available)

A.4.1 ☒ **Aerial Photographs**

A.4.2 ☒ **Historical Topographic Maps**

A.4.3 ☒ **Fire Insurance (Sanborn®) Maps – N/A**

A.4.4 ☒ **City Directories – N/A**

A.4.5 ☒ **Legal Description**

A.4.6 ☒ **Environmental Lien Search – N/A**

A.4.7 ☐ **Other:** _____

Appendix A.4.1 Aerial Photographs

ERS ENVIRONMENTAL RECORD SEARCH

Historical Aerial Photo
1952

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

Target Site: 33.885170, -118.125879 Job #: 2104701771

ERS ENVIRONMENTAL RECORD SEARCH

Historical Aerial Photo
1963

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

Target Site: 33.885170, -118.125879 Job #: 2104701771

Historical Aerial Photo
1972

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

Target Site: 33.885170, -118.125879 Job #: 2104701771

Historical Aerial Photo
1979

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

Target Site: 33.885170, -118.125879 Job #: 2104701771

ERS ENVIRONMENTAL RECORD SEARCH

Historical Aerial Photo
1989

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

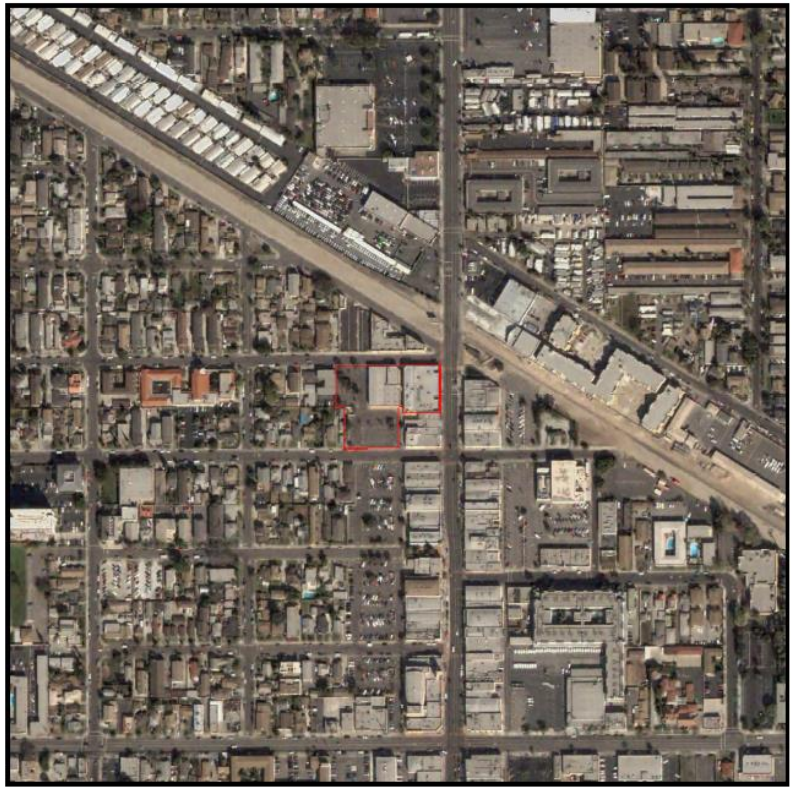
Target Site: 33.885170, -118.125879 Job #: 2104701771

ERS ENVIRONMENTAL RECORD SEARCH

Historical Aerial Photo
1994

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

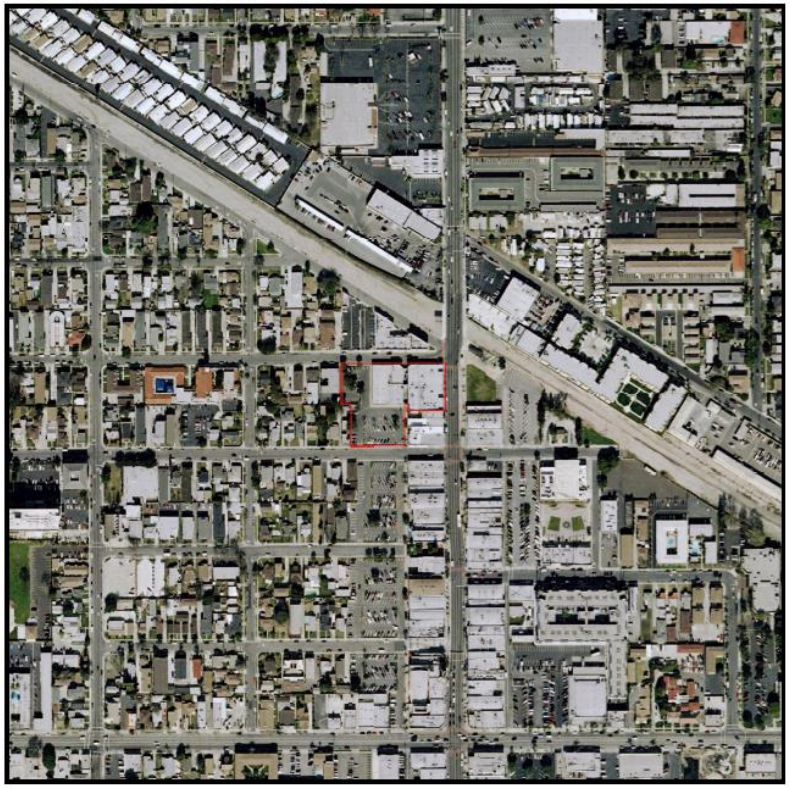
Target Site: 33.885170, -118.125879 Job #: 2104701771



Historical Aerial Photo
2003

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

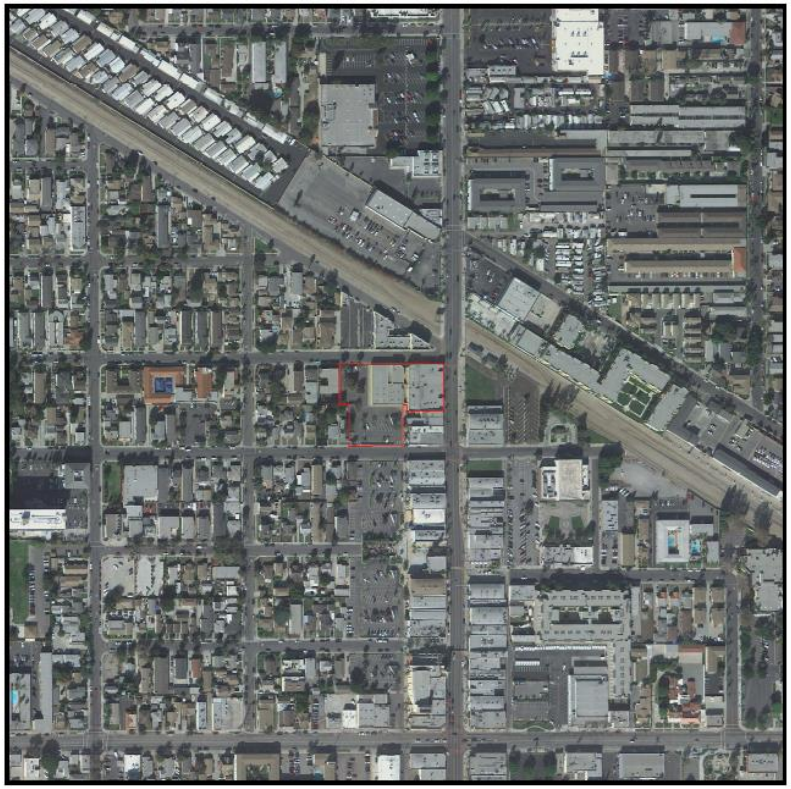
Target Site: 33.885170, -118.125879 Job #: 2104701771



Historical Aerial Photo
2006

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

Target Site: 33.885170, -118.125879 Job #: 2104701771

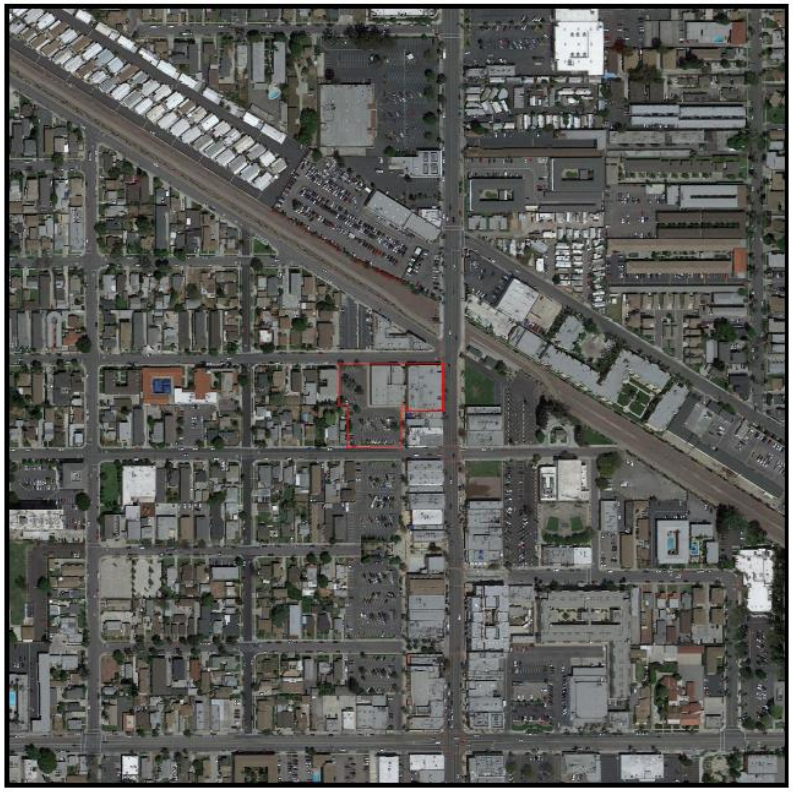


ERS ENVIRONMENTAL RECORD SEARCH

Historical Aerial Photo
2009

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

Target Site: 33.885170, -118.125879 Job #: 2104701771

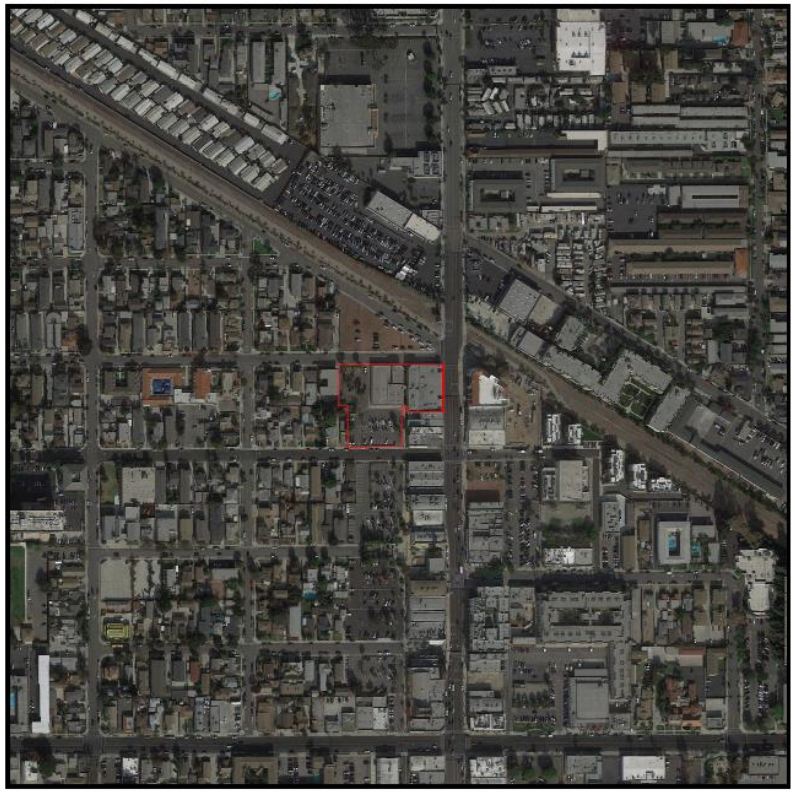


ERS ENVIRONMENTAL RECORD SEARCH

Historical Aerial Photo
2013

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

Target Site: 33.885170, -118.125879 Job #: 2104701771



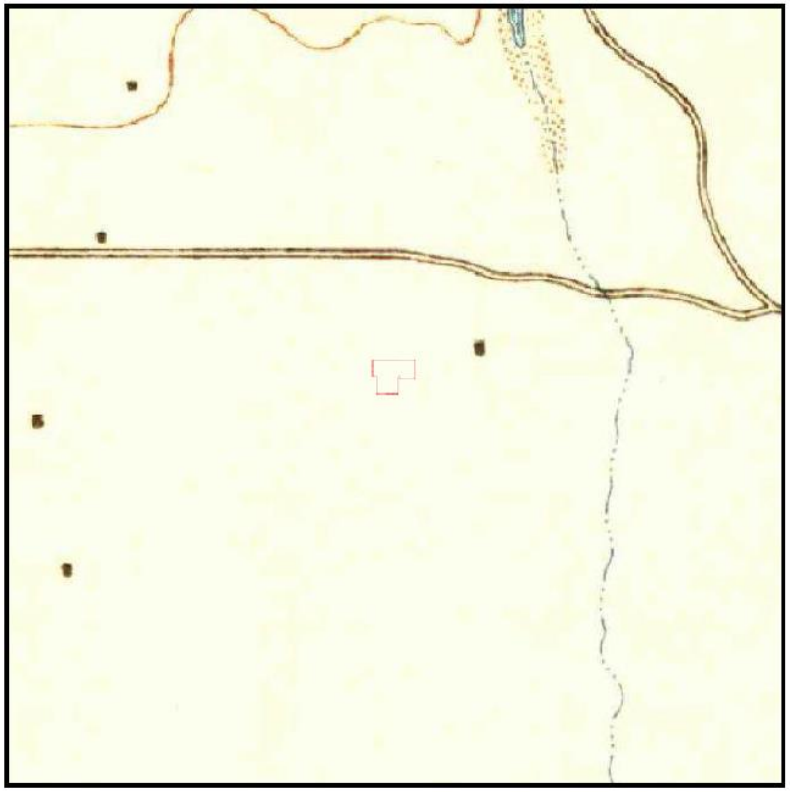
ERS
ENVIRONMENTAL RECORD SEARCH

Historical Aerial Photo
2017

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

Target Site: 33.885170, -118.125879 Job #: 2104701771

Appendix A.4.2 Historical Topographic Maps

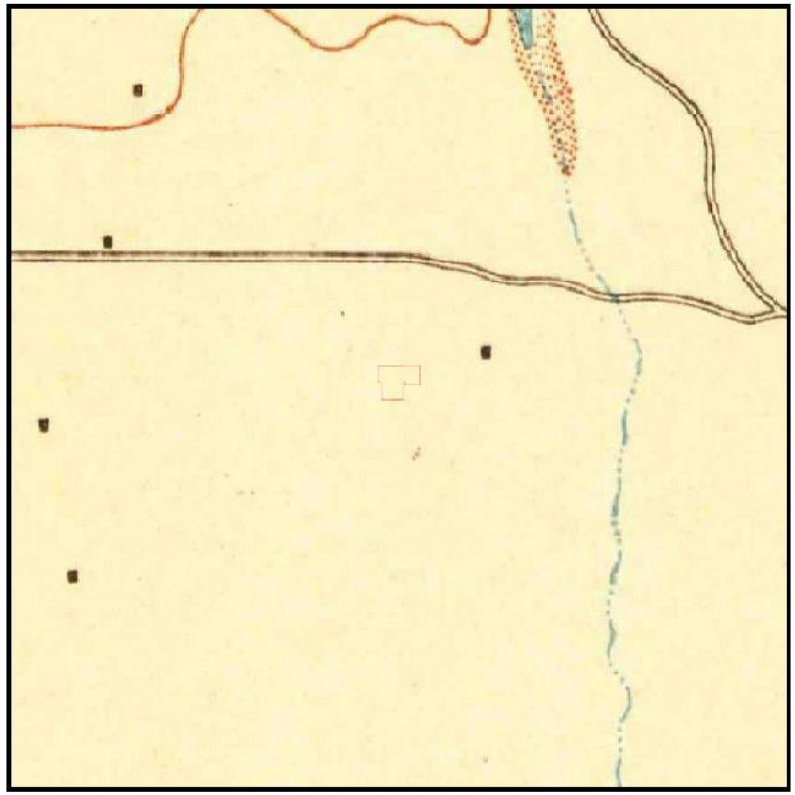


ERS ENVIRONMENTAL RECORD SEARCH

Historical Topographic Map
1896

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

Target Site: 33.885170, -118.125879 Job #: 2104701771

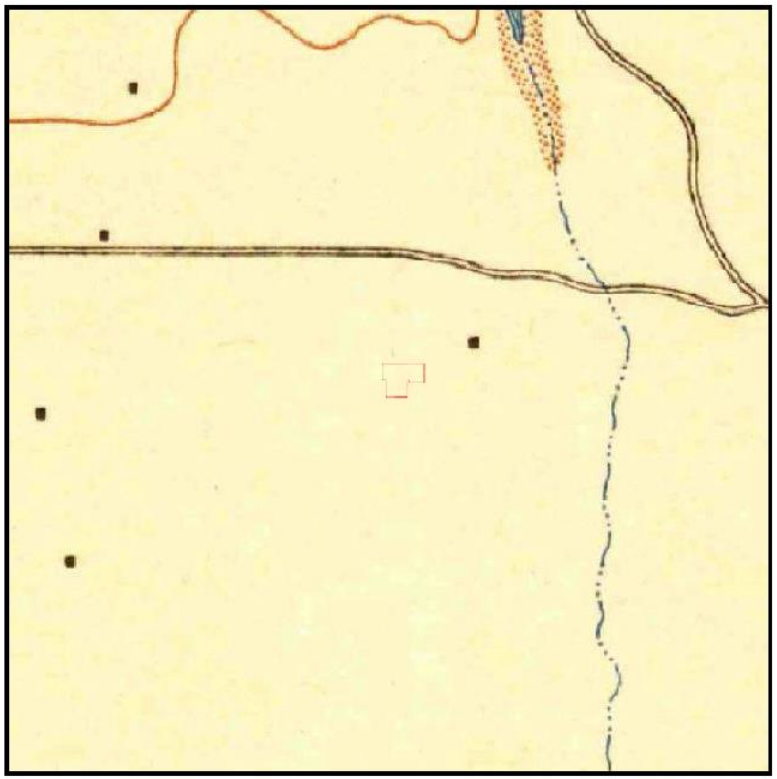


ERS ENVIRONMENTAL RECORD SEARCH

Historical Topographic Map
1906

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

Target Site: 33.885170, -118.125879 Job #: 2104701771



ERS ENVIRONMENTAL RECORD SEARCH

Historical Topographic Map
1916

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

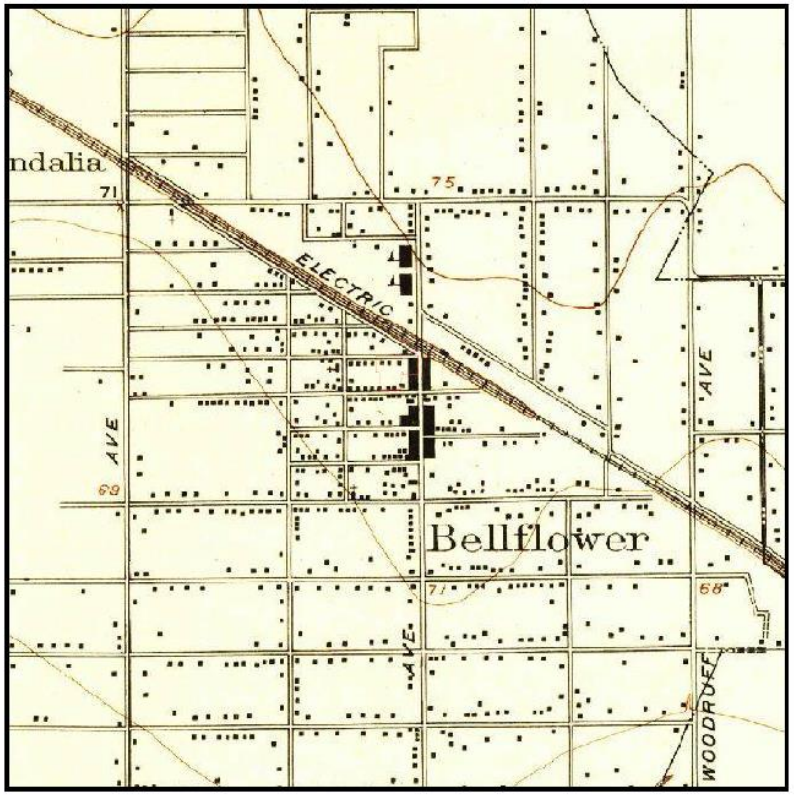
Target Site: 33.885170, -118.125879 Job #: 2104701771

ERS ENVIRONMENTAL RECORD SEARCH

Historical Topographic Map
1925

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

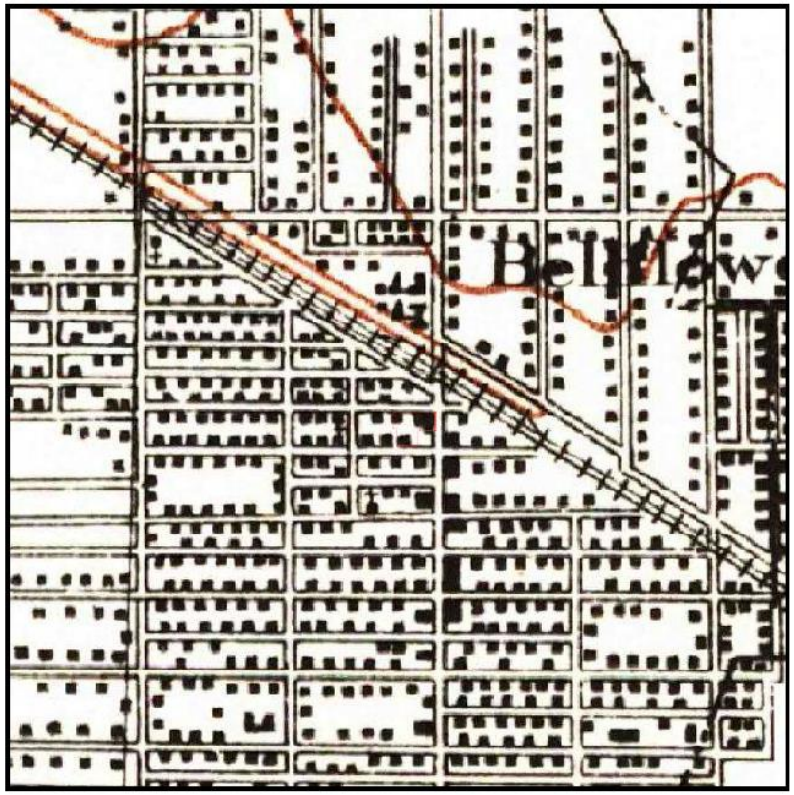
Target Site: 33.885170, -118.125879 Job #: 2104701771



Historical Topographic Map
1932

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

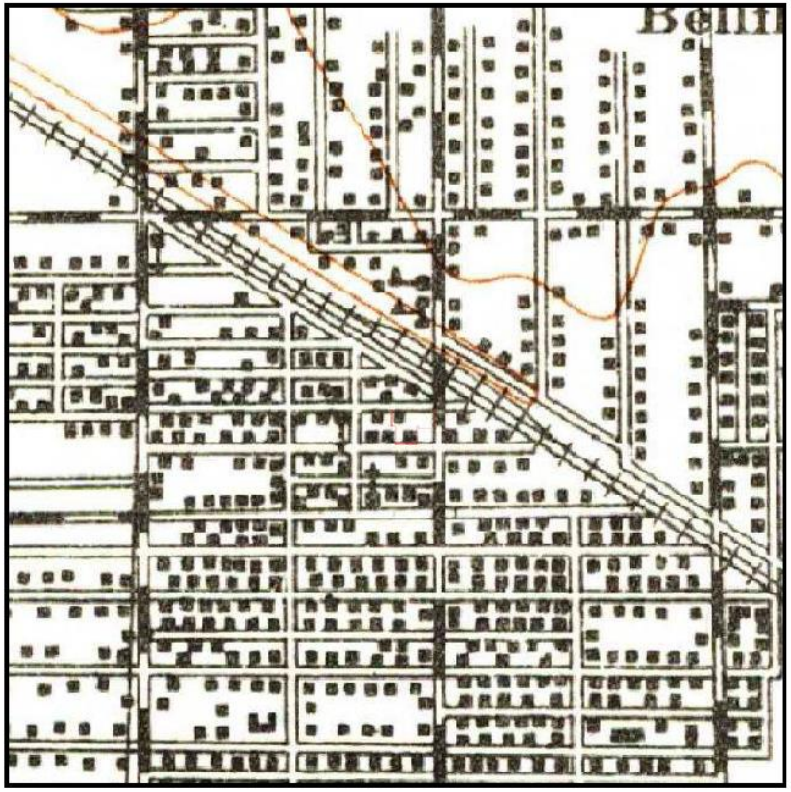
Target Site: 33.885170, -118.125879 Job #: 2104701771



Historical Topographic Map
1942

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

Target Site: 33.885170, -118.125879 Job #: 2104701771

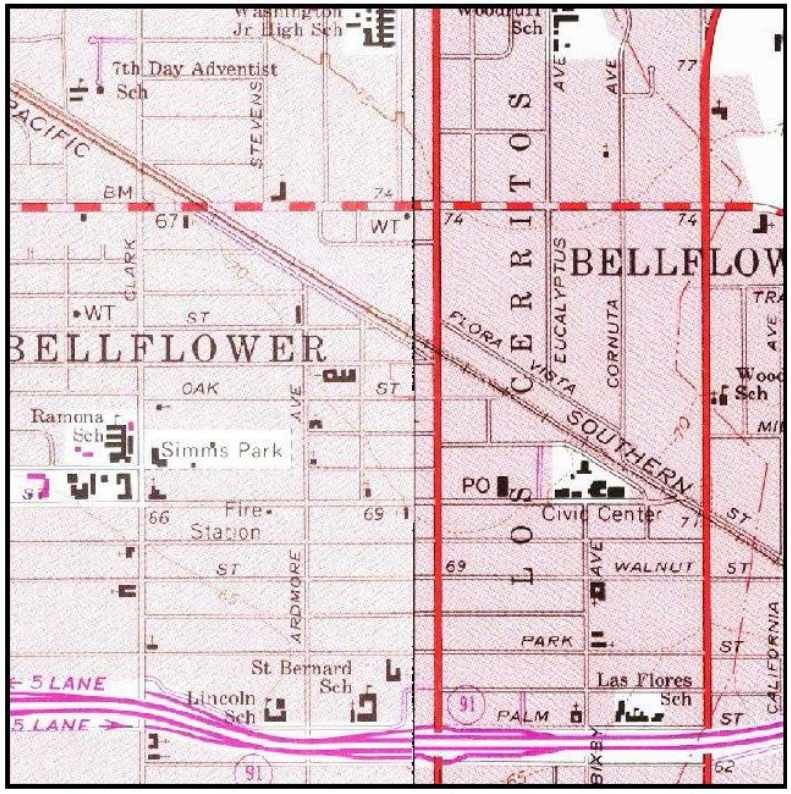


ERS ENVIRONMENTAL RECORD SEARCH

Historical Topographic Map
1963

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

Target Site: 33.885170, -118.125879 Job #: 2104701771

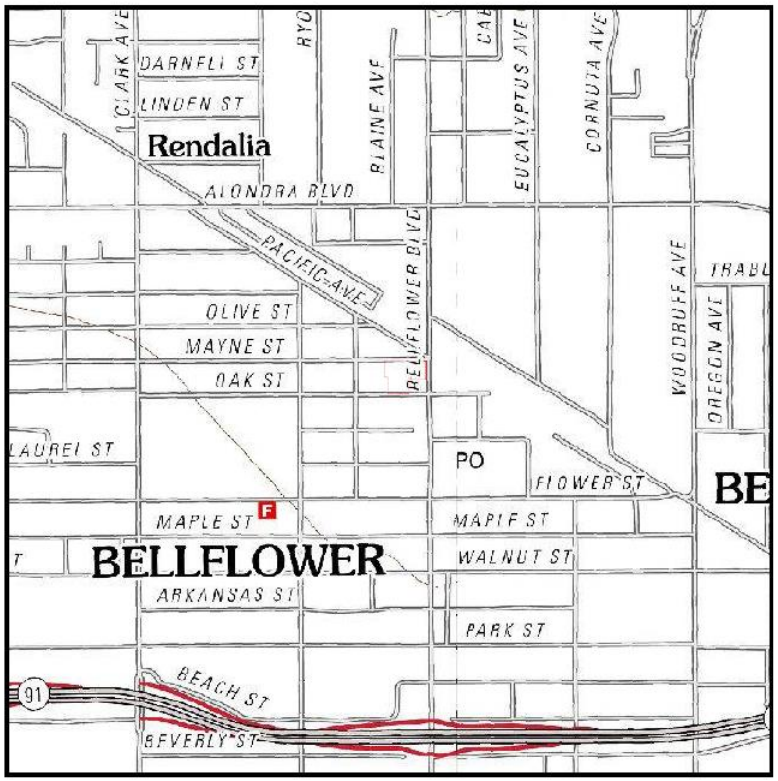


ERS ENVIRONMENTAL RECORD SEARCH

Historical Topographic Map
1982

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

Target Site: 33.885170, -118.125879 Job #: 2104701771

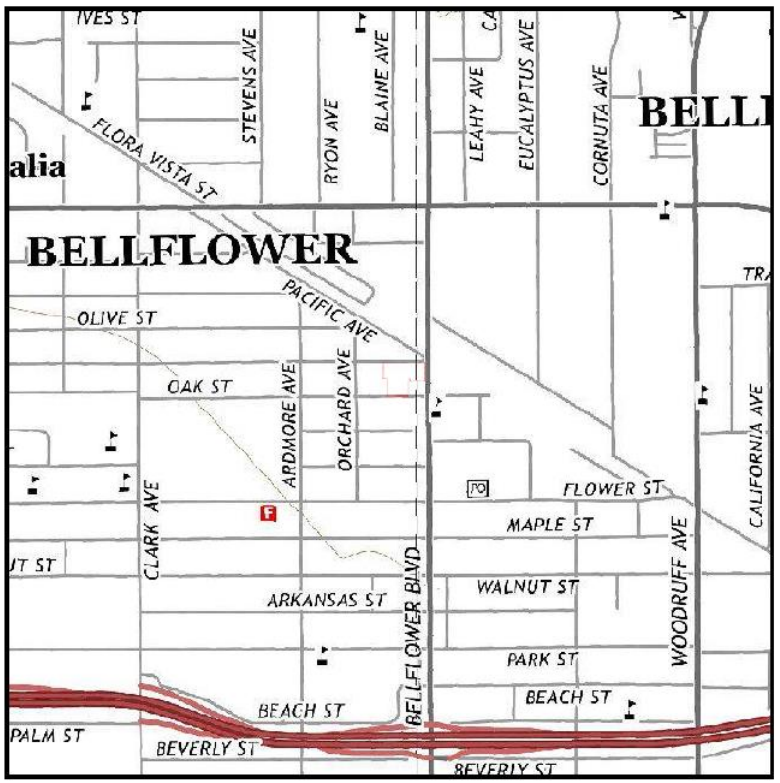


ERS ENVIRONMENTAL RECORD SEARCH

Historical Topographic Map
2012

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

Target Site: 33.885170, -118.125879 Job #: 2104701771



ERS ENVIRONMENTAL RECORD SEARCH

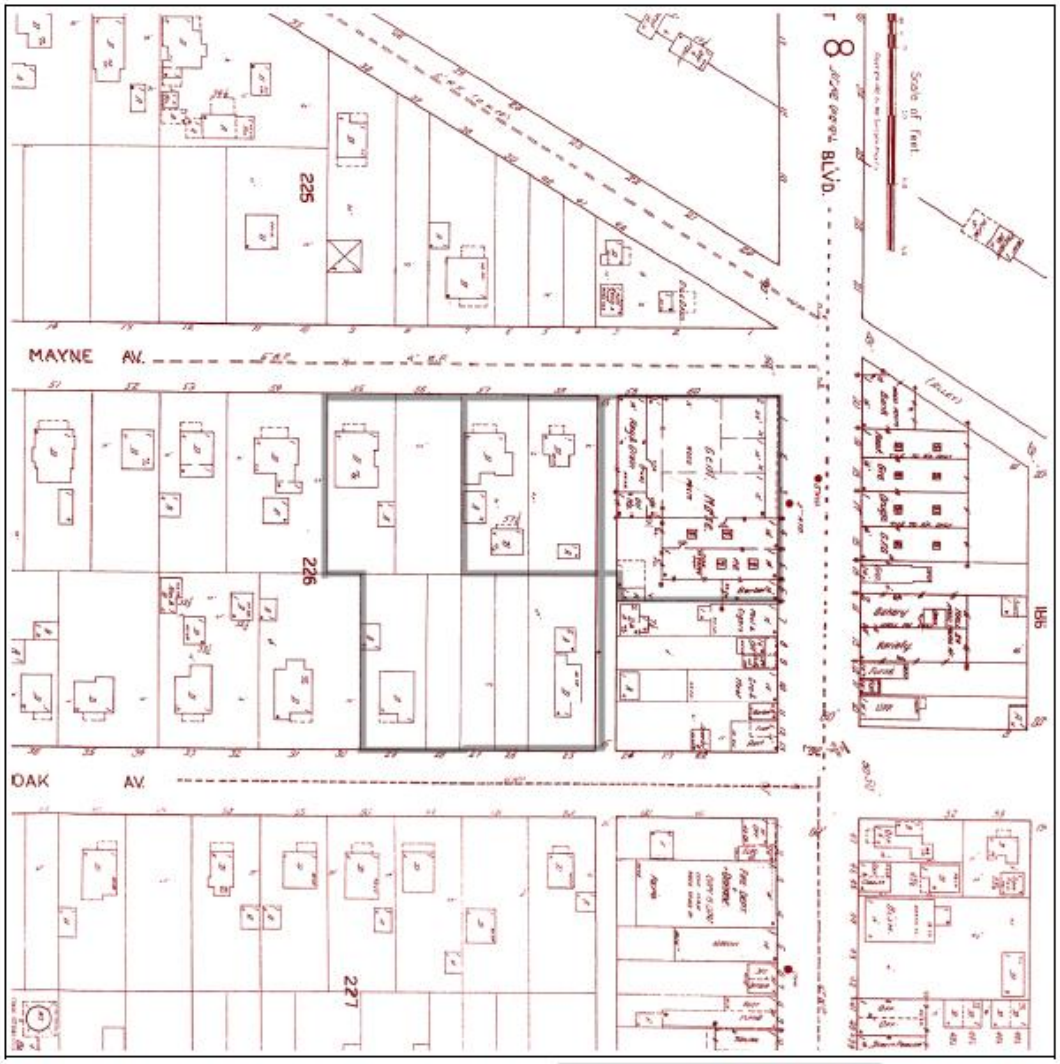
Historical Topographic Map
2015

16411 Bellflower Blvd., 9735 Oak St, 9742 Mayne St
Bellflower, CA

Target Site: 33.885170, -118.125879 Job #: 2104701771

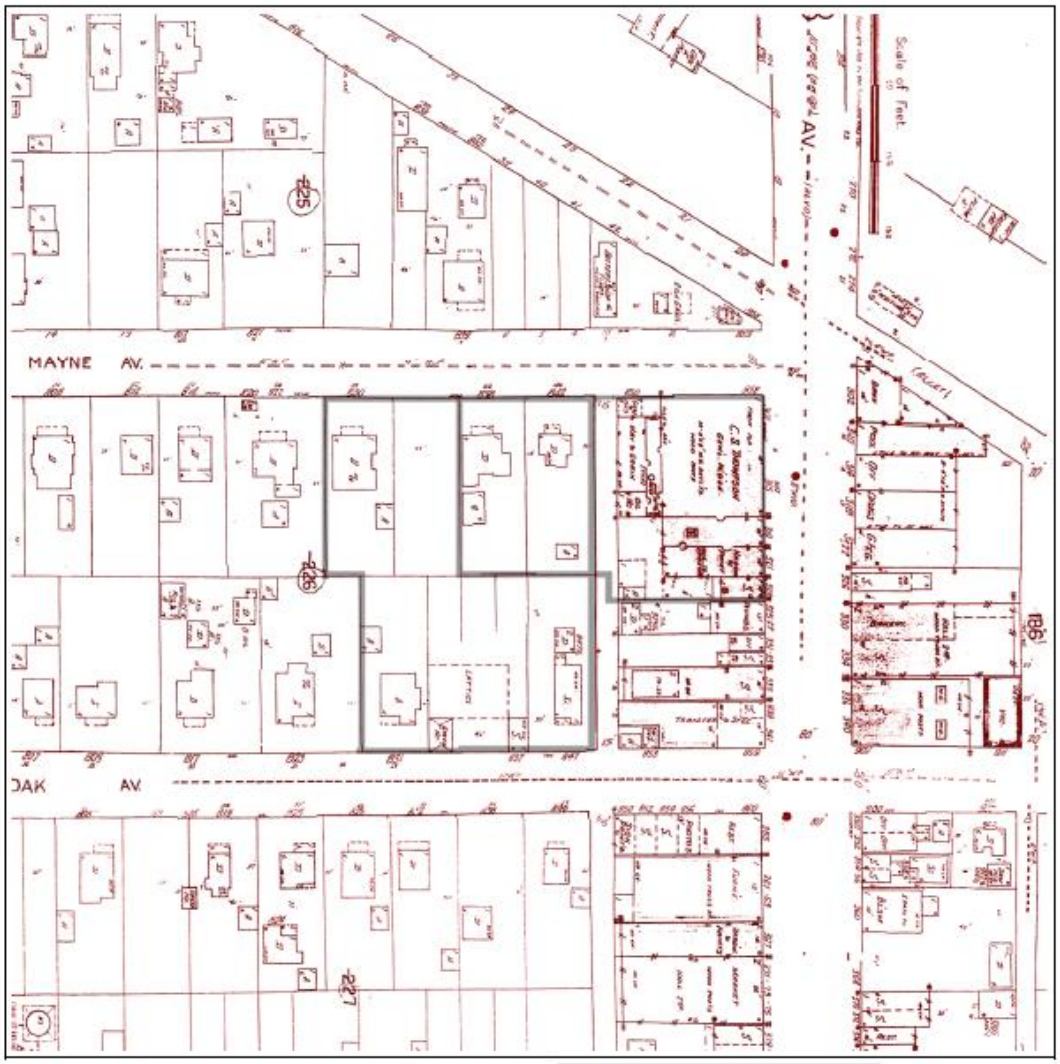
Appendix A.4.3 Fire Insurance (Sanborn®) Maps

ENVIRONMENTAL RECORD SEARCH



Site:		
9735 Oak St, 16411 Bellflower Blvd, & 9742 Mayne St, Bellflower, CA	Year	1925
	Volume	-
	Sheet	3, 4, 8, 9

ENVIRONMENTAL RECORD SEARCH



Site:		
9735 Oak St, 16411 Bellflower Blvd, & 9742 Mayne St, Bellflower, CA	Year	1932
	Volume	-
	Sheet	3, 4, 8, 9

Appendix A.4.4 City Directories

Enclosed are the results of our:

City Directory Research

Thank you for selecting ***Environmental Record Search***!

The attached image files represent the findings of our research of the subject site and immediate adjacent sites.

Streets Researched: 16300-16500 **Bellflower Boulevard** (Subject)
9700-9800 **Mayne Street** (Subject)
9700-9800 **Oak Street** (Subject)

Years researched which did cover your site or adjacent sites:

2005	**2000**	**1997**	**1990**	**1985**
1980	**1974**	**1971**	**1965**	**1961**
1952				

Years researched which did NOT cover your site or adjacent sites:

1940				

ERS's research has been limited to the information presented in the reviewed city directories only. All terms, conditions, and limitations normally associated with work contracted by **ERS** and presented or associated with the city directories are in effect at all times. This letter summary, all its information, and content have been derived from and rely upon the reviewed city directories. **ERS's** research has only been based on these books; **ERS** did not perform any type of independent investigation of any type, including as to the accuracy and/or completeness of the information derived or otherwise obtained from the secondary source or sources.

To view the complete *ERS City Directory Research Report Results*:

City Directory Research.pdf

Appendix A.4.5 Legal Description

The following legal descriptions were provided as part of the *Environmental Lien Research* report results provided by Environmnetal Record Search (ERS):

9735 Oak Street:

LEGAL DESCRIPTION

That part of Lot 42 and all of Lots 15 through 18 and 43 through 48, Block 11 of Tract 304, according to the map or plat thereof, as filed of record in Book 16, Page 125, Los Angeles County, State of California

Assessor's Parcel Number(s): 7106-020-900

16411 Bellflower Boulevard:

LEGAL DESCRIPTION

That part of Parcel 1 of Parcel Map Number 25601, according to the map or plat thereof, as filed of record in Book 301, Page 37, Los Angeles County, State of California

Assessor's Parcel Number(s): 7106-020-901

9742 Mayne Street:

LEGAL DESCRIPTION

That part of Parcel 1 of Parcel Map Number 25601, according to the map or plat thereof, as filed of record in Book 301, Page 37, Los Angeles County, State of California

Assessor's Parcel Number(s): 7106-020-902

Appendix A.4.6 Environmental Lien Search

The Environmental Lien Search Report provides results from a search of available current land title records for environmental cleanup liens and other activity and use limitations, such as engineering controls and institutional controls.

A network of professional, trained researchers, following established procedures, uses client supplied property information to:

- search for parcel information and/or legal description;
- search for ownership information;
- research official land title documents recorded at jurisdictional agencies such as recorders' office, registries of deed, county clerks' offices, etc.;
- access a copy of the deed;
- search for environmental encumbering instrument(s) associated with the deed;
- provide a copy of any environmental encumbrance(s) based upon a review of key words in the instrument(s) (title, parties involved and description); and
- provide a copy of the deed or cite documents reviewed;

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To view the complete *ERS Environmental Lien Research Report Results*:

Environmental Lien Research.pdf

ENVIRONMENTAL LIEN AND AUL REPORT

The NETR Environmental Lien Search Report is intended to assist in the search for environmental liens filed in land title records.

TARGET PROPERTY INFORMATION

ADDRESS

16411 Bellflower Boulevard, 9735 Oak Street and 9742 Mayne Street
Bellflower, California

RESEARCH SOURCE

Source: Los Angeles County Assessor
Los Angeles County Recorder

DEED INFORMATION

Type of Instrument: Grant Deed

Grantor: Edwin C. Hollands

Grantee: City of Bellflower

Deed Dated: 02/21/1968
Deed Recorded: 03/29/1968
Instrument: 8

Type of Instrument: Grant Deed

Grantor: Gail H. Eagleton and Margaret S. Eagleton, husband and wife

Grantee: City of Bellflower

Deed Dated: 03/23/1968
Deed Recorded: 04/18/1968
Instrument: 590

LEGAL DESCRIPTION

That part of Lot 42 and all of Lots 15 through 18 and 43 through 48, Block 11 of Tract 304, according to the map or plat thereof, as filed of record in Book 16, Page 125, Los Angeles County, State of California

Assessor's Parcel Number(s): 7106-020-900

ENVIRONMENTAL LIEN

Environmental Lien: Found ☐ Not Found ☒

OTHER ACTIVITY AND USE LIMITATIONS (AULs)

Other AULs: Found ☐ Not Found ☒

TARGET PROPERTY INFORMATION

ADDRESS

16411 Bellflower Boulevard, 9735 Oak Street and 9742 Mayne Street
Bellflower, California

RESEARCH SOURCE

Source: Los Angeles County Assessor
Los Angeles County Recorder

DEED INFORMATION

Type of Instrument: Grant Deed

Grantor: Paul Rothbard, Trustee of the Paul Rothbard Revocable Living Trust

Grantee: City of Bellflower

Deed Dated: 10/21/2016
Deed Recorded: 10/26/2016
Instrument: 20161317347

LEGAL DESCRIPTION

That part of Parcel 1 of Parcel Map Number 25601, according to the map or plat thereof, as filed of record in Book 301, Page 37, Los Angeles County, State of California

Assessor's Parcel Number(s): 7106-020-901

ENVIRONMENTAL LIEN

Environmental Lien: Found ☐ Not Found ☒

OTHER ACTIVITY AND USE LIMITATIONS (AULs)

Other AULs: Found ☐ Not Found ☒

TARGET PROPERTY INFORMATION

ADDRESS

16411 Bellflower Boulevard, 9735 Oak Street and 9742 Mayne Street
Bellflower, California

RESEARCH SOURCE

Source: Los Angeles County Assessor
Los Angeles County Recorder

DEED INFORMATION

Type of Instrument: Grant Deed

Grantor: Paul Rothbard, Trustee of the Paul Rothbard Revocable Living Trust

Grantee: City of Bellflower

Deed Dated: 10/21/2016
Deed Recorded: 10/26/2016
Instrument: 20161317347

LEGAL DESCRIPTION

That part of Parcel 1 of Parcel Map Number 25601, according to the map or plat thereof, as filed of record in Book 301, Page 37, Los Angeles County, State of California

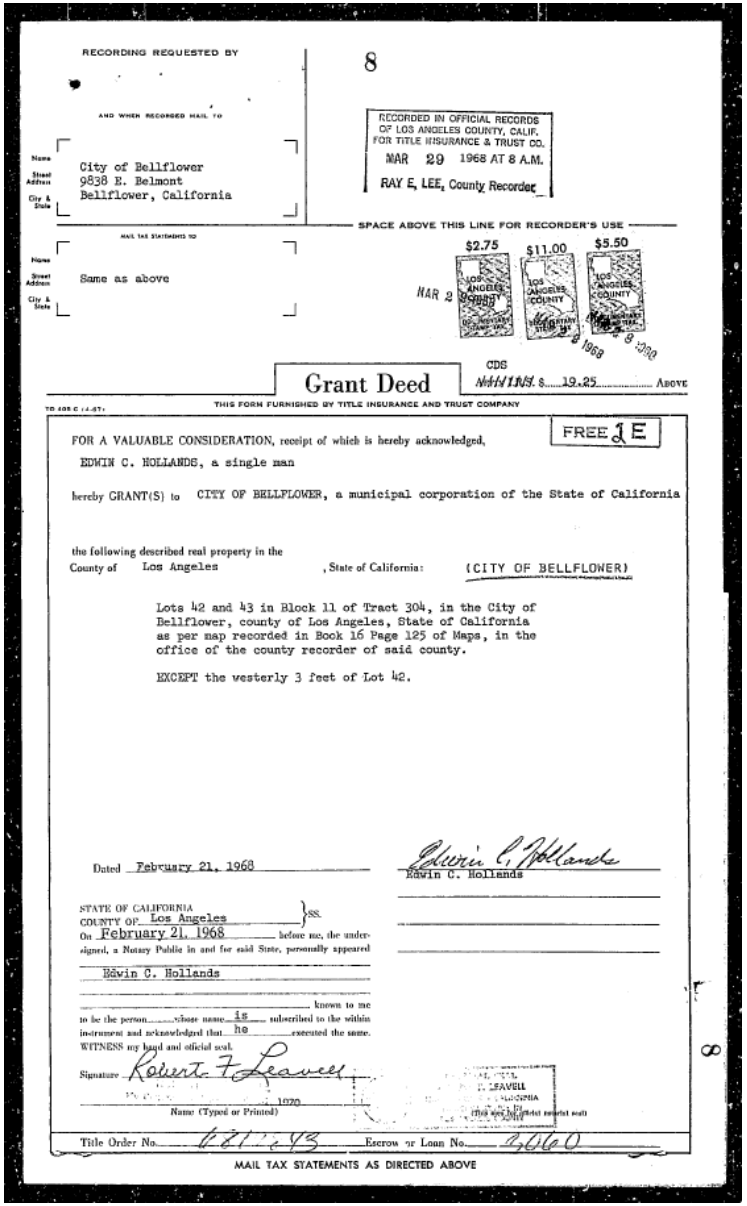
Assessor's Parcel Number(s): 7106-020-902

ENVIRONMENTAL LIEN

Environmental Lien: Found ☐ Not Found ☒

OTHER ACTIVITY AND USE LIMITATIONS (AULs)

Other AULs: Found ☐ Not Found ☒



RECORDING REQUESTED BY

8

AND WHEN RECORDED MAIL TO

Name
Street Address
City & State

City of Bellflower
9838 E. Belmont
Bellflower, California

RECORDED IN OFFICIAL RECORDS OF LOS ANGELES COUNTY, CALIF. FOR TITLE INSURANCE & TRUST CO.
MAR 29 1968 AT 8 A.M.
RAY E. LEE, County Recorder

SPACE ABOVE THIS LINE FOR RECORDER'S USE

MAIL TAX STATEMENTS TO

Name
Street Address
City & State

Same as above

$2.75 $11.00 $5.50

MAR 29 1968

CDS
NNNNNS $ 19.25 ABOVE

Grant Deed

THIS FORM FURNISHED BY TITLE INSURANCE AND TRUST COMPANY

TD 405 C (4-67)

FREE 1 E

FOR A VALUABLE CONSIDERATION, receipt of which is hereby acknowledged,

EDWIN C. HOLLANDS, a single man

hereby GRANT(S) to CITY OF BELLFLOWER, a municipal corporation of the State of California

the following described real property in the County of Los Angeles, State of California: (CITY OF BELLFLOWER)

Lots 42 and 43 in Block 11 of Tract 304, in the City of Bellflower, county of Los Angeles, State of California as per map recorded in Book 16 Page 125 of Maps, in the office of the county recorder of said county.

EXCEPT the westerly 3 feet of Lot 42.

Dated February 21, 1968

Edwin C. Hollands
Edwin C. Hollands

STATE OF CALIFORNIA
COUNTY OF Los Angeles } SS.
On February 21, 1968 before me, the undersigned, a Notary Public in and for said State, personally appeared

Edwin C. Hollands

known to me to be the person whose name is subscribed to the within instrument and acknowledged that he executed the same.
WITNESS my hand and official seal.

Signature Robert F. Leavell

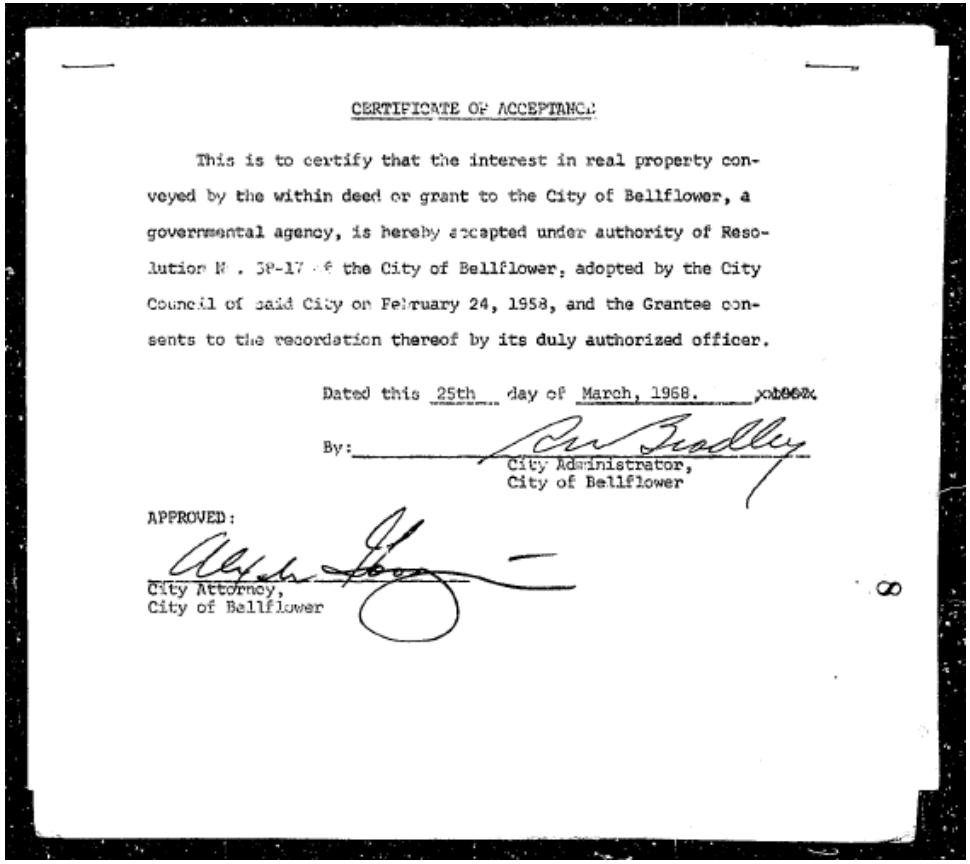
1970
Name (Typed or Printed)

(This area for official notarial seal)

Title Order No. 681-43 Escrow or Loan No. 3060

MAIL TAX STATEMENTS AS DIRECTED ABOVE

8



CERTIFICATE OF ACCEPTANCE

This is to certify that the interest in real property conveyed by the within deed or grant to the City of Bellflower, a governmental agency, is hereby accepted under authority of Resolution No. 58-17 of the City of Bellflower, adopted by the City Council of said City on February 24, 1958, and the Grantee consents to the recordation thereof by its duly authorized officer.

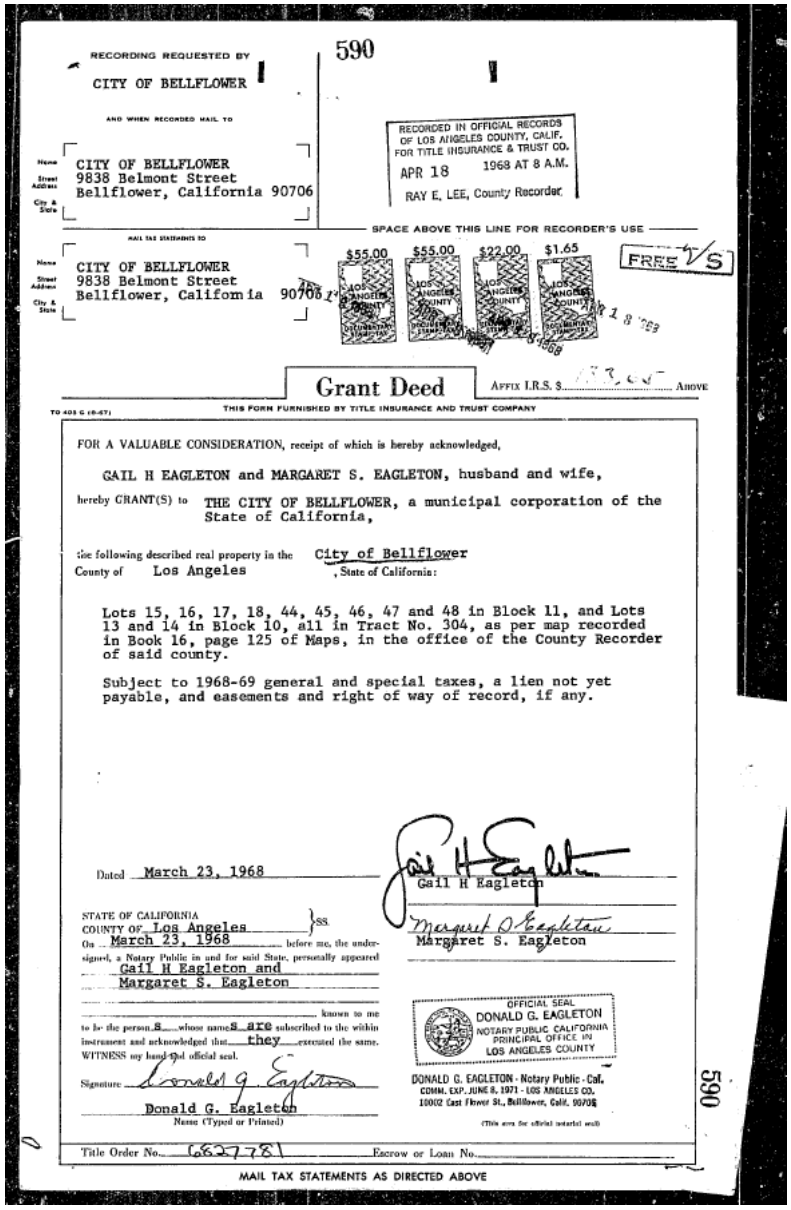
Dated this 25th day of March, 1968.

By: [signature]
City Administrator,
City of Bellflower

APPROVED:

[signature]
City Attorney,
City of Bellflower

8



590

RECORDING REQUESTED BY
CITY OF BELLFLOWER

AND WHEN RECORDED MAIL TO

Name
Street Address
City & State
CITY OF BELLFLOWER
9838 Belmont Street
Bellflower, California 90706

RECORDED IN OFFICIAL RECORDS OF LOS ANGELES COUNTY, CALIF. FOR TITLE INSURANCE & TRUST CO.
APR 18 1968 AT 8 A.M.
RAY E. LEE, County Recorder

SPACE ABOVE THIS LINE FOR RECORDER'S USE

MAIL TAX STATEMENTS TO

Name
Street Address
City & State
CITY OF BELLFLOWER
9838 Belmont Street
Bellflower, California 90706

$55.00 $55.00 $22.00 $1.65

FREE V/S

APR 18 1968

Grant Deed

AFFIX I.R.S. $ ABOVE

TO 403 G (8-67) THIS FORM FURNISHED BY TITLE INSURANCE AND TRUST COMPANY

FOR A VALUABLE CONSIDERATION, receipt of which is hereby acknowledged,

GAIL H EAGLETON and MARGARET S. EAGLETON, husband and wife,

hereby GRANT(S) to THE CITY OF BELLFLOWER, a municipal corporation of the State of California,

the following described real property in the City of Bellflower
County of Los Angeles, State of California:

Lots 15, 16, 17, 18, 44, 45, 46, 47 and 48 in Block 11, and Lots 13 and 14 in Block 10, all in Tract No. 304, as per map recorded in Book 16, page 125 of Maps, in the office of the County Recorder of said county.

Subject to 1968-69 general and special taxes, a lien not yet payable, and easements and right of way of record, if any.

Dated March 23, 1968

Gail H Eagleton

Margaret S. Eagleton

STATE OF CALIFORNIA
COUNTY OF Los Angeles } ss.
On March 23, 1968 before me, the undersigned, a Notary Public in and for said State, personally appeared Gail H Eagleton and Margaret S. Eagleton known to me to be the person S whose names are subscribed to the within instrument and acknowledged that they executed the same.
WITNESS my hand and official seal.

OFFICIAL SEAL
DONALD G. EAGLETON
NOTARY PUBLIC CALIFORNIA
PRINCIPAL OFFICE IN
LOS ANGELES COUNTY

Signature Donald G. Eagleton
Donald G. Eagleton
Name (Typed or Printed)

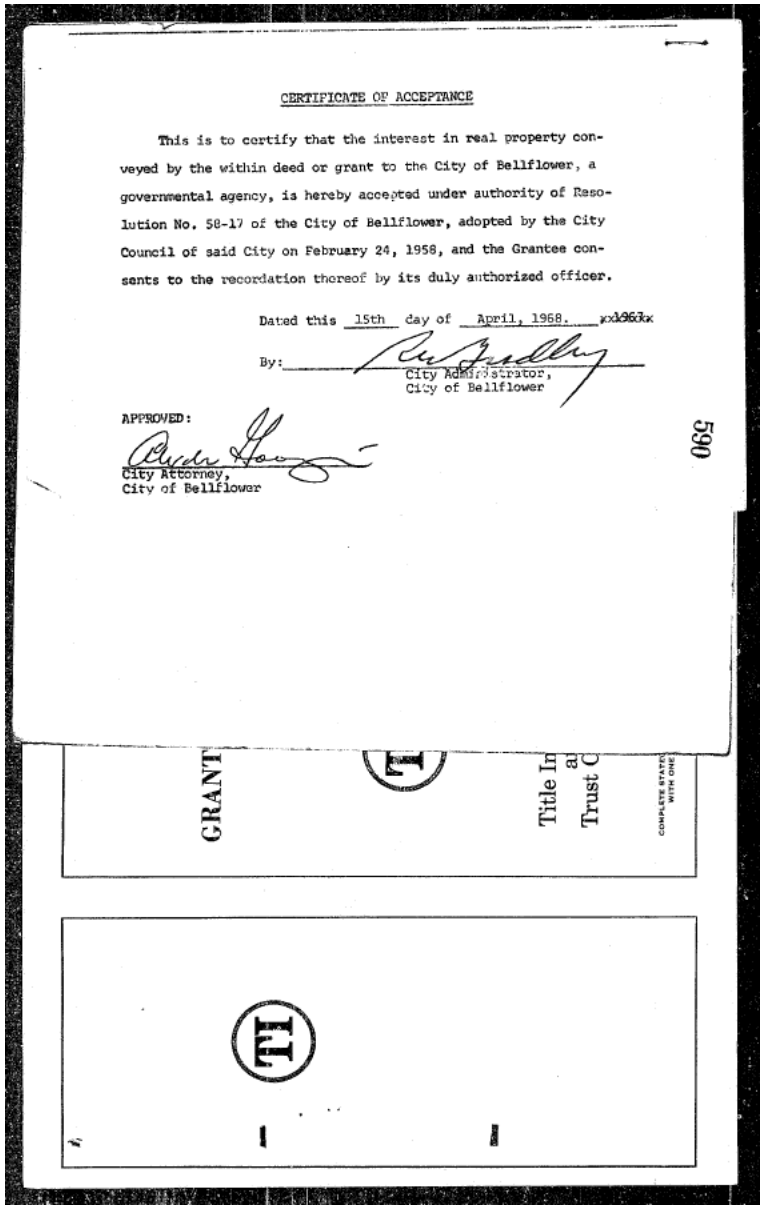
DONALD G. EAGLETON - Notary Public - Cal.
COMM. EXP. JUNE 8, 1971 - LOS ANGELES CO.
10002 East Flower St., Bellflower, Calif. 90706

(This area for official notarial seal)

Title Order No. 682781 Escrow or Loan No.

MAIL TAX STATEMENTS AS DIRECTED ABOVE

590



CERTIFICATE OF ACCEPTANCE

This is to certify that the interest in real property conveyed by the within deed or grant to the City of Bellflower, a governmental agency, is hereby accepted under authority of Resolution No. 58-17 of the City of Bellflower, adopted by the City Council of said City on February 24, 1958, and the Grantee consents to the recordation thereof by its duly authorized officer.

Dated this 15th day of April, 1968. ~~xx1963x~~

By:
City Administrator,
City of Bellflower

APPROVED:
City Attorney,
City of Bellflower

590

GRANT

Title In
a
Trust C

COMPLETE STATE WITH ONE

TI

This page is part of your document - DO NOT DISCARD

20161317347

Recorded/Filed in Official Records
Recorder's Office, Los Angeles County, California

10/26/16 AT 08:00AM

Pages: 0006

FEES:	34.00
TAXES:	0.00
OTHER:	0.00
PAID:	34.00

LEADSHEET

201610261030020

00012836413

007898609

SEQ: 01

SECURE - 8:00AM

THIS FORM IS NOT TO BE DUPLICATED

9180846

RECORDING REQUESTED BY
AND WHEN RECORDED MAIL TO:

Commonwealth Land Title Company
CITY OF BELLFLOWER
16600 Civic Center Drive
Bellflower, CA 90706
Attn: City Clerk

9180946

FREE RECORDING REQUESTED PURSUANT TO GOV. CODE §§ 6103 AND 27383
SPACE ABOVE THIS LINE FOR RECORDER'S USE

GRANT DEED

The undersigned declares there are $0.00 transfer tax

For valuable consideration, the receipt of which is hereby acknowledged,

PAUL ROTHBARD, TRUSTEE OF THE PAUL ROTHBARD REVOCABLE LIVING TRUST, herein called "Grantor," hereby grants to the CITY OF BELLFLOWER, a municipal corporation ("Grantee"), all of its rights, title, and interest in the real property legally described in Exhibit "A" attached hereto and by this reference incorporated herein.

Dated: 10/21/16

"GRANTOR"
PAUL ROTHBARD, TRUSTEE OF THE
PAUL ROTHBARD REVOCABLE LIVING
TRUST

By: _____, TRUSTEE
Paul Rothbard, Trustee

Attachment: Exhibit "A" (Legal Description)

"This conveyance transfers realty to an exempt governmental agency, R&T 11911."

EXHIBIT "A" TO GRANT DEED

LEGAL DESCRIPTION OF THE PROPERTY

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

PARCEL 1 OF PARCELS MAP NO. 25601, IN THE CITY OF BELLFLOWER, COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, AS SHOWN ON THE MAP FILED IN BOOK 301, PAGE 37 OF PARCEL MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

APN: **7106-020-039 and 7106-020-040**
Street Address: **16411 Bellflower Boulevard and 9742 Mayne Street**

ALL- PURPOSE CERTIFICATE OF ACKNOWLEDGMENT

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California }

County of Los Angeles }

On Oct. 21, 2016 before me, Henry A. Guerra, Notary Public
(Here insert name and title of the officer)

personally appeared Paul Rothbard,

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Notary Public Signature (Notary Public Seal)

HENRY A. GUERRA
Commission No. 2055108
NOTARY PUBLIC-CALIFORNIA
LOS ANGELES COUNTY
My Comm. Expires JANUARY 13, 2018

ADDITIONAL OPTIONAL INFORMATION

DESCRIPTION OF THE ATTACHED DOCUMENT

GRANT DEED
(Title or description of attached document)

(Title or description of attached document continued)

Number of Pages ____ Document Date ____

CAPACITY CLAIMED BY THE SIGNER
- ☐ Individual (s)
- ☐ Corporate Officer
  (Title)
- ☐ Partner(s)
- ☐ Attorney-in-Fact
- ☐ Trustee(s)
- ☐ Other ____

2015 Version www.NotaryClasses.com 800-873-9865

INSTRUCTIONS FOR COMPLETING THIS FORM

This form complies with current California statutes regarding notary wording and, if needed, should be completed and attached to the document. Acknowledgments from other states may be completed for documents being sent to that state so long as the wording does not require the California notary to violate California notary law.

- State and County information must be the State and County where the document signer(s) personally appeared before the notary public for acknowledgment.
- Date of notarization must be the date that the signer(s) personally appeared which must also be the same date the acknowledgment is completed.
- The notary public must print his or her name as it appears within his or her commission followed by a comma and then your title (notary public).
- Print the name(s) of document signer(s) who personally appear at the time of notarization.
- Indicate the correct singular or plural forms by crossing off incorrect forms (i.e. he/she/they- is /are) or circling the correct forms. Failure to correctly indicate this information may lead to rejection of document recording.
- The notary seal impression must be clear and photographically reproducible. Impression must not cover text or lines. If seal impression smudges, re-seal if a sufficient area permits, otherwise complete a different acknowledgment form.
- Signature of the notary public must match the signature on file with the office of the county clerk.
  - Additional information is not required but could help to ensure this acknowledgment is not misused or attached to a different document.
  - Indicate title or type of attached document, number of pages and date.
  - Indicate the capacity claimed by the signer. If the claimed capacity is a corporate officer, indicate the title (i.e. CEO, CFO, Secretary).
- Securely attach this document to the signed document with a staple.

CERTIFICATE OF ACCEPTANCE

Pursuant to Government Code § 27281, this is to certify that the interest in real property conveyed by the grant deed from Paul Rothbard, Trustee of the Paul Rothbard Revocable Living Trust ("Grantor") to the City of Bellflower, a general law city in Los Angeles, County ("Grantee") is accepted by order of the City Council pursuant to that Agreement for Acquisition of Real Property approved on September 26, 2016, and the Grantee consents to the recordation thereof.

APPROVED AS TO FORM:
OFFICE OF THE CITY ATTORNEY

By: _____
Karl H. Berger,
City Attorney

CITY OF BELLFLOWER,
A Municipal Corporation

By: _____
Jeffrey L. Stewart,
City Manager

ATTEST:

By: _____
Mayra Ochiqui,
City Clerk

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of _____)

See attached

On _____, 201__ before me, _____, Notary Public, personally appeared _____, who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct

WITNESS my hand and official seal.

Signature _____

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT **CIVIL CODE § 1189**

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of Los Angeles)

On September 30, 2016 before me, Mayra Ochiqui, Notary Public
Date *Here Insert Name and Title of the Officer*

personally appeared Jeffrey L. Stewart
Name(s) of Signer(s)

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/~~she/they~~ executed the same in his/~~her/their~~ authorized capacity(~~ies~~), and that by his/~~her/their~~ signature(~~s~~) on the instrument the person(~~s~~), or the entity upon behalf of which the person(~~s~~) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

MAYRA OCHIQUI
Commission # 2030323
Notary Public - California
Los Angeles County
My Comm. Expires Jun 22, 2017

Signature _____
Signature of Notary Public

Place Notary Seal Above

OPTIONAL

Though this section is optional, completing this information can deter alteration of the document or fraudulent reattachment of this form to an unintended document.

Description of Attached Document Certificate of Acceptance
Title or Type of Document: 16411 Bellflower Blvd & 9742 Mayne St Document Date: N/A
Number of Pages: 1 Signer(s) Other Than Named Above: Karl H. Berger; Mayra Ochiqui (not notarized)

Capacity(ies) Claimed by Signer(s)

Signer's Name: Jeffrey L. Stewart	Signer's Name:
☐ Corporate Officer — Title(s):	☐ Corporate Officer — Title(s):
☐ Partner — ☐ Limited ☐ General	☐ Partner — ☐ Limited ☐ General
☐ Individual ☐ Attorney in Fact	☐ Individual ☐ Attorney in Fact
☐ Trustee ☐ Guardian or Conservator	☐ Trustee ☐ Guardian or Conservator
☒ Other: City Manager	☐ Other:
Signer Is Representing: City of Bellflower	Signer Is Representing:

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Appendix A.5 Regulatory Records Documentation (Government Database) (i.e. ERS)

EXECUTIVE SUMMARY

INFORMATION ON THE REQUESTED LOCATION

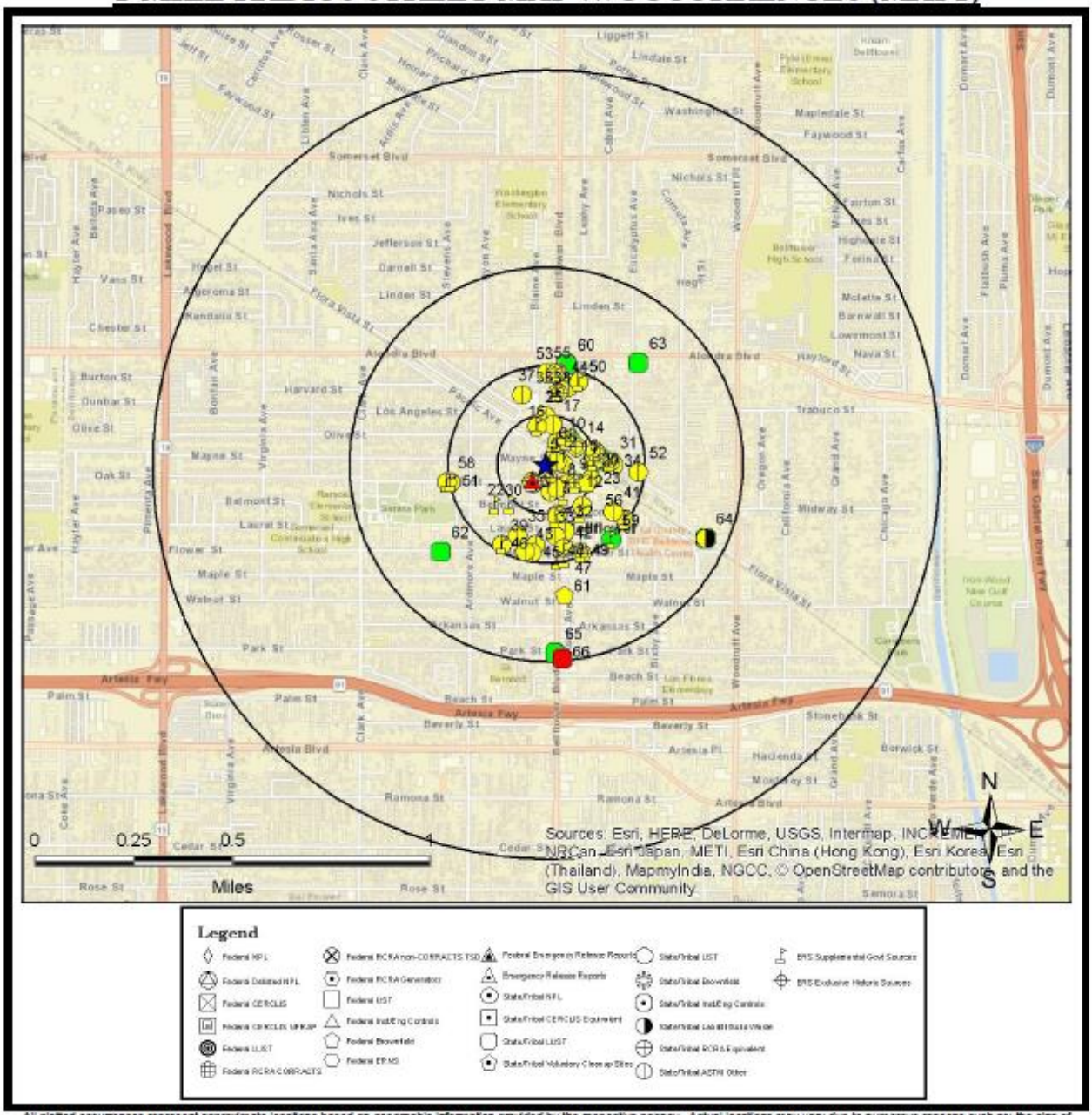
Site Address:	9735 Oak Street, 16411 Bellflower Blvd, and 9742 Mayne Street Bellflower, CA 90706
Client Project Name/Number:	Bellflower Laemmle Mixed-Use BELF618A
Coordinates:	N 33-53-7, W 118-7-33 (NAD 83) 33.88517, -118.125879
Date of Report	December 10, 2018
ERS Project Number:	2104701771
Subject Site Listed on the following lists:	Not Listed
Subject Site Listed as Map ID#:	N/A
USGS 7.5 Minute Quad Map:	South Gate (2015-03-23)
Subject Site Located within a Potential Area of Concern:	No
Township, Section and Range:	Township: 03S Range: 12W Section: 27 Baseline: San Bernardino
Site Elevation: **(feet above or below (-) mean sea level)**	76
Flood Zone: **(FEMA Q3 Digital Data)**	Panel: 06037C1820F, Effective Date: 9/26/2008 Zone X - Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level.
Fire Insurance Map Coverage:	Coverage May Exist in Bellflower. Years: 1925, 1932. Sources: ERS; California State Univ., Northridge ;
Radon Information:	EPA Radon Zone: 2 (Predicted avg for county: 2 to 4 pCi/L)For zip code 90706: Number of tests per zip code: 15 Number of tests where radon is > 4 pCi/L: 0 Percentage of test where radon is > 4 pCi/L: 0.00% Other Information: Not Reported
Search Radius Expansion Size: **(In Miles)**	0

Soil Type: (USDA Soil Survey Geographic Database) (SSURGO)	Urban land-Hueneme, drained-San Emigdio complex, 0 to 2 percent slopes Map Unit Type: Complex Hydric: No Drainage Class: Somewhat poorly drained General Information: Coarse-loamy, mixed, superactive, calcareous, thermic Oxyaquic Xerofluvents
Zip Codes Searched for "Un-Mappable" Sites:	Not Researched
Occurrence Count:	194

To view the complete
ERS RecCheck Report Results:

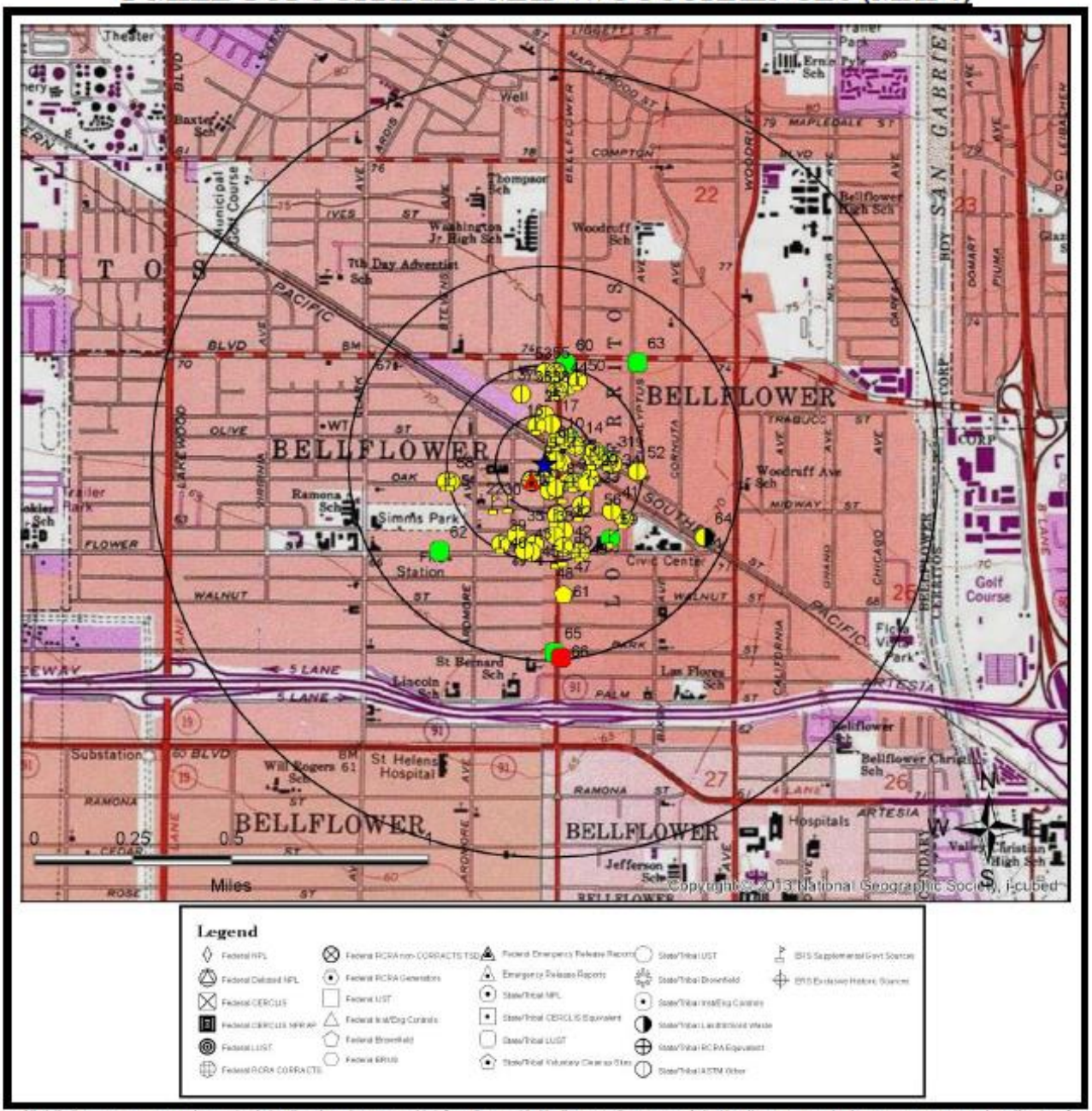
RecCheck.pdf

1-MILE RADIUS STREET MAP W/OCCURRENCES (MAP1)



All plotted occurrences represent approximate locations based on geographic information provided by the respective agency. Actual locations may vary due to numerous reasons such as: the size of the property, accuracy of the provided location, accuracy of the software used to determine the location, etc. **Occurrences are shown in three colors** to give a visual indication of the potential risk of the listed occurrence based on the type of list and the current status of the occurrence. Occurrences shown in **RED** are locations with known contamination that have not received a "case closed" or "no further action" status. Occurrences shown in **YELLOW** have been listed by the respective agency, but do not always represent an environmental risk. The detailed status information and description of the listing should be reviewed for further information. Occurrences shown in **GREEN** are occurrences that have active permits or have had contamination in the past but have received a "case closed" or "no further action" status and therefore, do not likely present an environmental risk.

1-MILE TOPOGRAPHIC MAP W/OCCURRENCES (MAP4)



All plotted occurrences represent approximate locations based on geographic information provided by the respective agency. Actual locations may vary due to numerous reasons such as: the size of the property, accuracy of the provided location, accuracy of the software used to determine the location, etc. **Occurrences are shown in three colors** to give a visual indication of the potential risk of the listed occurrence based on the type of list and the current status of the occurrence. Occurrences shown in **RED** are locations with known contamination that have not received a "case closed" or "no further action" status. Occurrences shown in **YELLOW** have been listed by the respective agency, but do not always represent an environmental risk. The detailed status information and description of the listing should be reviewed for further information. Occurrences shown in **GREEN** are occurrences that have active permits or have had contamination in the past but have received a "case closed" or "no further action" status and therefore, do not likely present an environmental risk.

Appendix A.6 Photos

Elevator Drive Unit Under Stairs.	Elevator Drive Unit 80% full of hydraulic fluid. ~100 gallons to disposal.
Asbestos containing material and lead-based paint surveys recommended in warehouse prior to renovation or demolition & disposal.	Eight paint / tar 5-gallon containers must be removed and disposed of properly from rear (western / central) trash enclosure.

Appendix E

Noise Calculations

Traffic Noise Spreadsheet Calculator

Project: #REF!

Noise Level Descriptor: Ldn
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor:

		Segment Description and Location		Input										Output				
						Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics							Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	Ldn, (dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
ID	R oadway																	
1	Ardmore Avenue	Flower Street	Oak Street	2,000	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	55.4	10	21	46	99
2	Ardmore Avenue	Oak Street	Mayne Street	1,800	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	54.9	9	20	43	92
3	Oak Street	West of Ardmore	0	2,000	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	55.4	10	21	46	99
4	Oak Street	Ardmore Avenue	Orchard Aven	1,900	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	55.2	10	21	44	96
5	Oak Street	Orchard Avenue	site	2,600	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	56.5	12	25	55	118
6	Oak Street	site	Bellflower Bou	2,600	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	56.5	12	25	55	118
7	Mayne Street	Orchard Avenue	Site	2,800	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	56.9	12	27	57	124
8	Mayne Street	Site	Bellflower Bou	2,800	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	56.9	12	27	57	124
9	Bellflower Boulevard	South of Flower	0	14,400	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	64.0	37	79	171	369
10	Bellflower Boulevard	Flower Street	Oak Street	12,500	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	63.4	34	72	156	335
11	Bellflower Boulevard	Oak Street	Mayne Street	13,300	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	63.6	35	75	162	350
12	Bellflower Boulevard	Mayne Street	Alondra Boule	14,500	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	64.0	37	80	172	370
13	Bellflower Boulevard	Alondra Boulevard	North	12,500	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	63.4	34	72	156	335
14	Alondra Boulevard	West of Bellflower Boulevard	0	16,300	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	64.5	40	86	186	400
15	Alondra Boulevard	East of Bellflower	0	16,700	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	64.6	41	88	189	407
16	Flower Street	Orchard Avenue	Bellflower Bou	7,400	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	61.1	24	51	110	236
17	Flower Street	Bellflower Boulevard	East	8,400	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	61.6	26	55	119	257

Traffic Noise Spreadsheet Calculator

Project: #REF!

Noise Level Descriptor: Ldn
Site Conditions: Soft
Traffic Input: ADT
Traffic K-Factor:

		Segment Description and Location		Input										Output				
						Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics							Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	Ldn, (dBA)[5,6,7]	70 dBA	65 dBA	60 dBA	55 dBA
ID	Roadway																	
1	Ardmore Avenue	Flower Street	Oak Street	2,200	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	55.8	11	23	49	105
2	Ardmore Avenue	Oak Street	Mayne Street	1,900	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	55.2	10	21	44	96
3	Oak Street	West of Ardmore	0	2,100	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	55.6	10	22	47	102
4	Oak Street	Ardmore Avenue	Orchard Aven	2,100	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	55.6	10	22	47	102
5	Oak Street	Orchard Avenue	site	2,800	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	56.9	12	27	57	124
6	Oak Street	site	Bellflower Bou	3,100	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	57.3	13	29	61	132
7	Mayne Street	Orchard Avenue	Site	3,200	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	57.4	14	29	63	135
8	Mayne Street	Site	Bellflower Bou	3,800	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	58.2	15	33	70	152
9	Bellflower Boulevard	South of Flower	0	14,800	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	64.1	38	81	174	375
10	Bellflower Boulevard	Flower Street	Oak Street	13,200	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	63.6	35	75	161	348
11	Bellflower Boulevard	Oak Street	Mayne Street	14,100	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	63.9	36	78	169	363
12	Bellflower Boulevard	Mayne Street	Alondra Boule	15,300	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	64.2	38	83	178	384
13	Bellflower Boulevard	Alondra Boulevard	North	12,800	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	63.5	34	73	158	341
14	Alondra Boulevard	West of Bellflower Boulevard	0	16,500	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	64.6	40	87	187	404
15	Alondra Boulevard	East of Bellflower	0	17,000	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	64.7	41	89	191	412
16	Flower Street	Orchard Avenue	Bellflower Bou	7,500	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	61.1	24	51	111	239
17	Flower Street	Bellflower Boulevard	East	8,700	45	75	115	97.5%	1.5%	1.0%	85.0%	7.5%	7.5%	61.8	26	57	122	263

	Exist	W/Pro	Change
1	55.4	55.8	0.4
2	54.9	55.2	0.2
3	55.4	55.6	0.2
4	55.2	55.6	0.4
5	56.5	56.9	0.3
6	56.5	57.3	0.8
7	56.9	57.4	0.6
8	56.9	58.2	1.3
9	64.0	64.1	0.1
10	63.4	63.6	0.2
11	63.6	63.9	0.3
12	64.0	64.2	0.2
13	63.4	63.5	0.1
14	64.5	64.6	0.1
15	64.6	64.7	0.1
16	61.1	61.1	0.1
17	61.6	61.8	0.2

Citation #	Citations	
1	Caltrans Technical Noise Supplement. 2009 (November). Table (5-11), Pg 5-60.	Caltrans Technical Noise Supplement. 2013 (September). Table (4-2), Pg 4-17.
2	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-26), Pg 5-60.	Caltrans Technical Noise Supplement. 2013 (September). Equation (4-5), Pg 4-17.
3	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-16), Pg 2-32.	FHWA 2004 TNM Version 2.5
4	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-11), Pg 5-47, 48.	FHWA 2004 TNM Version 2.5
5	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-26), Pg 2-55, 56.	Caltrans Technical Noise Supplement. 2013 (September). Equation (2-23), Pg 2-51, 52.
6	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-27), Pg 2-57.	Caltrans Technical Noise Supplement. 2013 (September). Equation (2-24), Pg 2-53.
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8	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-7), Pg 5-45.	FHWA 2004 TNM Version 2.5
9	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-8), Pg 5-45.	FHWA 2004 TNM Version 2.5
10	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-9), Pg 5-45.	FHWA 2004 TNM Version 2.5
11	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-13), Pg 5-49.	FHWA 2004 TNM Version 2.5
12	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-14), Pg 5-49.	FHWA 2004 TNM Version 2.5
13	Federal Highway Administration Traffic Noise Model Technical Manual. Report No. FHWA-PD-96-010. 1998 (January). Equation (16), Pg 67	
14	Federal Highway Administration Traffic Noise Model Technical Manual. Report No. FHWA-PD-96-010. 1998 (January). Equation (20), Pg 69	
15	Federal Highway Administration Traffic Noise Model Technical Manual. Report No. FHWA-PD-96-010. 1998 (January). Equation (18), Pg 69	

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California Department of Transportation (Caltrans). 2009 (November). Technical Noise Supplement. Available: http://www.dot.ca.gov/hq/env/noise/pub/tens_complete.pdf. Accessed August 17, 2017.

California Department of Transportation (Caltrans). 2013 (September). Technical Noise Supplement. Available: http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013A.pdf. Accessed August 17, 2017.

Federal Highway Administration. 2004. Traffic Noise Model Version 2.5. Available: https://www.fhwa.dot.gov/environment/noise/traffic_noise_model/tnm_v25/. Accessed August 17, 2017.

					Existing ADT		Existing + Proj
1	Ardmore Avenue	Flower Street	Oak Street	2	2000	2.2	2200
2	Ardmore Avenue	Oak Street	Mayne Street	1.8	1800	1.9	1900
3	Oak Street	West of Ardmore		2	2000	2.1	2100
4	Oak Street	Ardmore Avenue	Orchard Avenue	1.9	1900	2.1	2100
5	Oak Street	Orchard Avenue	site	2.6	2600	2.8	2800
6	Oak Street	site	Bellflower Boulevard	2.6	2600	3.1	3100
7	Mayne Street	Orchard Avenue	Site	2.8	2800	3.2	3200
8	Mayne Street	Site	Bellflower Boulevard	2.8	2800	3.8	3800
9	Bellflower Boulevard	South of Flower		14.4	14400	14.8	14800
10	Bellflower Boulevard	Flower Street	Oak Street	12.5	12500	13.2	13200
11	Bellflower Boulevard	Oak Street	Mayne Street	13.3	13300	14.1	14100
12	Bellflower Boulevard	Mayne Street	Alondra Boulevard	14.5	14500	15.3	15300
13	Bellflower Boulevard	Alondra Boulevard	North	12.5	12500	12.8	12800
14	Alondra Boulevard	West of Bellflower Boulevard		16.3	16300	16.5	16500
15	Alondra Boulevard	East of Bellflower		16.7	16700	17	17000
16	Flower Street	Orchard Avenue	Bellflower Boulevard	7.4	7400	7.5	7500
17	Flower Street	Bellflower Boulevard	East	8.4	8400	8.7	8700

Caltrans 2016 AADT Truck Data by Segmnet

			Truck ADT by Axle				TOTAL
			2 axle	3 axle	4 axle	5+ axle	
SR 16	32.226	JCT. RTE. 505	229	93	50	429	801
SR 113	R9.228	GIBSON RD	700	265	46	1402	2413

Noise Model Vehicle Clas Percent Input Calc

		Meadium Truck	Heavy Truck
SR 16	ADT	229	572
	percent	0.3	0.7
SR 113	ADT	700	1713
	percent	0.3	0.7

Appendix F

Traffic Impact Analysis

BELLFLOWER MIXED-USE PROJECT TRAFFIC IMPACT ANALYSIS

City of Bellflower

October 30, 2019

Traffic Engineering ● Transportation Planning ● Parking ● Noise & Vibration
Air Quality ● Global Climate Change ● Health Risk Assessment

BELLFLOWER MIXED-USE PROJECT TRAFFIC IMPACT ANALYSIS

City of Bellflower

October 30, 2019

prepared by
Bryan Crawford
Giancarlo Ganddini, PE, PTP

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19-0190

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EXECUTIVE SUMMARY

The purpose of this Traffic Impact Analysis is to provide an assessment of traffic operations resulting from development of the proposed Bellflower Mixed-Use Project and to identify measures necessary to mitigate potentially significant traffic impacts. This report analyzes traffic impacts for the anticipated project opening year in Year 2023. Although this is a technical report, effort has been made to write the report clearly and concisely. A glossary is provided in Appendix A to assist the reader with terms related to transportation engineering.

PROJECT DESCRIPTION

The project site is located west of Bellflower Boulevard between Mayne Street and Oak Street in the City of Bellflower. The project site is currently constructed with a public parking lot and commercial retail adjacent to Bellflower Boulevard.

The proposed project consists of redeveloping the project site with a vertical mixed-use development consisting of 91 multifamily dwelling units, a four-screen art house movie theater, and approximately 5,250 square feet of street-facing commercial retail and restaurant land uses. The proposed project is anticipated to be constructed and fully operational by year 2023.

The project proposes one full access driveway at Oak Street and one outbound only access at Mayne Street for the residential uses. Guest parking for the residential portion of the project site is provided on the west side of the north-south alley that extends from the project access on Oak Street to Mayne Street. This north-south alley is restricted to outbound only to Mayne Street to be utilized for guests. All residents will enter/exit the project site via the proposed Oak Street access.

Patrons of the commercial uses will park off-site and walk to/from the commercial uses. An approximately 285 space parking garage is currently being constructed on Mayne Street directly north of the project site. This parking garage will be open to the public and operational before the project's opening year of 2023. Additional public parking lots are available directly south of the project site on Oak Street and on Oak Street east of Bellflower Boulevard.

EXISTING CONDITIONS

The study intersections currently operate at Levels of Service B or better during the peak hours for Existing conditions (see Table 1).

PROJECT TRIPS

The proposed project is forecast to generate a total of approximately 2,187 daily trips, including 39 trips during the AM peak hour and 114 trips during the PM peak hour (see Table 2).

FORECAST OPERATIONS

Existing Plus Project Conditions: The study intersections are forecast to operate at Levels of Service C or better during the peak hours for Existing Plus Project conditions (see Table 4). The proposed project is forecast to result in no significant traffic impacts at the study intersections for Existing Plus Project conditions (see Table 5).

Opening Year (2023) Without Project: The study intersections are forecast to operate at Levels of Service C or better during the peak hours for Opening Year (2023) Without Project conditions (see Table 6).

Opening Year (2023) With Project: The study intersections are forecast to operate at Levels of Service C or better during the peak hours for Opening Year (2023) With Project conditions (see Table 7). The proposed project is forecast to result in no significant traffic impacts at the study intersections for Opening Year (2023) With Project conditions (see Table 8).

MITIGATION MEASURES

No off-site mitigation measure improvements were identified since the proposed project is forecast to result in no significant traffic impacts at the study intersections for the scenarios analyzed.

1. INTRODUCTION

This section describes the purpose of this traffic impact analysis, project location, proposed development, and study area. Figure 1 shows the project location map. Figure 2 illustrates the project site plan.

PURPOSE AND OBJECTIVES

The purpose of this Traffic Impact Analysis is to provide an assessment of traffic operations resulting from development of the proposed Bellflower Mixed-Use Project and to identify measures necessary to mitigate potentially significant traffic impacts. This report analyzes traffic impacts for the anticipated project opening year in Year 2023. Although this is a technical report, effort has been made to write the report clearly and concisely. A glossary is provided in Appendix A to assist the reader with terms related to transportation engineering.

PROJECT DESCRIPTION

The project site is located west of Bellflower Boulevard between Mayne Street and Oak Street in the City of Bellflower. The project site is currently constructed with a public parking lot and commercial retail adjacent to Bellflower Boulevard.

The proposed project consists of redeveloping the project site with a vertical mixed-use development consisting of 91 multifamily dwelling units, a four-screen art house movie theater, and approximately 5,250 square feet of street-facing commercial retail and restaurant land uses. The proposed project is anticipated to be constructed and fully operational by year 2023.

The project proposes one full access driveway at Oak Street and one outbound only access at Mayne Street for the residential uses. Guest parking for the residential portion of the project site is provided on the west side of the north-south alley that extends from the project access on Oak Street to Mayne Street. This north-south alley is restricted to outbound only to Mayne Street to be utilized for guests. All residents will enter/exit the project site via the proposed Oak Street access.

Patrons of the commercial uses will park off-site and walk to/from the commercial uses. An approximately 285 space parking garage is currently being constructed on Mayne Street directly north of the project site. This parking garage will be open to the public and operational before the project's opening year of 2023. Additional public parking lots are available directly south of the project site on Oak Street and on Oak Street east of Bellflower Boulevard.

STUDY AREA

Based on the study intersections identified in the approved scoping agreement (Appendix B), the study area consists of the following study intersections within the City of Bellflower:

Study Intersections	Jurisdiction
1. Ardmore Avenue (NS) at Oak Street (EW)	City of Bellflower
2. Parking Garage Driveway (NS) at Mayne Street (EW)	City of Bellflower
3. Project Driveway (NS) at Oak Street (EW)	City of Bellflower
4. Bellflower Boulevard (NS) at Alondra Boulevard (EW)	City of Bellflower
5. Bellflower Boulevard (NS) at Mayne Street (EW)	City of Bellflower
6. Bellflower Boulevard (NS) at Oak Street (EW)	City of Bellflower
7. Bellflower Boulevard (NS) at Flower Street (EW)	City of Bellflower

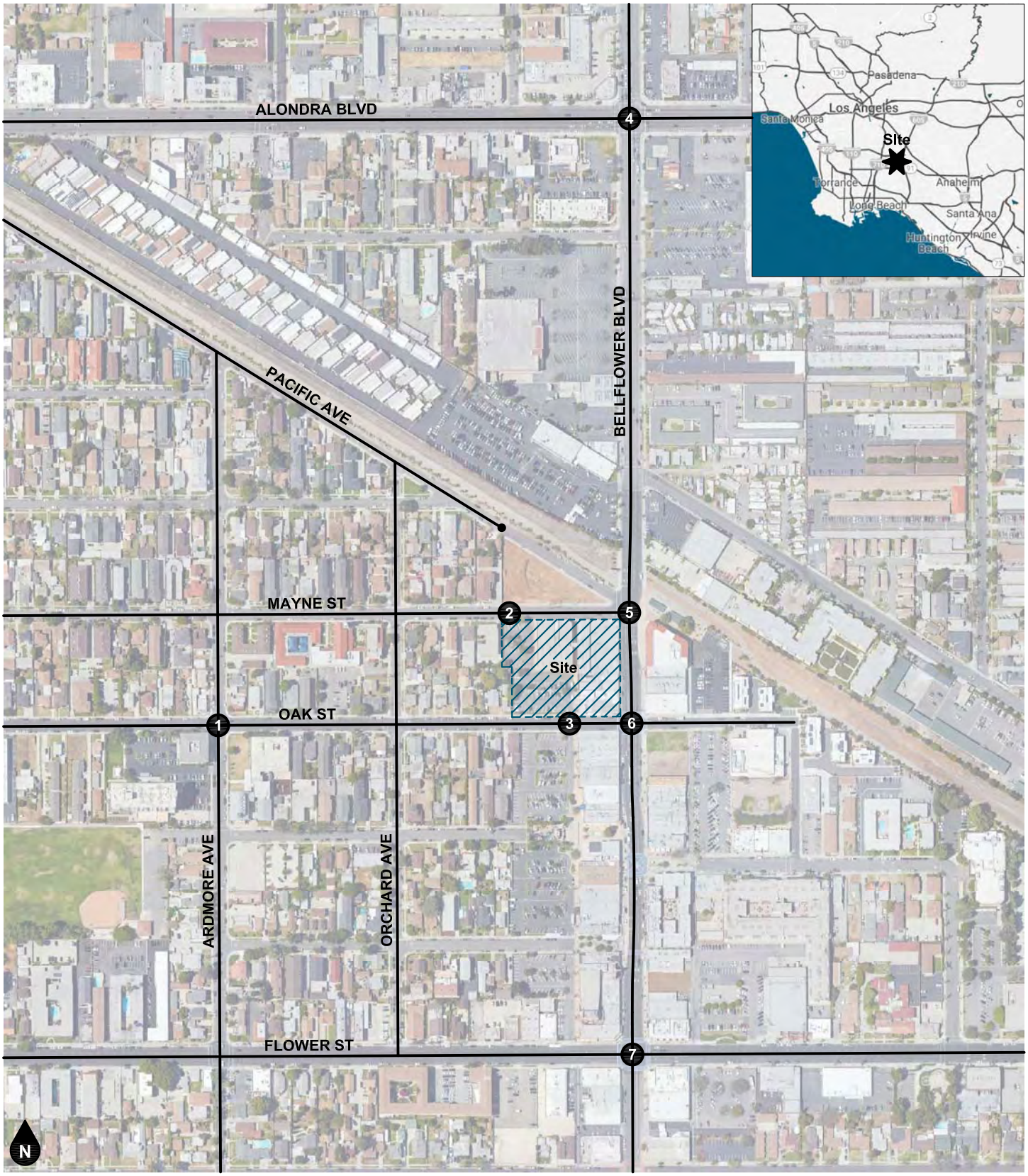
ANALYSIS SCENARIOS

According to the County of Los Angeles Traffic Impact Analysis Report Guidelines (Los Angeles Department of Public Works, December 2013) ["County of Los Angeles guidelines"] and scoping discussions with City of Bellflower Public Works Department staff, the following traffic conditions shall be included in a traffic impact analysis:

a) Existing traffic;
b) Traffic in (a) plus project traffic;
c) Traffic in (b) with the proposed mitigation measures (if necessary);
d) Traffic in (b) plus the cumulative traffic of other known developments; and
e) Traffic in (d) with the proposed mitigation measures (if necessary).

Accordingly, the following scenarios are analyzed during typical weekday AM and PM peak hour conditions (with mitigation as necessary):

- Existing Conditions (a)
- Existing Plus Project Conditions (b)
- Opening Year (2023) Without Project Conditions
- Opening Year (2023) With Project Conditions (d)



Legend

(#) Study Intersection

Figure 1
Project Location Map

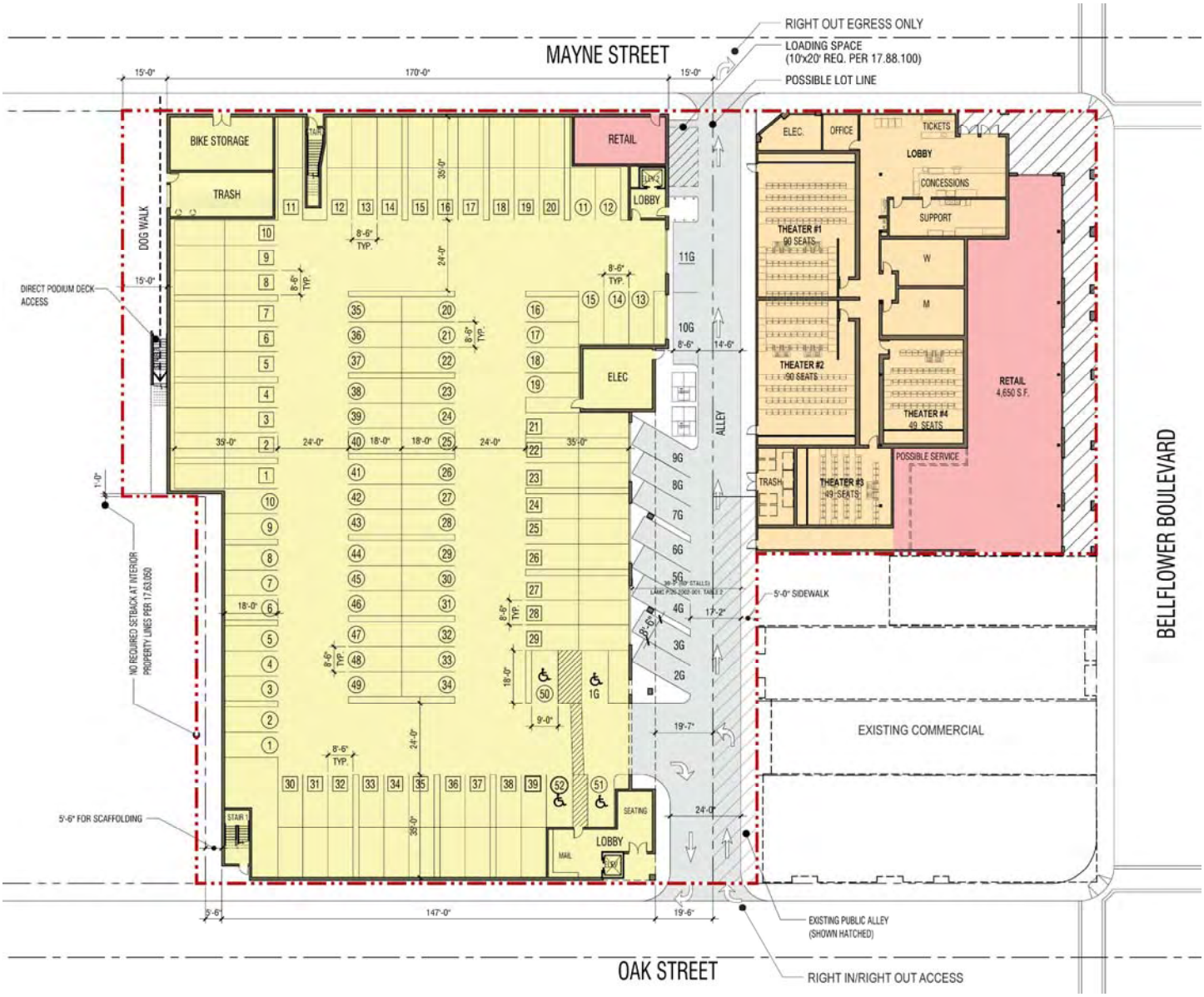


Figure 2
Site Plan

2. METHODOLOGY

This section discusses the analysis methodologies used to assess transportation facility performance as adopted by the respective jurisdictional agencies.

SIGNALIZED INTERSECTIONS - INTERSECTION CAPACITY UTILIZATION

In accordance with City of Bellflower guidelines, analysis of signalized intersections is based on the Intersection Capacity Utilization (ICU) methodology. The ICU methodology compares the volume of traffic using the intersection to the capacity of the intersection. The resulting volume-to-capacity (V/C) ratio represents that portion of the hour required to provide sufficient capacity to accommodate all intersection traffic if all approaches operate at capacity. The volume-to-capacity ratio is then correlated to a performance measure known as Level of Service based on the following thresholds:

Level of Service	Volume/Capacity Ratio
A	≤ 0.600
B	0.601 to 0.700
C	0.701 to 0.800
D	0.801 to 0.900
E	0.901 to 1.000
F	> 1.000

Source: Transportation Research Board, Interim Materials on Highway Capacity, Transportation Research Circular No. 212, January 1980.

Level of Service is used to qualitatively describe the performance of a roadway facility, ranging from Level of Service A (free-flow conditions) to Level of Service F (extreme congestion and system failure). ICU analysis was performed using the Vistro software.

Consistent with City of Bellflower guidelines, this analysis uses the following input parameters for the ICU analysis: 1,600 vehicles per hour per lane for through and turn lanes, 2,880 vehicles per hour for dual left-turn lanes, and a total clearance time of 10 percent.

INTERSECTION DELAY METHODOLOGY

The technique used to assess the performance of unsignalized intersections is known as the intersection delay methodology based on the procedures contained in the Highway Capacity Manual. The methodology compares the traffic volume using the intersection to the capacity of the intersection to calculate the delay associated with the traffic control at the intersection. The intersection delay is then correlated to a performance measure known as Level of Service based on the following thresholds:

Level of Service	Intersection Control Delay (Seconds / Vehicle)
	Unsignalized Intersection
A	≤ 10.0
B	> 10.0 to ≤ 15.0
C	> 15.0 to ≤ 25.0
D	> 25.0 to ≤ 35.0
E	> 35.0 to ≤ 50.0
F	> 50.0

Source: Transportation Research Board, Highway Capacity Manual (6th Edition).

Level of Service is used to qualitatively describe the performance of a roadway facility, ranging from Level of Service A (free-flow conditions) to Level of Service F (extreme congestion and system failure). Intersection delay analysis was performed using the Vistro software.

THRESHOLDS OF SIGNIFICANCE

The City of Bellflower has established Level of Service D as the minimum acceptable Level of Service. For purposes of this analysis, any intersection operating at Level of Service E or F is considered to be deficient.

In accordance with the City of Bellflower guidelines, a project traffic impact is considered significant if the intersection that would operate at an acceptable Level of Service without the project would operate at an unacceptable Level of Service with the project, or if the project related increase in the volume-to-capacity ratio equals or exceeds the thresholds shown below for an intersection operating at an unacceptable Level of Service:

Significant Impact Threshold for Intersections		
Level of Service	Volume/Capacity	Incremental Increase
E/F	0.91 - more	0.02 or more

If a project is forecast to cause a significant traffic impact, feasible mitigation measures that will reduce the impact to a less than significant level are identified. Mitigation measures can be in many forms, including the addition of lanes, traffic control modification, or demand management measures. If no feasible mitigation measures can be identified for a significantly impacted facility, the impact will remain significant and unavoidable and a statement of overriding considerations is required.

3. EXISTING CONDITIONS

EXISTING ROADWAY SYSTEM

Figure 3 identifies the lane geometry and intersection traffic controls for Existing conditions based on a field survey of the study area. Regional access to the project area is provided by the I-105 Freeway north of the project site, the I-605 Freeway east of the project site, and the SR-91 Freeway east of the project site. The key north-south roadways providing local circulation are Ardmore Avenue and Bellflower Street. The key east-west roadways providing local circulation are Alondra Boulevard, Mayne Street, Oak Street, and Flower Street.

Ardmore Avenue is a 2-lane undivided roadway in the study area. Ardmore Avenue is not in the City of Bellflower Circulation Element. On-street parking is permitted in the project area. No bicycle facilities are provided in the study area. Sidewalks are provided on both sides of the roadway.

Bellflower Boulevard is a 4-lane undivided roadway in the study area. Bellflower Boulevard is classified as a Secondary Arterial in the City of Bellflower Circulation Element. On-street parking is intermittently permitted and prohibited in the project area. No bicycle facilities are provided in the study area. Sidewalks are provided on both sides of the roadway.

Alondra Boulevard is a 4-lane divided roadway in the study area. Alondra Boulevard is classified as a Major Arterial in the City of Bellflower Circulation Element. On-street parking is intermittently permitted and prohibited in the project area. No bicycle facilities are provided in the study area. Sidewalks are provided on both sides of the roadway.

Mayne Street is a 2-lane undivided roadway in the study area. Mayne Street is not in the City of Bellflower Circulation Element. On-street parking is permitted in the project area. No bicycle facilities are provided in the study area. Sidewalks are provided on both sides of the roadway.

Oak Street is a 2-lane undivided roadway in the study area. Oak Street is not in the City of Bellflower Circulation Element. On-street parking is permitted in the project area. No bicycle facilities are provided in the study area. Sidewalks are provided on both sides of the roadway.

Flower Street is a 4-lane undivided roadway in the study area. Flower Street is classified as a Secondary Arterial in the City of Bellflower Circulation Element. On-street parking is intermittently permitted and prohibited in the project area. No bicycle facilities are provided in the study area. Sidewalks are provided on both sides of the roadway.

PEDESTRIAN FACILITIES

Existing pedestrian facilities in the project vicinity are shown on Figure 4.

BICYCLE ROUTES

Bicycle routes are not proposed in the study area. The City of Bellflower Existing and Proposed Bikeway Facilities Map is depicted on Figure 5.

TRANSIT FACILITIES

Figure 6 shows the existing transit routes available in the project vicinity provided by Bellflower Bus. As shown on Figure 6, Bellflower Bus North Route services Bellflower Boulevard and Flower Street, while Bellflower Bus South Route services Bellflower Boulevard, and Oak Street in the study area. A bus stop is situated on the west side of Bellflower Boulevard south of Oak Street near the project site.

Figure 7 shows the existing transit routes available in the project vicinity provided by the Los Angeles Metropolitan Transportation Authority (Metro). As shown on Figure 9, Route 127 services Bellflower Boulevard north of Alondra Boulevard and Route 128 services Alondra Boulevard in the study area.

Figure 8 shows the existing transit routes available in the project vicinity provided by Long Beach Transit. As shown on Figure 8, Route 91 services Bellflower Boulevard and Alondra Boulevard, while Route 93 services Bellflower Boulevard, Alondra Boulevard, and Flower Street in the study area. A bus stop is situated on the west side of Bellflower Boulevard south of Oak Street, and on the east side of Bellflower Boulevard north of Mayne Street near the project site.

GENERAL PLAN CONTEXT

Figure 9 shows the City of Bellflower General Plan Circulation Element roadway classifications map. This figure shows the nature and extent of arterial and collector highways that are needed to adequately serve the ultimate development depicted by the Land Use Element of the General Plan.

EXISTING TRAFFIC VOLUMES

Figure 10 shows the Existing average daily traffic volumes. The Existing average daily traffic volumes have been factored from peak hour intersection turning movement volumes using the following formula for each intersection leg:

Evening Peak Hour (Approach Volume + Exit Volume) x 10 = Leg Volume.

Existing peak hour traffic conditions are based upon morning peak period and evening peak period intersection turning movement counts obtained in October 2019 during typical weekday conditions while local schools were in session. The AM peak period was counted between 7:00 AM and 9:00 AM and the PM peak period was counted between 4:00 PM and 6:00 PM. The actual peak hour within the peak period is the four consecutive 15 minute periods with the highest total volume when all movements are added together. Thus, the weekday evening peak hour at one intersection may be 4:45 PM to 5:45 PM if those four consecutive 15 minute periods have the highest combined volume. Intersection turning movement count worksheets are provided in Appendix C.

Figure 11 and Figure 12 show the Existing AM peak hour and PM peak hour intersection turning movement volumes.

Mayne Street west of Bellflower Boulevard is currently closed as construction occurs on the roadway and parking garage being constructed on the northwest corner of Bellflower Boulevard and Mayne Street. With the west leg closure, traffic counts at Bellflower Boulevard and Oak Street were compared to April 2017 traffic counts at the intersection of Bellflower Boulevard and Mayne Street. North-south AM/PM peak hour volumes for the north leg of the intersection of Bellflower Boulevard and Oak Street were then used in conjunction with the April 2017 traffic count at the intersection of Bellflower Boulevard and Mayne Street to establish conservation of flow between the intersections and to develop existing traffic counts for the intersection of Bellflower Boulevard and Mayne Street based on April 2017 turning movement percentages for the three-legged intersection. These calculations are shown in Appendix C.

EXISTING INTERSECTION LEVEL OF SERVICE

The intersection Levels of Service for Existing conditions have been calculated and are shown in Table 1. Existing intersection Level of Service worksheets are provided in Appendix D.

Mayne Street west of Bellflower Boulevard is currently closed as construction occurs on the roadway and parking garage being constructed on the northwest corner of Bellflower Boulevard and Mayne Street. The intersection has been analyzed with the lane geometrics, traffic signalization, and traffic signal phasing controls

provided by the City of Bellflower Public Works Department for when construction is complete and the intersection is reopened. On-street parking on Mayne Street adjacent to the project site will be prohibited.

As shown in Table 1, the study intersections currently operate at Levels of Service B or better during the peak hours for Existing conditions.

Table 1
Existing Intersection Level of Service

ID	Study Intersection	Traffic Control[1]	AM Peak Hour ICU[2] or [Delay][3]	AM Peak Hour LOS[4]	PM Peak Hour ICU[2] or [Delay][3]	PM Peak Hour LOS[4]
1.	Ardmore Ave at Oak St	AWS	[8.2]	A	[8.2]	A
3.	Project Dwy at Oak St	CSS	[10.4]	B	[10.8]	B
4.	Bellflower Blvd at Alondra Blvd	TS	0.657	B	0.678	B
5.	Bellflower Blvd at Mayne St	TS	0.545	A	0.582	A
6.	Bellflower Blvd at Oak St	TS	0.560	A	0.594	A
7.	Bellflower Blvd at Flower St	TS	0.659	B	0.698	B

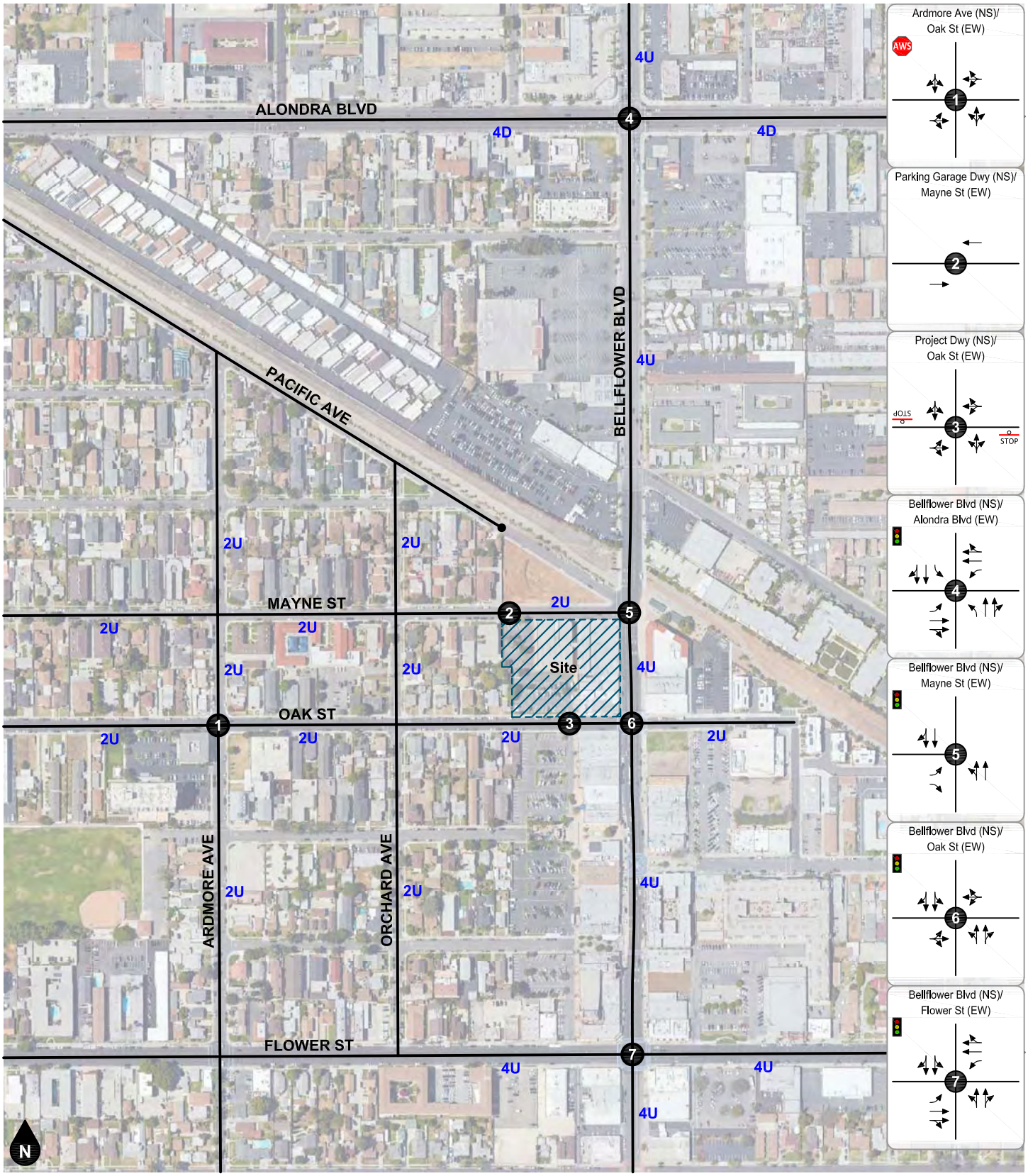
Notes:

(1) AWS = All Way Stop; CSS = Cross Street Stop; TS = Traffic Signal

(2) ICU = Intersection Capacity Utilization.

(3) Delay is shown in [seconds/vehicle]. Delay is reported for un-signalized study intersections. For intersections with all way stop control, overall average intersection delay and LOS are shown. For intersections with cross street stop control, LOS is based on average delay of the worst individual lane (or movements sharing a lane).

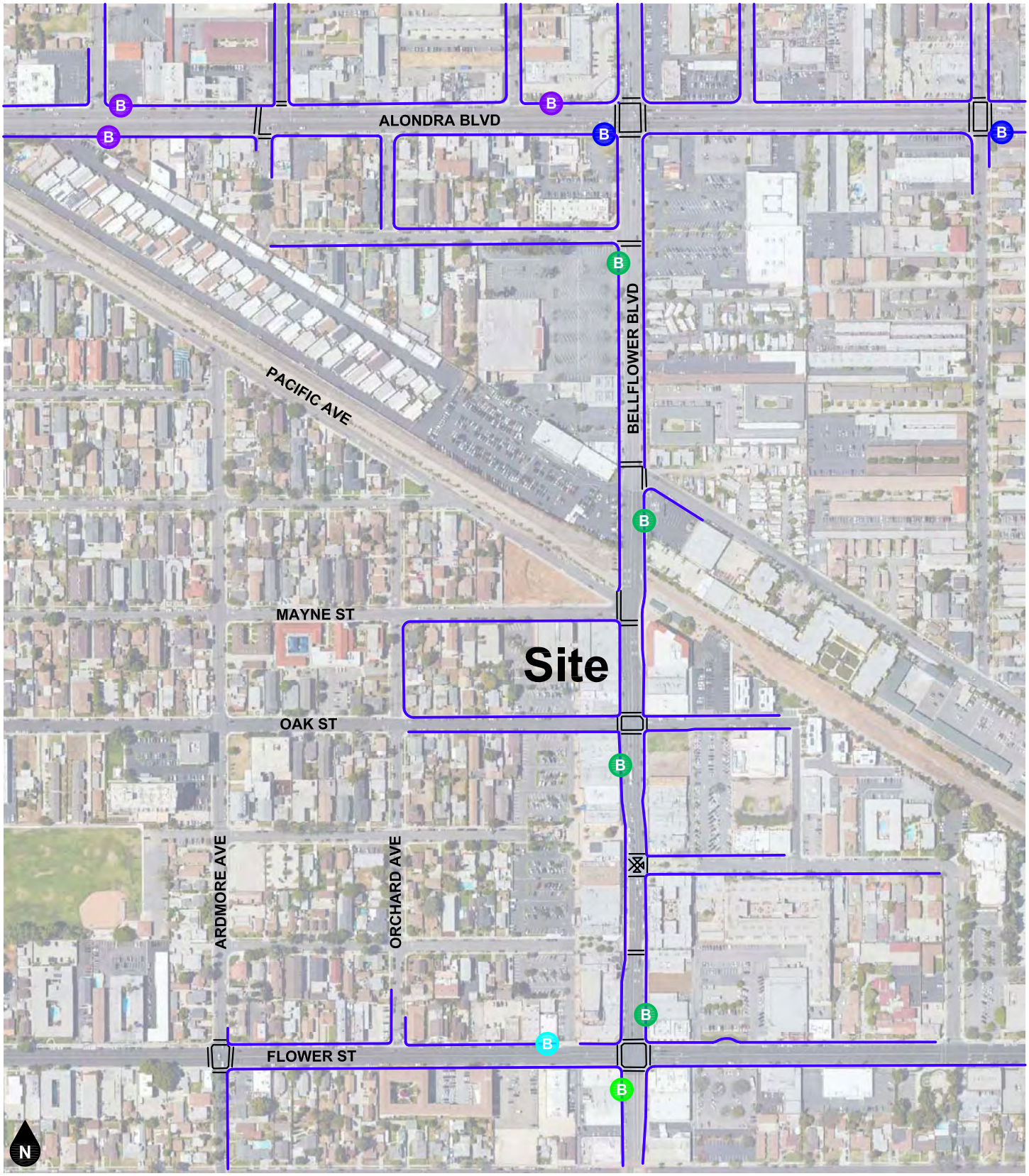
(4) LOS = Level of Service



Legend

- Traffic Signal
- AWS All Way Stop
- STOP Stop Sign
- #D #-Lane Divided Roadway
- #U #-Lane Undivided Roadway
- Existing Lane

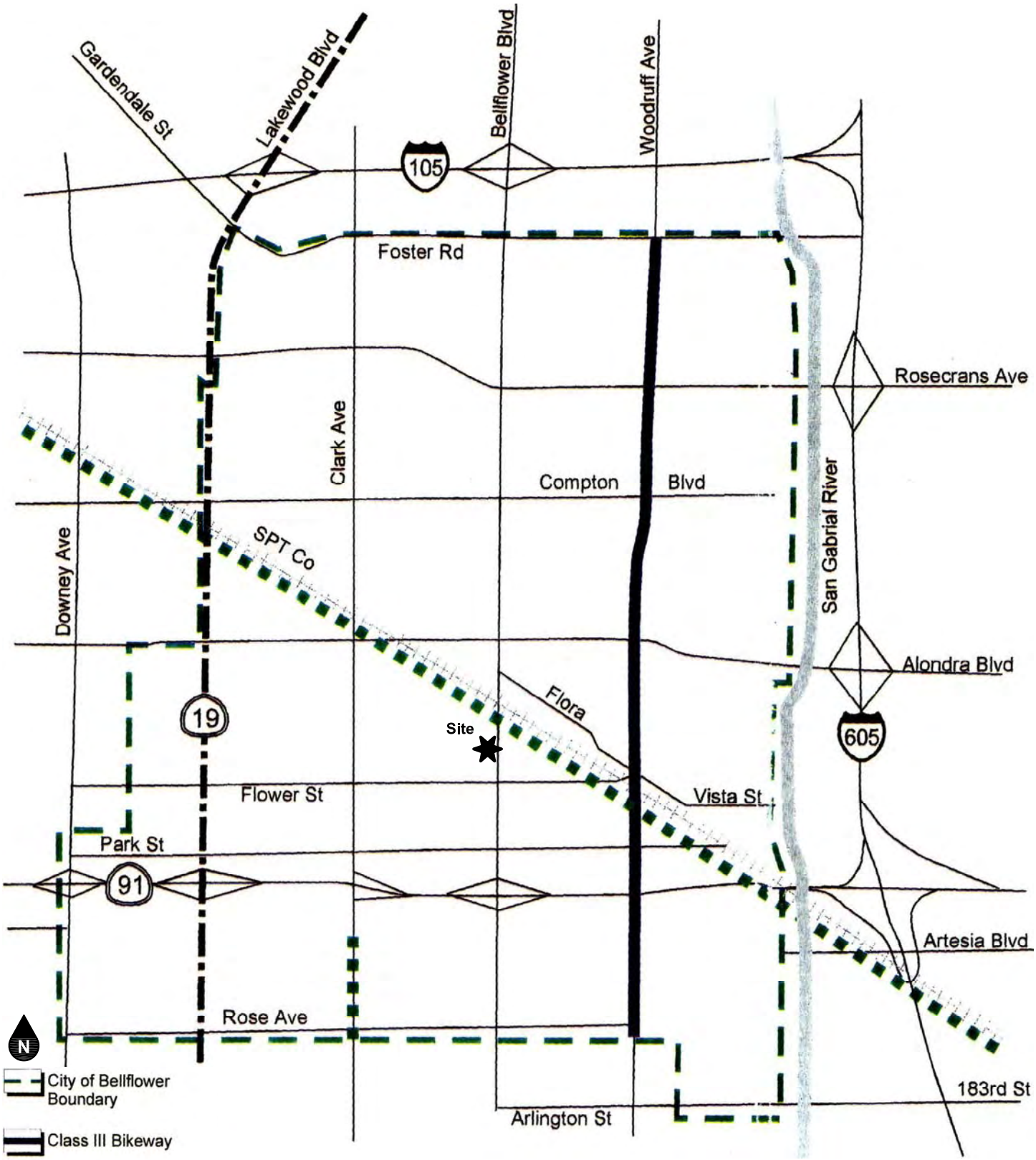
Figure 3
Existing Lane Geometry and Intersection Traffic Controls



Legend

- Sidewalk
- Cross Walk
- 127 & 128 Route Bus Stop
- 91 & 93 & 128 Route Bus Stop
- 91 & 93 Route Bus Stop
- 91 Route Bus Stop
- 93 Route Bus Stop

Figure 4
Existing Pedestrian Facilities



Source: Los Angeles County Bicycle Master Plan

Figure 5
City of Bellflower Existing and Proposed Bikeway Facilities Map

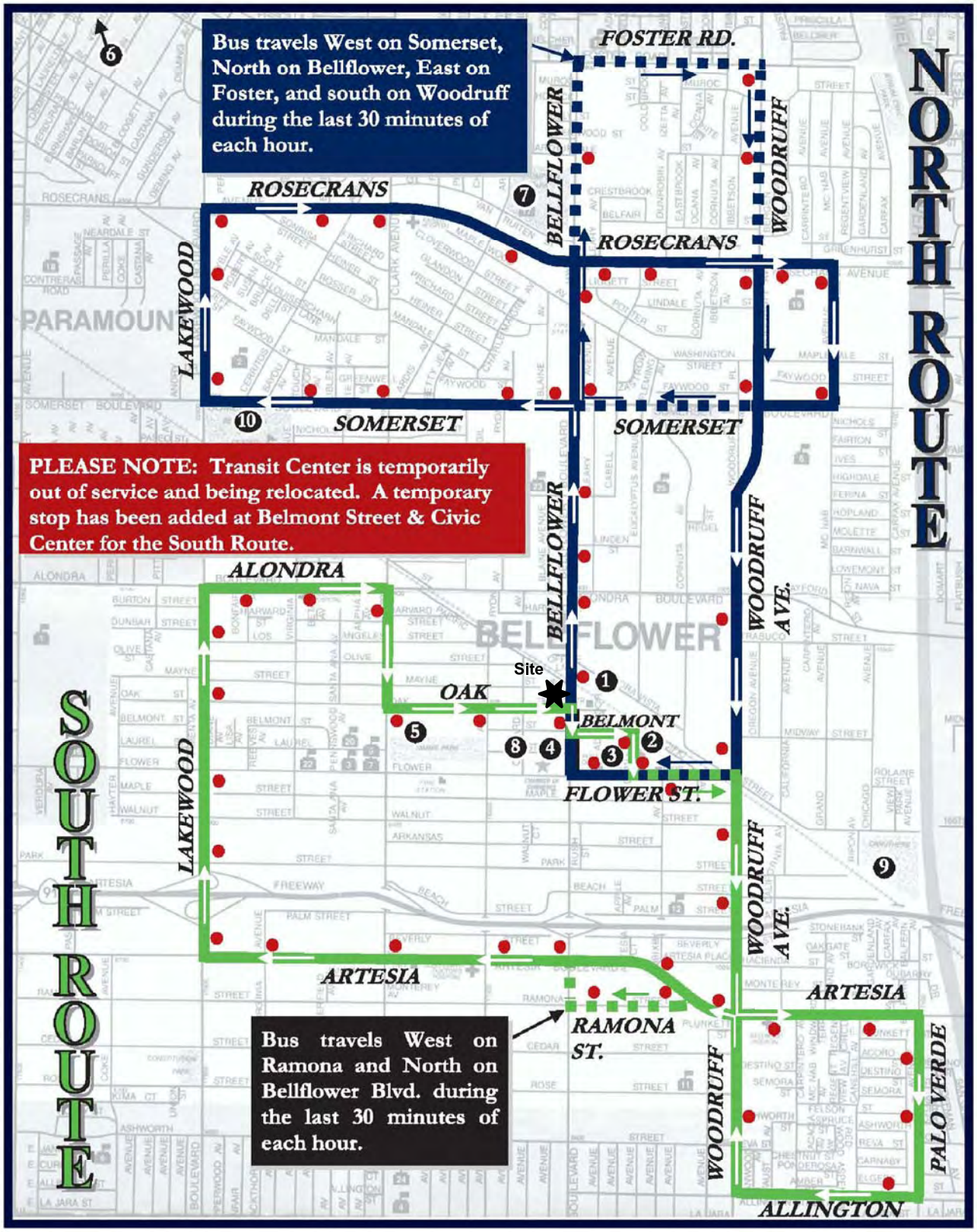
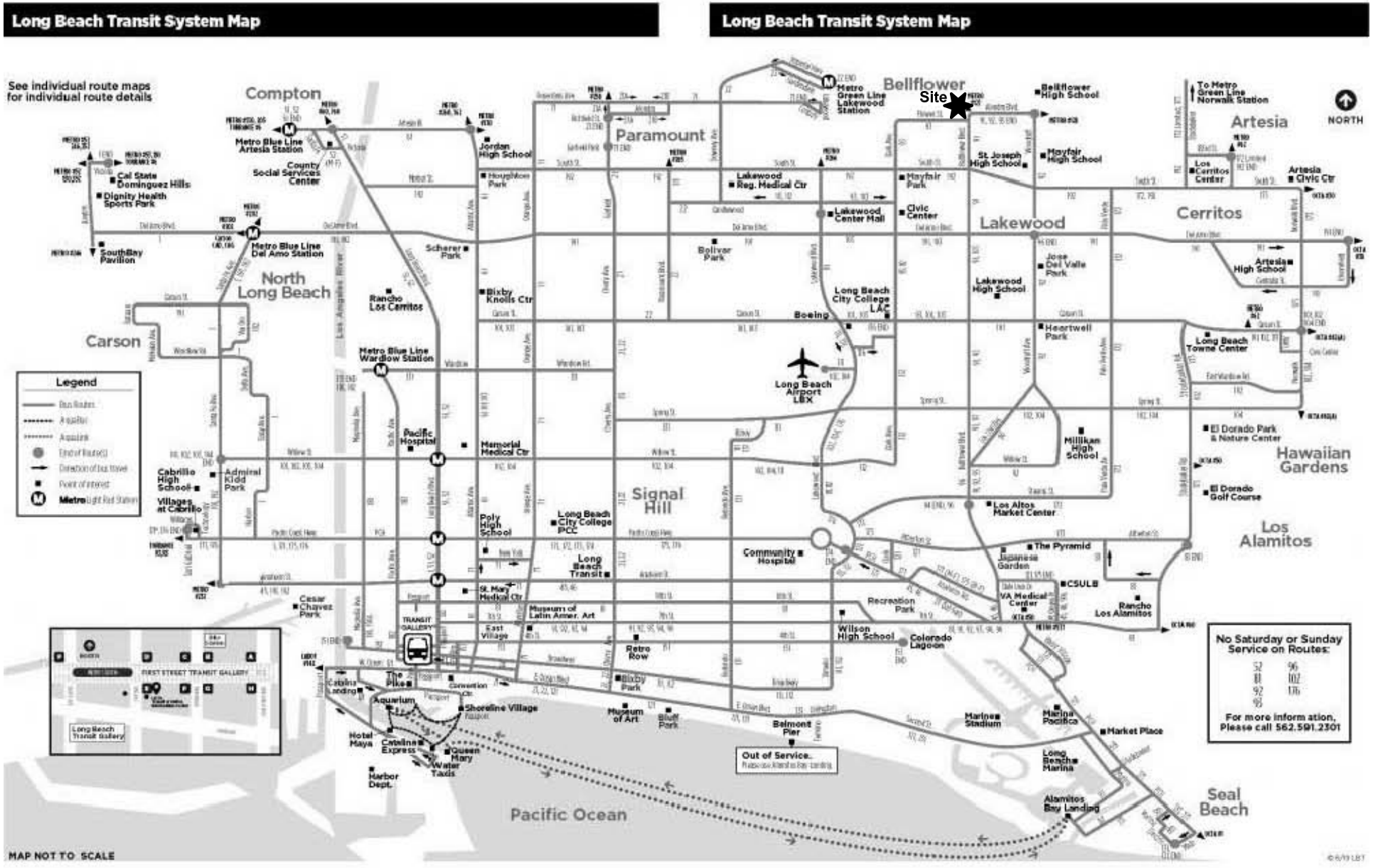


Figure 6
Bellflower Bus System Map

Source: City of Bellflower

Figure 7
Los Angeles Metropolitan Transportation Authority System Map

Source: L.A. Metro



Source: Long Beach Transit

Figure 8
Long Beach Transit System Map

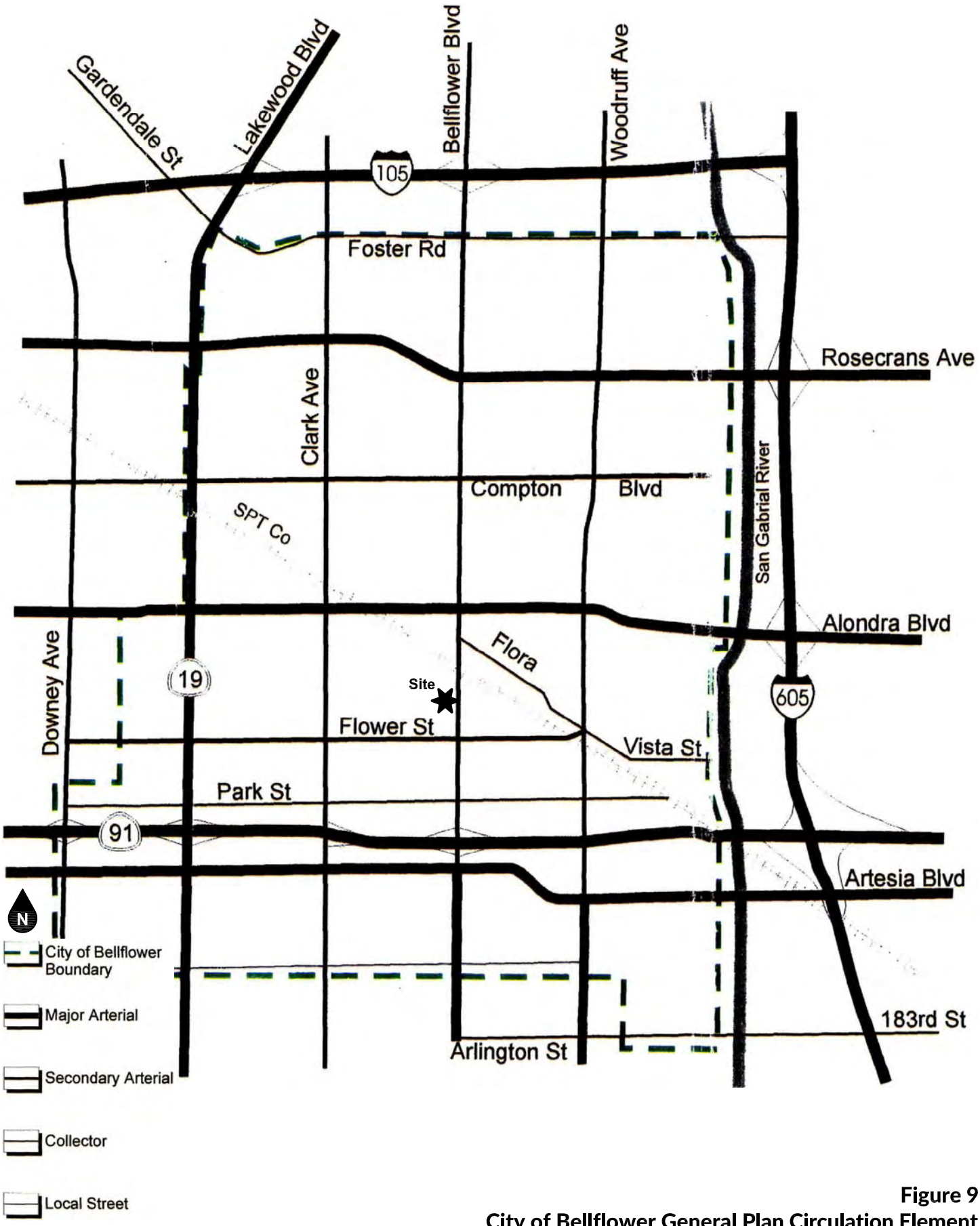
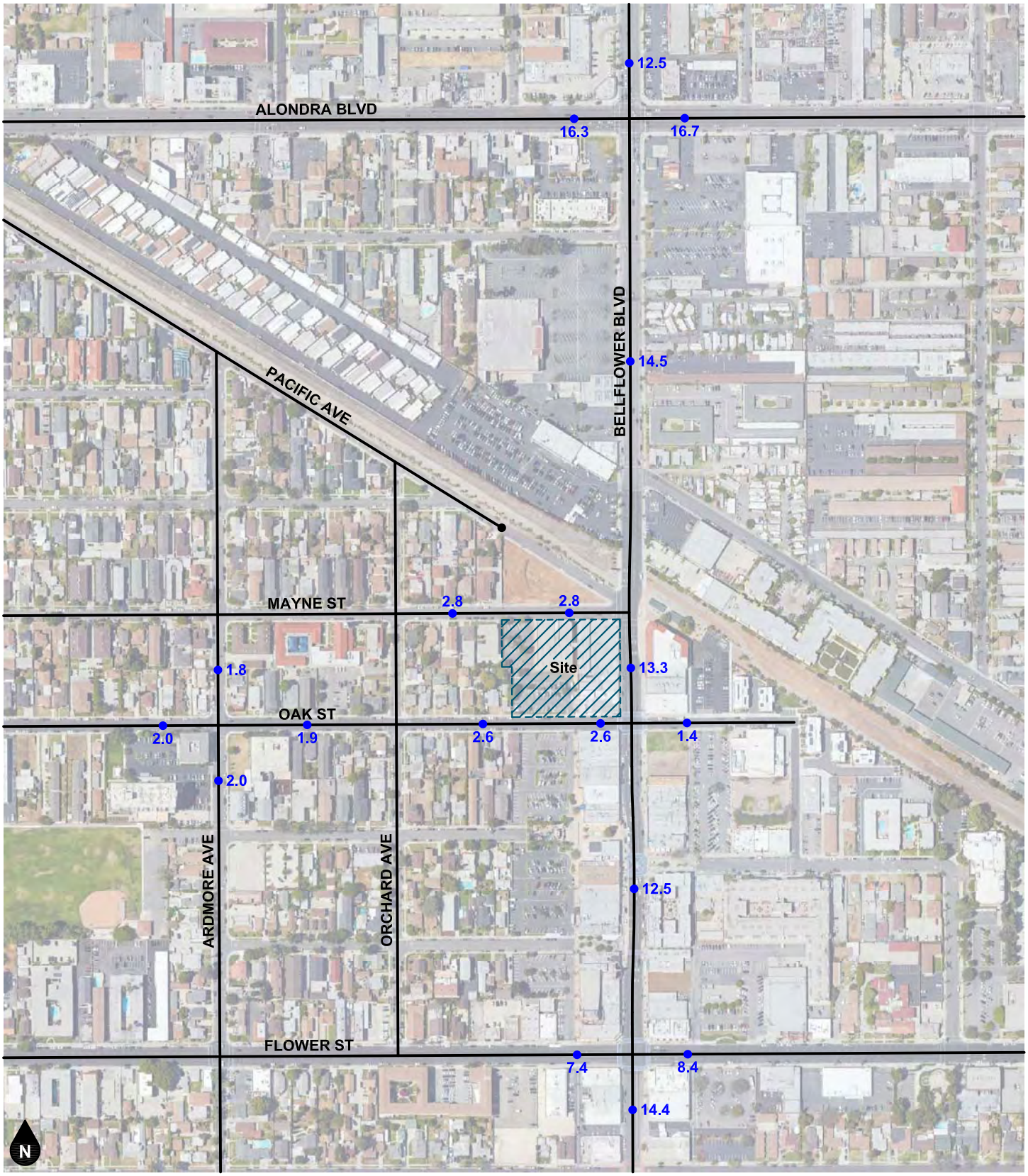


Figure 9
City of Bellflower General Plan Circulation Element

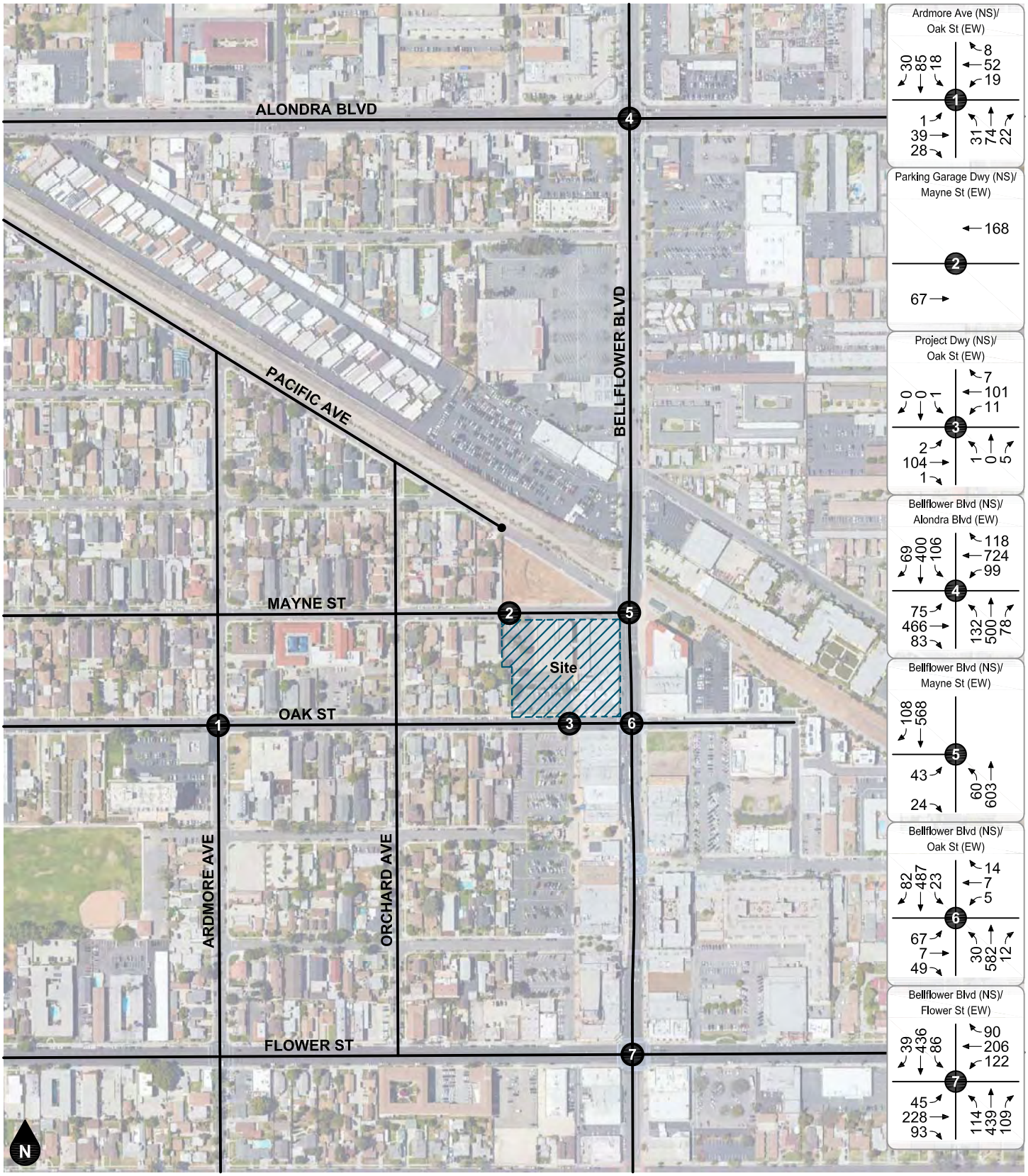
Source: City of Bellflower General Plan



Legend

●## Vehicles Per Day (1,000's)

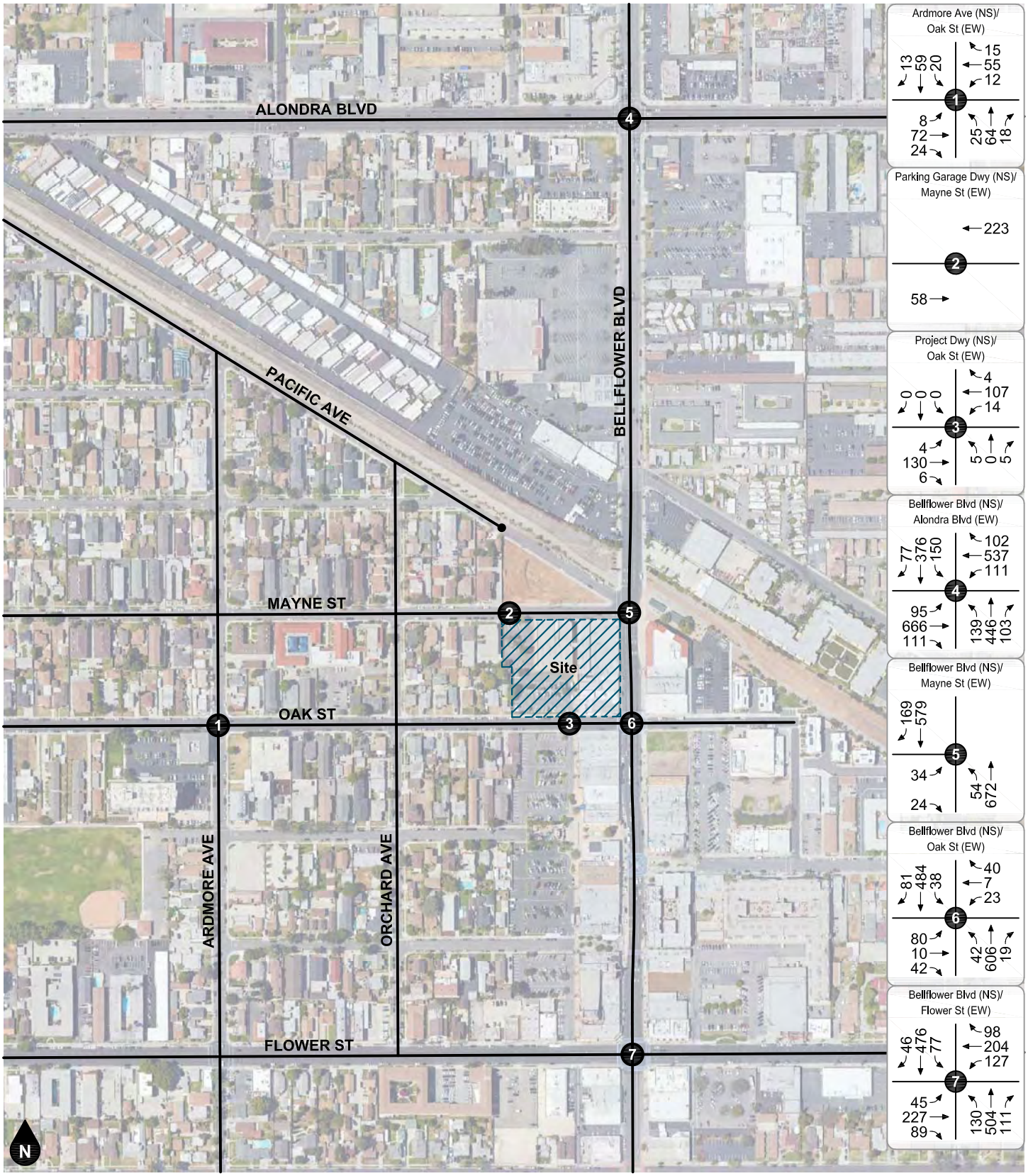
Figure 10
Existing Average Daily Traffic Volumes



Legend

(#) Study Intersection

Figure 11
Existing AM Peak Hour Intersection Turning Movement Volumes



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(#) Study Intersection

Figure 12
Existing PM Peak Hour Intersection Turning Movement Volumes

4. PROJECT FORECASTS

This section describes how project trip generation, trip distribution, and trip assignment forecasts were developed. The forecast project volumes are illustrated on figures contained in this section.

PROJECT DESCRIPTION

The project site is located west of Bellflower Boulevard between Mayne Street and Oak Street in the City of Bellflower. The project site is currently constructed with a public parking lot and commercial retail adjacent to Bellflower Boulevard.

The proposed project consists of redeveloping the project site with a vertical mixed-use development consisting of 91 multifamily dwelling units, a four-screen art house movie theater, and approximately 5,250 square feet of street-facing commercial retail and restaurant land uses. The proposed project is anticipated to be constructed and fully operational by year 2023.

The project proposes one full access driveway at Oak Street and one outbound only access at Mayne Street for the residential uses. Guest parking for the residential portion of the project site is provided on the west side of the north-south alley that extends from the project access on Oak Street to Mayne Street. This north-south alley is restricted to outbound only to Mayne Street to be utilized for guests. All residents will enter/exit the project site via the proposed Oak Street access.

Patrons of the commercial uses will park off-site and walk to/from the commercial uses. An approximately 285 space parking garage is currently being constructed on Mayne Street directly north of the project site. This parking garage will be open to the public and operational before the project's opening year of 2023. Additional public parking lots are available directly south of the project site on Oak Street and on Oak Street east of Bellflower Boulevard.

RESIDENTIAL PARKING

The project applicant has conducted a separate parking demand study to determine the residential parking demand for the project. After reviewing the results of this parking demand study and the specific site conditions, the applicant and the City have agreed to proceed with a project entitlement request for 1.50 parking stalls per unit, which will meet or exceed 1 stall per one bedroom unit and two stalls per two bedroom unit and also provide 10 guest parking spaces for the residential portion of the project. Therefore, 52 one-bedroom units equates to 52 (52 x 1) parking spaces, 39 two-bedroom units equates to 78 (39 x 2) parking spaces, plus 10 guest parking spaces. This totals 140 (52 + 78 + 10) parking spaces or 1.54 parking spaces per dwelling unit. Note that the specific parking counts may be adjusted as the final residential floor plans and unit mix is developed and in no case shall the final parking calculations be below 1.50 stalls per unit, 1 stall per one bedroom, two stalls per two bedroom, and 10 guest parking spaces

PROJECT DESIGN FEATURES

The proposed project shall construct the following improvements to provide project site access:

Project Driveway (NS) at Oak Street (EW) - #3

- Construct the project driveway to provide one inbound lane and one outbound lane with southbound stop-control.
- The existing eastbound lane on Oak Street will allow shared through/left/right turn movements.
- The existing westbound lane on Oak Street will allow shared through/left/right turn movements.
- The new southbound lane at the Project Driveway will allow shared left/through/right turn movements.

Project Driveway (NS) at Mayne Street (EW)

- Construct the project driveway to provide one outbound lane with northbound stop-control.
- The new northbound lane at the Project Driveway will allow shared left/right turn movements.

The project driveway to Mayne Street was not analyzed as part of this traffic impact analysis as the project driveway will only serve a minimal number of residential guest parking spaces along the north-south drive aisle. Residents will not use this access as they will park in the parking garage and use the project driveway on Oak Street for all inbound/outbound access.

PROJECT TRIP GENERATION

Table 2 shows the project trip generation based upon trip generation rates obtained from the Institute of Transportation Engineers (ITE) Trip Generation Manual (10th Edition, 2017). The project trip generation forecast is determined by multiplying the trip generation rates by the land use quantity. Trip generation rates for Multi-Family Housing (Mid-Rise) (Land Use Code 221), Movie Theater (Land Use Code 444), Commercial Retail (Land Use Code 820), and Fast Casual Restaurant (Land Use Code 930) were used.

As shown in Table 2, the proposed project is forecast to generate a total of approximately 2,187 vehicle trips, including 39 trips during the AM peak hour and 114 trips during the PM peak hour.

OTHER FACTORS AFFECTING TRIP GENERATION

Land uses such as shopping centers, restaurants, gasoline stations, and convenience stores will often locate next to busy roadways to attract motorists already on the street. Since the trip generation rates contained in the ITE Trip Generation Manual represent vehicles entering and exiting at the site driveway(s), it is appropriate to reduce the initial trip generation forecast by the applicable pass-by trip rate when calculating the net new trips that will be added to the surrounding street system. This analysis applies a pass-by trip reduction for the commercial retail land use based upon rates from the ITE Trip Generation Handbook (3rd Edition, 2017).

Traffic volumes shown in Table 2 consist of the total trips generated for each project land use. As a residential trip generated by the project may also interact with the commercial retail, movie theater, or fast casual restaurant land uses within the project, a double counting of those trips occurs. To account for this internal interaction, the trips generated by the project site have been adjusted in accordance with procedures developed by the National Cooperative Highway Research Program 684 Internal Capture Estimation Tool as incorporated into the ITE Trip Generation Handbook (3rd Edition). Detailed internal capture worksheets are provided in the scoping agreement in Appendix B.

A light rail station is anticipated to be constructed at Bellflower Boulevard and Flower Street for the West Santa Ana Branch Transit Corridor by 2028. Once this station is constructed and operational, it is expected that the project vehicular trip generation will be further reduced as residents and visitors will have convenient access to high-quality transit. To provide a conservative analysis, transit credit has not been applied to the project trip generation since the project is opening five years prior to this facility.

PROJECT TRIP DISTRIBUTION AND ASSIGNMENT

Figure 13 and Figure 14 show the forecast directional distribution patterns for the project generated trips. The project trip distribution patterns are based on review of existing volume data, surrounding land uses, and the local and regional roadway facilities in the project vicinity. Since the proposed commercial uses will utilize the parking structure currently under construction and public parking lots south of Oak Street and east of Bellflower Boulevard, project-generated commercial trips were distributed accordingly.

Based on the identified project trip generation and distributions, project average daily traffic volumes have been calculated and shown on Figure 15. The project-generated AM and PM peak hour intersection turning movement volumes are shown on Figure 16 and Figure 17.

TRANSIT TRIP GENERATION

The Los Angeles County Metropolitan Transportation Authority 2010 Congestion Management Program Appendix D - Guidelines for CMP Transportation Impact Analysis 8.4 utilizes a conversion factor based on the daily and AM and PM peak hour trip generation to provide for a transit analysis. The conversion is as follows:

- Multiply the total trips generated by 1.4 to convert vehicle trips to person trips;
- For each time period, multiply the result by one of the following factors:

  3.5% of Total Person Trips Generated for most cases, except:

  10% primarily Residential within 1/4 mile of a CMP transit center
  15% primarily Commercial within 1/4 mile of a CMP transit center
  7% primarily Residential within 1/4 mile of a CMP multi-modal transportation center
  9% primarily Commercial within 1/4 mile of a CMP multi-modal transportation center
  5% primarily Residential within 1/4 mile of a CMP transit corridor
  7% primarily Commercial within 1/4 mile of a CMP transit corridor
  0% if no fixed route transit services operate within one mile of the project

Accordingly, the proposed project-generated transit trips are calculated as follows for the near-term:

- Daily: ((2,187 trips x 1.4) x 0.035) ≈ 107
- Morning Peak Hour: ((39 trips x 1.4) x 0.035) ≈ 2
- Evening Peak Hour: ((114 trips x 1.4) x 0.035) ≈ 6

The proposed project is forecast to generate approximately two (2) transit trips during the AM peak hour and approximately six (6) transit trips during the PM peak hour. Based on the existing transit services available in the project vicinity and the relatively low transit trip generation, the proposed project is forecast to have a nominal impact on transit service.

Upon completion of the West Santa Ana Branch Transit Corridor station, the proposed project-generated transit trips are calculated as follows:

- Daily: ((2,1 trips x 1.4) x 0.10) ≈ 306
- Morning Peak Hour: ((39 trips x 1.4) x 0.10) ≈ 5
- Evening Peak Hour: ((114 trips x 1.4) x 0.10) ≈ 16

Table 2
Project Trip Generation

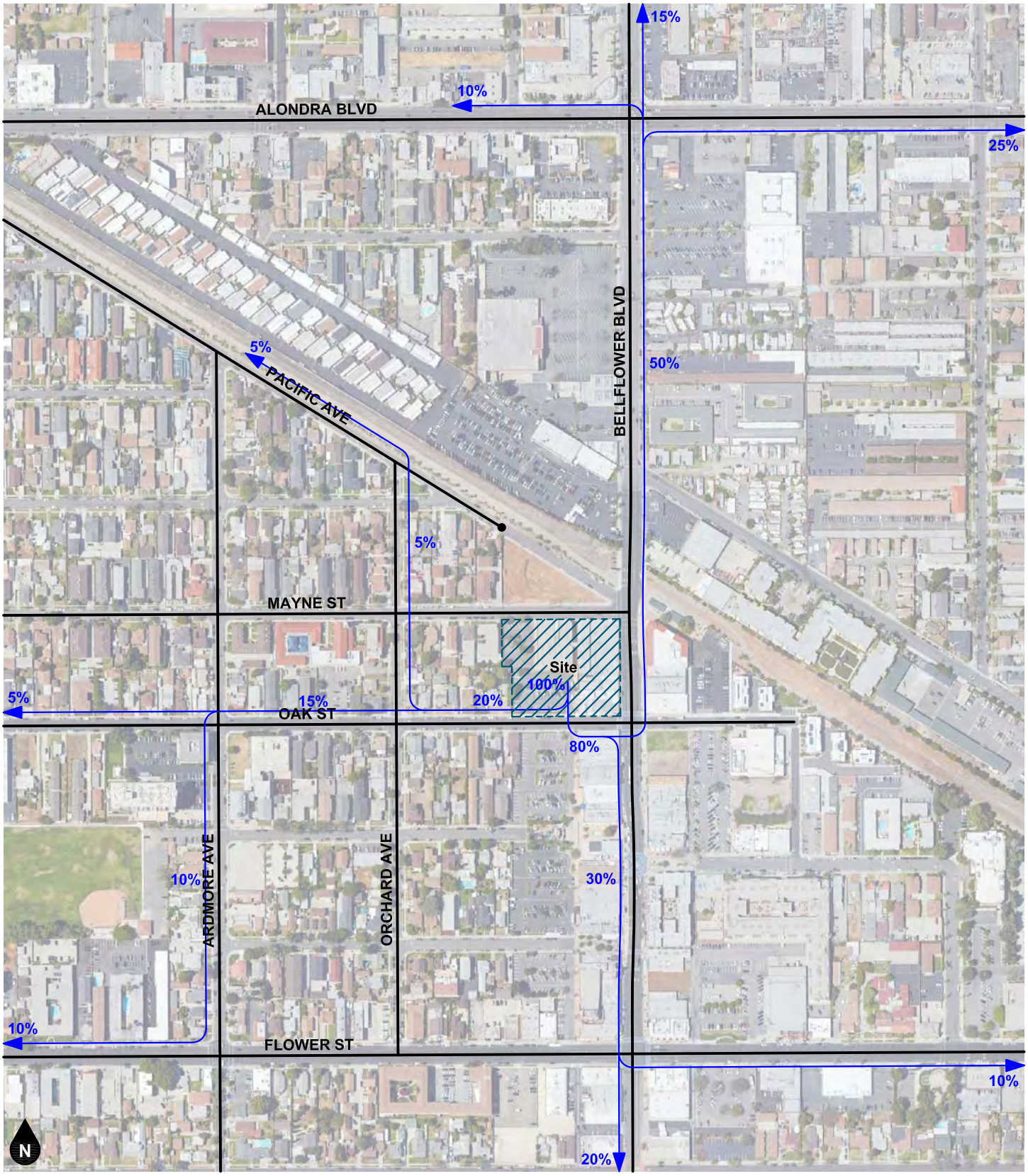
Trip Generation Rates									
			AM Peak Hour			PM Peak Hour			
Land Use	Source[1]	Units[2]	In	Out	Total	In	Out	Total	Daily
Multi-Family Housing (Mid-Rise)	ITE 221	DU	26%	74%	0.36	61%	39%	0.44	5.44
Movie Theater	ITE 444	MS	--	--	--	44%	56%	14.60	220.00
Commercial Retail	ITE 820	TSF	62%	38%	0.94	48%	52%	3.81	37.75
Fast Casual Restaurant	ITE 930	TSF	67%	33%	2.07	55%	45%	14.13	315.17

Trips Generated									
			AM Peak Hour			PM Peak Hour			
Land Use	Quantity		In	Out	Total	In	Out	Total	Daily
Multi-Family Housing (Mid-Rise)	91	DU	9	24	33	24	16	40	495
Internal Capture[3]			0	-1	-1	-5	-3	-8	-9
Subtotal - Multi-Family Housing			9	23	32	19	13	32	486
Movie Theater	4	MS	--	--	--	26	33	59	880
Internal Capture[3]			--	--	--	-1	-2	-3	-3
Subtotal - Movie Theater			--	--	--	25	31	56	877
Commercial Retail	2.925	TSF	2	1	3	5	6	11	110
Internal Capture[3]			0	0	0	-3	-2	-5	-5
Pass-By Reduction (34% PM)[3]			--	--	--	-1	-1	-2	-2
Subtotal - Commercial Retail			2	1	3	1	3	4	103
Fast Casual Restaurant	2.325	TSF	3	2	5	18	15	33	733
Internal Capture[3]			-1	0	-1	-5	-6	-11	-12
Subtotal - Fast Casual Restaurant			2	2	4	13	9	22	721
Total			**13**	**26**	**39**	**58**	**56**	**114**	**2,187**

Notes:
(1) Source: Institute of Transportation Engineers, Trip Generation Manual, 10th Edition, 2017, ### = Land Use Code.

(2) DU = Dwelling Units; MS = Movie Screens, TSF = Thousand Square Feet

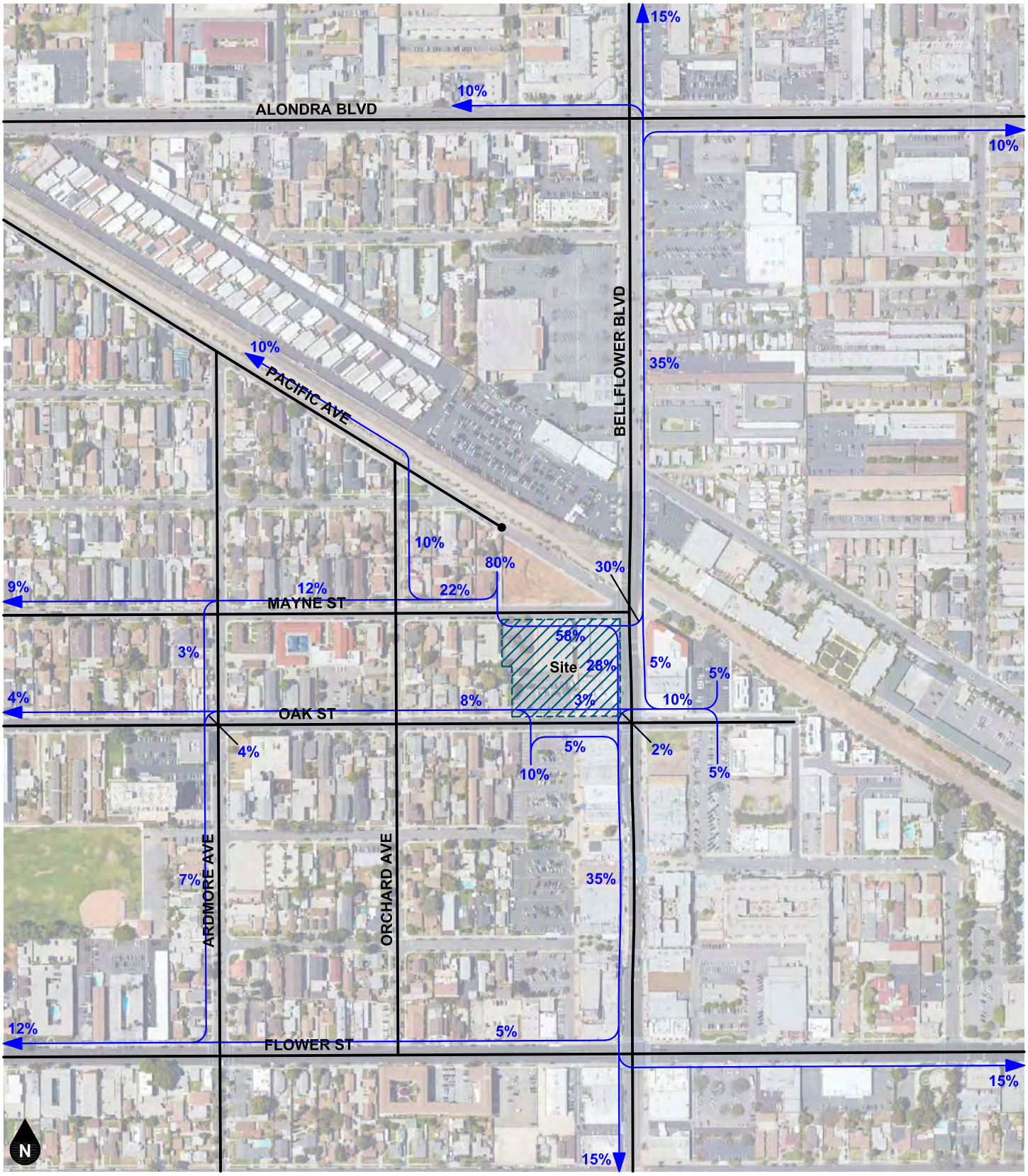
(3) Source: Institute of Transportation Engineers, Trip Generation Handbook, 3rd Edition, 2017. Internal capture calculated using the National Cooperative Highway Research Program 684 Internal Capture Estimation Tool provided by the Institute of Transportation Engineers (see Appendix B).



Legend

10% Percent To/From Project

Figure 13
Project Trip Distribution - Residential



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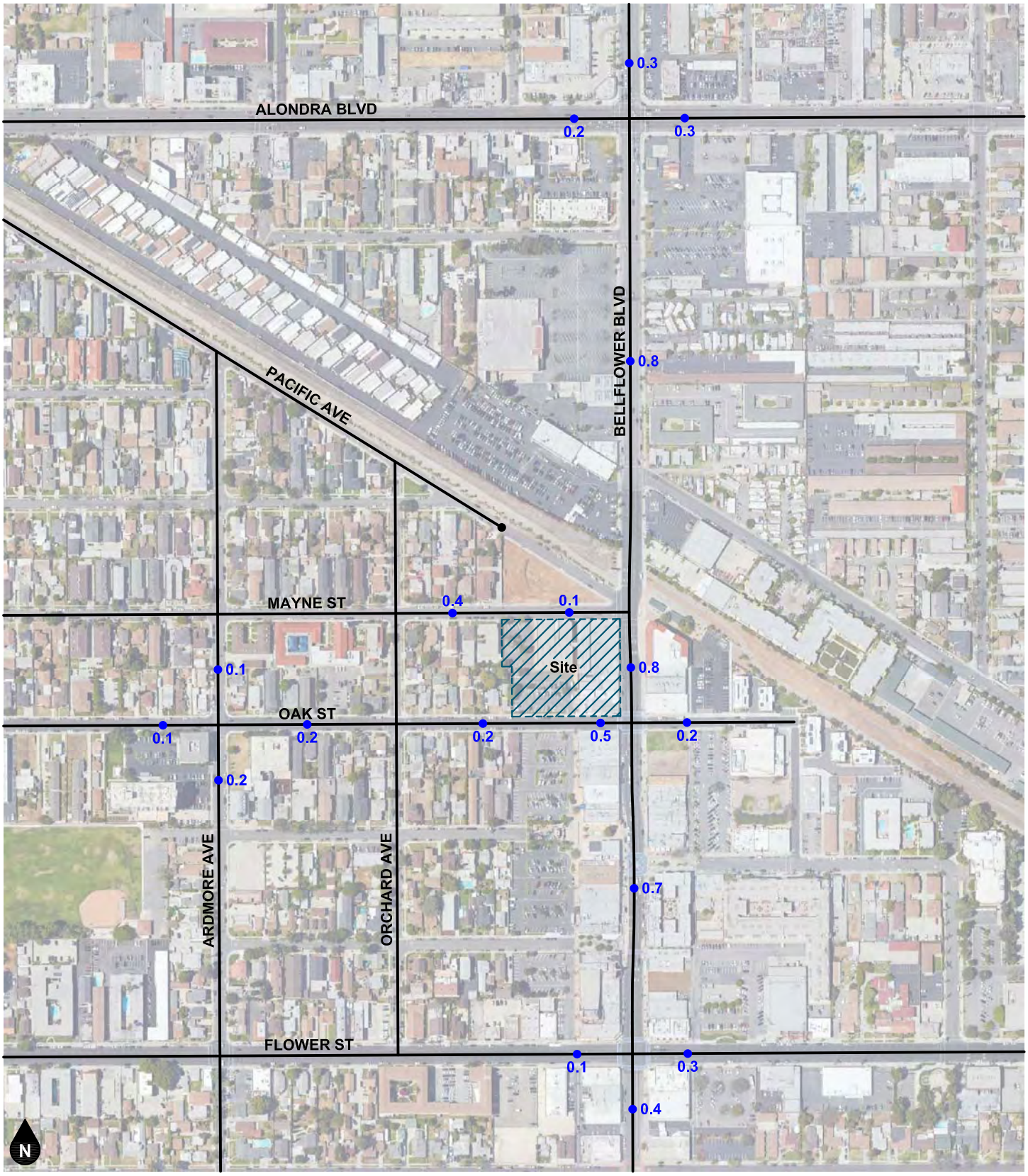
10% Percent To/From Project

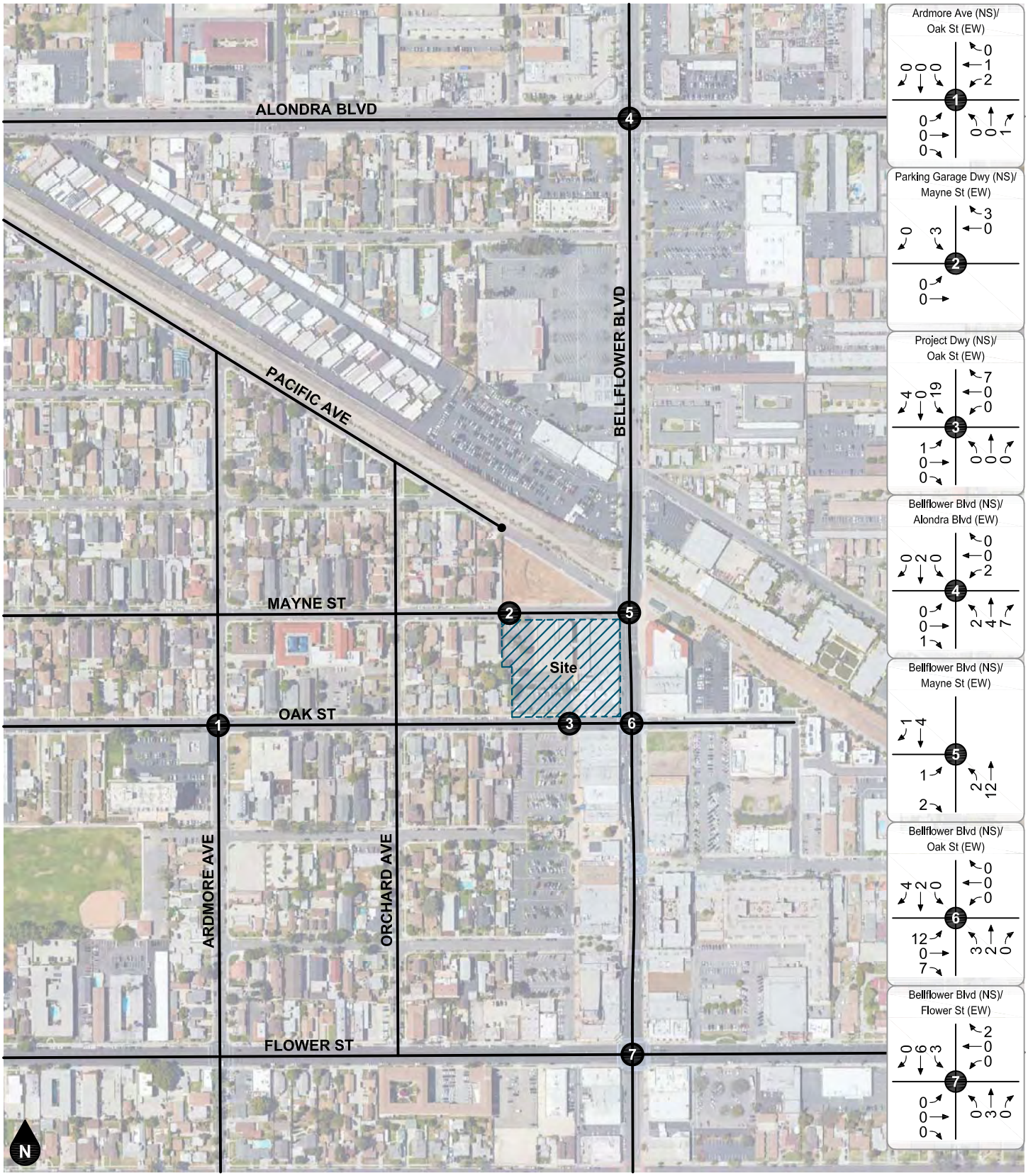
Figure 14
Project Trip Distribution - Commercial Uses



Legend

●## Vehicles Per Day (1,000's)

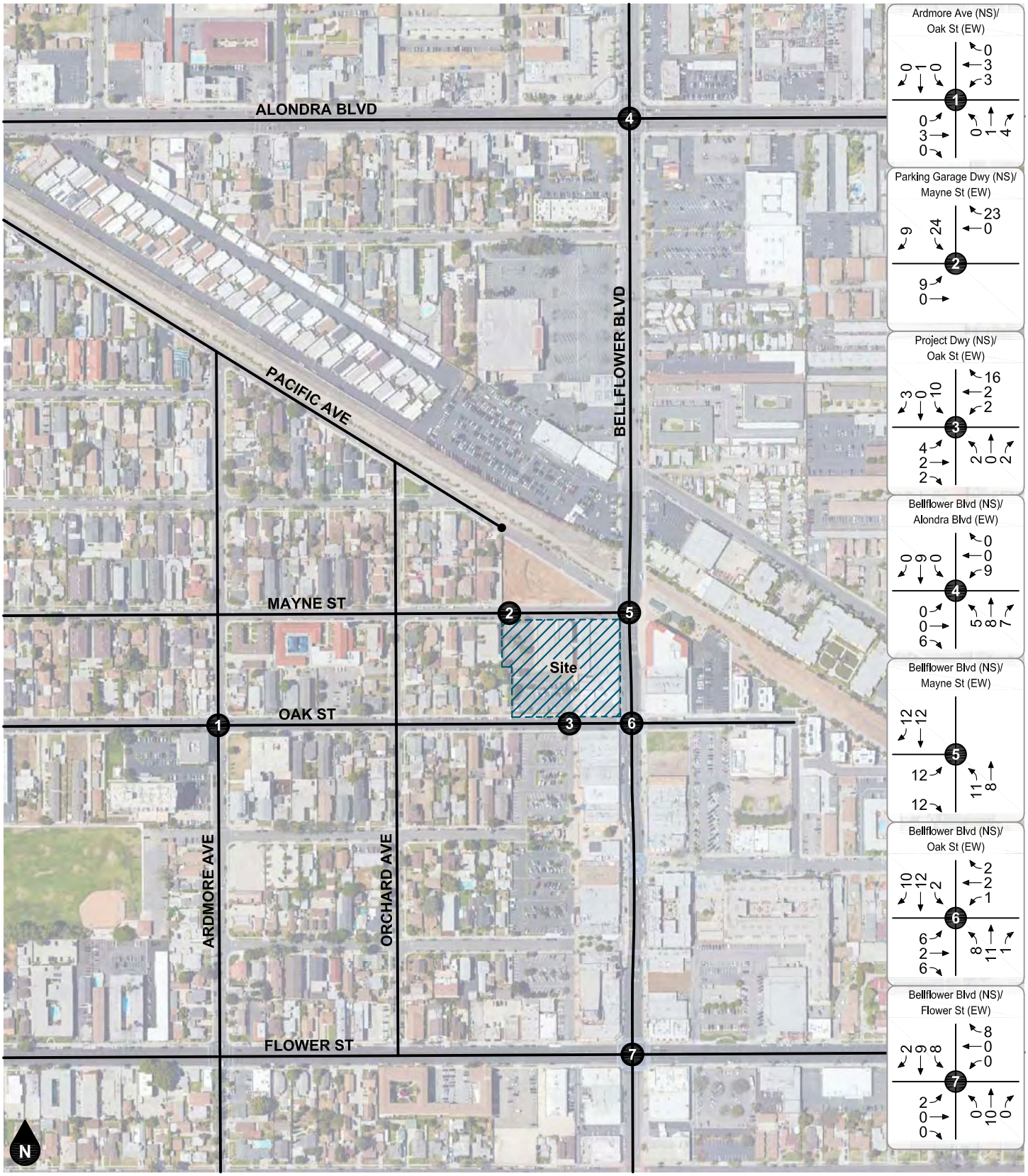
Figure 15
Project Average Daily Traffic Volumes



Legend

(#) Study Intersection

Figure 16
Project AM Peak Hour Intersection Turning Movement Volumes



Legend

(#) Study Intersection

Figure 17
Project PM Peak Hour Intersection Turning Movement Volumes

5. FUTURE VOLUME FORECASTS

This section describes how future volume forecasts for each analysis scenario were developed. Forecast study area volumes are illustrated on figures contained in this section.

OTHER DEVELOPMENT

To account for trips generated by future development, trips generated by pending or approved other development projects in the City of Bellflower were added to the study area. Table 3 shows the trip generation summary for other development projects. Figure 18 shows the other development location map.

Figure 19 shows the forecast average daily traffic volumes for the other development. Figure 20 and Figure 21 show the forecast AM and PM peak hour intersection turning movement volumes for trips generated by other developments.

ANALYSIS SCENARIO VOLUME FORECASTS

Existing Plus Project

Existing Plus Project volume forecasts were derived by adding the project generated trips to Existing volumes. This scenario has been analyzed with the parking garage on the northwest corner of Bellflower Boulevard and Mayne Street being operational and utilized by project traffic. It is currently under construction. Existing Plus Project average daily traffic volumes are shown on Figure 22. Existing Plus Project AM and PM peak hour intersection turning movement volumes are shown on Figure 23 and Figure 24.

Opening Year (2023) Without Project

To develop Opening Year (2023) Without Project volume forecasts, Existing volumes were combined with trips generated by other developments. Opening Year (2023) Without Project average daily traffic volumes are shown on Figure 25. Opening Year (2023) Without Project AM and PM peak hour intersection turning movement volumes are shown Figure 26 and Figure 27.

Opening Year (2023) With Project

Opening Year (2023) With Project volume forecasts were developed by adding project-generated trips to the Opening Year (2023) Without Project forecast. The Opening Year (2023) Without Project forecasts have been reduced for the parking garage on the northwest corner of Bellflower Boulevard and Mayne Street to account for project traffic. Thus, when project traffic is added for Opening Year (2023) With Project conditions, the parking garage trip generation will be at its full trip generation forecast. Opening Year (2023) With Project average daily traffic volumes are shown on Figure 28. Opening Year (2023) With Project AM and PM peak hour intersection turning movement volumes are shown on Figure 29 and Figure 30.

Table 3
Other Development Trip Generation

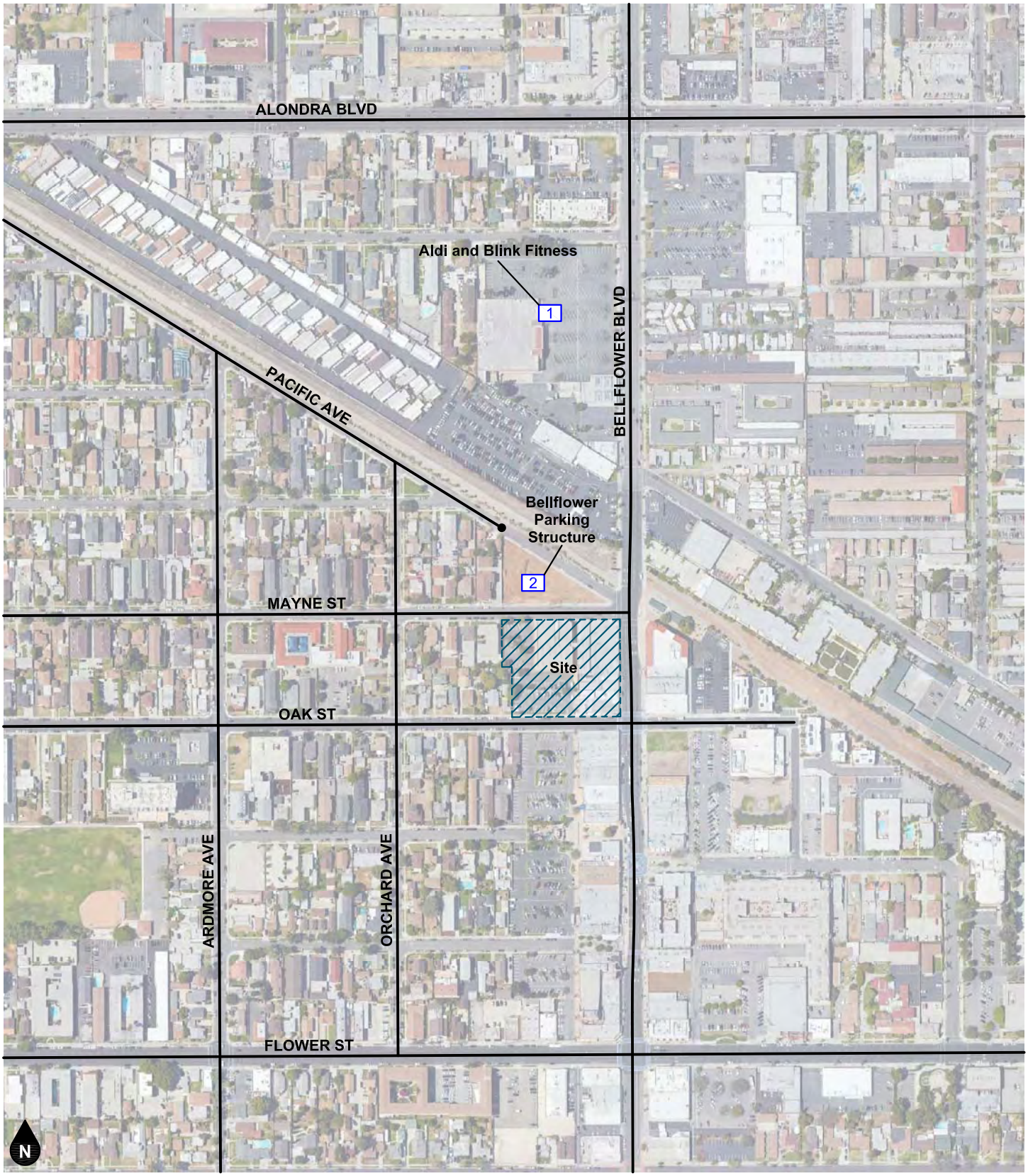
Project Name	Land Use	Quantity	Units[1]	Source[2]	AM Peak Hour			PM Peak Hour			Daily
					In	Out	Total	In	Out	Total	
Aldi	Grocery Store	21.772	TSF	ITE 850	50	33	83	103	99	202	2,325
	Pass-By Trips (36% PM)				--	--	--	-37	-36	-73	-73
Blink Fitness	Fitness Center	14.594	TSF	ITE 492	10	9	19	29	22	51	438
	Subtotal				60	42	102	95	85	180	2,690
Bellflower Parking Structure	Light Rail Transit Station w/ Parking	285	PS	[3]	245	60	305	205	148	353	715
TOTAL OTHER DEVELOPMENT TRIPS					**305**	**102**	**407**	**300**	**233**	**533**	**3,405**

Notes:

(1) TSF = Thousand Square Feet; PS = Parking Spaces

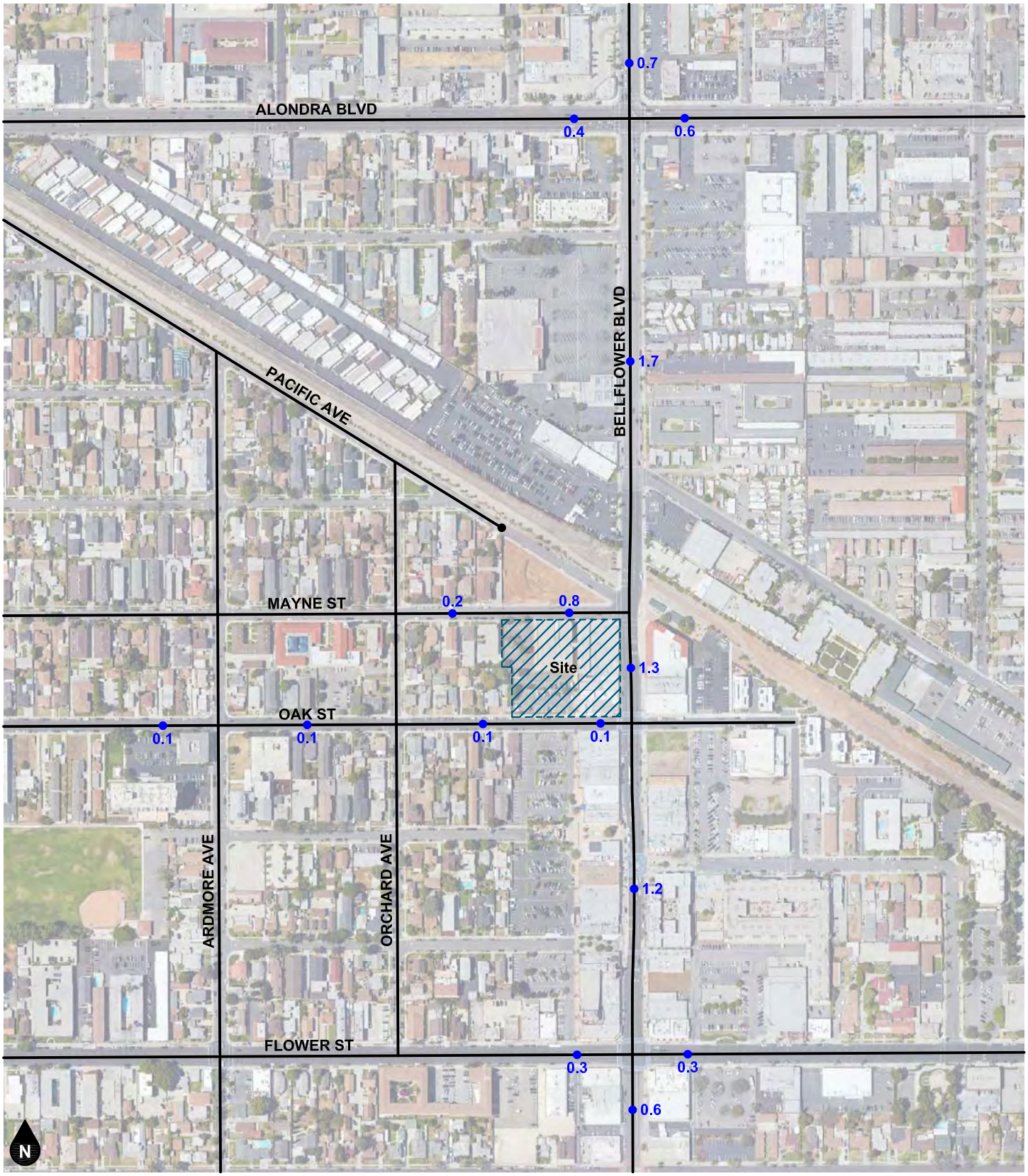
(2) Based on trip generation and pass-by rates from:
Institute of Transportation Engineers, Trip Generation Manual, 10th Edition, 2017;
Institute of Transportation Engineers, Trip Generation Handbook, 3rd Edition, 2017;
San Diego Association of Governments, Brief Guide of Vehicular Traffic Generation Rates for San Diego Region, April 2002.

(3) Bellflower Parking Structure Traffic Impact Study, Hartzog & Crabill, Inc. (October 12, 2017)



Legend
[#] Traffic Analysis Zone

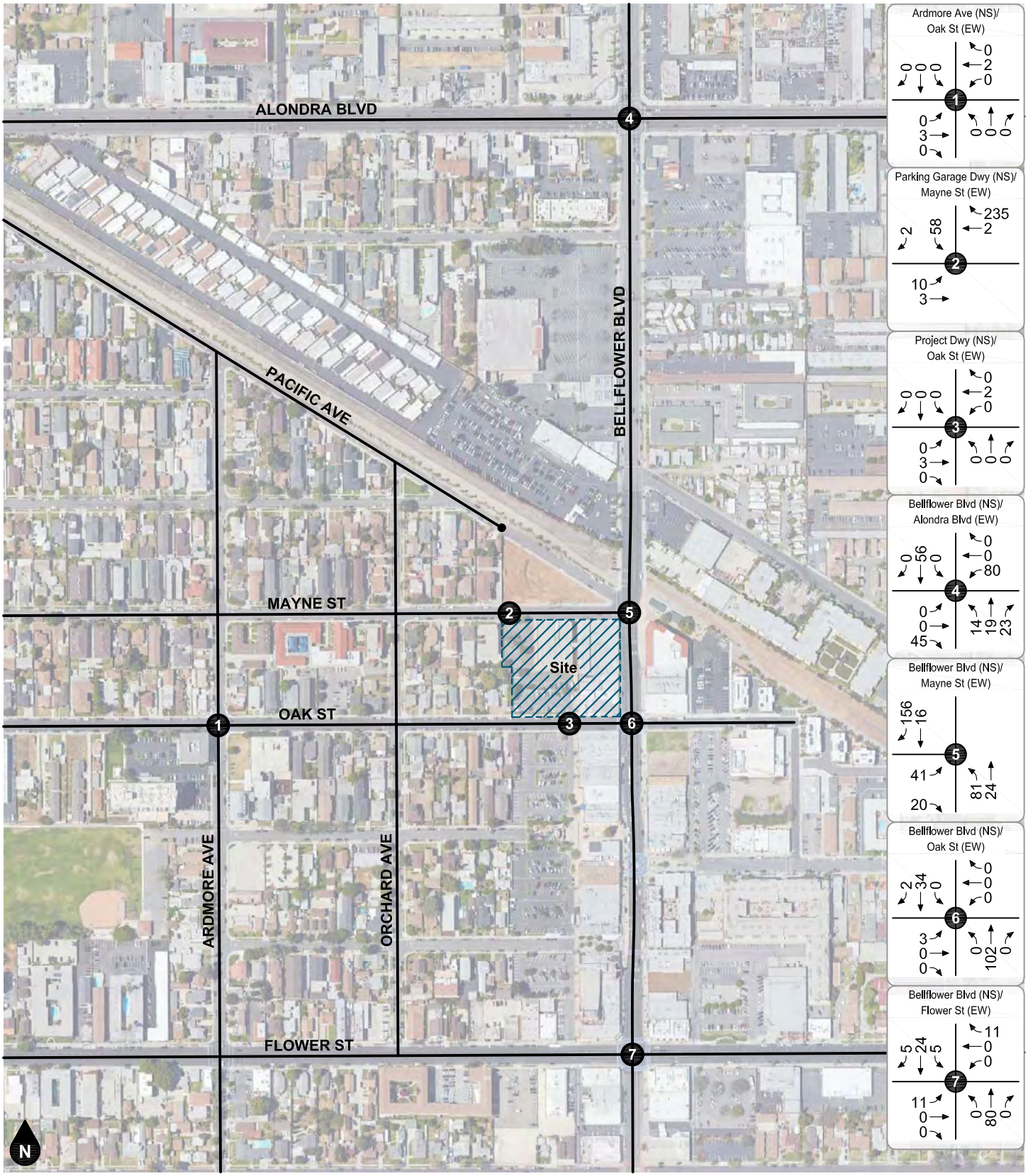
Figure 18
Other Development Location Map



Legend

●## Vehicles Per Day (1,000's)

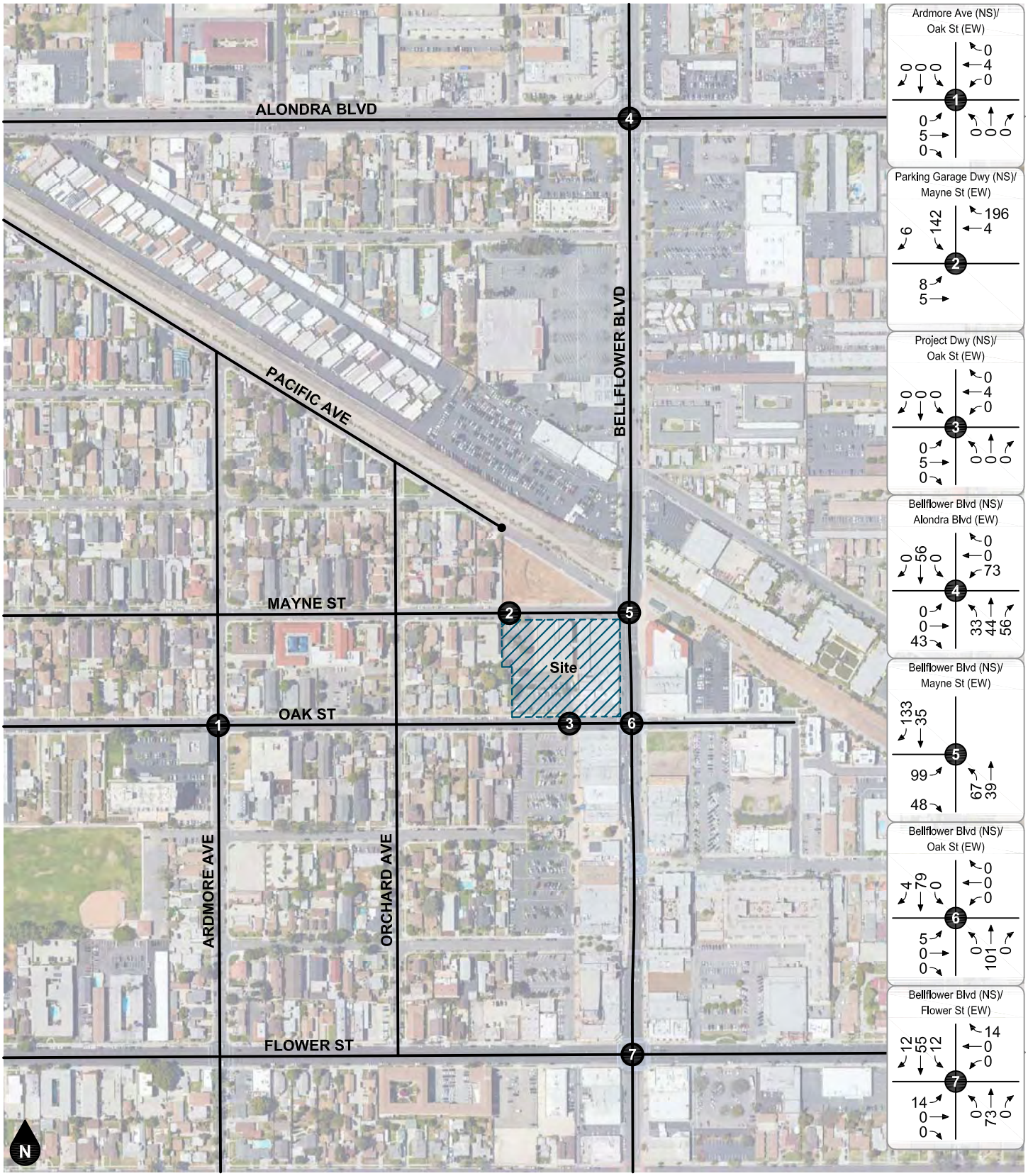
Figure 19
Other Development Average Daily Traffic Volumes



Legend

(#) Study Intersection

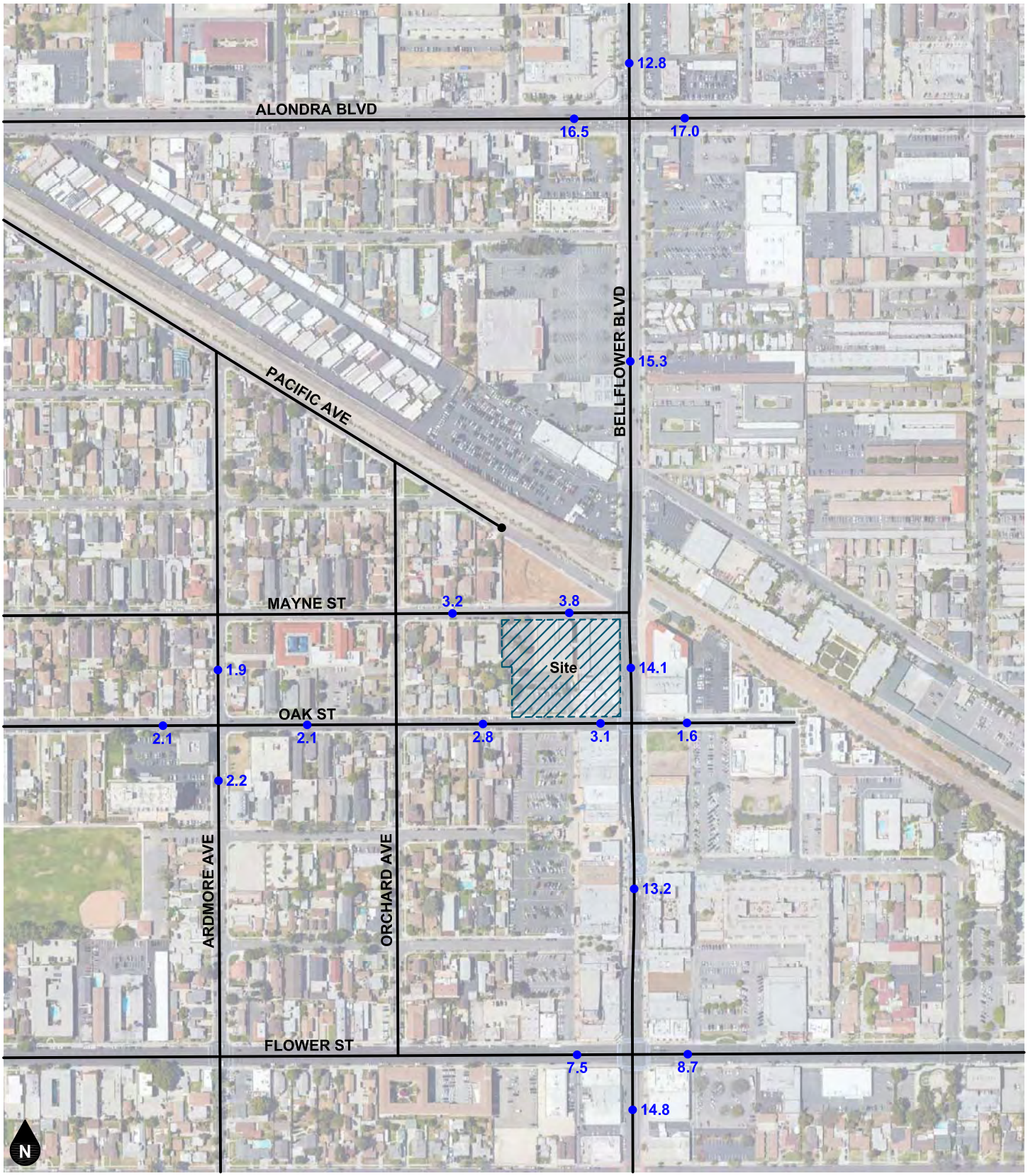
Figure 20
Other Development
AM Peak Hour Intersection Turning Movement Volumes



Legend

(#) Study Intersection

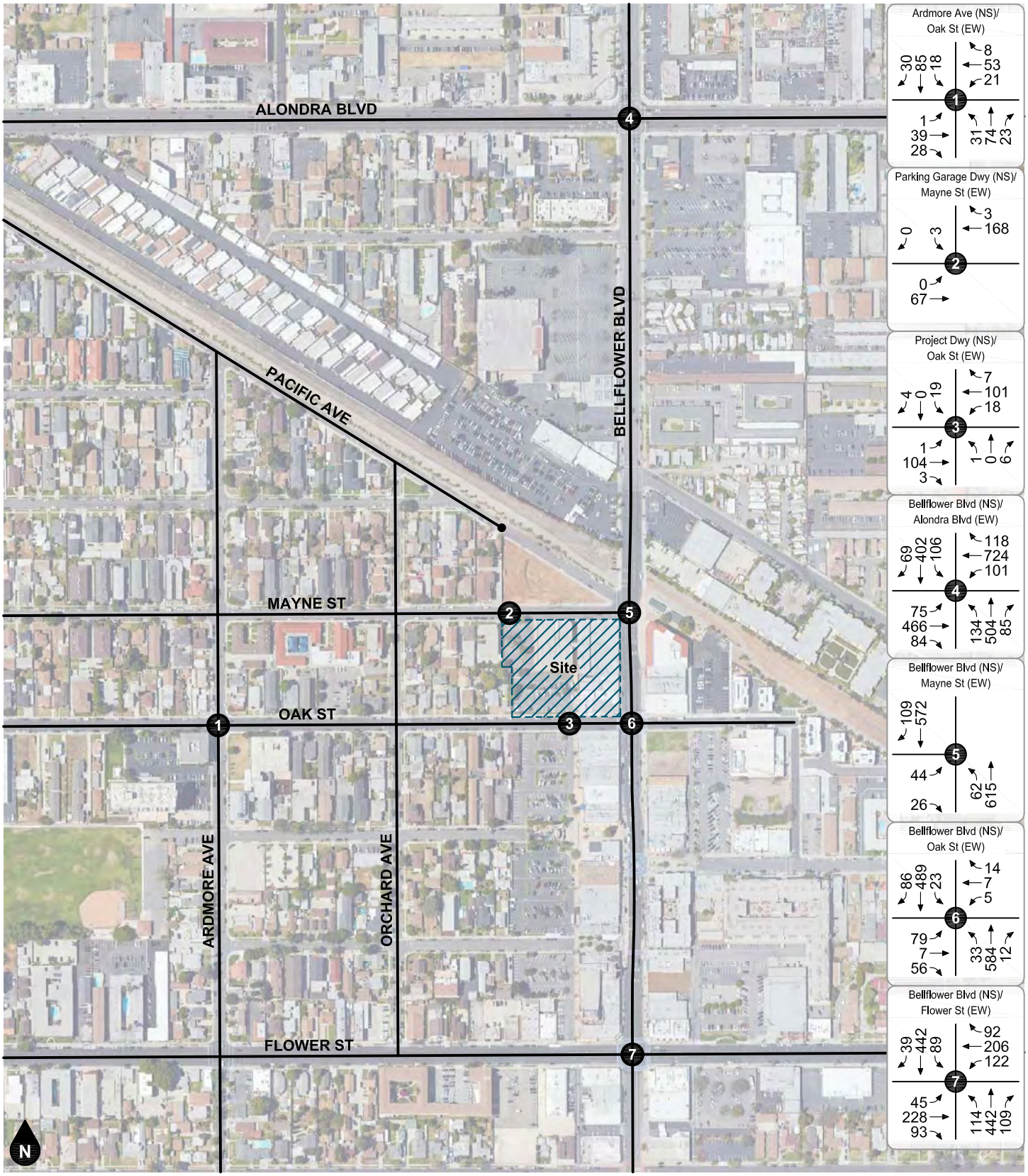
Figure 21
Other Development
PM Peak Hour Intersection Turning Movement Volumes



Legend

●## Vehicles Per Day (1,000's)

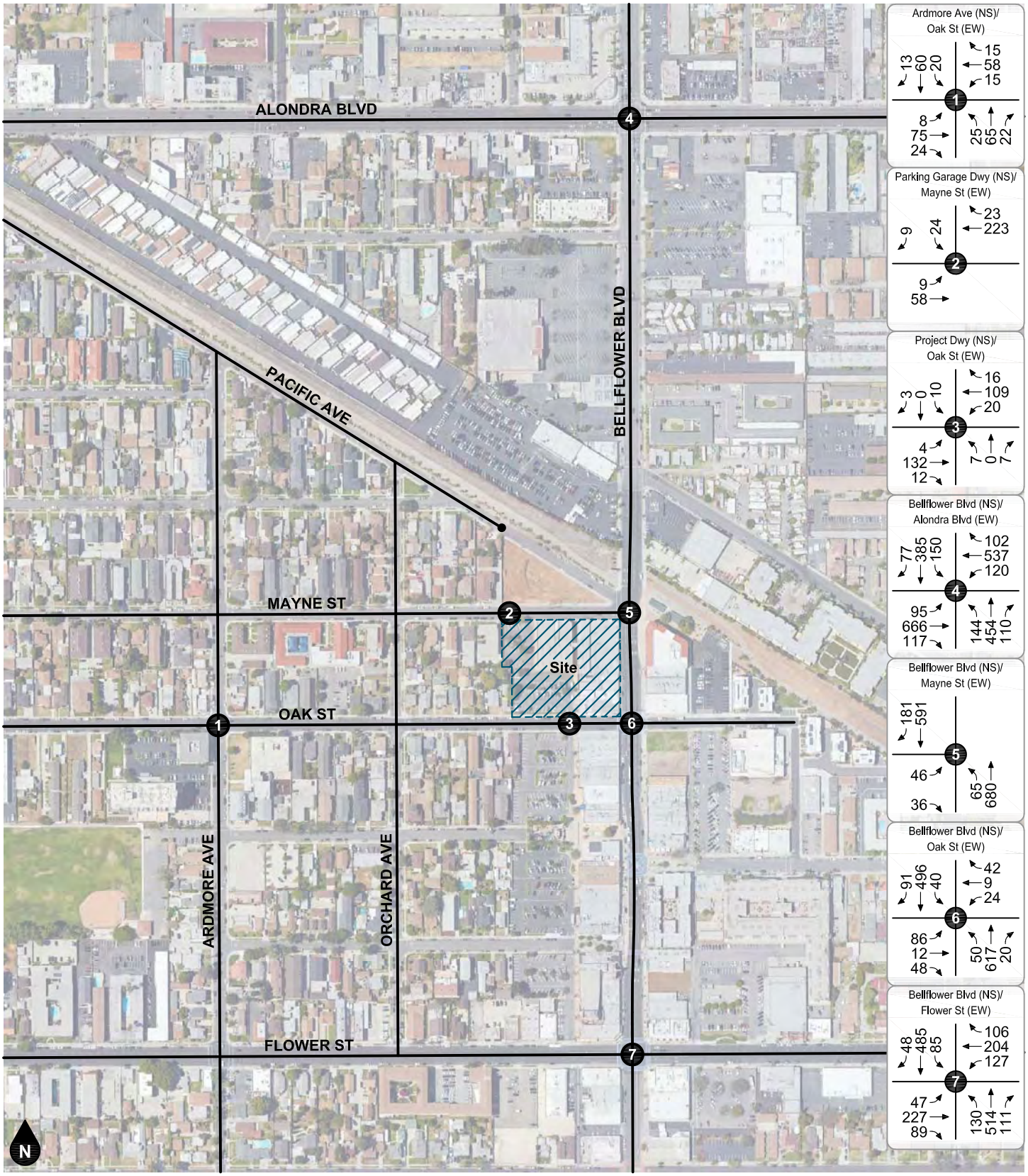
Figure 22
Existing Plus Project Average Daily Traffic Volumes



Legend

(#) Study Intersection

Figure 23
Existing Plus Project
AM Peak Hour Intersection Turning Movement Volumes



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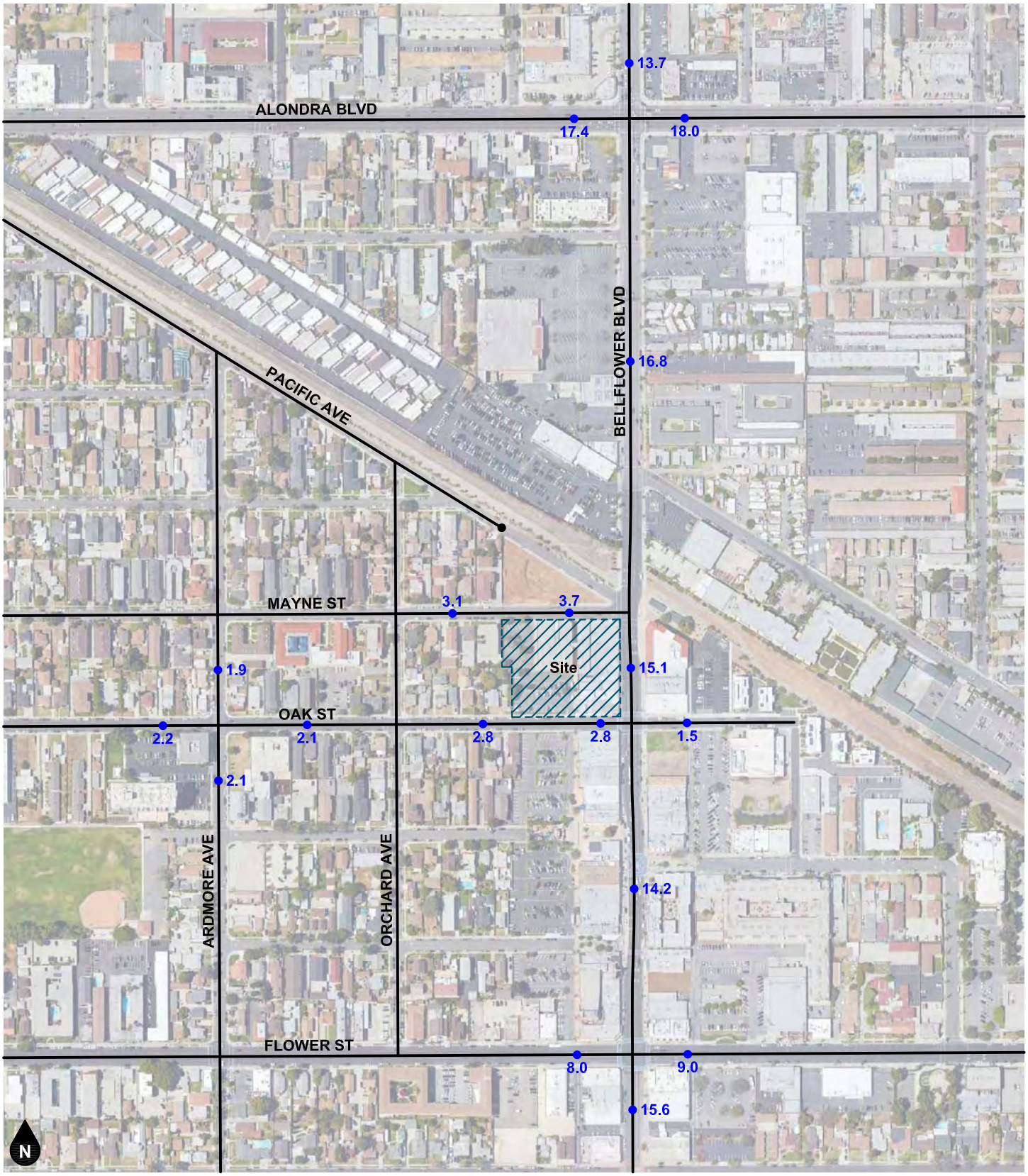
(#) Study Intersection

Figure 24
Existing Plus Project
PM Peak Hour Intersection Turning Movement Volumes



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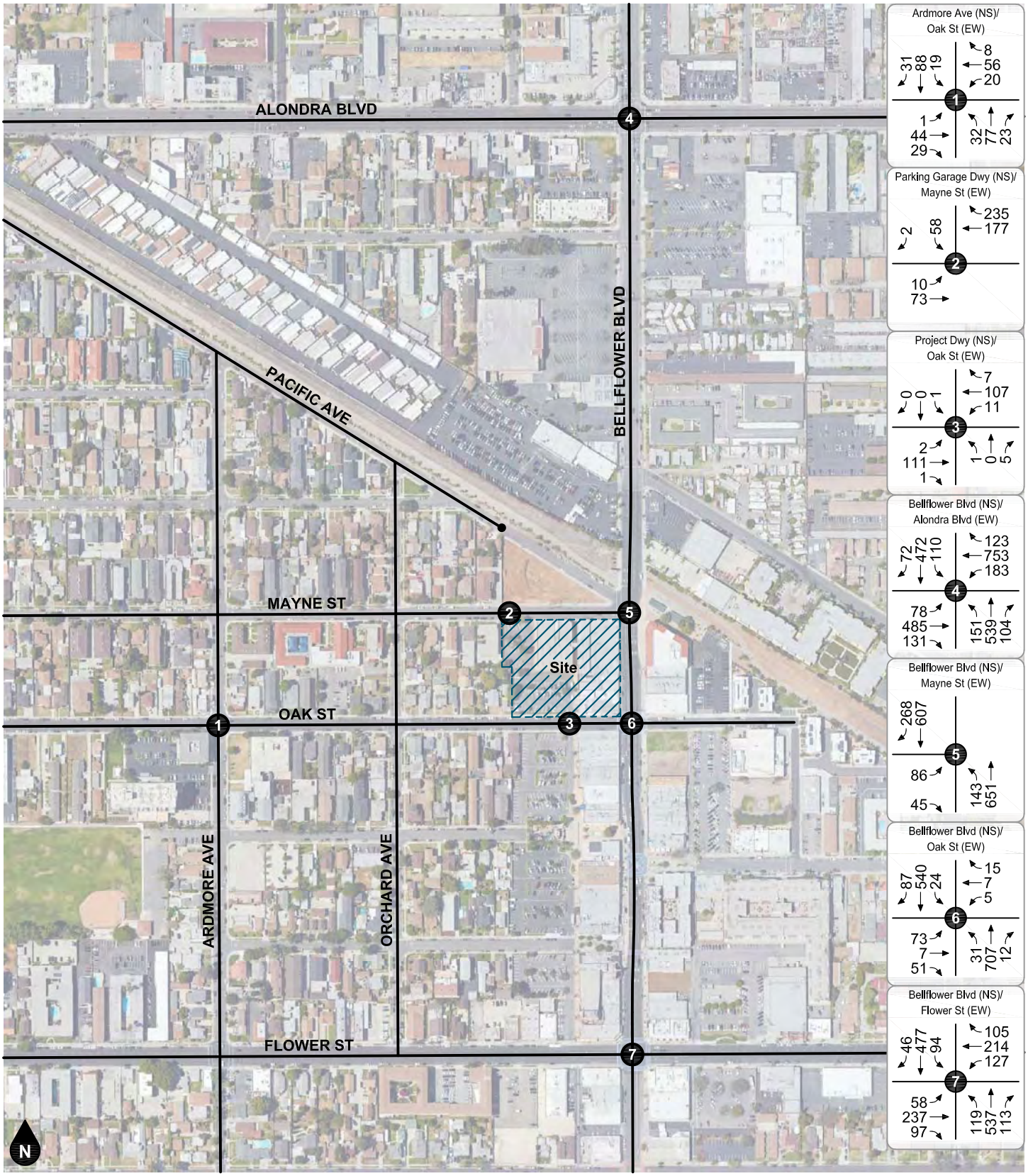
●## Vehicles Per Day (1,000's)

Figure 25
Opening Year (2023) Without Project Average Daily Traffic Volumes



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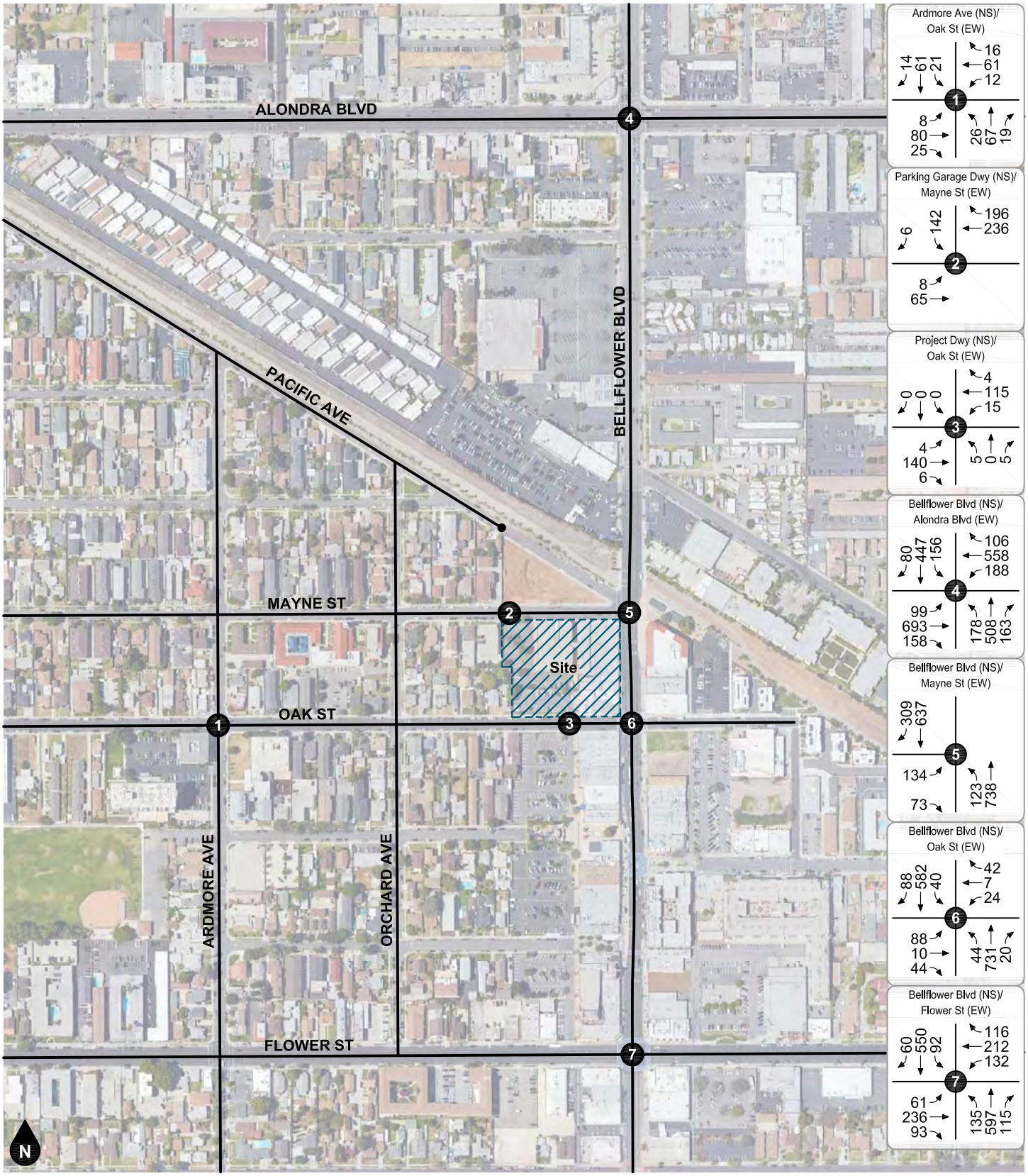
(#) Study Intersection

Figure 26
Opening Year (2023) Without Project
AM Peak Hour Intersection Turning Movement Volumes



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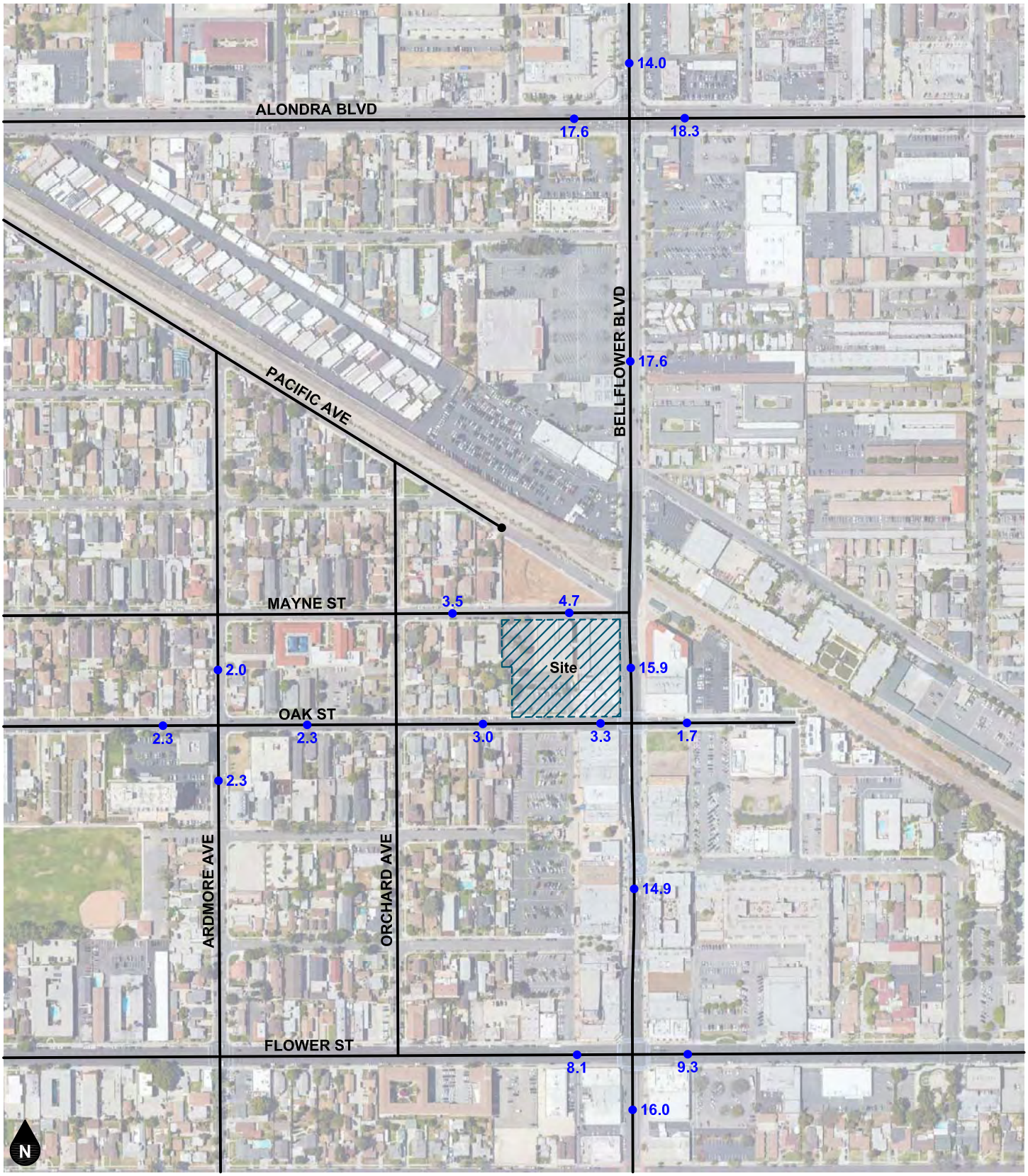
(#) Study Intersection

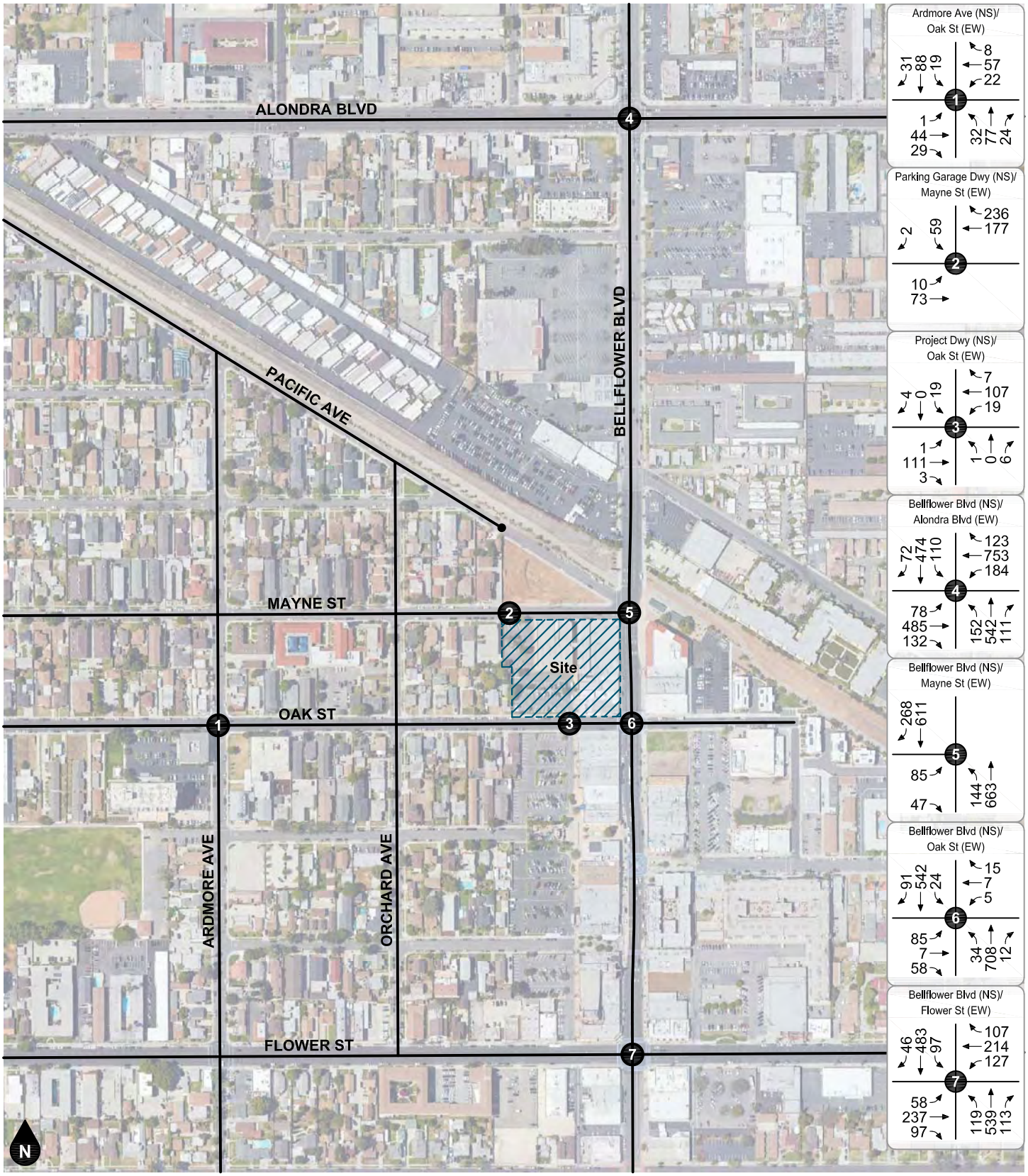
Figure 27
Opening Year (2023) Without Project
PM Peak Hour Intersection Turning Movement Volumes



Legend

●## Vehicles Per Day (1,000's)

Figure 28
Opening Year (2023) With Project Average Daily Traffic Volumes



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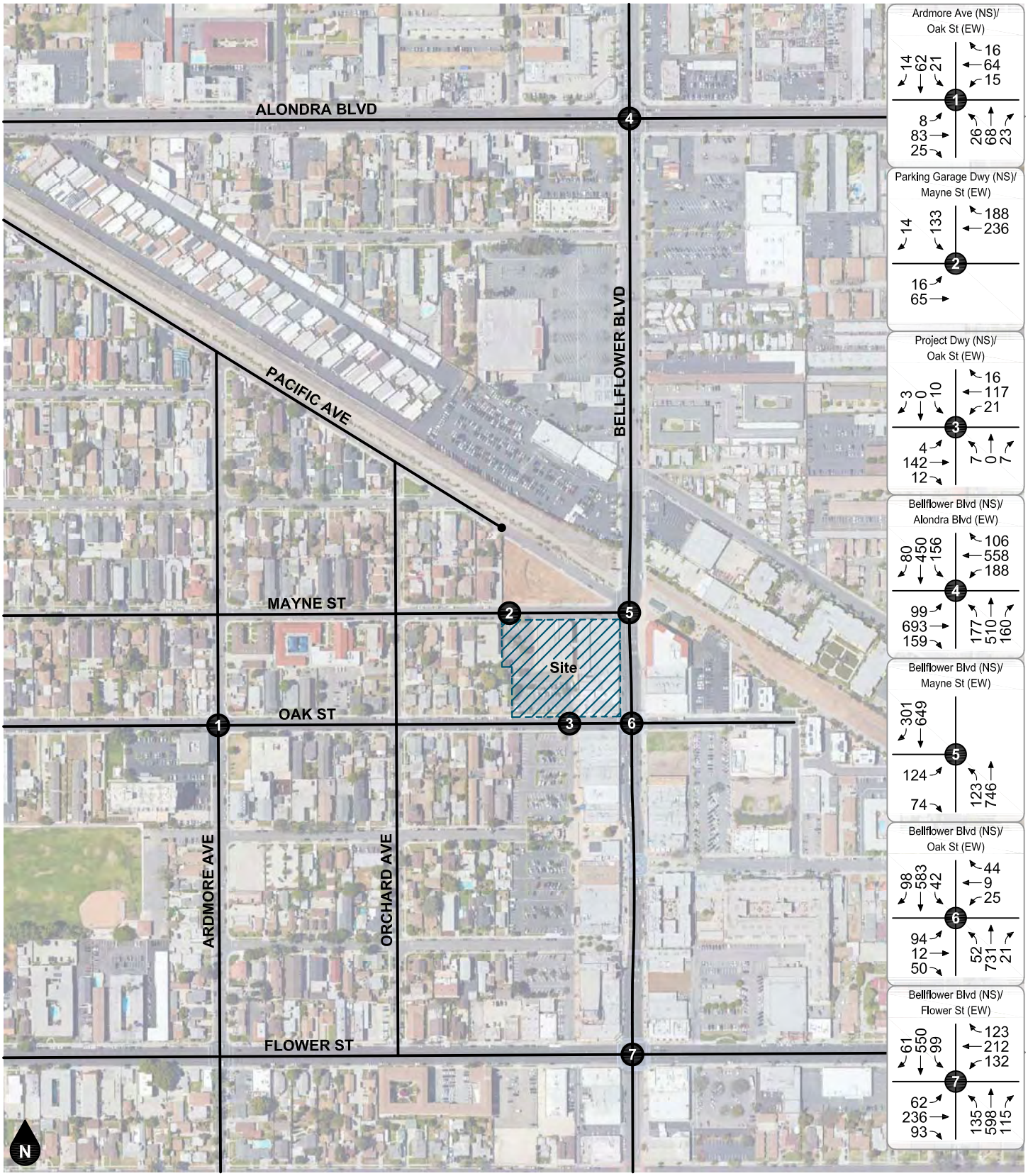
(#) Study Intersection

Figure 29
Opening Year (2023) With Project
AM Peak Hour Intersection Turning Movement Volumes



Legend

(#) Study Intersection

Figure 30
Opening Year (2023) With Project
PM Peak Hour Intersection Turning Movement Volumes

6. FUTURE OPERATIONAL ANALYSIS

Detailed intersection Level of Service calculation worksheets for each of the following analysis scenarios are provided in Appendix D.

EXISTING PLUS PROJECT

Intersection Levels of Service

The delay and Levels of Service for Existing Plus Project conditions are shown in Table 4. As shown in Table 4, the study intersections are forecast to operate at Levels of Service C or better during the peak hours for Existing Plus Project conditions.

Significant Impact Evaluation

Table 5 evaluates the project impact at the study intersections for Existing Plus Project conditions. As shown in Table 5, the proposed project is forecast to result in no significant traffic impacts at the study intersections for Existing Plus Project conditions.

OPENING YEAR (2023) WITHOUT PROJECT

Intersection Levels of Service

The delay and Levels of Service for Opening Year (2023) Without Project conditions are shown in Table 6. As shown in Table 6, the study intersections are forecast to operate at Levels of Service C or better during the peak hours for Opening Year (2023) Without Project conditions.

OPENING YEAR (2023) WITH PROJECT

Intersection Levels of Service

The delay and Levels of Service for Opening Year (2023) With Project conditions are shown in Table 7. As shown in Table 7, the study intersections are forecast to operate at Levels of Service C or better during the peak hours for Opening Year (2023) With Project conditions.

Significant Impact Evaluation

Table 8 evaluates the project impact at the study intersections for Opening Year (2023) With Project conditions. As shown in Table 8, the proposed project is forecast to result in no significant traffic impacts at the study intersections for Opening Year (2023) With Project conditions.

Table 4
Existing Plus Project Intersection Level of Service

ID	Study Intersection	Traffic Control[1]	AM Peak Hour ICU[2] or [Delay][3]	AM Peak Hour LOS[3]	PM Peak Hour ICU[2] or [Delay][3]	PM Peak Hour LOS[3]
1.	Ardmore Ave at Oak St	AWS	[8.2]	A	[8.2]	A
2.	Parking Garage Dwy at Mayne St	CSS	[9.9]	A	[10.7]	B
3.	Project Dwy at Oak St	CSS	[10.7]	B	[11.2]	B
4.	Bellflower Blvd at Alondra Blvd	TS	0.660	B	0.690	B
5.	Bellflower Blvd at Mayne St	TS	0.552	A	0.603	B
6.	Bellflower Blvd at Oak St	TS	0.575	A	0.617	B
7.	Bellflower Blvd at Flower St	TS	0.663	B	0.707	C

Notes:

(1) AWS = All Way Stop; CSS = Cross Street Stop; TS = Traffic Signal

(2) ICU = Intersection Capacity Utilization

(3) Delay is shown in [seconds/vehicle]. Delay is reported for un-signalized study intersections. For intersections with all way stop control, overall average intersection delay and LOS are shown. For intersections with cross street stop control, LOS is based on average delay of the worst individual lane (or movements sharing a lane).

(4) LOS = Level of Service

Table 5
Existing Plus Project Significant Impact Evaluation

ID Study Intersection	AM Peak Hour						PM Peak Hour					
	Without Project		With Project		Project Impact	Significant Impact?[4]	Without Project		With Project		Project Impact	Significant Impact?[4]
	ICU[1] or [Delay][2]	LOS[3]	ICU[1] or [Delay][2]	LOS[3]			ICU[1] or [Delay][2]	LOS[3]	ICU[1] or [Delay][2]	LOS[3]		
1. Ardmore Ave at Oak St	[8.2]	A	[8.2]	A	--	No	[8.2]	A	[8.2]	A	--	No
2. Parking Garage Dwy at Mayne St	--	--	[9.9]	A	--	No	--	--	[10.7]	B	--	No
3. Project Dwy at Oak St	[10.4]	B	[10.7]	B	--	No	[10.8]	B	[11.2]	B	--	No
4. Bellflower Blvd at Alondra Blvd	0.657	B	0.660	B	+0.003	No	0.678	B	0.690	B	+0.012	No
5. Bellflower Blvd at Mayne St	0.545	A	0.552	A	+0.007	No	0.582	A	0.603	B	+0.021	No
6. Bellflower Blvd at Oak St	0.560	A	0.575	A	+0.015	No	0.594	A	0.617	B	+0.023	No
7. Bellflower Blvd at Flower St	0.659	B	0.663	B	+0.004	No	0.698	B	0.707	C	+0.009	No

Notes:

(1) ICU = Intersection Capacity Utilization

(2) Delay is shown in [seconds/vehicle]

(3) LOS = Level of Service

(4) In the City of Bellflower, an impact is considered significant if the project-related increase in ICU equals or exceeds 0.02 at Level of Service E or F.

Table 6
Opening Year (2023) Without Project Intersection Level of Service

ID	Study Intersection	Traffic Control[1]	AM Peak Hour ICU[2] or [Delay][3]	AM Peak Hour LOS[4]	PM Peak Hour ICU[2] or [Delay][3]	PM Peak Hour LOS[4]
1.	Ardmore Ave at Oak St	AWS	[8.3]	A	[8.3]	A
2.	Parking Garage Dwy at Mayne St	CSS	[11.7]	B	[13.5]	B
3.	Project Dwy at Oak St	CSS	[10.5]	B	[11.0]	B
4.	Bellflower Blvd at Alondra Blvd	TS	0.692	B	0.791	C
5.	Bellflower Blvd at Mayne St	TS	0.675	B	0.748	C
6.	Bellflower Blvd at Oak St	TS	0.623	B	0.674	B
7.	Bellflower Blvd at Flower St	TS	0.717	C	0.769	C

Notes:

(1) AWS = All Way Stop; CSS = Cross Street Stop; TS = Traffic Signal

(2) ICU = Intersection Capacity Utilization

(3) Delay is shown in [seconds/vehicle]. Delay is reported for un-signalized study intersections. For intersections with all way stop control, overall average intersection delay and LOS are shown. For intersections with cross street stop control, LOS is based on average delay of the worst individual lane (or movements sharing a lane).

(4) LOS = Level of Service

Table 7
Opening Year (2023) With Project Intersection Level of Service

ID	Study Intersection	Traffic Control[1]	AM Peak Hour ICU[2] or [Delay][3]	AM Peak Hour LOS[4]	PM Peak Hour ICU[2] or [Delay][3]	PM Peak Hour LOS[4]
1.	Ardmore Ave at Oak St	AWS	[8.3]	A	[8.4]	A
2.	Parking Garage Dwy at Mayne St	CSS	[11.8]	B	[13.7]	B
3.	Project Dwy at Oak St	CSS	[10.9]	B	[11.4]	B
4.	Bellflower Blvd at Alondra Blvd	TS	0.695	B	0.791	C
5.	Bellflower Blvd at Mayne St	TS	0.680	B	0.746	C
6.	Bellflower Blvd at Oak St	TS	0.638	B	0.690	B
7.	Bellflower Blvd at Flower St	TS	0.720	C	0.772	C

Notes:

(1) AWS = All Way Stop; CSS = Cross Street Stop; TS = Traffic Signal

(2) ICU = Intersection Capacity Utilization

(3) Delay is shown in [seconds/vehicle]. Delay is reported for un-signalized study intersections. For intersections with all way stop control, overall average intersection delay and LOS are shown. For intersections with cross street stop control, LOS is based on average delay of the worst individual lane (or movements sharing a lane).

(4) LOS = Level of Service

Table 8
Opening Year (2023) With Project Significant Impact Evaluation

ID	Study Intersection	AM Peak Hour						PM Peak Hour					
		Without Project		With Project		Project Impact	Significant Impact?[3]	Without Project		With Project		Project Impact	Significant Impact?[3]
		ICU[1]	LOS[2]	ICU[1]	LOS[2]			ICU[1]	LOS[2]	ICU[1]	LOS[2]		
1.	Ardmore Ave at Oak St	[8.3]	A	[8.3]	A	--	No	[8.3]	A	[8.4]	A	--	No
2.	Parking Garage Dwy at Mayne St	[11.7]	B	[11.8]	B	--	No	[13.5]	B	[13.7]	B	--	No
3.	Project Dwy at Oak St	[10.5]	B	[10.9]	B	--	No	[11.0]	B	[11.4]	B	--	No
4.	Bellflower Blvd at Alondra Blvd	0.692	B	0.695	B	+0.003	No	0.791	C	0.791	C	0.0	No
5.	Bellflower Blvd at Mayne St	0.675	B	0.680	B	+0.005	No	0.748	C	0.746	C	-0.002	No
6.	Bellflower Blvd at Oak St	0.623	B	0.638	B	+0.015	No	0.674	B	0.690	B	+0.016	No
7.	Bellflower Blvd at Flower St	0.717	C	0.720	C	+0.003	No	0.769	C	0.772	C	+0.003	No

Notes:

(1) ICU = Intersection Capacity Utilization

(2) Delay is shown in [seconds/vehicle]

(3) LOS = Level of Service

(4) In the City of Bellflower, an impact is considered significant if the project-related increase in ICU equals or exceeds 0.02 at Level of Service E or F.

7. CONCLUSIONS

PROJECT DESIGN FEATURES

The proposed project shall construct the following improvements to provide project site access:

Project Driveway (NS) at Mayne Street (EW)

- Construct the project driveway to provide one outbound lane with northbound stop-control.
- The new northbound lane at the Project Driveway will allow shared left/right turn movements.

The project driveway to Mayne Street was not analyzed as part of this traffic impact analysis as the project driveway will only serve guest traffic parked along the north-south drive aisle being utilized by the residential component of the project site. Residents will not use this access as they will park in the parking garage and use the project driveway on Oak Street for all inbound/outbound access.

Project Driveway (NS) at Oak Street (EW) - #3

- Construct the project driveway to provide one inbound lane and one outbound lane with southbound stop-control.
- The existing eastbound lane on Oak Street will allow shared through/left/right turn movements.
- The existing westbound lane on Oak Street will allow shared through/left/right turn movements.
- The new southbound lane at the Project Driveway will allow shared left/through/right turn movements.

MITIGATION MEASURES

No off-site mitigation measure improvements were identified since the proposed project is forecast to result in no significant traffic impacts at the study intersections for the scenarios analyzed.

GENERAL RECOMMENDATIONS

All roadway design, traffic signing and striping, and traffic control improvements relating to the proposed project should be constructed in accordance with applicable engineering standards and to the satisfaction of the City of Bellflower Public Works Department.

Site-adjacent roadways should be constructed or repaired at their ultimate half-section width, including landscaping and parkway improvements in conjunction with development, or as otherwise required by the City of Bellflower Public Works Department.

A development agreement between the project applicant and City of Bellflower will be necessary to address off-street parking deficiencies with the City of Bellflower Municipal Code requirements for the residential portion of the project site. On-street parking on Mayne Street adjacent to the project site is prohibited.

The final grading, landscaping, and street improvement plans should demonstrate that sight distance standards are met in accordance with applicable City of Bellflower/California Department of Transportation sight distance standards.

As is the case for any roadway design, the City of Bellflower should periodically review traffic operations in the vicinity of the project once the project is constructed to assure that the traffic operations are satisfactory.

APPENDICES

Appendix A Glossary
Appendix B Scoping Agreement
Appendix C Volume Count Worksheets
Appendix D Level of Service Worksheets

APPENDIX A

GLOSSARY

GLOSSARY OF TERMS

ACRONYMS

AC	Acres
ADT	Average Daily Traffic
Caltrans	California Department of Transportation
DU	Dwelling Unit
ICU	Intersection Capacity Utilization
LOS	Level of Service
TSF	Thousand Square Feet
V/C	Volume/Capacity
VMT	Vehicle Miles Traveled

TERMS

AVERAGE DAILY TRAFFIC: The average 24-hour volume for a stated period divided by the number of days in that period. For example, Annual Average Daily Traffic is the total volume during a year divided by 365 days.

BANDWIDTH: The number of seconds of green time available for through traffic in a signal progression.

BOTTLENECK: A point of constriction along a roadway that limits the amount of traffic that can proceed downstream from its location.

CAPACITY: The maximum number of vehicles that can be reasonably expected to pass over a given section of a lane or a roadway in a given time period.

CHANNELIZATION: The separation or regulation of conflicting traffic movements into definite paths of travel by the use of pavement markings, raised islands, or other suitable means to facilitate the safe and orderly movements of both vehicles and pedestrians.

CLEARANCE INTERVAL: Nearly same as yellow time. If there is an all red interval after the end of a yellow, then that is also added into the clearance interval.

CONTROL DELAY: The component of delay, typically expressed in seconds per vehicle, resulting from the type of traffic control at an intersection. Control delay is measured by comparison with the uncontrolled condition; it includes delay incurred by slowing down, stopping/waiting, and speeding up.

CORDON: An imaginary line around an area across which vehicles, persons, or other items are counted (in and out).

CORNER SIGHT DISTANCE: The minimum sight distance required by the driver of a vehicle to cross or enter the lanes of the major roadway without requiring approaching traffic travelling at a given speed to radically alter their speed or trajectory. Corner sight distance is measured from the driver's eye at 42 inches above the pavement to an object height of 36 inches above the pavement in the center of the nearest approach lane.

CYCLE LENGTH: The time period in seconds required for a traffic signal to complete one full cycle of indications.

CUL-DE-SAC: A local street open at one end only and with special provisions for turning around.

DAILY CAPACITY: A theoretical value representing the daily traffic volume that will typically result in a peak hour volume equal to the capacity of the roadway.

DELAY: The time consumed while traffic is impeded in its movement by some element over which it has no control, usually expressed in seconds per vehicle.

DEMAND RESPONSIVE SIGNAL: Same as traffic-actuated signal.

DENSITY: The number of vehicles occupying in a unit length of the through traffic lanes of a roadway at any given instant. Usually expressed in vehicles per mile.

DETECTOR: A device that responds to a physical stimulus and transmits a resulting impulse to the signal controller.

DESIGN SPEED: A speed selected for purposes of design. Features of a highway, such as curvature, superelevation, and sight distance (upon which the safe operation of vehicles is dependent) are correlated to design speed.

DIRECTIONAL SPLIT: The percent of traffic in the peak direction at any point in time.

DIVERSION: The rerouting of peak hour traffic to avoid congestion.

FORCED FLOW: Opposite of free flow.

FREE FLOW: Volumes are well below capacity. Vehicles can maneuver freely and travel is unimpeded by other traffic.

GAP: Time or distance between successive vehicles in a traffic stream, rear bumper to front bumper.

HEADWAY: Time or distance spacing between successive vehicles in a traffic stream, front bumper to front bumper.

INTERCONNECTED SIGNAL SYSTEM: A number of intersections that are connected to achieve signal progression.

LEVEL OF SERVICE: A qualitative measure of a number of factors, which include speed and travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience, and operating costs.

LOOP DETECTOR: A vehicle detector consisting of a loop of wire embedded in the roadway, energized by alternating current and producing an output circuit closure when passed over by a vehicle.

MINIMUM ACCEPTABLE GAP: Smallest time headway between successive vehicles in a traffic stream into which another vehicle is willing and able to cross or merge.

MULTI-MODAL: More than one mode; such as automobile, bus transit, rail rapid transit, and bicycle transportation modes.

OFFSET: The time interval in seconds between the beginning of green at one intersection and the beginning of green at an adjacent intersection.

PLATOON: A closely grouped component of traffic that is composed of several vehicles moving, or standing ready to move, with clear spaces ahead and behind.

PASSENGER CAR EQUIVALENT (PCE): A metric used to assess the impact of larger vehicles, such as trucks, recreational vehicles, and buses, by converting the traffic volume of larger vehicles to an equivalent number of passenger cars.

PEAK HOUR: The 60 consecutive minutes with the highest number of vehicles.

PRETIMED SIGNAL: A type of traffic signal that directs traffic to stop and go on a predetermined time schedule without regard to traffic conditions. Also, fixed time signal.

PROGRESSION: A term used to describe the progressive movement of traffic through several signalized intersections.

QUEUE: The number of vehicles waiting at a service area such as a traffic signal, stop sign, or access gate.

QUEUE LENGTH: The length of vehicle queue, typically expressed in feet, waiting at a service area such as a traffic signal, stop sign, or access gate.

SCREEN-LINE: An imaginary line or physical feature across which all trips are counted, normally to verify the validity of mathematical traffic models.

SHARED/RECIPROCAL PARKING AGREEMENT: A written binding document executed between property owners to provide a designated number of off-street parking stalls within a designated area to be available for specified businesses or land uses.

SIGHT DISTANCE: The continuous length of roadway visible to a driver or roadway user.

SIGNAL CYCLE: The time period in seconds required for one complete sequence of signal indications.

SIGNAL PHASE: The part of the signal cycle allocated to one or more traffic movements.

STACKING DISTANCE: The length of area available behind a service area, such as a traffic signal or gate, for vehicle queueing to occur.

STARTING DELAY: The delay experienced in initiating the movement of queued traffic from a stop to an average running speed through an intersection.

STOPPING SIGHT DISTANCE: The minimum distance required by the driver of a vehicle on the major roadway travelling at a given speed to bring the vehicle to a stop after an object on the road becomes visible. Stopping sight distance is measured from the driver's eye at 42 inches above the pavement to an object height of 6 inches above the pavement.

TRAFFIC-ACTUATED SIGNAL: A type of traffic signal that directs traffic to stop and go in accordance with the demands of traffic, as registered by the actuation of detectors.

TRIP: The movement of a person or vehicle from one location (origin) to another (destination). For example, from home to store to home is two trips, not one.

TRIP-END: One end of a trip at either the origin or destination (i.e., each trip has two trip-ends). A trip-end occurs when a person, object, or message is transferred to or from a vehicle.

TRIP GENERATION RATE: The quantity of trips produced and/or attracted by a specific land use stated in terms of units such as per dwelling, per acre, and per 1,000 square feet of floor space.

TRUCK: A vehicle having dual tires on one or more axles, or having more than two axles.

TURNING RADIUS: The circular arc formed by the smallest turning path radius of the front outside tire of a vehicle, such as that performed by a U-turn maneuver. This is based on the length and width of the wheel base as well as the steering mechanism of the vehicle.

UNBALANCED FLOW: Heavier traffic flow in one direction than the other. On a daily basis, most facilities have balanced flow. During the peak hours, flow is seldom balanced in an urban area.

VEHICLE MILES OF TRAVEL: A measure of the amount of usage of a section of highway, obtained by multiplying the average daily traffic by length of facility in miles.

APPENDIX B

SCOPING AGREEMENT

MEMORANDUM OF UNDERSTANDING

TO: Jerry Stock | CITY OF BELLFLOWER

FROM: Bryan Crawford | GANDDINI GROUP, INC.

DATE: October 2, 2019

SUBJECT: Bellflower Mixed-Use Project Traffic Study Scope
19-0190

INTRODUCTION

The purpose of this scoping document is to outline the proposed traffic analysis parameters and assumptions for review/concurrence by City of Bellflower staff.

PROJECT DESCRIPTION

Figure 1 shows the project location map. The project site is located west of Bellflower Boulevard between Mayne Street and Oak Street in the City of Bellflower.

The site plan is illustrated on Figure 2. The proposed project consists of redeveloping the project site with a vertical mixed-use development consisting of 91 multifamily dwelling units, a four-screen art house movie theater, and approximately 5,000 square feet of street-facing commercial retail and restaurant land uses.

The project proposes one full access driveway at Oak Street and one outbound only access at Mayne Street for the residential uses. Guest parking for the residential portion of the project site is provided on the west side of the north-south alley that extends from the project access on Oak Street to Mayne Street. This north-south alley is restricted to outbound only to Mayne Street to be utilized for guests. All residents will enter/exit the project site via the proposed Oak Street access.

Patrons of the commercial uses will park off-site and walk to/from the commercial uses. An approximately 285 space parking garage is currently being constructed on Mayne Street directly north of the project site. This parking garage will be open to the public and operational before the project's opening year of 2023. Additional public parking lots are available directly south of the project site on Oak Street and on Oak Street east of Bellflower Boulevard.

PROJECT TRIP GENERATION & DISTRIBUTION

Table 1 shows the project trip generation based upon rates obtained from the Institute of Transportation Engineers (ITE) Trip Generation Manual (10th Edition, 2017). As shown in Table 1, the proposed project is forecast to generate approximately 2,224 daily trips, including 38 trips during the AM peak hour and 113 trips during the PM peak hour.

Pass-by trip adjustments were calculated in accordance with procedures outlined in the latest ITE Trip Generation Handbook (3rd Edition, 2017), which utilizes the National Cooperative Highway Research Program 684 Internal Capture Estimation Tool. Internal capture worksheets are attached following Table 1.

Figures 3 and 4 illustrate the forecast directional distribution patterns of project-generated trips.

STUDY AREA

Based on the County of Los Angeles Congestion Management Program guidelines, intersections identified for analysis typically include signalized intersections at which a project is forecast to contribute 50 or more trips during the AM or PM peak hours. The study area is proposed to consist of the following five (5) study intersections, even if the project may not contribute 50 or more trips during either the AM or PM peak hours, but are the adjacent or primary intersections impacted by the proposed project.

Study Intersections

1. Ardmore Avenue (NS) at Oak Street (EW)
2. Parking Garage Driveway (NS) at Mayne Street
3. Project Driveway (NS) at Oak Street (EW)
4. Bellflower Boulevard (NS) at Alondra Boulevard (EW)
5. Bellflower Boulevard (NS) at Mayne Street (EW)
6. Bellflower Boulevard (NS) at Oak Street (EW)
7. Bellflower Boulevard (NS) at Flower Street (EW)

TRAFFIC COUNTS

New intersection turning movement counts will be collected at the study intersections during the AM peak period (7:00 AM – 9:00 AM) and PM peak period (4:00 PM – 6:00 PM) on a typical weekday (Tuesday, Wednesday, or Thursday) while local schools are in session and on a non-holiday week. Since Bellflower Boulevard at Mayne Street is currently closed as a result of construction for the parking garage, this intersection will not be counted, with volumes interpolated based on new traffic counts from nearby intersections, and historical traffic counts and adjustments applied within the traffic study for the parking garage.

ANALYSIS SCENARIOS

The traffic study shall evaluate the following analysis scenarios for weekday AM and PM peak hour conditions:

- Existing
- Existing Plus Project
- Opening Year (2023) Without Project
- Opening Year (2023) With Project

A General Plan Buildout analysis is not included since the project does not propose a General Plan Amendment or Zone Change.

ANALYSIS METHODOLOGY

The signalized study intersections shall by analyzed using the Intersection Capacity Utilization methodology in accordance with the capacity parameters prescribed in the Los Angeles County Traffic Impact Analysis Report Guidelines (Public Works Department, January 1997).

The unsignalized study intersections shall be analyzed using the intersection delay methodology and recommended default factors prescribed in the Transportation Research Board Highway Capacity Manual (6th Edition).

Intersection Level of Service analysis shall be performed using the Vistro software.

PERFORMANCE STANDARDS

The City of Bellflower has established Level of Service D as the minimum acceptable Level of Service during peak hour conditions. Intersections operating at Level of Service E/F shall be identified as deficient.

THRESHOLDS OF SIGNIFICANCE

Signalized Intersections

For signalized study intersections within City of Bellflower jurisdiction, a project traffic impact is considered significant if:

- The addition of project generated trips is forecast to cause an intersection to deteriorate from acceptable Level of Service (D or better) to unacceptable Level of Service (E or F); or,

- The addition of project generated trips is forecast to cause an increase in volume-to-capacity of 0.02 or greater when the intersection is operating at unacceptable Level of Service (E or F) in the baseline condition.

Unsignalized Intersections

Many jurisdictions in the region, including the City of Bellflower, have not established significant impact thresholds for unsignalized intersections. For purposes of this traffic impact analysis, a project impact at an unsignalized intersection shall be considered significant if the addition of project-generated trips is forecast to cause or worsen Level of Service E or F and a traffic signal is warranted based on the peak hour volume criteria established in the California Manual on Uniform Traffic Control Devices (2014 Edition).

The intersections of Parking Garage Driveway at Mayne Street and Project Driveway at Oak Street are the unsignalized intersections that will be analyzed.

FORECASTING METHODOLOGY

To account for ambient growth, existing roadway volumes shall be increased by a growth rate of 1 percent (1%) per year over a four-year period for Opening Year (2023) conditions.

In addition, a list of pending and approved other development projects shall be requested from the City of Bellflower. Trip forecasts for other development projects within the project study area shall be determined based on the Institute of Transportation Engineers (ITE), Trip Generation Manual, 10th Edition, 2017 and will be added to existing roadway volumes for the applicable analysis scenarios.

RESIDENTIAL PARKING

The project applicant has conducted a separate parking demand study to determine the residential parking demand for the project. After reviewing the results of this parking demand study and the specific site

conditions, the applicant and the City have agreed to proceed with a project entitlement request for 1.50 parking stalls per unit, which will meet or exceed 1 stall per one bedroom unit and two stalls per two bedroom unit and also provide 10 guest parking spaces for the residential portion of the project. Therefore, 53 one-bedroom units equates to 53 (53 x 1) parking spaces, 38 two-bedroom units equates to 76 (38 x 2) parking spaces, plus 10 guest parking spaces. This totals 139 (53 + 76 + 10) total parking spaces or 1.52 parking spaces per dwelling unit. Note that the specific parking counts may be adjusted as the final residential floor plans and unit mix is developed and in no case shall the final parking calculations be below 1.50 stalls per unit, 1 stall per one bedroom, two stalls per two bedroom, and 10 guest parking spaces

CONCLUSION

We appreciate the opportunity to provide this scoping document for your review. Should you have any questions or comments regarding the proposed scope, please contact me at (714) 795-3100 x 104.

Table 1
Project Trip Generation

Trip Generation Rates									
			AM Peak Hour			PM Peak Hour			
Land Use	Source[1]	Units[2]	In	Out	Total	In	Out	Total	Daily
Multi-Family Housing (Mid-Rise)	ITE 221	DU	26%	74%	0.36	61%	39%	0.44	5.44
Movie Theater	ITE 444	MS	--	--	--	44%	56%	14.60	220.00
Commercial Retail	ITE 820	TSF	62%	38%	0.94	48%	52%	3.81	37.75
Fast Casual Restaurant	ITE 930	TSF	67%	33%	2.07	55%	45%	14.13	315.17

Trips Generated									
			AM Peak Hour			PM Peak Hour			
Land Use	Quantity		In	Out	Total	In	Out	Total	Daily
Multi-Family Housing (Mid-Rise)	91	DU	9	24	33	24	16	40	495
Internal Capture[3]			0	-1	-1	-5	-4	-9	-10
Subtotal			9	23	32	19	12	31	485
Movie Theater	4	MS	--	--	--	26	33	59	880
Internal Capture[3]			--	--	--	-1	-2	-3	-3
Subtotal			--	--	--	25	31	56	877
Commercial Retail	2.500	TSF	1	1	2	5	5	10	94
Internal Capture[3]			0	0	0	-4	-2	-6	-6
Pass-By Reduction (34% PM)[3]			--	--	--	0	-1	-1	-1
Subtotal			1	1	2	1	2	3	87
Fast Casual Restaurant	2.500	TSF	3	2	5	19	16	35	788
Internal Capture[3]			-1	0	-1	-5	-7	-12	-13
Subtotal			2	2	4	14	9	23	775
Total			**12**	**26**	**38**	**59**	**54**	**113**	**2,224**

Notes:

(1) Source: Institute of Transportation Engineers, Trip Generation Manual, 10th Edition, 2017, ### = Land Use Code.

(2) DU = Dwelling Units; MS = Movie Screens, TSF = Thousand Square Feet

(3) Source: Institute of Transportation Engineers, Trip Generation Handbook, 3rd Edition, 2017. Internal capture calculated using the National Cooperative Highway Research Program 684 Internal Capture Estimation Tool provided by the Institute of Transportation Engineers.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Bellflower Mixed-Use Project	**Organization:**	Gandinni Group, Inc.
Project Location:	City of Bellflower	**Performed By:**	Bryan Crawford
Scenario Description:	Mixed-Use	**Date:**	25-Sep-19
Analysis Year:	2023	**Checked By:**	Giancarlo Ganddini
Analysis Period:	**AM Street Peak Hour**	**Date:**	9/25/2019

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				2	1	1
Restaurant				5	3	2
Cinema/Entertainment				0		
Residential				33	9	24
Hotel				0		
All Other Land Uses[2]				0		
				40	13	27

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	1	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	40	13	27
Internal Capture Percentage	5%	8%	4%
External Vehicle-Trips[5]	38	12	26
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	0%	0%
Restaurant	33%	0%
Cinema/Entertainment	N/A	N/A
Residential	0%	4%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Bellflower Mixed-Use Project
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	1	1	1.00	1	1
Restaurant	1.00	3	3	1.00	2	2
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	9	9	1.00	24	24
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	1	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	5	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	1	0	0	0
Retail	0		2	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	1	0		0
Hotel	0	0	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	0	1	1	1	0	0
Restaurant	1	2	3	2	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	9	9	9	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	0	1	1	1	0	0
Restaurant	0	2	2	2	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	1	23	24	23	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	Bellflower Mixed-Use Project	**Organization:**	Gandinni Group, Inc.
Project Location:	City of Bellflower	**Performed By:**	Bryan Crawford
Scenario Description:	Mixed-Use	**Date:**	43733
Analysis Year:	2023	**Checked By:**	Giancarlo Ganddini
Analysis Period:	**PM Street Peak Hour**	**Date:**	43733

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips[3]		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				10	5	5
Restaurant				35	19	16
Cinema/Entertainment				59	26	33
Residential				40	24	16
Hotel				0		
All Other Land Uses[2]				0		
				144	74	70

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.[4]	% Transit	% Non-Motorized	Veh. Occ.[4]	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses[2]						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		1	0	1	0
Restaurant	0	3		1	3	0
Cinema/Entertainment	0	0	1		1	0
Residential	0	1	3	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	144	74	70
Internal Capture Percentage	21%	20%	21%
External Vehicle-Trips[5]	114	59	55
External Transit-Trips[6]	0	0	0
External Non-Motorized Trips[6]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	80%	40%
Restaurant	26%	44%
Cinema/Entertainment	4%	6%
Residential	21%	25%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

[3]Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

[4]Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be

[5]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

[6]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Bellflower Mixed-Use Project
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	5	5	1.00	5	5
Restaurant	1.00	19	19	1.00	16	16
Cinema/Entertainment	1.00	26	26	1.00	33	33
Residential	1.00	24	24	1.00	16	16
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		1	0	1	0
Restaurant	0	7		1	3	1
Cinema/Entertainment	1	7	10		3	1
Residential	1	7	3	0		0
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	1	0
Retail	0		6	7	11	0
Restaurant	0	3		8	4	0
Cinema/Entertainment	0	0	1		1	0
Residential	0	1	3	0		0
Hotel	0	0	1	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	4	1	5	1	0	0
Restaurant	5	14	19	14	0	0
Cinema/Entertainment	1	25	26	25	0	0
Residential	5	19	24	19	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	2	3	5	3	0	0
Restaurant	7	9	16	9	0	0
Cinema/Entertainment	2	31	33	31	0	0
Residential	4	12	16	12	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

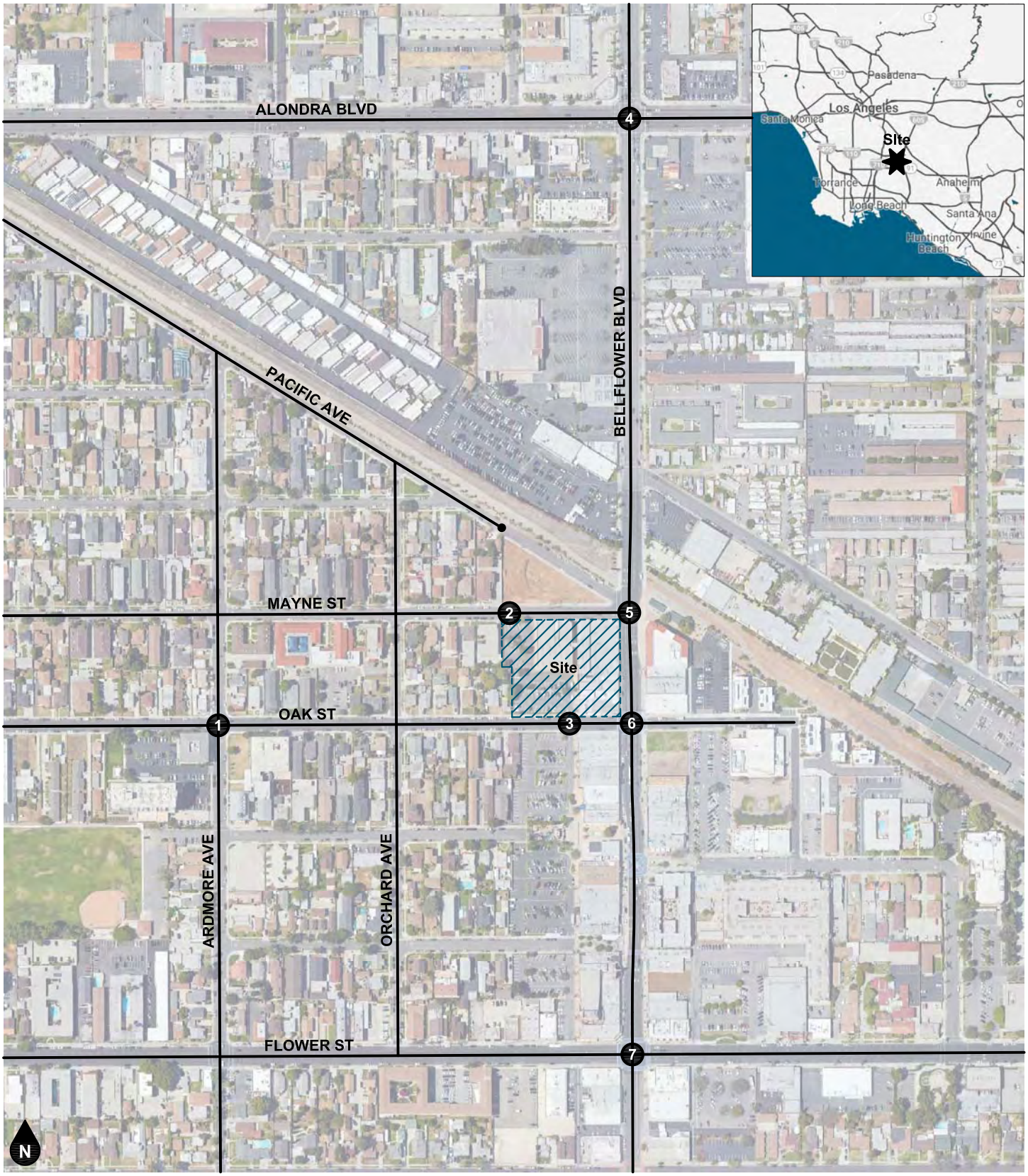
[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

Table 7.1a Adjusted Internal Trip Capture Rates for Trip Origins within a Multi-Use Development			
Land Use Pairs		Weekday	
		AM Peak Hour	PM Peak Hour
From OFFICE	To Office	0.0%	0.0%
	To Retail	28.0%	20.0%
	To Restaurant	63.0%	4.0%
	To Cinema/Entertainment	0.0%	0.0%
	To Residential	1.0%	2.0%
	To Hotel	0.0%	0.0%
From RETAIL	To Office	29.0%	2.0%
	To Retail	0.0%	0.0%
	To Restaurant	13.0%	29.0%
	To Cinema/Entertainment	0.0%	4.0%
	To Residential	14.0%	26.0%
	To Hotel	0.0%	5.0%
From RESTAURANT	To Office	31.0%	3.0%
	To Retail	14.0%	41.0%
	To Restaurant	0.0%	0.0%
	To Cinema/Entertainment	0.0%	8.0%
	To Residential	4.0%	18.0%
	To Hotel	3.0%	7.0%
From CINEMA/ENTERTAINMENT	To Office	0.0%	2.0%
	To Retail	0.0%	21.0%
	To Restaurant	0.0%	31.0%
	To Cinema/Entertainment	0.0%	0.0%
	To Residential	0.0%	8.0%
	To Hotel	0.0%	2.0%
From RESIDENTIAL	To Office	2.0%	4.0%
	To Retail	1.0%	42.0%
	To Restaurant	20.0%	21.0%
	To Cinema/Entertainment	0.0%	0.0%
	To Residential	0.0%	0.0%
	To Hotel	0.0%	3.0%
From HOTEL	To Office	75.0%	0.0%
	To Retail	14.0%	16.0%
	To Restaurant	9.0%	68.0%
	To Cinema/Entertainment	0.0%	0.0%
	To Residential	0.0%	2.0%
	To Hotel	0.0%	0.0%

Table 7.2a Adjusted Internal Trip Capture Rates for Trip Destinations within a Multi-Use Development			
Land Use Pairs		Weekday	
		AM Peak Hour	PM Peak Hour
To OFFICE	From Office	0.0%	0.0%
	From Retail	4.0%	31.0%
	From Restaurant	14.0%	30.0%
	From Cinema/Entertainment	0.0%	6.0%
	From Residential	3.0%	57.0%
	From Hotel	3.0%	0.0%
To RETAIL	From Office	32.0%	8.0%
	From Retail	0.0%	0.0%
	From Restaurant	8.0%	50.0%
	From Cinema/Entertainment	0.0%	4.0%
	From Residential	17.0%	10.0%
	From Hotel	4.0%	2.0%
To RESTAURANT	From Office	23.0%	2.0%
	From Retail	50.0%	29.0%
	From Restaurant	0.0%	0.0%
	From Cinema/Entertainment	0.0%	3.0%
	From Residential	20.0%	14.0%
	From Hotel	6.0%	5.0%
To CINEMA/ENTERTAINMENT	From Office	0.0%	1.0%
	From Retail	0.0%	26.0%
	From Restaurant	0.0%	32.0%
	From Cinema/Entertainment	0.0%	0.0%
	From Residential	0.0%	0.0%
	From Hotel	0.0%	0.0%
To RESIDENTIAL	From Office	0.0%	4.0%
	From Retail	2.0%	46.0%
	From Restaurant	5.0%	16.0%
	From Cinema/Entertainment	0.0%	4.0%
	From Residential	0.0%	0.0%
	From Hotel	0.0%	0.0%
To HOTEL	From Office	0.0%	0.0%
	From Retail	0.0%	17.0%
	From Restaurant	4.0%	71.0%
	From Cinema/Entertainment	0.0%	1.0%
	From Residential	0.0%	12.0%
	From Hotel	0.0%	0.0%



Legend

(#) Study Intersection

Figure 1
Project Location Map

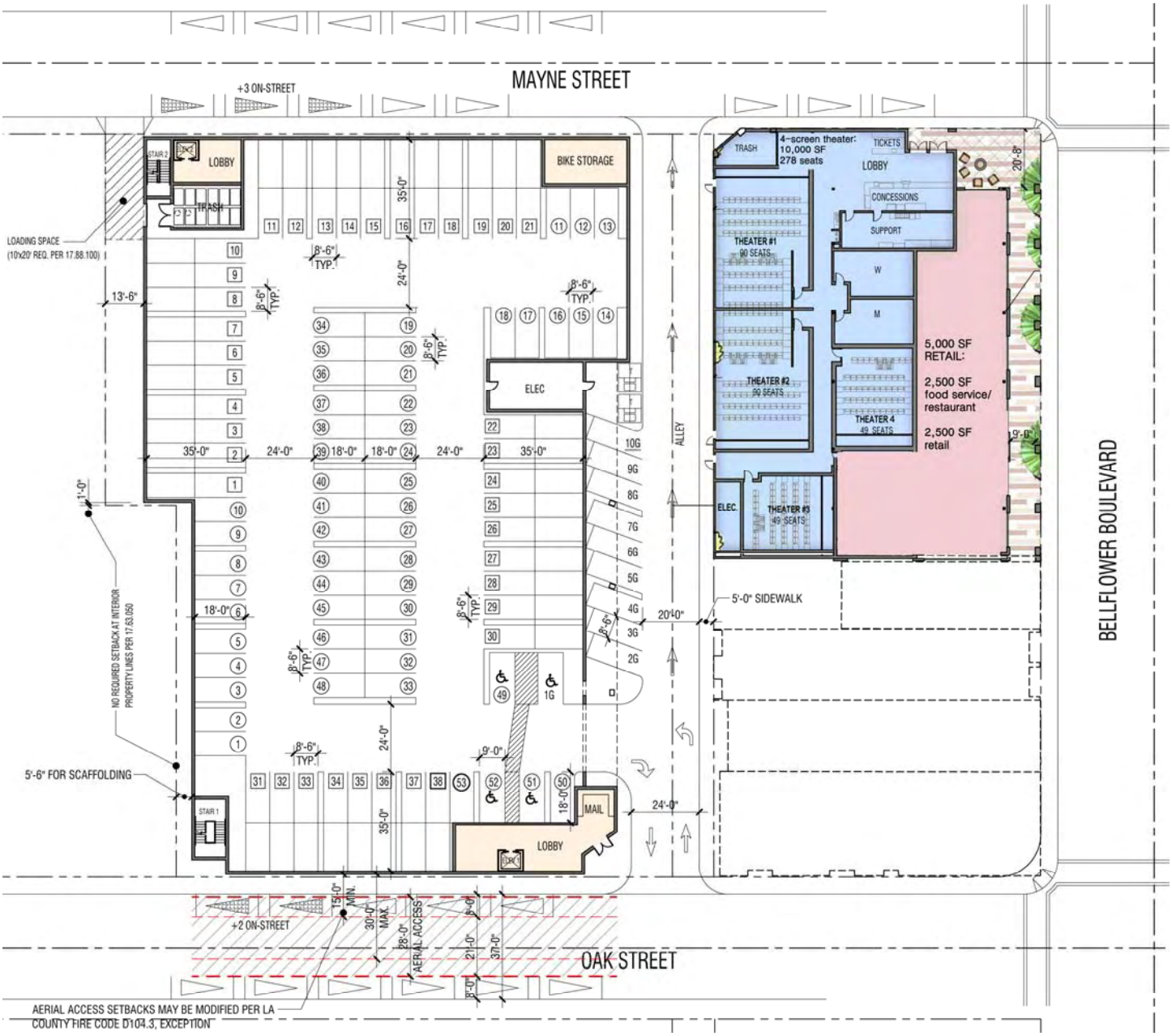
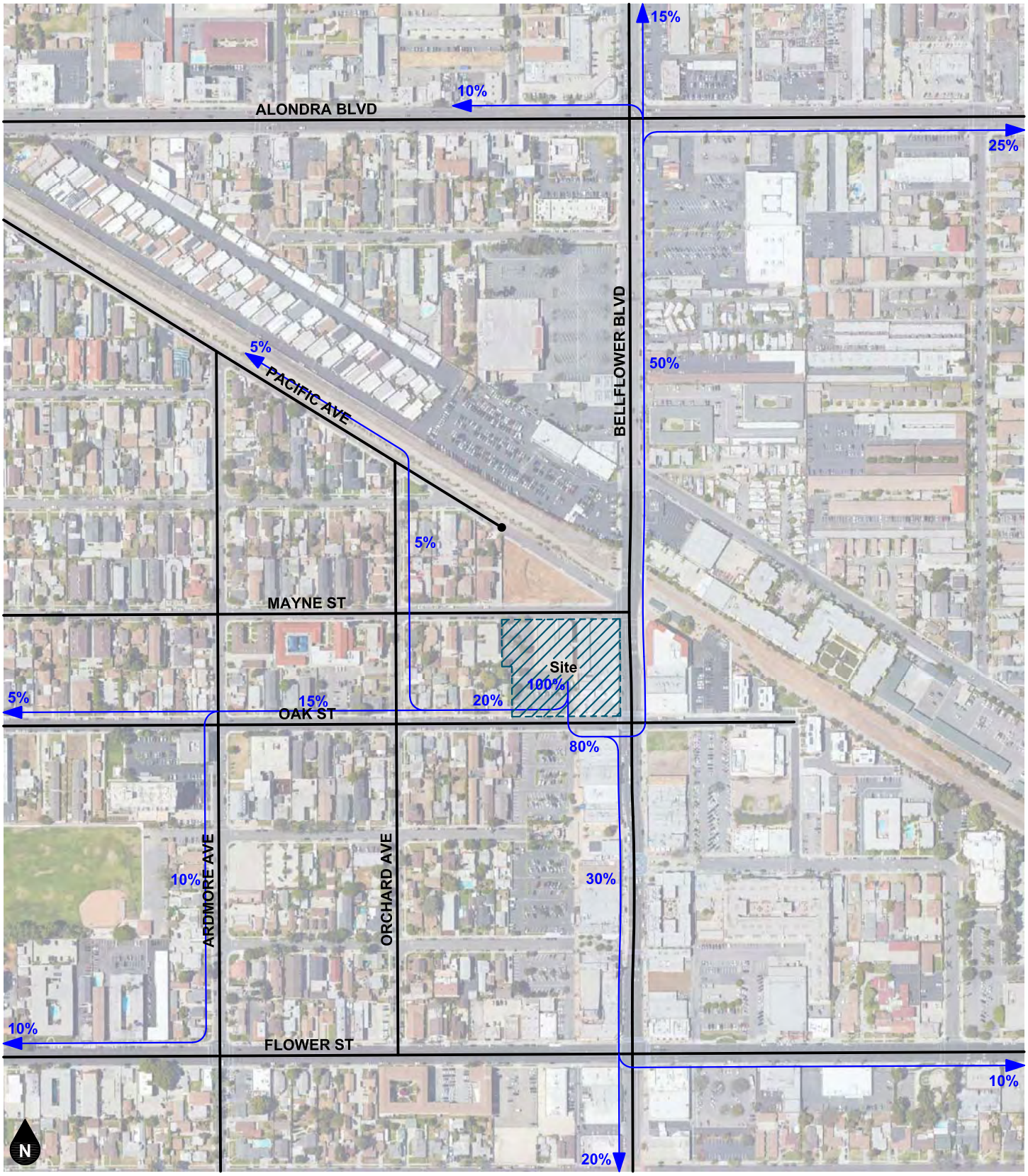


Figure 2
Site Plan



Legend

10% Percent To/From Project

Figure 3
Project Trip Distribution - Residential

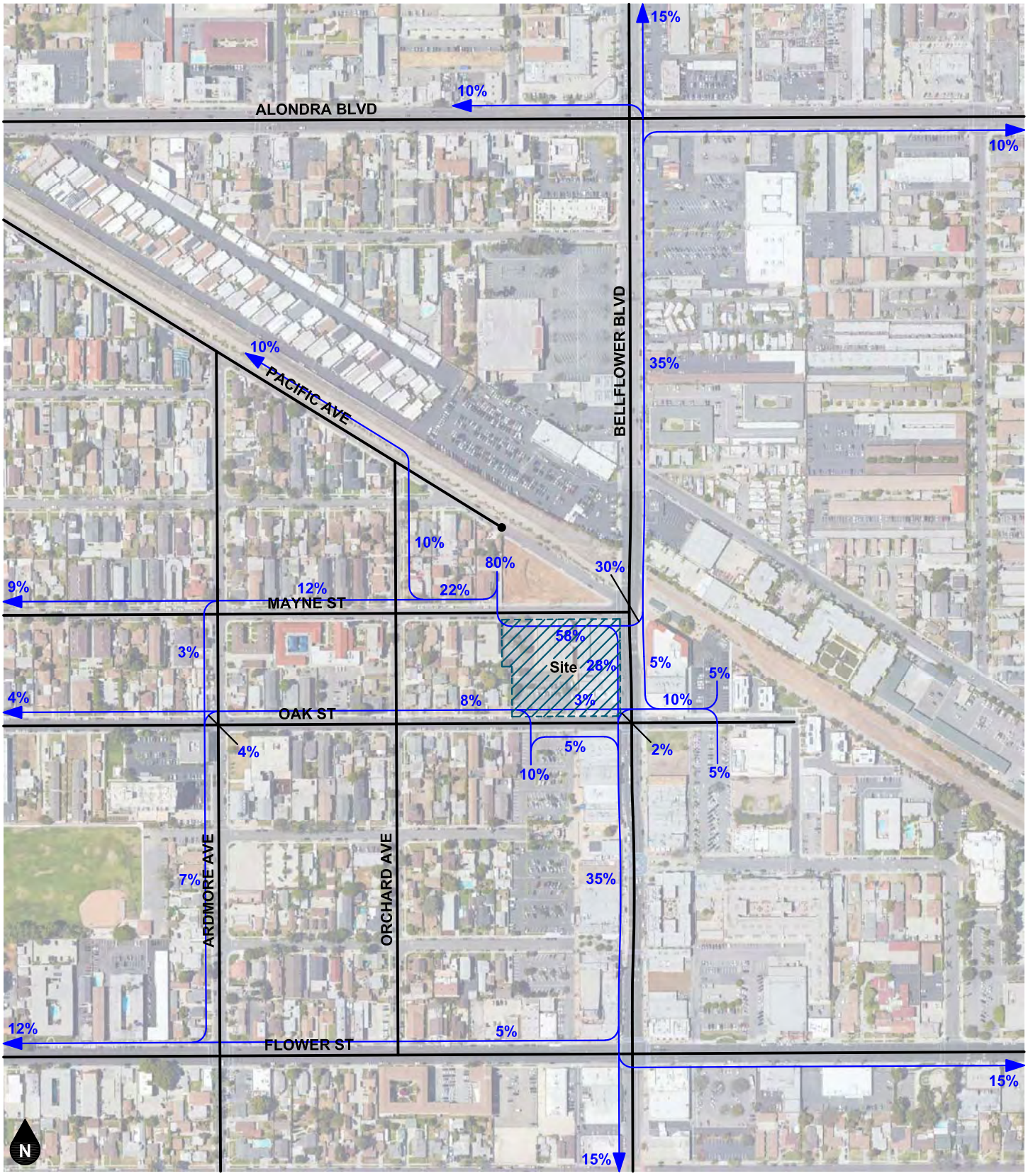


Figure 4
Project Trip Distribution - Commercial Uses

Gmail **Bryan Crawford <bryandavidcrawford@gmail.com>**

RE: Bellflower Mixed-Use Project Scoping Agreement

Bryan Crawford <bryan@ganddini.com> Wed, Oct 2, 2019 at 5:49 PM
To: Jerry Stock <jstock@bellflower.org>
Cc: Frank Preciado <fpreciado@bellflower.org>, Philip Wang <pwang@bellflower.org>, Len Gorecki <lgorecki@bellflower.org>, Jim Dellalonga <jdellalonga@bellflower.org>, Elizabeth Corpuz <ecorpuz@bellflower.org>, Abbie Catron <acatron@serranodevelopment.com>, William Jacobs <wjacobs@serranodevelopment.com>, David Ledyard <David.Ledyard@nv5.com>

Jerry,

Attached is the scoping agreement revised based on your comments. Note that the site plan has been updated to show more detail for the commercial uses, but still shows on-street parking on Mayne. The site plan is currently being revised (changes won't affect the traffic study) and is a week or two from being fully completed. The finalized site plan that will be included in the traffic study will have the on-street parking on Mayne removed per your comment. Please let me know if this revised scope is sufficient or if there are any additional comments. Thanks for all your help on this project, Jerry.

Jim/Beth,

Can you provide the list of approved developments within the City to be used for the traffic study?

Thanks.
[Quoted text hidden]

Bellflower Mixed-Use Project Scoping Agreement - 2Oct2019.pdf
1407K

Gmail **Bryan Crawford <bryandavidcrawford@gmail.com>**

RE: Bellflower Mixed-Use Project Scoping Agreement

Jerry Stock <jstock@bellflower.org> Thu, Oct 3, 2019 at 11:10 AM
To: Bryan Crawford <bryan@ganddini.com>
Cc: Frank Preciado <fpreciado@bellflower.org>, Philip Wang <pwang@bellflower.org>, Len Gorecki <lgorecki@bellflower.org>, Jim Dellalonga <jdellalonga@bellflower.org>, Elizabeth Corpuz <ecorpuz@bellflower.org>, Abbie Catron <acatron@serranodevelopment.com>, William Jacobs <wjacobs@serranodevelopment.com>

Good morning.

This reflects all of the items we discussed and from my perspective you are good to go.

Elizabeth, does the parking discussion work for you?

[Quoted text hidden]

APPENDIX C

VOLUME COUNT WORKSHEETS

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: AimTD LLC. tel: 714 253 7888 cs@aimtd.com

DATE: Tue, Oct 8, 19

LOCATION: Bellflower
NORTH & SOUTH: Ardmore
EAST & WEST: Oak

PROJECT #: SC2382
LOCATION #: 1
CONTROL: STOP ALL

NOTES:

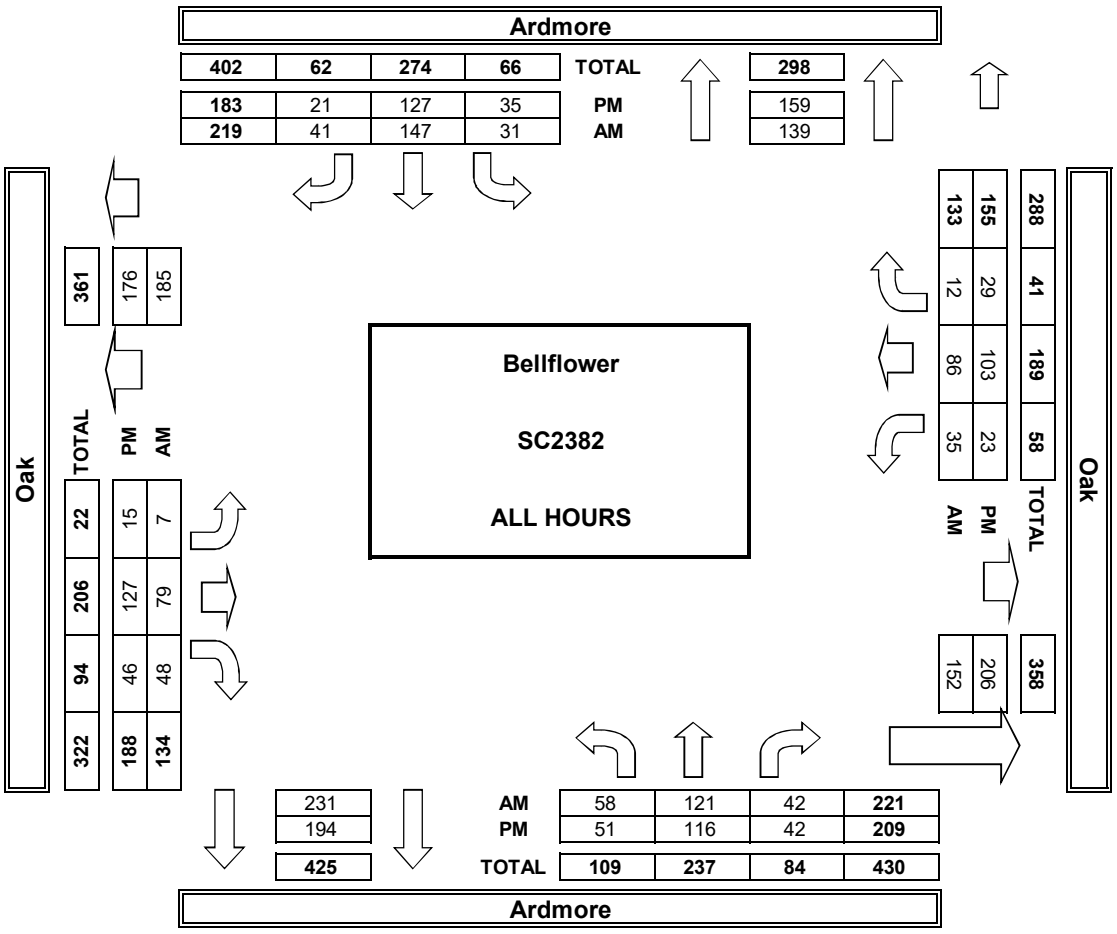
AM / PM / MD / OTHER / OTHER — ▲ N, ◄ W, E ►, S ▼

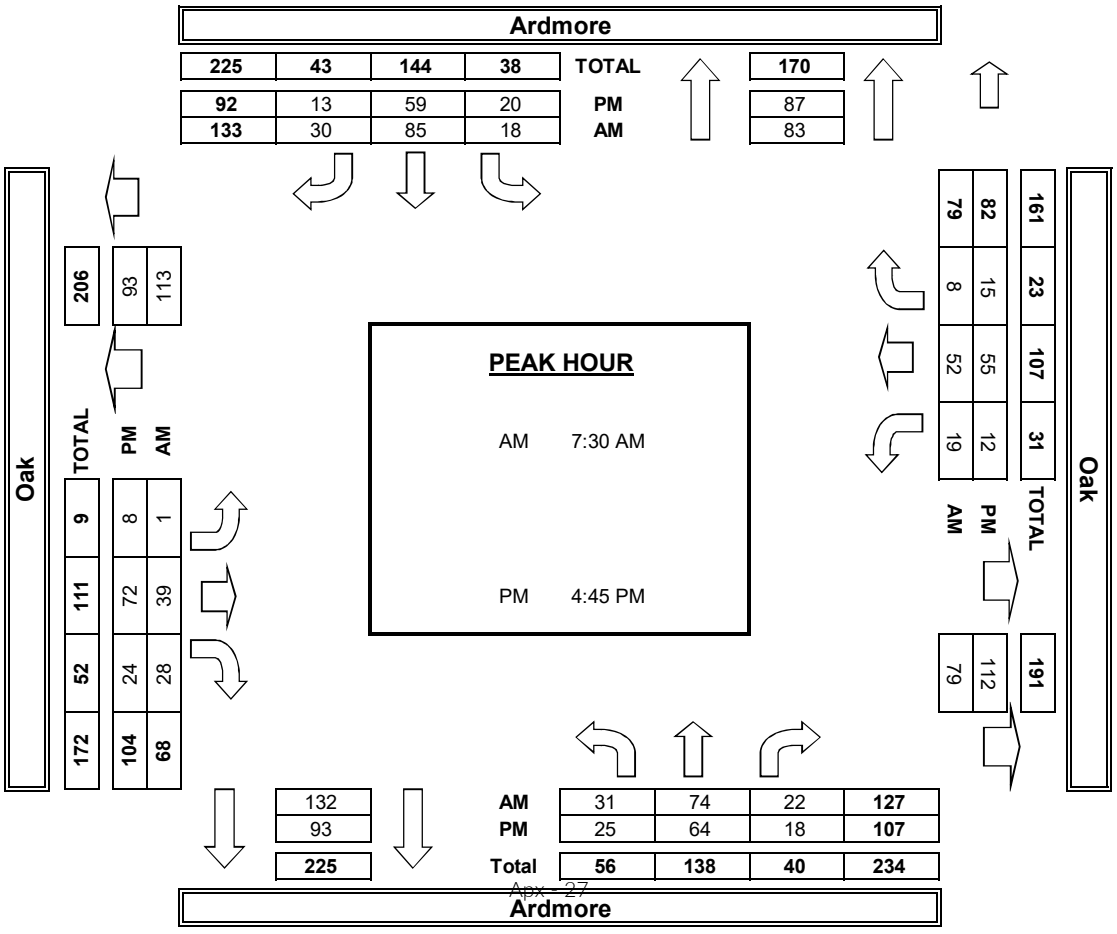
☑ Add U-Turns to Left Turns

		NORTHBOUND Ardmore			SOUTHBOUND Ardmore			EASTBOUND Oak			WESTBOUND Oak				U-TURNS				
	LANES:	NL 0	NT 1	NR 0	SL 0	ST 1	SR 0	EL 0	ET 1	ER 0	WL 0	WT 1	WR 0	TOTAL	NB 0	SB 0	EB 0	WB 0	TTL
AM	7:00 AM	5	13	6	6	20	4	0	7	4	3	9	1	78	0	0	0	0	0
	7:15 AM	8	14	3	3	21	3	2	13	4	2	5	2	80	0	0	0	0	0
	7:30 AM	11	23	5	6	22	3	0	10	7	4	8	3	102	0	0	0	0	0
	7:45 AM	7	18	9	3	21	4	0	9	4	5	13	2	95	0	0	0	0	0
	8:00 AM	7	12	4	3	29	7	0	11	11	8	19	2	113	0	0	0	0	0
	8:15 AM	6	21	4	6	13	16	1	9	6	2	12	1	97	0	0	0	0	0
	8:30 AM	5	10	6	3	15	3	4	9	7	7	9	1	79	0	0	1	0	1
	8:45 AM	9	10	5	1	6	1	0	11	5	4	11	0	63	1	0	0	0	1
	VOLUMES	58	121	42	31	147	41	7	79	48	35	86	12	707	1	0	1	0	2
	APPROACH %	26%	55%	19%	14%	67%	19%	5%	59%	36%	26%	65%	9%						
	APP/DEPART	221	/	139	219	/	231	134	/	152	133	/	185	0					
	BEGIN PEAK HR		7:30 AM																
	VOLUMES	31	74	22	18	85	30	1	39	28	19	52	8	407					
	APPROACH %	24%	58%	17%	14%	64%	23%	1%	57%	41%	24%	66%	10%						
	PEAK HR FACTOR		0.814			0.853			0.773			0.681		0.900					
	APP/DEPART	127	/	83	133	/	132	68	/	79	79	/	113	0					
PM	4:00 PM	6	10	5	4	14	0	0	16	5	5	18	5	88	0	0	0	0	0
	4:15 PM	5	13	8	4	12	1	3	11	1	3	15	4	80	0	0	0	0	0
	4:30 PM	9	17	4	2	21	2	2	18	3	1	10	2	91	0	0	0	0	0
	4:45 PM	5	17	8	5	9	5	2	19	7	3	19	0	99	0	0	0	0	0
	5:00 PM	3	18	3	1	14	1	2	14	4	5	11	4	80	0	0	0	0	0
	5:15 PM	7	13	3	7	15	4	3	16	6	2	15	6	97	0	0	0	0	0
	5:30 PM	10	16	4	7	21	3	1	23	7	2	10	5	109	0	0	0	2	2
	5:45 PM	6	12	7	5	21	5	2	10	13	2	5	3	91	0	0	1	0	1
	VOLUMES	51	116	42	35	127	21	15	127	46	23	103	29	735	0	0	1	2	3
	APPROACH %	24%	56%	20%	19%	69%	11%	8%	68%	24%	15%	66%	19%						
	APP/DEPART	209	/	159	183	/	194	188	/	206	155	/	176	0					
	BEGIN PEAK HR		4:45 PM																
	VOLUMES	25	64	18	20	59	13	8	72	24	12	55	15	385					
	APPROACH %	23%	60%	17%	22%	64%	14%	8%	69%	23%	15%	67%	18%						
	PEAK HR FACTOR		0.892			0.742			0.839			0.891		0.883					
	APP/DEPART	107	/	87	92	/	93	104	/	112	82	/	93	0					

AimTD LLC

TURNING MOVEMENT COUNTS





INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: AimTD LLC. tel: 714 253 7888 cs@aimtd.com

DATE: Tue, Oct 8, 19

LOCATION: Bellflower
NORTH & SOUTH: Driveway
EAST & WEST: Oak

PROJECT #: SC2382
LOCATION #: 2
CONTROL: STOP N/S

NOTES:

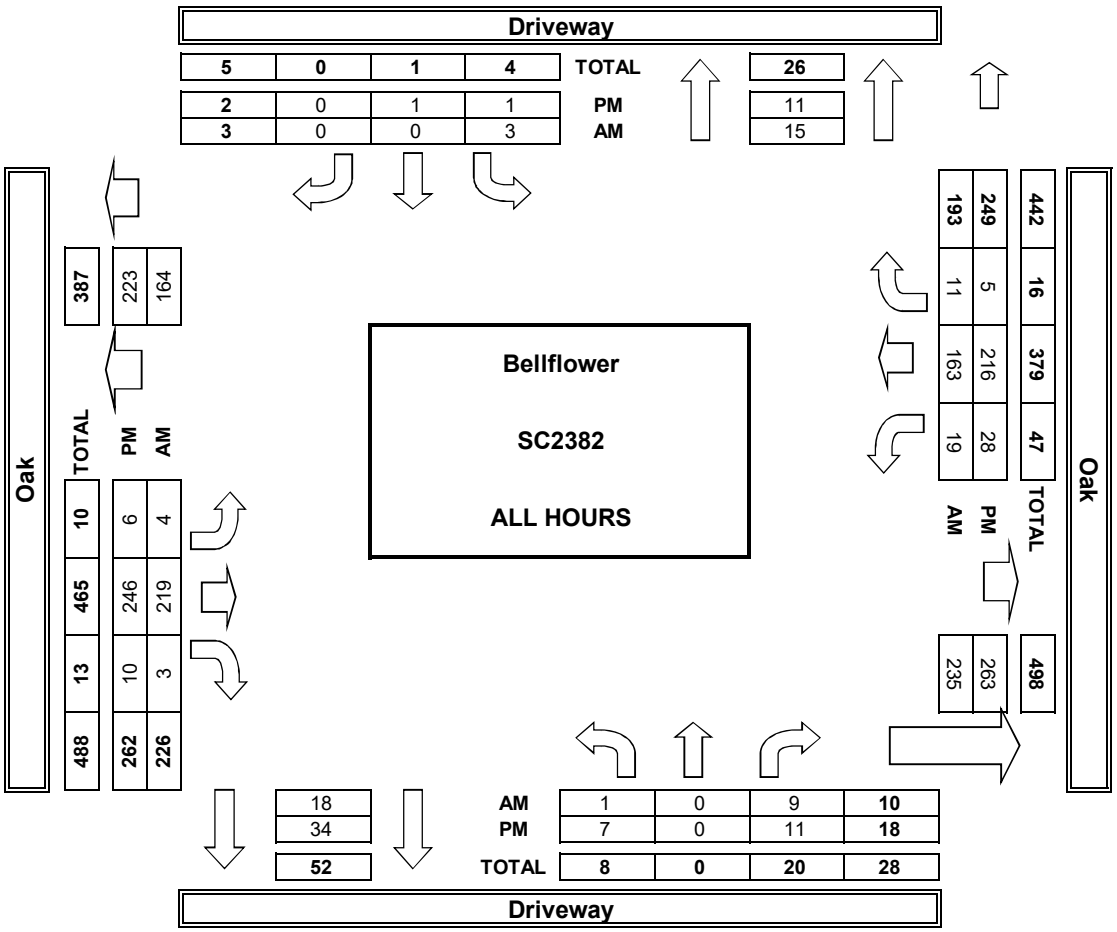
AM / PM / MD / OTHER / OTHER — ▲ N, ◄ W, E ►, S ▼

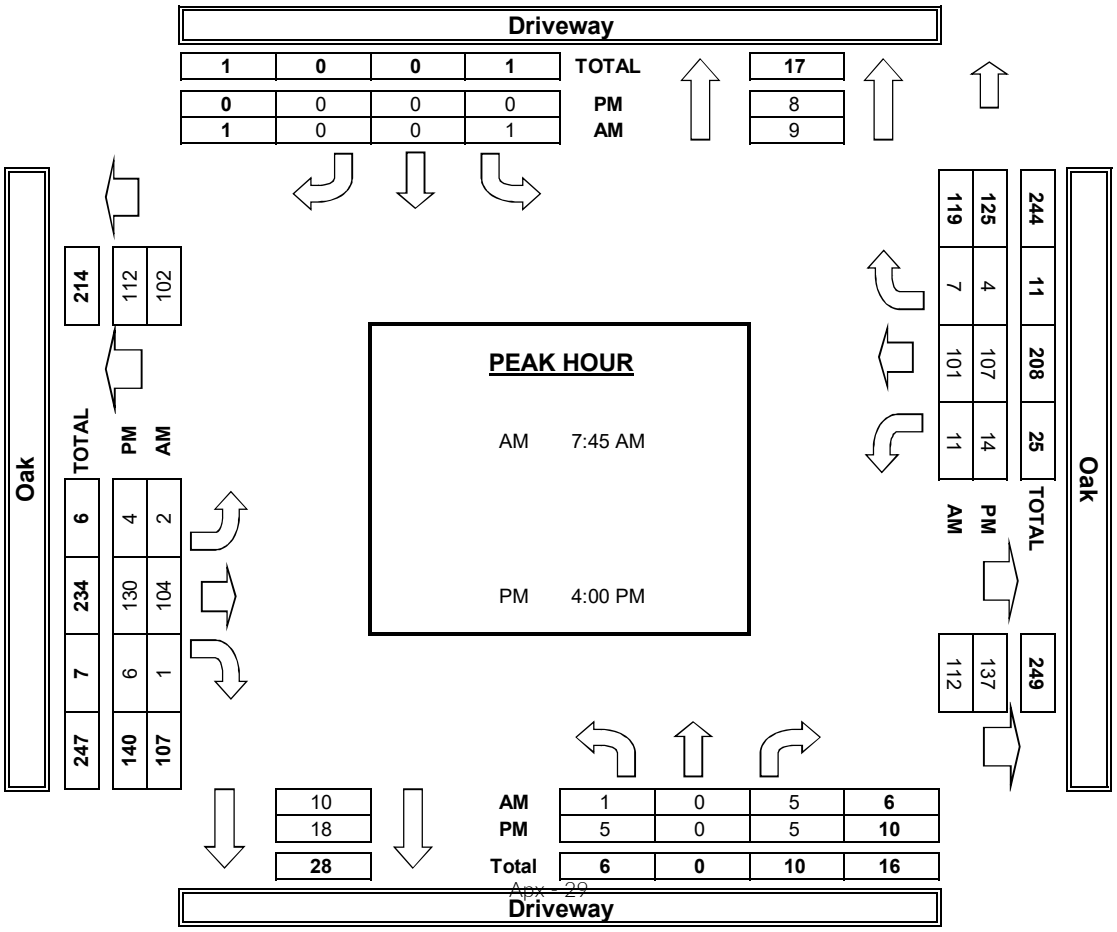
☑ Add U-Turns to Left Turns

		NORTHBOUND Driveway			SOUTHBOUND Driveway			EASTBOUND Oak			WESTBOUND Oak				U-TURNS				
	LANES:	NL 0	NT 1	NR 0	SL 0	ST 1	SR 0	EL 0	ET 1	ER 0	WL 0	WT 1	WR 0	TOTAL	NB 0	SB 0	EB 0	WB 0	TTL
AM	7:00 AM	0	0	0	0	0	0	1	35	0	1	13	0	50	0	0	0	0	0
	7:15 AM	0	0	2	0	0	0	0	25	0	3	11	1	42	0	0	0	2	2
	7:30 AM	0	0	0	0	0	0	1	38	0	2	21	1	63	0	0	0	0	0
	7:45 AM	0	0	0	1	0	0	0	32	0	3	29	2	67	0	0	0	1	1
	8:00 AM	0	0	2	0	0	0	2	26	0	2	28	1	61	0	0	0	1	1
	8:15 AM	0	0	1	0	0	0	0	16	0	3	20	1	41	0	0	0	0	0
	8:30 AM	1	0	2	0	0	0	0	30	1	3	24	3	64	0	0	0	0	0
	8:45 AM	0	0	2	2	0	0	0	17	2	2	17	2	44	0	0	0	0	0
	VOLUMES	1	0	9	3	0	0	4	219	3	19	163	11	432	0	0	0	4	4
	APPROACH %	10%	0%	90%	100%	0%	0%	2%	97%	1%	10%	84%	6%						
	APP/DEPART	10	/	15	3	/	18	226	/	235	193	/	164	0					
	BEGIN PEAK HR		7:45 AM																
	VOLUMES	1	0	5	1	0	0	2	104	1	11	101	7	233					
	APPROACH %	17%	0%	83%	100%	0%	0%	2%	97%	1%	9%	85%	6%						
	PEAK HR FACTOR		0.500			0.250			0.686			0.875		0.869					
	APP/DEPART	6	/	9	1	/	10	107	/	112	119	/	102	0					
PM	4:00 PM	0	0	1	0	0	0	2	31	1	5	30	2	72	0	0	0	2	2
	4:15 PM	2	0	2	0	0	0	1	38	2	4	28	1	78	0	0	0	0	0
	4:30 PM	1	0	1	0	0	0	1	28	0	2	27	1	61	0	0	0	0	0
	4:45 PM	2	0	1	0	0	0	0	33	3	3	22	0	64	0	0	0	0	0
	5:00 PM	1	0	1	0	0	0	1	25	2	6	33	0	69	0	0	0	1	1
	5:15 PM	1	0	3	0	1	0	0	30	0	4	29	1	69	0	0	0	1	1
	5:30 PM	0	0	2	1	0	0	0	32	0	1	24	0	60	0	0	0	1	1
	5:45 PM	0	0	0	0	0	0	1	29	2	3	23	0	58	0	0	0	0	0
	VOLUMES	7	0	11	1	1	0	6	246	10	28	216	5	531	0	0	0	5	5
	APPROACH %	39%	0%	61%	50%	50%	0%	2%	94%	4%	11%	87%	2%						
	APP/DEPART	18	/	11	2	/	34	262	/	263	249	/	223	0					
	BEGIN PEAK HR		4:00 PM																
	VOLUMES	5	0	5	0	0	0	4	130	6	14	107	4	275					
	APPROACH %	50%	0%	50%	0%	0%	0%	3%	93%	4%	11%	86%	3%						
	PEAK HR FACTOR		0.625			0.000			0.854			0.845		0.881					
	APP/DEPART	10	/	8	0	/	18	140	/	137	125	/	112	0					

AimTD LLC

TURNING MOVEMENT COUNTS





INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: AimTD LLC. tel: 714 253 7888 cs@aimtd.com

DATE:	LOCATION:	Bellflower	PROJECT #:	SC2382
Tue, Oct 8, 19	NORTH & SOUTH:	Bellflower	LOCATION #:	3
	EAST & WEST:	Alondra	CONTROL:	SIGNAL

NOTES:

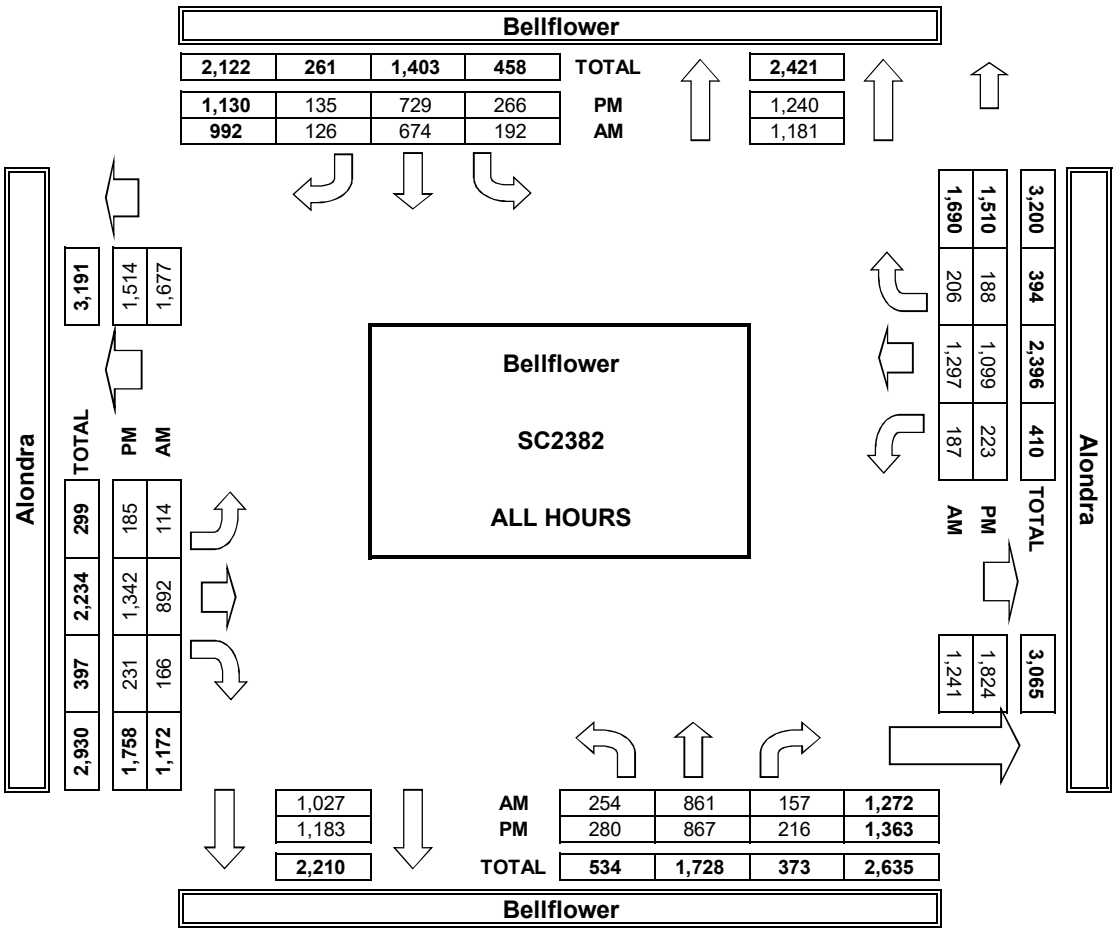
AM / PM / MD / OTHER / OTHER — ▲ N, ◄ W, E ►, S ▼

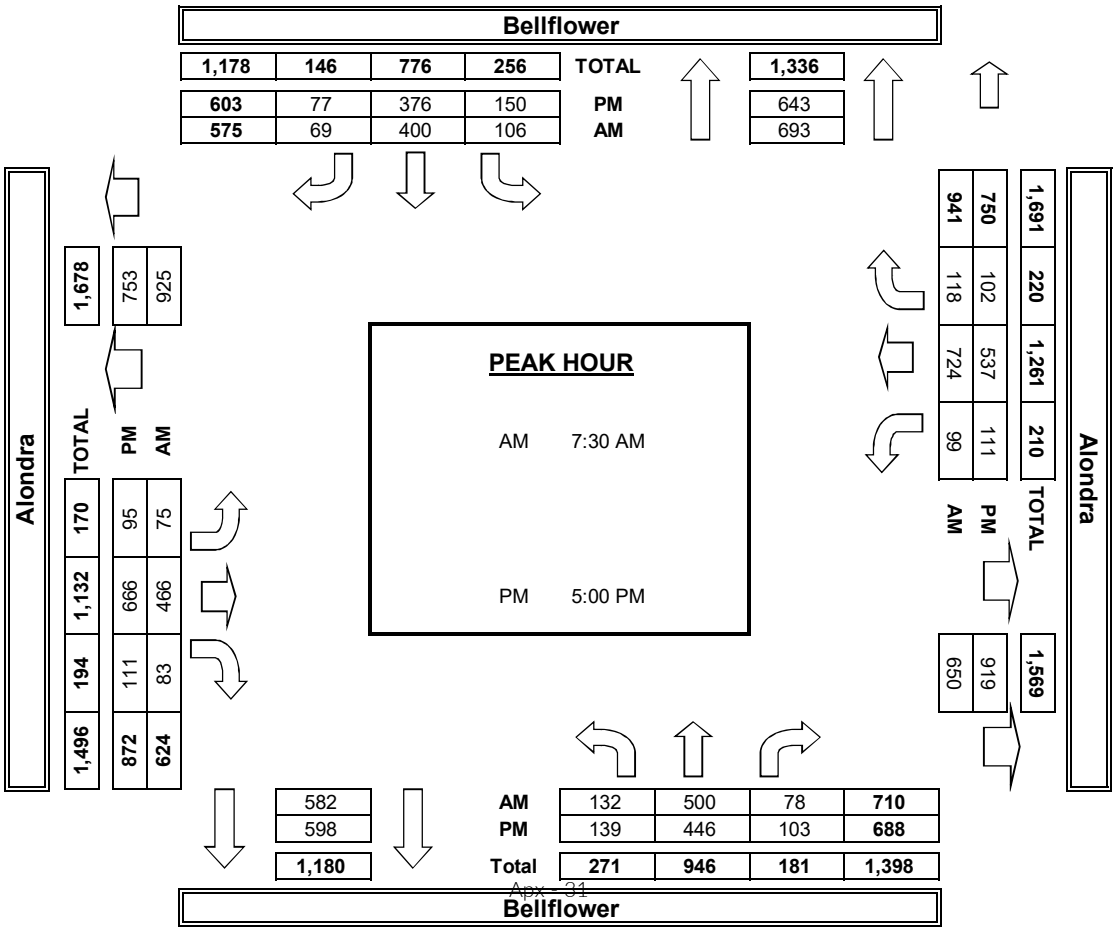
☑ Add U-Turns to Left Turns

		NORTHBOUND Bellflower			SOUTHBOUND Bellflower			EASTBOUND Alondra			WESTBOUND Alondra				U-TURNS				
	LANES:	NL 1	NT 2	NR 0	SL 1	ST 2	SR 0	EL 1	ET 2	ER 0	WL 1	WT 2	WR 0	TOTAL	NB 0	SB 0	EB 0	WB 0	TTL
AM	7:00 AM	23	70	14	14	67	9	7	87	28	25	115	30	489	0	0	0	0	0
	7:15 AM	30	100	19	11	83	14	13	101	17	19	150	11	568	0	0	0	0	0
	7:30 AM	28	115	22	27	85	14	22	150	17	18	191	39	728	0	0	0	0	0
	7:45 AM	30	137	23	24	99	21	25	127	14	25	194	29	748	0	0	0	0	0
	8:00 AM	33	111	20	27	123	16	21	96	21	34	175	26	703	0	0	0	0	0
	8:15 AM	41	137	13	28	93	18	7	93	31	22	164	24	671	0	0	0	0	0
	8:30 AM	27	95	22	25	64	13	13	125	26	26	179	25	640	0	0	0	0	0
	8:45 AM	42	96	24	36	60	21	6	113	12	18	129	22	579	0	0	0	0	0
	VOLUMES	254	861	157	192	674	126	114	892	166	187	1,297	206	5,126	0	0	0	0	0
	APPROACH %	20%	68%	12%	19%	68%	13%	10%	76%	14%	11%	77%	12%						
	APP/DEPART	1,272	/	1,181	992	/	1,027	1,172	/	1,241	1,690	/	1,677	0					
	BEGIN PEAK HR		7:30 AM																
	VOLUMES	132	500	78	106	400	69	75	466	83	99	724	118	2,850					
	APPROACH %	19%	70%	11%	18%	70%	12%	12%	75%	13%	11%	77%	13%						
	PEAK HR FACTOR		0.929			0.866			0.825			0.949		0.953					
	APP/DEPART	710	/	693	575	/	582	624	/	650	941	/	925	0					
PM	4:00 PM	42	107	32	35	99	10	26	148	35	33	123	25	715	0	0	0	0	0
	4:15 PM	39	85	31	19	90	17	18	187	30	34	148	21	719	0	0	0	0	0
	4:30 PM	32	104	30	36	69	14	18	179	30	26	143	22	703	0	0	0	0	0
	4:45 PM	28	125	20	26	95	17	28	162	25	19	148	18	711	0	0	0	0	0
	5:00 PM	32	109	34	38	74	19	21	161	26	20	132	26	692	0	0	0	0	0
	5:15 PM	40	112	20	40	88	17	27	160	29	29	129	31	722	0	0	0	0	0
	5:30 PM	27	104	27	36	97	18	27	176	31	36	147	25	751	0	0	0	0	0
	5:45 PM	40	121	22	36	117	23	20	169	25	26	129	20	748	0	0	0	0	0
	VOLUMES	280	867	216	266	729	135	185	1,342	231	223	1,099	188	5,761	0	0	0	0	0
	APPROACH %	21%	64%	16%	24%	65%	12%	11%	76%	13%	15%	73%	12%						
	APP/DEPART	1,363	/	1,240	1,130	/	1,183	1,758	/	1,824	1,510	/	1,514	0					
	BEGIN PEAK HR		5:00 PM																
	VOLUMES	139	446	103	150	376	77	95	666	111	111	537	102	2,913					
	APPROACH %	20%	65%	15%	25%	62%	13%	11%	76%	13%	15%	72%	14%						
	PEAK HR FACTOR		0.940			0.857			0.932			0.901		0.970					
	APP/DEPART	688	/	643	603	/	598	872	/	919	750	/	753	0					

AimTD LLC

TURNING MOVEMENT COUNTS





National Data & Surveying Services

Intersection Turning Movement Count

Location: Bellflower Blvd & Mayne St
City: Bellflower
Control: 1-Way Stop(EB)

Project ID: 17-05530-007
Date: 8/30/2017

Total

NS/EW Streets:	Bellflower Blvd					Bellflower Blvd					Mayne St					Pacific Ave						
AM	NORTHBOUND					SOUTHBOUND					EASTBOUND					EASTBOUND2						
	0	2	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	NL2	SL	ST	SR	SU	SR2	EL	ET	ER	EU	EU2	E2L	E2U	E2L2	E2T2	E2R2	E2U2	TOTAL
7:00 AM	13	114	0	0	13	0	115	13	0	5	11	0	9	0	0	0	0	1	0	0	0	294
7:15 AM	9	141	0	0	9	0	92	6	0	2	11	0	4	0	0	0	0	0	0	0	0	274
7:30 AM	13	135	0	0	10	0	139	20	0	9	18	0	5	0	1	0	0	1	0	0	0	351
7:45 AM	6	148	0	0	6	0	163	32	0	8	7	0	5	0	0	0	0	0	0	0	0	375
8:00 AM	5	126	0	0	5	0	141	17	0	5	7	0	5	0	1	0	0	1	0	0	0	313
8:15 AM	6	131	0	0	3	0	147	16	0	5	9	0	10	1	1	0	0	0	0	0	0	329
8:30 AM	6	142	0	0	4	0	110	16	0	4	5	0	4	0	0	0	0	0	0	0	0	291
8:45 AM	7	163	0	0	6	0	137	8	0	2	8	0	5	0	0	0	0	0	0	0	0	336
	NL	NT	NR	NU	NL2	SL	ST	SR	SU	SR2	EL	ET	ER	EU	EU2	E2L	E2U	E2L2	E2T2	E2R2	E2U2	TOTAL
TOTAL VOLUMES :	65	1100	0	0	56	0	1044	128	0	40	76	0	47	1	3	0	0	3	0	0	0	2563
APPROACH %'s :	5.32%	90.09%	0.00%	0.00%	4.59%	0.00%	86.14%	10.56%	0.00%	3.30%	59.84%	0.00%	37.01%	0.79%	2.36%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	
PEAK HR :	07:30 AM - 08:30 AM																					TOTAL
PEAK HR VOL :	30	540	0	0	24	0	590	85	0	27	41	0	25	1	3	0	0	2	0	0	0	1368
PEAK HR FACTOR :	0.577	0.912	0.000	0.000	0.600	0.000	0.905	0.664	0.000	0.750	0.569	0.000	0.625	0.250	0.750	0.000	0.000	0.500	0.000	0.000	0.000	0.912
			0.928					0.865					0.729					0.500				

PM	NORTHBOUND					SOUTHBOUND					EASTBOUND					EASTBOUND2						
	0	2	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	NL2	SL	ST	SR	SU	SR2	EL	ET	ER	EU	EU2	E2L	E2U	E2L2	E2T2	E2R2	E2U2	TOTAL
4:00 PM	5	194	0	1	3	0	133	29	0	12	4	0	7	0	0	0	0	0	0	0	0	388
4:15 PM	5	157	0	0	4	0	150	22	0	9	5	0	8	0	0	0	0	0	0	0	0	360
4:30 PM	7	181	0	1	4	0	146	30	0	12	9	0	6	0	0	0	0	0	0	0	0	396
4:45 PM	13	173	0	1	8	0	127	32	0	7	8	0	7	0	0	0	0	0	0	0	0	376
5:00 PM	2	167	0	0	2	0	163	24	0	10	6	0	3	0	0	0	0	1	0	0	0	378
5:15 PM	11	185	0	0	8	0	133	37	0	14	9	0	8	1	1	0	0	0	0	0	0	407
5:30 PM	7	162	0	0	5	0	145	22	0	8	12	0	7	0	0	0	0	0	0	0	0	368
5:45 PM	8	163	0	0	5	0	141	22	0	10	11	0	2	0	0	0	0	0	0	0	0	362
	NL	NT	NR	NU	NL2	SL	ST	SR	SU	SR2	EL	ET	ER	EU	EU2	E2L	E2U	E2L2	E2T2	E2R2	E2U2	TOTAL
TOTAL VOLUMES :	58	1382	0	3	39	0	1138	218	0	82	64	0	48	1	1	0	0	1	0	0	0	3035
APPROACH %'s :	3.91%	93.25%	0.00%	0.20%	2.63%	0.00%	79.14%	15.16%	0.00%	5.70%	56.14%	0.00%	42.11%	0.88%	0.88%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	
PEAK HR :	04:30 PM - 05:30 PM																					TOTAL
PEAK HR VOL :	33	706	0	2	22	0	569	123	0	43	32	0	24	1	1	0	0	1	0	0	0	1557
PEAK HR FACTOR :	0.635	0.954	0.000	0.500	0.688	0.000	0.873	0.831	0.000	0.768	0.889	0.000	0.750	0.250	0.250	0.000	0.000	0.250	0.000	0.000	0.000	0.956
			0.935					0.933					0.763					0.250				

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: AimTD LLC. tel: 714 253 7888 cs@aimtd.com

DATE: Tue, Oct 8, 19

LOCATION: Bellflower
NORTH & SOUTH: Bellflower
EAST & WEST: Oak

PROJECT #: SC2382
LOCATION #: 6
CONTROL: SIGNAL

NOTES:

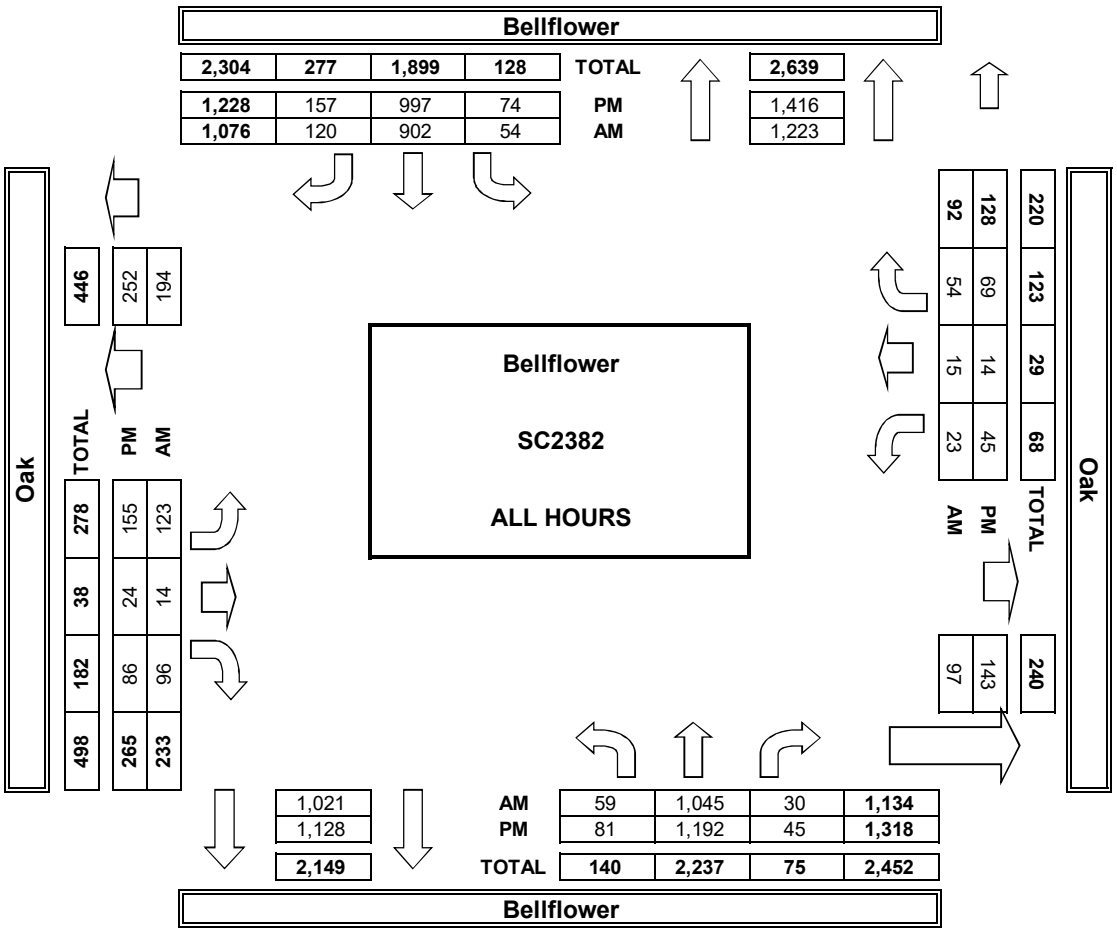
AM / PM / MD / OTHER / OTHER — ▲ N, ◄ W, E ►, S ▼

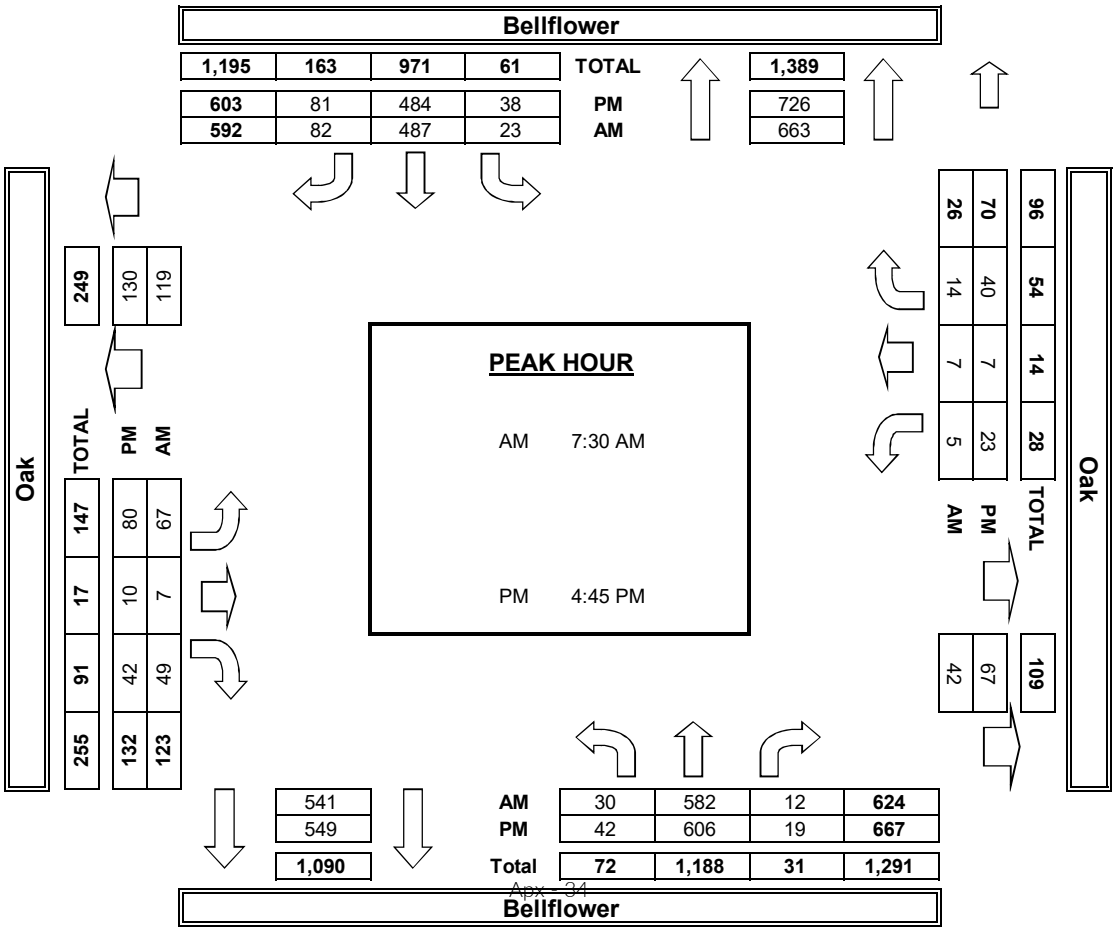
☑ Add U-Turns to Left Turns

		NORTHBOUND Bellflower			SOUTHBOUND Bellflower			EASTBOUND Oak			WESTBOUND Oak				U-TURNS				
	LANES:	NL 0	NT 2	NR 0	SL 0	ST 2	SR 0	EL 0	ET 1	ER 0	WL 0	WT 1	WR 0	TOTAL	NB 0	SB 0	EB 0	WB 0	TTL
AM	7:00 AM	8	92	3	10	110	6	18	2	14	0	0	6	269	0	1	0	0	1
	7:15 AM	4	118	2	8	118	8	13	1	10	0	0	7	289	0	0	0	0	0
	7:30 AM	12	130	5	4	112	15	23	2	10	0	1	3	317	0	0	0	0	0
	7:45 AM	5	159	2	7	119	24	24	1	14	0	3	3	361	0	0	0	0	0
	8:00 AM	5	138	2	5	140	27	10	4	14	3	2	6	356	0	0	0	0	0
	8:15 AM	8	155	3	7	116	16	10	0	11	2	1	2	331	0	0	0	0	0
	8:30 AM	9	129	3	9	95	12	14	1	10	4	5	9	300	0	0	0	0	0
	8:45 AM	8	124	10	4	92	12	11	3	13	14	3	18	312	0	0	0	0	0
	VOLUMES	59	1,045	30	54	902	120	123	14	96	23	15	54	2,535	0	1	0	0	1
	APPROACH %	5%	92%	3%	5%	84%	11%	53%	6%	41%	25%	16%	59%						
	APP/DEPART	1,134	/	1,223	1,076	/	1,021	233	/	97	92	/	194	0					
	BEGIN PEAK HR		7:30 AM																
	VOLUMES	30	582	12	23	487	82	67	7	49	5	7	14	1,365					
	APPROACH %	5%	93%	2%	4%	82%	14%	54%	6%	40%	19%	27%	54%						
	PEAK HR FACTOR		0.940			0.860			0.788			0.591		0.945					
	APP/DEPART	624	/	663	592	/	541	123	/	42	26	/	119	0					
PM	4:00 PM	15	154	3	8	141	20	13	3	10	8	4	6	385	0	0	0	0	0
	4:15 PM	11	146	8	8	132	23	28	5	15	3	2	6	387	0	0	0	0	0
	4:30 PM	8	140	7	6	115	18	15	4	10	4	1	10	338	0	0	0	0	0
	4:45 PM	12	147	5	12	117	13	25	4	7	8	2	9	361	0	0	0	0	0
	5:00 PM	10	146	6	4	110	25	16	2	10	9	3	11	352	0	0	0	0	0
	5:15 PM	11	172	3	11	117	25	17	1	15	3	1	10	386	0	0	0	0	0
	5:30 PM	9	141	5	11	140	18	22	3	10	3	1	10	373	0	0	0	0	0
	5:45 PM	5	146	8	14	125	15	19	2	9	7	0	7	357	0	0	0	0	0
	VOLUMES	81	1,192	45	74	997	157	155	24	86	45	14	69	2,939	0	0	0	0	0
	APPROACH %	6%	90%	3%	6%	81%	13%	58%	9%	32%	35%	11%	54%						
	APP/DEPART	1,318	/	1,416	1,228	/	1,128	265	/	143	128	/	252	0					
	BEGIN PEAK HR		4:45 PM																
	VOLUMES	42	606	19	38	484	81	80	10	42	23	7	40	1,472					
	APPROACH %	6%	91%	3%	6%	80%	13%	61%	8%	32%	33%	10%	57%						
	PEAK HR FACTOR		0.897			0.892			0.917			0.761		0.953					
	APP/DEPART	667	/	726	603	/	549	132	/	67	70	/	130	0					

AimTD LLC

TURNING MOVEMENT COUNTS





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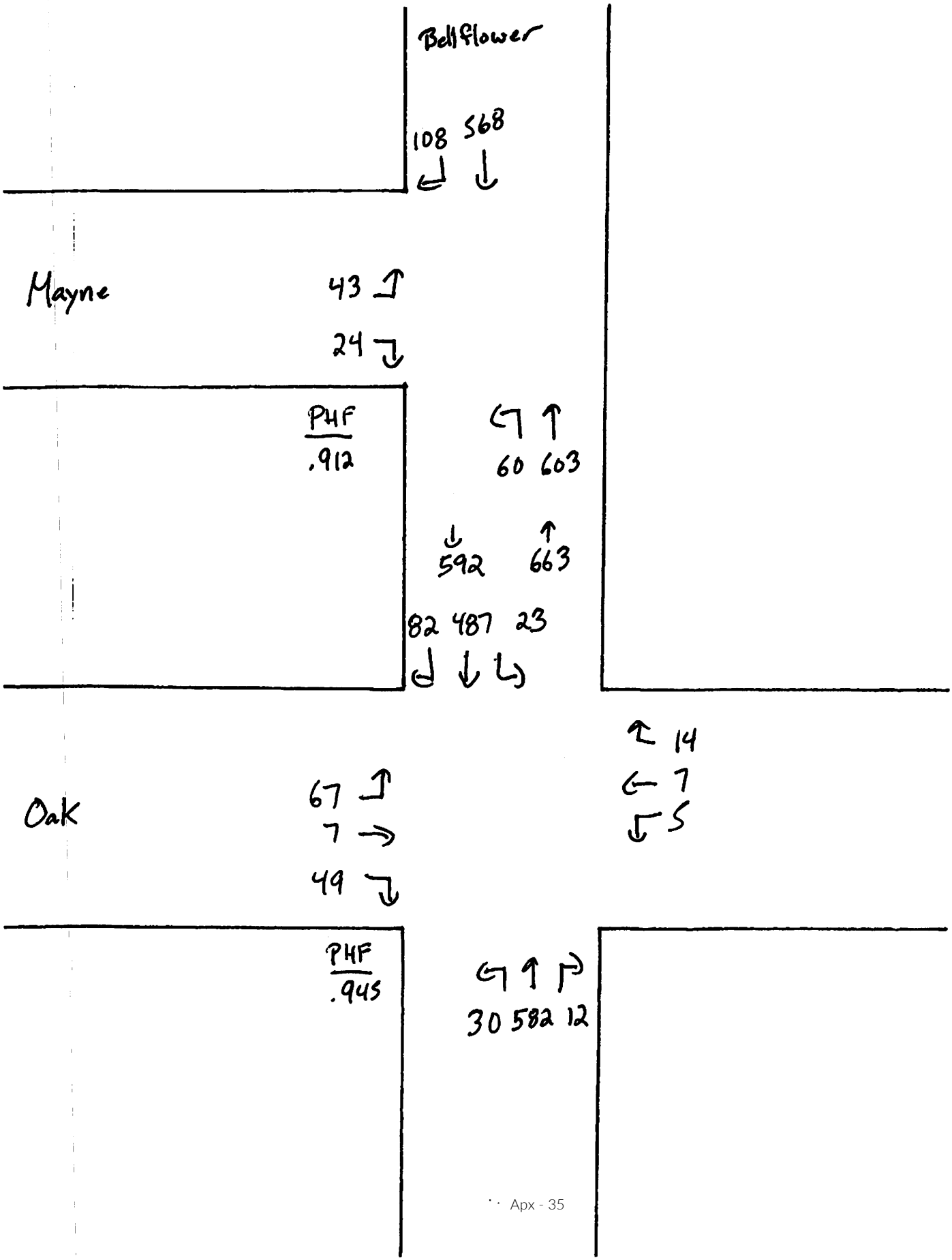
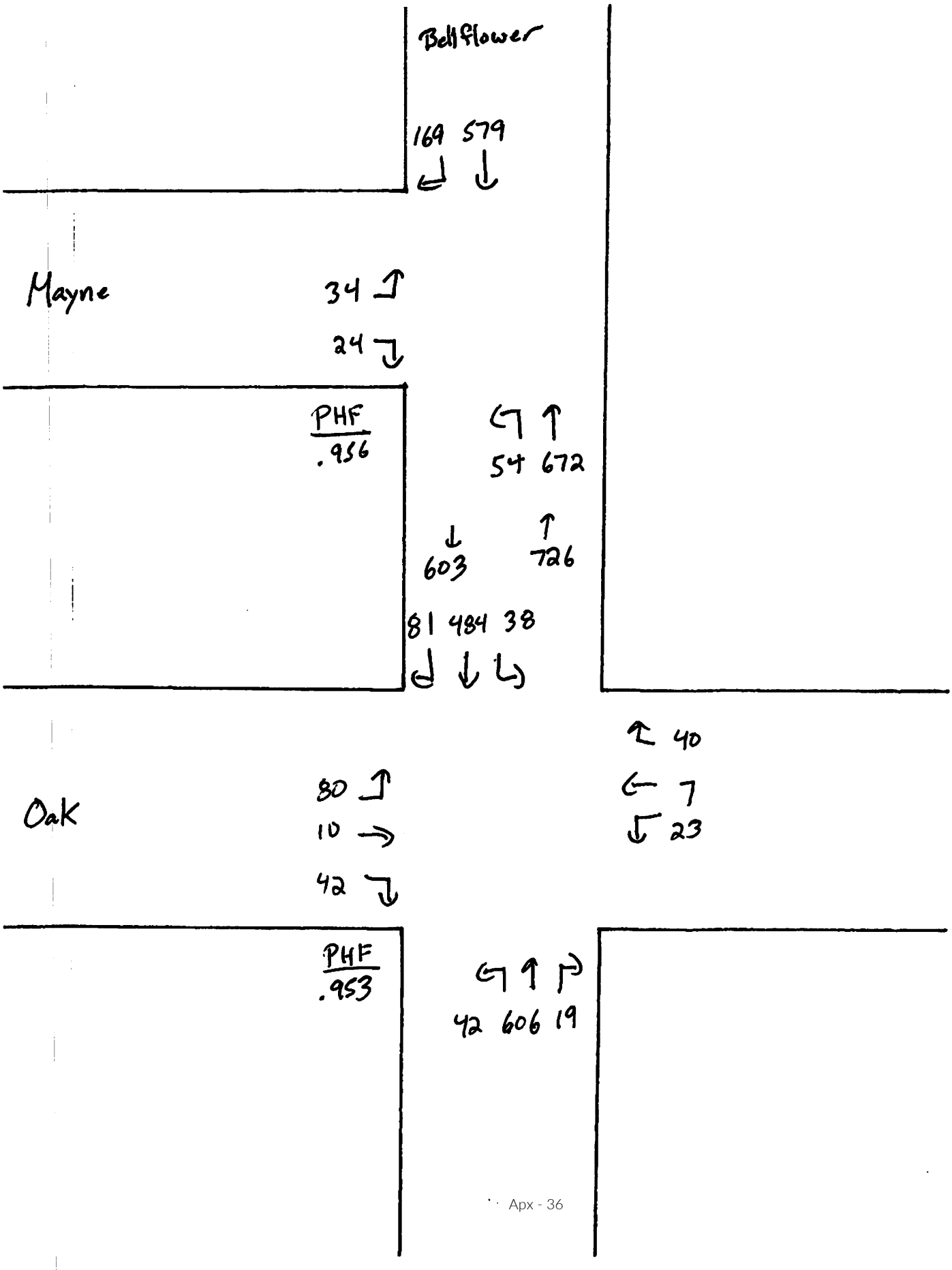

Bellflower
108 568
Mayne
43
24
PHF
.912
60 603
592 663
82 487 23
14
7
5
Oak
67
7
49
PHF
.945
30 582 12

PM


Bellflower
169 579
Mayne
34
24
PHF
.956
54 672
603
726
81 484 38
40
7
23
Oak
80
10
42
PHF
.953
42 606 19

INTERSECTION TURNING MOVEMENT COUNTS

PREPARED BY: AimTD LLC. tel: 714 253 7888 cs@aimtd.com

DATE: Tue, Oct 8, 19

LOCATION: Bellflower
NORTH & SOUTH: Bellflower
EAST & WEST: Flower

PROJECT #: SC2382
LOCATION #: 4
CONTROL: SIGNAL

NOTES:

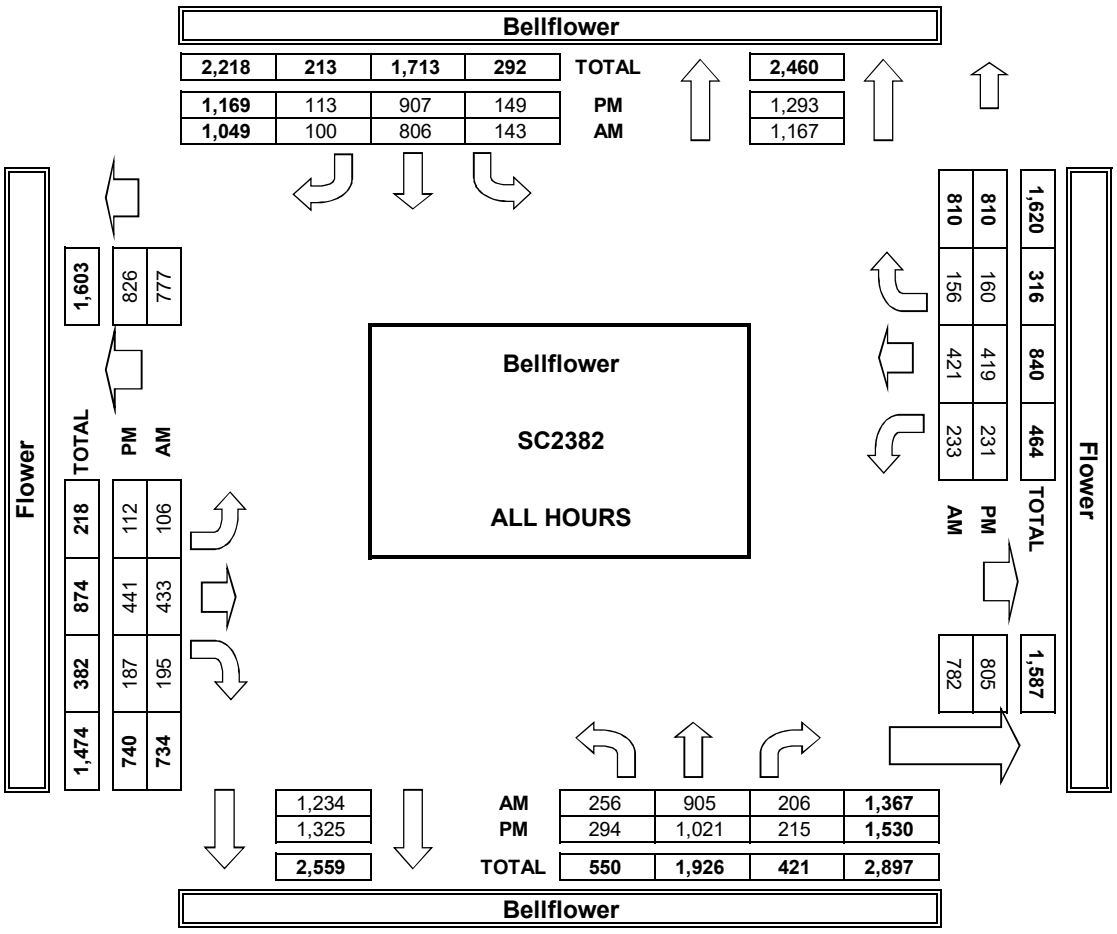
AM / PM / MD / OTHER / OTHER — ▲ N, ◄ W, E ►, S ▼

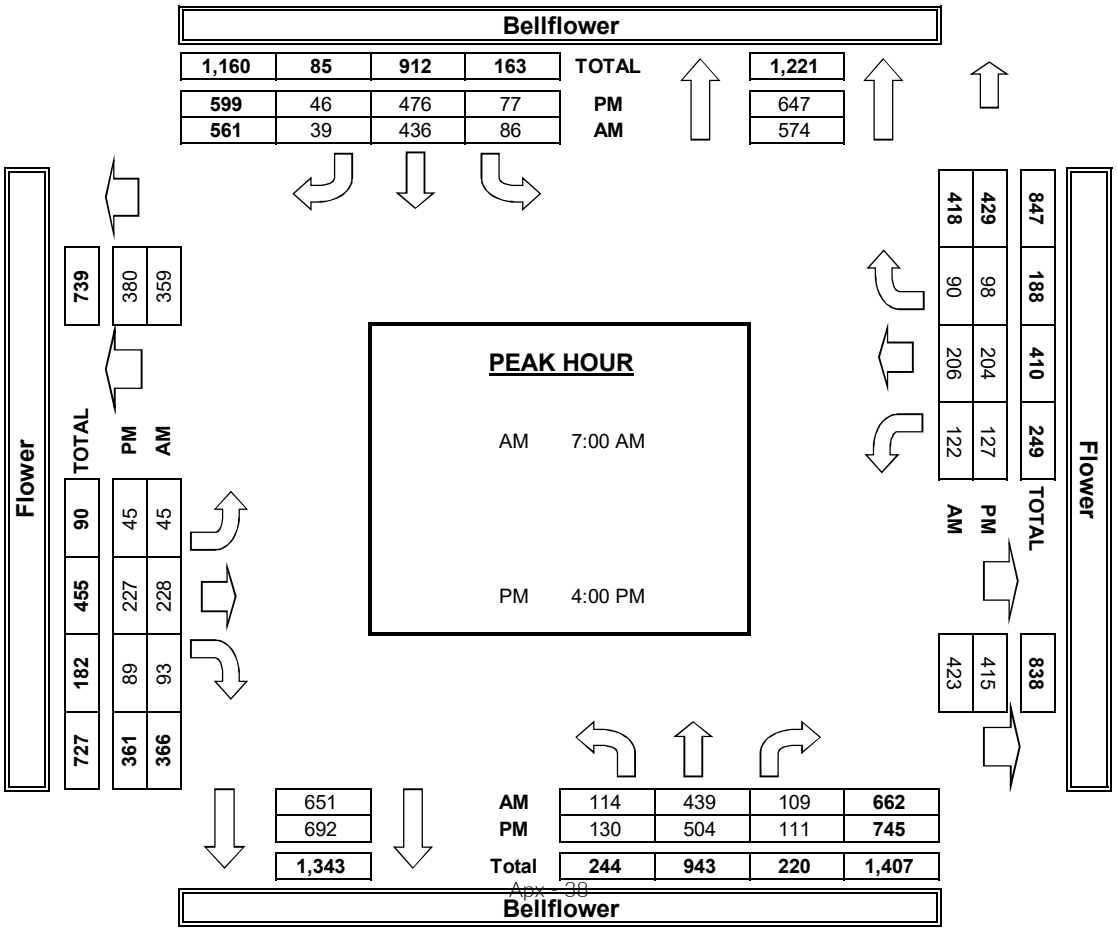
☑ Add U-Turns to Left Turns

		NORTHBOUND Bellflower			SOUTHBOUND Bellflower			EASTBOUND Flower			WESTBOUND Flower				U-TURNS				
	LANES:	NL 0	NT 2	NR 0	SL 0	ST 2	SR 0	EL 1	ET 2	ER 0	WL 1	WT 2	WR 0	TOTAL	NB 0	SB 0	EB 0	WB 0	TTL
AM	7:00 AM	28	124	32	25	137	5	7	52	22	33	54	22	541	0	0	0	0	0
	7:15 AM	22	106	31	22	104	13	6	46	16	31	46	19	462	0	0	0	0	0
	7:30 AM	35	110	26	19	109	6	15	58	30	27	50	27	512	0	0	0	0	0
	7:45 AM	29	99	20	20	86	15	17	72	25	31	56	22	492	0	0	0	0	0
	8:00 AM	40	105	27	15	109	16	14	42	19	39	61	27	514	0	0	0	0	0
	8:15 AM	41	101	24	10	87	14	22	59	18	29	39	11	455	0	0	0	0	0
	8:30 AM	34	127	21	19	90	17	14	50	39	17	58	12	498	0	0	0	0	0
	8:45 AM	27	133	25	13	84	14	11	54	26	26	57	16	486	0	0	0	0	0
	VOLUMES	256	905	206	143	806	100	106	433	195	233	421	156	3,960	0	0	0	0	0
	APPROACH %	19%	66%	15%	14%	77%	10%	14%	59%	27%	29%	52%	19%						
	APP/DEPART	1,367	/	1,167	1,049	/	1,234	734	/	782	810	/	777	0					
	BEGIN PEAK HR		7:00 AM																
	VOLUMES	114	439	109	86	436	39	45	228	93	122	206	90	2,007					
	APPROACH %	17%	66%	16%	15%	78%	7%	12%	62%	25%	29%	49%	22%						
	PEAK HR FACTOR		0.899			0.840			0.803			0.959		0.927					
	APP/DEPART	662	/	574	561	/	651	366	/	423	418	/	359	0					
PM	4:00 PM	36	137	26	21	144	8	6	48	25	36	49	28	564	0	0	0	0	0
	4:15 PM	18	120	36	21	110	13	7	49	18	27	52	21	492	0	0	0	0	0
	4:30 PM	42	133	23	17	127	10	13	55	24	30	44	24	542	0	0	0	0	0
	4:45 PM	34	114	26	18	95	15	19	75	22	34	59	25	536	0	0	0	0	0
	5:00 PM	44	120	31	20	109	20	15	46	22	38	57	23	545	0	0	0	0	0
	5:15 PM	37	117	19	16	107	13	19	57	17	25	43	10	480	0	0	0	0	0
	5:30 PM	47	137	25	17	119	17	15	54	36	20	62	14	563	0	0	0	0	0
	5:45 PM	36	143	29	19	96	17	18	57	23	21	53	15	527	0	0	0	0	0
	VOLUMES	294	1,021	215	149	907	113	112	441	187	231	419	160	4,249	0	0	0	0	0
	APPROACH %	19%	67%	14%	13%	78%	10%	15%	60%	25%	29%	52%	20%						
	APP/DEPART	1,530	/	1,293	1,169	/	1,325	740	/	805	810	/	826	0					
	BEGIN PEAK HR		4:00 PM																
	VOLUMES	130	504	111	77	476	46	45	227	89	127	204	98	2,134					
	APPROACH %	17%	68%	15%	13%	79%	8%	12%	63%	25%	30%	48%	23%						
	PEAK HR FACTOR		0.936			0.866			0.778			0.909		0.946					
	APP/DEPART	745	/	647	599	/	692	361	/	415	429	/	380	0					

AimTD LLC

TURNING MOVEMENT COUNTS





APPENDIX D

LEVEL OF SERVICE WORKSHEETS

EXISTING

Bellflower Mixed Use Project

Vistro File: C:\...\AME.vistro
Report File: C:\...\AME.pdf

Scenario 1 Existing AM Peak Hour
10/28/2019

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Ardmore Ave (NS) at Oak St (EW)	All-way stop	HCM 6th Edition	NB Thru	0.177	8.2	A
3	Project Dwy (NS) at Oak St (EW)	Two-way stop	HCM 6th Edition	SB Left	0.001	10.4	B
4	Bellflower Blvd (NS) at Alondra Blvd (EW)	Signalized	ICU 1	WB Thru	0.657	-	B
5	Bellflower Blvd (NS) at Mayne St (EW)	Signalized	ICU 1	SB Thru	0.545	-	A
6	Bellflower Blvd (NS) at Oak St (EW)	Signalized	ICU 1	NB Right	0.560	-	A
7	Bellflower Blvd (NS) at Flower St (EW)	Signalized	ICU 1	NB Thru	0.659	-	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Ardmore Ave (NS) at Oak St (EW)

Control Type:	All-way stop	Delay (sec / veh):	8.2
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.177

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	31	74	22	18	85	30	1	39	28	19	52	8
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth 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
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
Total Hourly Volume [veh/h]	31	74	22	18	85	30	1	39	28	19	52	8
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
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]	9	21	6	5	24	8	0	11	8	5	14	2
Total Analysis Volume [veh/h]	34	82	24	20	94	33	1	43	31	21	58	9
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	819	830	815	778
Degree of Utilization, x	0.17	0.18	0.09	0.11

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	0.61	0.64	0.30	0.38
95th-Percentile Queue Length [ft]	15.36	16.03	7.58	9.53
Approach Delay [s/veh]	8.30	8.27	7.87	8.22
Approach LOS	A	A	A	A
Intersection Delay [s/veh]	8.20			
Intersection LOS	A			

Intersection Level Of Service Report
Intersection 3: Project Dwy (NS) at Oak St (EW)

Control Type:	Two-way stop	Delay (sec / veh):	10.4
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.001

Intersection Setup

Name											
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	1	0	5	1	0	0	2	104	1	11	101	7
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth 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
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
Total Hourly Volume [veh/h]	1	0	5	1	0	0	2	104	1	11	101	7
Peak Hour Factor	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690
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	1	0	0	0	1	30	0	3	29	2
Total Analysis Volume [veh/h]	1	0	6	1	0	0	2	120	1	13	116	8
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	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	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	10.32	10.75	8.88	10.36	10.70	8.85	7.44	0.00	0.00	7.46	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02
95th-Percentile Queue Length [ft/ln]	0.60	0.60	0.60	0.11	0.11	0.11	0.10	0.10	0.10	0.56	0.56	0.56
d_A, Approach Delay [s/veh]	9.08			10.36			0.12			0.71		
Approach LOS	A			B			A			A		
d_I, Intersection Delay [s/veh]	0.69											
Intersection LOS	B											

Intersection Level Of Service Report
Intersection 4: Bellflower Blvd (NS) at Alondra Blvd (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.657

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	132	500	78	106	400	69	75	466	83	99	724	118
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth 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
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
Total Hourly Volume [veh/h]	132	500	78	106	400	69	75	466	83	99	724	118
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]	33	125	20	27	100	17	19	117	21	25	181	30
Total Analysis Volume [veh/h]	132	500	78	106	400	69	75	466	83	99	724	118
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.18	0.18	0.07	0.15	0.15	0.05	0.17	0.17	0.06	0.26	0.26
Intersection LOS	B											
Intersection V/C	0.657											

Intersection Level Of Service Report
Intersection 5: Bellflower Blvd (NS) at Mayne St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.545

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		Yes	

Volumes

Name						
Base Volume Input [veh/h]	60	603	568	108	43	24
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	60	603	568	108	43	24
Peak Hour Factor	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
Total 15-Minute Volume [veh/h]	15	151	142	27	11	6
Total Analysis Volume [veh/h]	60	603	568	108	43	24
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split
Signal group	0	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.21	0.21	0.21	0.03	0.02
Intersection LOS	A					
Intersection V/C	0.545					

Intersection Level Of Service Report
Intersection 6: Bellflower Blvd (NS) at Oak St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.560

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	30	582	12	23	487	82	67	7	49	5	7	14
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth 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
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
Total Hourly Volume [veh/h]	30	582	12	23	487	82	67	7	49	5	7	14
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]	8	146	3	6	122	21	17	2	12	1	2	4
Total Analysis Volume [veh/h]	30	582	12	23	487	82	67	7	49	5	7	14
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.20	0.20	0.01	0.19	0.19	0.04	0.08	0.08	0.00	0.02	0.02
Intersection LOS	A											
Intersection V/C	0.560											

Intersection Level Of Service Report
Intersection 7: Bellflower Blvd (NS) at Flower St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.659

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	114	439	109	86	436	39	45	228	93	122	206	90
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth 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
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
Total Hourly Volume [veh/h]	114	439	109	86	436	39	45	228	93	122	206	90
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]	29	110	27	22	109	10	11	57	23	31	52	23
Total Analysis Volume [veh/h]	114	439	109	86	436	39	45	228	93	122	206	90
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.21	0.21	0.05	0.18	0.18	0.03	0.10	0.10	0.08	0.09	0.09
Intersection LOS	B											
Intersection V/C	0.659											

Bellflower Mixed Use Project

Vistro File: C:\...\PME.vistro
Report File: C:\...\PME.pdf

Scenario 1 Existing PM Peak Hour
10/28/2019

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Ardmore Ave (NS) at Oak St (EW)	All-way stop	HCM 6th Edition	NB Thru	0.149	8.2	A
3	Project Dwy (NS) at Oak St (EW)	Two-way stop	HCM 6th Edition	NB Left	0.009	10.8	B
4	Bellflower Blvd (NS) at Alondra Blvd (EW)	Signalized	ICU 1	EB Thru	0.678	-	B
5	Bellflower Blvd (NS) at Mayne St (EW)	Signalized	ICU 1	SB Thru	0.582	-	A
6	Bellflower Blvd (NS) at Oak St (EW)	Signalized	ICU 1	NB Thru	0.594	-	A
7	Bellflower Blvd (NS) at Flower St (EW)	Signalized	ICU 1	NB Thru	0.698	-	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Ardmore Ave (NS) at Oak St (EW)

Control Type:	All-way stop	Delay (sec / veh):	8.2
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.149

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	25	64	18	20	59	13	8	72	24	12	55	15
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth 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
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
Total Hourly Volume [veh/h]	25	64	18	20	59	13	8	72	24	12	55	15
Peak Hour Factor	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830
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]	7	18	5	6	17	4	2	20	7	3	16	4
Total Analysis Volume [veh/h]	28	72	20	23	67	15	9	82	27	14	62	17
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	807	802	815	803
Degree of Utilization, x	0.15	0.13	0.14	0.12

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	0.52	0.45	0.50	0.39
95th-Percentile Queue Length [ft]	13.03	11.25	12.62	9.79
Approach Delay [s/veh]	8.24	8.17	8.16	8.07
Approach LOS	A	A	A	A
Intersection Delay [s/veh]	8.17			
Intersection LOS	A			

Intersection Level Of Service Report
Intersection 3: Project Dwy (NS) at Oak St (EW)

Control Type:	Two-way stop	Delay (sec / veh):	10.8
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.009

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	5	0	5	0	0	0	4	130	6	14	107	4
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth 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
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
Total Hourly Volume [veh/h]	5	0	5	0	0	0	4	130	6	14	107	4
Peak Hour Factor	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810
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]	1	0	1	0	0	0	1	37	2	4	30	1
Total Analysis Volume [veh/h]	6	0	6	0	0	0	5	148	7	16	121	5
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	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	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	10.78	11.17	9.08	10.76	11.10	8.86	7.45	0.00	0.00	7.53	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.05	0.05	0.05	0.00	0.00	0.00	0.01	0.01	0.01	0.03	0.03	0.03
95th-Percentile Queue Length [ft/ln]	1.23	1.23	1.23	0.00	0.00	0.00	0.20	0.20	0.20	0.74	0.74	0.74
d_A, Approach Delay [s/veh]	9.93			10.24			0.23			0.85		
Approach LOS	A			B			A			A		
d_I, Intersection Delay [s/veh]	0.88											
Intersection LOS	B											

Intersection Level Of Service Report
Intersection 4: Bellflower Blvd (NS) at Alondra Blvd (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.678

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	139	446	103	150	376	77	95	666	111	111	537	102
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth 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
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
Total Hourly Volume [veh/h]	139	446	103	150	376	77	95	666	111	111	537	102
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]	35	112	26	38	94	19	24	167	28	28	134	26
Total Analysis Volume [veh/h]	139	446	103	150	376	77	95	666	111	111	537	102
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.17	0.17	0.09	0.14	0.14	0.06	0.24	0.24	0.07	0.20	0.20
Intersection LOS	B											
Intersection V/C	0.678											

Intersection Level Of Service Report
Intersection 5: Bellflower Blvd (NS) at Mayne St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.582

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		Yes	

Volumes

Name						
Base Volume Input [veh/h]	54	672	579	169	34	24
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	54	672	579	169	34	24
Peak Hour Factor	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
Total 15-Minute Volume [veh/h]	14	168	145	42	9	6
Total Analysis Volume [veh/h]	54	672	579	169	34	24
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split
Signal group	0	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.23	0.23	0.23	0.02	0.02
Intersection LOS	A					
Intersection V/C	0.582					

Intersection Level Of Service Report
Intersection 6: Bellflower Blvd (NS) at Oak St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.594

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	42	606	19	38	484	81	80	10	42	23	7	40
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth 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
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
Total Hourly Volume [veh/h]	42	606	19	38	484	81	80	10	42	23	7	40
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]	11	152	5	10	121	20	20	3	11	6	2	10
Total Analysis Volume [veh/h]	42	606	19	38	484	81	80	10	42	23	7	40
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.21	0.21	0.02	0.19	0.19	0.05	0.08	0.08	0.01	0.04	0.04
Intersection LOS	A											
Intersection V/C	0.594											

Intersection Level Of Service Report
Intersection 7: Bellflower Blvd (NS) at Flower St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.698

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	130	504	111	77	476	46	45	227	89	127	204	98
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth 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
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
Total Hourly Volume [veh/h]	130	504	111	77	476	46	45	227	89	127	204	98
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]	33	126	28	19	119	12	11	57	22	32	51	25
Total Analysis Volume [veh/h]	130	504	111	77	476	46	45	227	89	127	204	98
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.23	0.23	0.05	0.19	0.19	0.03	0.10	0.10	0.08	0.09	0.09
Intersection LOS	B											
Intersection V/C	0.698											

EXISTING PLUS PROJECT

Bellflower Mixed Use Project

Vistro File: C:\...\AME.vistro
Report File: C:\...\AMEP.pdf

Scenario 2 Existing Plus Project AM Peak Hour
10/28/2019

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Ardmore Ave (NS) at Oak St (EW)	All-way stop	HCM 6th Edition	NB Thru	0.178	8.2	A
2	Parking Garage Dwy (NS) at Mayne St (EW)	Two-way stop	HCM 6th Edition	SB Left	0.004	9.9	A
3	Project Dwy (NS) at Oak St (EW)	Two-way stop	HCM 6th Edition	SB Left	0.034	10.7	B
4	Bellflower Blvd (NS) at Alondra Blvd (EW)	Signalized	ICU 1	WB Thru	0.660	-	B
5	Bellflower Blvd (NS) at Mayne St (EW)	Signalized	ICU 1	SB Thru	0.552	-	A
6	Bellflower Blvd (NS) at Oak St (EW)	Signalized	ICU 1	NB Right	0.575	-	A
7	Bellflower Blvd (NS) at Flower St (EW)	Signalized	ICU 1	NB Thru	0.663	-	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Ardmore Ave (NS) at Oak St (EW)

Control Type:	All-way stop	Delay (sec / veh):	8.2
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.178

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	31	74	22	18	85	30	1	39	28	19	52	8
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth 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
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	1	0	0	0	0	0	0	2	1	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
Total Hourly Volume [veh/h]	31	74	23	18	85	30	1	39	28	21	53	8
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
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]	9	21	6	5	24	8	0	11	8	6	15	2
Total Analysis Volume [veh/h]	34	82	26	20	94	33	1	43	31	23	59	9
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	818	828	813	776
Degree of Utilization, x	0.17	0.18	0.09	0.12

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	0.63	0.64	0.30	0.40
95th-Percentile Queue Length [ft]	15.63	16.07	7.60	9.92
Approach Delay [s/veh]	8.32	8.29	7.88	8.26
Approach LOS	A	A	A	A
Intersection Delay [s/veh]	8.22			
Intersection LOS	A			

Intersection Level Of Service Report
Intersection 2: Parking Garage Dwy (NS) at Mayne St (EW)

Control Type:	Two-way stop	Delay (sec / veh):	9.9
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.004

Intersection Setup

Name						
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		No	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	67	168	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	3	0	0	0	0	3
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	0	0	67	168	3
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	0	0	18	44	1
Total Analysis Volume [veh/h]	3	0	0	71	177	3
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop		Free		Free	
Flared Lane	No					
Storage Area [veh]	0		0		0	
Two-Stage Gap Acceptance	No					
Number of Storage Spaces in Median	0		0		0	

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.86	9.16	7.56	0.00	0.00	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.01	0.01	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	0.30	0.30	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.86		0.00		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.12					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 3: Project Dwy (NS) at Oak St (EW)

Control Type:	Two-way stop	Delay (sec / veh):	10.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.034

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	1	0	6	0	0	0	0	104	3	18	101	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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth 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
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	19	0	4	1	0	0	0	0	7
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
Total Hourly Volume [veh/h]	1	0	6	19	0	4	1	104	3	18	101	7
Peak Hour Factor	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690
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	2	5	0	1	0	30	1	5	29	2
Total Analysis Volume [veh/h]	1	0	7	22	0	5	1	120	3	21	116	8
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	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	0.01	0.03	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	10.52	10.90	8.89	10.71	11.05	9.05	7.44	0.00	0.00	7.47	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.03	0.03	0.03	0.12	0.12	0.12	0.00	0.00	0.00	0.04	0.04	0.04
95th-Percentile Queue Length [ft/ln]	0.68	0.68	0.68	3.04	3.04	3.04	0.05	0.05	0.05	0.93	0.93	0.93
d_A, Approach Delay [s/veh]	9.09			10.41			0.06			1.08		
Approach LOS	A			B			A			A		
d_I, Intersection Delay [s/veh]	1.70											
Intersection LOS	B											

Intersection Level Of Service Report

Intersection 4: Bellflower Blvd (NS) at Alondra Blvd (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.660

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	132	500	78	106	400	69	75	466	83	99	724	118
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth 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
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	4	7	0	2	0	0	0	1	2	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
Total Hourly Volume [veh/h]	134	504	85	106	402	69	75	466	84	101	724	118
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]	34	126	21	27	101	17	19	117	21	25	181	30
Total Analysis Volume [veh/h]	134	504	85	106	402	69	75	466	84	101	724	118
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.18	0.18	0.07	0.15	0.15	0.05	0.17	0.17	0.06	0.26	0.26
Intersection LOS	B											
Intersection V/C	0.660											

Intersection Level Of Service Report
Intersection 5: Bellflower Blvd (NS) at Mayne St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.552

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		Yes	

Volumes

Name						
Base Volume Input [veh/h]	60	603	568	108	43	24
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	12	4	1	1	2
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	62	615	572	109	44	26
Peak Hour Factor	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
Total 15-Minute Volume [veh/h]	16	154	143	27	11	7
Total Analysis Volume [veh/h]	62	615	572	109	44	26
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split
Signal group	0	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.21	0.21	0.21	0.03	0.02
Intersection LOS	A					
Intersection V/C	0.552					

Intersection Level Of Service Report
Intersection 6: Bellflower Blvd (NS) at Oak St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.575

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	30	582	12	23	487	82	67	7	49	5	7	14
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth 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
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	3	2	0	0	2	4	12	0	7	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
Total Hourly Volume [veh/h]	33	584	12	23	489	86	79	7	56	5	7	14
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]	8	146	3	6	122	22	20	2	14	1	2	4
Total Analysis Volume [veh/h]	33	584	12	23	489	86	79	7	56	5	7	14
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.20	0.20	0.01	0.19	0.19	0.05	0.09	0.09	0.00	0.02	0.02
Intersection LOS	A											
Intersection V/C	0.575											

Intersection Level Of Service Report
Intersection 7: Bellflower Blvd (NS) at Flower St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.663

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	114	439	109	86	436	39	45	228	93	122	206	90
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth 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
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	3	0	3	6	0	0	0	0	0	0	2
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
Total Hourly Volume [veh/h]	114	442	109	89	442	39	45	228	93	122	206	92
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]	29	111	27	22	111	10	11	57	23	31	52	23
Total Analysis Volume [veh/h]	114	442	109	89	442	39	45	228	93	122	206	92
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.21	0.21	0.06	0.18	0.18	0.03	0.10	0.10	0.08	0.09	0.09
Intersection LOS	B											
Intersection V/C	0.663											

Bellflower Mixed Use Project

Vistro File: C:\...\PME.vistro
Report File: C:\...\PMEP.pdf

Scenario 2 Existing Plus Project PM Peak Hour
10/28/2019

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Ardmore Ave (NS) at Oak St (EW)	All-way stop	HCM 6th Edition	NB Thru	0.158	8.2	A
2	Parking Garage Dwy (NS) at Mayne St (EW)	Two-way stop	HCM 6th Edition	SB Left	0.037	10.7	B
3	Project Dwy (NS) at Oak St (EW)	Two-way stop	HCM 6th Edition	SB Left	0.019	11.2	B
4	Bellflower Blvd (NS) at Alondra Blvd (EW)	Signalized	ICU 1	EB Thru	0.690	-	B
5	Bellflower Blvd (NS) at Mayne St (EW)	Signalized	ICU 1	SB Thru	0.603	-	B
6	Bellflower Blvd (NS) at Oak St (EW)	Signalized	ICU 1	NB Thru	0.617	-	B
7	Bellflower Blvd (NS) at Flower St (EW)	Signalized	ICU 1	NB Thru	0.707	-	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Ardmore Ave (NS) at Oak St (EW)

Control Type:	All-way stop	Delay (sec / veh):	8.2
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.158

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	25	64	18	20	59	13	8	72	24	12	55	15
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth 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
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	1	4	0	1	0	0	3	0	3	3	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
Total Hourly Volume [veh/h]	25	65	22	20	60	13	8	75	24	15	58	15
Peak Hour Factor	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830
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]	7	18	6	6	17	4	2	21	7	4	16	4
Total Analysis Volume [veh/h]	28	74	25	23	68	15	9	85	27	17	66	17
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	806	796	809	796
Degree of Utilization, x	0.16	0.13	0.15	0.13

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	0.56	0.46	0.52	0.43
95th-Percentile Queue Length [ft]	13.95	11.48	13.11	10.73
Approach Delay [s/veh]	8.31	8.22	8.23	8.17
Approach LOS	A	A	A	A
Intersection Delay [s/veh]	8.24			
Intersection LOS	A			

Intersection Level Of Service Report
Intersection 2: Parking Garage Dwy (NS) at Mayne St (EW)

Control Type:	Two-way stop	Delay (sec / veh):	10.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.037

Intersection Setup

Name						
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		No	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	58	223	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	24	9	9	0	0	23
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	24	9	9	58	223	23
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	2	2	15	59	6
Total Analysis Volume [veh/h]	25	9	9	61	235	24
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.01	0.01	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.66	9.78	7.75	0.00	0.00	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.15	0.15	0.02	0.02	0.00	0.00
95th-Percentile Queue Length [ft/ln]	3.84	3.84	0.52	0.52	0.00	0.00
d_A, Approach Delay [s/veh]	10.43		1.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.17					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 3: Project Dwy (NS) at Oak St (EW)

Control Type:	Two-way stop	Delay (sec / veh):	11.2
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.019

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	5	0	5	0	0	0	0	130	10	18	107	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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth 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
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	0	2	10	0	3	4	2	2	2	2	16
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
Total Hourly Volume [veh/h]	7	0	7	10	0	3	4	132	12	20	109	16
Peak Hour Factor	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810
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]	2	0	2	3	0	1	1	37	3	6	31	5
Total Analysis Volume [veh/h]	8	0	8	11	0	3	5	150	14	23	124	18
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	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	0.01	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
d_M, Delay for Movement [s/veh]	11.13	11.53	9.14	11.19	11.52	9.03	7.49	0.00	0.00	7.56	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.07	0.07	0.07	0.07	0.07	0.07	0.01	0.01	0.01	0.04	0.04	0.04
95th-Percentile Queue Length [ft/ln]	1.71	1.71	1.71	1.67	1.67	1.67	0.21	0.21	0.21	1.07	1.07	1.07
d_A, Approach Delay [s/veh]	10.13			10.73			0.22			1.05		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	1.44											
Intersection LOS	B											

Intersection Level Of Service Report
Intersection 4: Bellflower Blvd (NS) at Alondra Blvd (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.690

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	139	446	103	150	376	77	95	666	111	111	537	102
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth 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
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	5	8	7	0	9	0	0	0	6	9	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
Total Hourly Volume [veh/h]	144	454	110	150	385	77	95	666	117	120	537	102
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]	36	114	28	38	96	19	24	167	29	30	134	26
Total Analysis Volume [veh/h]	144	454	110	150	385	77	95	666	117	120	537	102
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.18	0.18	0.09	0.14	0.14	0.06	0.24	0.24	0.08	0.20	0.20
Intersection LOS	B											
Intersection V/C	0.690											

Intersection Level Of Service Report
Intersection 5: Bellflower Blvd (NS) at Mayne St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.603

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		Yes	

Volumes

Name						
Base Volume Input [veh/h]	54	672	579	169	34	24
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	11	8	12	12	12	12
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	65	680	591	181	46	36
Peak Hour Factor	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
Total 15-Minute Volume [veh/h]	16	170	148	45	12	9
Total Analysis Volume [veh/h]	65	680	591	181	46	36
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split
Signal group	0	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.23	0.24	0.24	0.03	0.02
Intersection LOS	B					
Intersection V/C	0.603					

Intersection Level Of Service Report
Intersection 6: Bellflower Blvd (NS) at Oak St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.617

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	42	606	19	38	484	81	80	10	42	23	7	40
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth 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
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	8	11	1	2	12	10	6	2	6	1	2	2
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
Total Hourly Volume [veh/h]	50	617	20	40	496	91	86	12	48	24	9	42
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]	13	154	5	10	124	23	22	3	12	6	2	11
Total Analysis Volume [veh/h]	50	617	20	40	496	91	86	12	48	24	9	42
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.21	0.21	0.03	0.20	0.20	0.05	0.09	0.09	0.02	0.05	0.05
Intersection LOS	B											
Intersection V/C	0.617											

Intersection Level Of Service Report
Intersection 7: Bellflower Blvd (NS) at Flower St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.707

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	130	504	111	77	476	46	45	227	89	127	204	98
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth 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
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	10	0	8	9	2	2	0	0	0	0	8
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
Total Hourly Volume [veh/h]	130	514	111	85	485	48	47	227	89	127	204	106
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]	33	129	28	21	121	12	12	57	22	32	51	27
Total Analysis Volume [veh/h]	130	514	111	85	485	48	47	227	89	127	204	106
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.24	0.24	0.05	0.19	0.19	0.03	0.10	0.10	0.08	0.10	0.10
Intersection LOS	C											
Intersection V/C	0.707											

OPENING YEAR (2023) WITHOUT PROJECT

Bellflower Mixed Use Project

Vistro File: C:\...\AME.vistro

Scenario 3 Opening Year (2023) Without Project AM Peak Hour

Report File: C:\...\AMOYWO.pdf

10/28/2019

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Ardmore Ave (NS) at Oak St (EW)	All-way stop	HCM 6th Edition	NB Thru	0.186	8.3	A
2	Parking Garage Dwy (NS) at Mayne St (EW)	Two-way stop	HCM 6th Edition	SB Left	0.102	11.7	B
3	Project Dwy (NS) at Oak St (EW)	Two-way stop	HCM 6th Edition	SB Left	0.002	10.5	B
4	Bellflower Blvd (NS) at Alondra Blvd (EW)	Signalized	ICU 1	WB Thru	0.692	-	B
5	Bellflower Blvd (NS) at Mayne St (EW)	Signalized	ICU 1	SB Thru	0.675	-	B
6	Bellflower Blvd (NS) at Oak St (EW)	Signalized	ICU 1	NB Thru	0.623	-	B
7	Bellflower Blvd (NS) at Flower St (EW)	Signalized	ICU 1	NB Thru	0.717	-	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Ardmore Ave (NS) at Oak St (EW)

Control Type:	All-way stop	Delay (sec / veh):	8.3
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.186

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	31	74	22	18	85	30	1	39	28	19	52	8
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
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	3	0	0	2	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
Total Hourly Volume [veh/h]	32	77	23	19	88	31	1	44	29	20	56	8
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
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]	9	21	6	5	24	9	0	12	8	6	16	2
Total Analysis Volume [veh/h]	36	86	26	21	98	34	1	49	32	22	62	9
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	811	821	804	769
Degree of Utilization, x	0.18	0.19	0.10	0.12

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	0.66	0.68	0.34	0.41
95th-Percentile Queue Length [ft]	16.60	17.04	8.49	10.27
Approach Delay [s/veh]	8.43	8.39	7.99	8.32
Approach LOS	A	A	A	A
Intersection Delay [s/veh]	8.32			
Intersection LOS	A			

Intersection Level Of Service Report
Intersection 2: Parking Garage Dwy (NS) at Mayne St (EW)

Control Type:	Two-way stop	Delay (sec / veh):	11.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.102

Intersection Setup

Name						
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		No	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	67	168	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	58	2	10	3	2	235
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	58	2	10	73	177	235
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	15	1	3	19	47	62
Total Analysis Volume [veh/h]	61	2	11	77	186	247
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.00	0.01	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	11.73	10.60	8.20	0.00	0.00	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.35	0.35	0.03	0.03	0.00	0.00
95th-Percentile Queue Length [ft/ln]	8.75	8.75	0.67	0.67	0.00	0.00
d_A, Approach Delay [s/veh]	11.70		1.02		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.42					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 3: Project Dwy (NS) at Oak St (EW)

Control Type:	Two-way stop	Delay (sec / veh):	10.5
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.002

Intersection Setup

Name											
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	1	0	5	1	0	0	2	104	1	11	101	7
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
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	3	0	0	2	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
Total Hourly Volume [veh/h]	1	0	5	1	0	0	2	111	1	11	107	7
Peak Hour Factor	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690
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	1	0	0	0	1	32	0	3	31	2
Total Analysis Volume [veh/h]	1	0	6	1	0	0	2	128	1	13	123	8
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	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	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	10.45	10.87	8.92	10.48	10.82	8.89	7.46	0.00	0.00	7.47	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02
95th-Percentile Queue Length [ft/ln]	0.60	0.60	0.60	0.11	0.11	0.11	0.10	0.10	0.10	0.57	0.57	0.57
d_A, Approach Delay [s/veh]	9.14			10.48			0.11			0.67		
Approach LOS	A			B			A			A		
d_I, Intersection Delay [s/veh]	0.66											
Intersection LOS	B											

Intersection Level Of Service Report

Intersection 4: Bellflower Blvd (NS) at Alondra Blvd (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.692

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	132	500	78	106	400	69	75	466	83	99	724	118
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	14	19	23	0	56	0	0	0	45	80	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
Total Hourly Volume [veh/h]	151	539	104	110	472	72	78	485	131	183	753	123
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]	38	135	26	28	118	18	20	121	33	46	188	31
Total Analysis Volume [veh/h]	151	539	104	110	472	72	78	485	131	183	753	123
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.20	0.20	0.07	0.17	0.17	0.05	0.19	0.19	0.11	0.27	0.27
Intersection LOS	B											
Intersection V/C	0.692											

Intersection Level Of Service Report
Intersection 5: Bellflower Blvd (NS) at Mayne St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.675

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		Yes	

Volumes

Name						
Base Volume Input [veh/h]	60	603	568	108	43	24
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	81	24	16	156	41	20
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	143	651	607	268	86	45
Peak Hour Factor	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
Total 15-Minute Volume [veh/h]	36	163	152	67	22	11
Total Analysis Volume [veh/h]	143	651	607	268	86	45
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split
Signal group	0	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.25	0.27	0.27	0.05	0.03
Intersection LOS	B					
Intersection V/C	0.675					

Intersection Level Of Service Report
Intersection 6: Bellflower Blvd (NS) at Oak St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.623

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	30	582	12	23	487	82	67	7	49	5	7	14
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	102	0	0	34	2	3	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
Total Hourly Volume [veh/h]	31	707	12	24	540	87	73	7	51	5	7	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]	8	177	3	6	135	22	18	2	13	1	2	4
Total Analysis Volume [veh/h]	31	707	12	24	540	87	73	7	51	5	7	15
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.23	0.23	0.02	0.20	0.20	0.05	0.08	0.08	0.00	0.02	0.02
Intersection LOS	B											
Intersection V/C	0.623											

Intersection Level Of Service Report
Intersection 7: Bellflower Blvd (NS) at Flower St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.717

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	114	439	109	86	436	39	45	228	93	122	206	90
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	80	0	5	24	5	11	0	0	0	0	11
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
Total Hourly Volume [veh/h]	119	537	113	94	477	46	58	237	97	127	214	105
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]	30	134	28	24	119	12	15	59	24	32	54	26
Total Analysis Volume [veh/h]	119	537	113	94	477	46	58	237	97	127	214	105
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.24	0.24	0.06	0.19	0.19	0.04	0.10	0.10	0.08	0.10	0.10
Intersection LOS	C											
Intersection V/C	0.717											

Bellflower Mixed Use Project

Vistro File: C:\...\PME.vistro

Scenario 3 Opening Year (2023) Without Project PM Peak Hour

Report File: C:\...\PMOYWO.pdf

10/28/2019

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Ardmore Ave (NS) at Oak St (EW)	All-way stop	HCM 6th Edition	NB Thru	0.159	8.3	A
2	Parking Garage Dwy (NS) at Mayne St (EW)	Two-way stop	HCM 6th Edition	SB Left	0.258	13.5	B
3	Project Dwy (NS) at Oak St (EW)	Two-way stop	HCM 6th Edition	NB Left	0.010	11.0	B
4	Bellflower Blvd (NS) at Alondra Blvd (EW)	Signalized	ICU 1	EB Thru	0.791	-	C
5	Bellflower Blvd (NS) at Mayne St (EW)	Signalized	ICU 1	SB Thru	0.748	-	C
6	Bellflower Blvd (NS) at Oak St (EW)	Signalized	ICU 1	NB Thru	0.674	-	B
7	Bellflower Blvd (NS) at Flower St (EW)	Signalized	ICU 1	NB Thru	0.769	-	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Ardmore Ave (NS) at Oak St (EW)

Control Type:	All-way stop	Delay (sec / veh):	8.3
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.159

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	25	64	18	20	59	13	8	72	24	12	55	15
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
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	5	0	0	4	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
Total Hourly Volume [veh/h]	26	67	19	21	61	14	8	80	25	12	61	16
Peak Hour Factor	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830
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]	7	19	5	6	17	4	2	23	7	3	17	5
Total Analysis Volume [veh/h]	29	76	22	24	69	16	9	91	28	14	69	18
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	798	792	807	795
Degree of Utilization, x	0.16	0.14	0.16	0.13

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	0.56	0.48	0.56	0.43
95th-Percentile Queue Length [ft]	14.10	11.91	14.05	10.87
Approach Delay [s/veh]	8.36	8.27	8.30	8.19
Approach LOS	A	A	A	A
Intersection Delay [s/veh]	8.29			
Intersection LOS	A			

Intersection Level Of Service Report
Intersection 2: Parking Garage Dwy (NS) at Mayne St (EW)

Control Type:	Two-way stop	Delay (sec / veh):	13.5
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.258

Intersection Setup

Name						
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		No	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	58	223	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	142	6	8	5	4	196
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	142	6	8	65	236	196
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	37	2	2	17	62	52
Total Analysis Volume [veh/h]	149	6	8	68	248	206
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.26	0.01	0.01	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.46	12.40	8.25	0.00	0.00	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	1.07	1.07	0.02	0.02	0.00	0.00
95th-Percentile Queue Length [ft/ln]	26.71	26.71	0.54	0.54	0.00	0.00
d_A, Approach Delay [s/veh]	13.42		0.87		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	3.13					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 3: Project Dwy (NS) at Oak St (EW)

Control Type:	Two-way stop	Delay (sec / veh):	11.0
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.010

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	5	0	5	0	0	0	4	130	6	14	107	4
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
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	5	0	0	4	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
Total Hourly Volume [veh/h]	5	0	5	0	0	0	4	140	6	15	115	4
Peak Hour Factor	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810
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]	1	0	1	0	0	0	1	40	2	4	33	1
Total Analysis Volume [veh/h]	6	0	6	0	0	0	5	159	7	17	131	5
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	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	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	10.99	11.36	9.14	10.97	11.29	8.91	7.47	0.00	0.00	7.56	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.05	0.05	0.05	0.00	0.00	0.00	0.01	0.01	0.01	0.03	0.03	0.03
95th-Percentile Queue Length [ft/ln]	1.27	1.27	1.27	0.00	0.00	0.00	0.21	0.21	0.21	0.80	0.80	0.80
d_A, Approach Delay [s/veh]	10.06			10.39			0.22			0.84		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	0.85											
Intersection LOS	B											

Intersection Level Of Service Report
Intersection 4: Bellflower Blvd (NS) at Alondra Blvd (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.791

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	139	446	103	150	376	77	95	666	111	111	537	102
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	33	44	56	0	56	0	0	0	43	73	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
Total Hourly Volume [veh/h]	178	508	163	156	447	80	99	693	158	188	558	106
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]	45	127	41	39	112	20	25	173	40	47	140	27
Total Analysis Volume [veh/h]	178	508	163	156	447	80	99	693	158	188	558	106
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.11	0.21	0.21	0.10	0.16	0.16	0.06	0.27	0.27	0.12	0.21	0.21
Intersection LOS	C											
Intersection V/C	0.791											

Intersection Level Of Service Report
Intersection 5: Bellflower Blvd (NS) at Mayne St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.748

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		Yes	

Volumes

Name						
Base Volume Input [veh/h]	54	672	579	169	34	24
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	67	39	35	133	99	48
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	123	738	637	309	134	73
Peak Hour Factor	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
Total 15-Minute Volume [veh/h]	31	185	159	77	34	18
Total Analysis Volume [veh/h]	123	738	637	309	134	73
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split
Signal group	0	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.27	0.30	0.30	0.08	0.05
Intersection LOS	C					
Intersection V/C	0.748					

Intersection Level Of Service Report
Intersection 6: Bellflower Blvd (NS) at Oak St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.674

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	42	606	19	38	484	81	80	10	42	23	7	40
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	101	0	0	79	4	5	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
Total Hourly Volume [veh/h]	44	731	20	40	582	88	88	10	44	24	7	42
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]	11	183	5	10	146	22	22	3	11	6	2	11
Total Analysis Volume [veh/h]	44	731	20	40	582	88	88	10	44	24	7	42
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.25	0.25	0.03	0.22	0.22	0.06	0.09	0.09	0.02	0.05	0.05
Intersection LOS	B											
Intersection V/C	0.674											

Intersection Level Of Service Report
Intersection 7: Bellflower Blvd (NS) at Flower St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.769

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	130	504	111	77	476	46	45	227	89	127	204	98
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	73	0	12	55	12	14	0	0	0	0	14
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
Total Hourly Volume [veh/h]	135	597	115	92	550	60	61	236	93	132	212	116
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]	34	149	29	23	138	15	15	59	23	33	53	29
Total Analysis Volume [veh/h]	135	597	115	92	550	60	61	236	93	132	212	116
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.26	0.26	0.06	0.22	0.22	0.04	0.10	0.10	0.08	0.10	0.10
Intersection LOS	C											
Intersection V/C	0.769											

OPENING YEAR (2023) WITH PROJECT

Bellflower Mixed Use Project

Vistro File: C:\...\AME.vistro
Report File: C:\...\AMOYW.pdf

Scenario 4 Opening Year (2023) With Project AM Peak Hour
10/28/2019

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Ardmore Ave (NS) at Oak St (EW)	All-way stop	HCM 6th Edition	NB Thru	0.187	8.3	A
2	Parking Garage Dwy (NS) at Mayne St (EW)	Two-way stop	HCM 6th Edition	SB Left	0.104	11.8	B
3	Project Dwy (NS) at Oak St (EW)	Two-way stop	HCM 6th Edition	SB Left	0.035	10.9	B
4	Bellflower Blvd (NS) at Alondra Blvd (EW)	Signalized	ICU 1	WB Thru	0.695	-	B
5	Bellflower Blvd (NS) at Mayne St (EW)	Signalized	ICU 1	SB Thru	0.680	-	B
6	Bellflower Blvd (NS) at Oak St (EW)	Signalized	ICU 1	NB Right	0.638	-	B
7	Bellflower Blvd (NS) at Flower St (EW)	Signalized	ICU 1	NB Thru	0.720	-	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Ardmore Ave (NS) at Oak St (EW)

Control Type:	All-way stop	Delay (sec / veh):	8.3
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.187

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	31	74	22	18	85	30	1	39	28	19	52	8
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	1	0	0	0	0	3	0	2	3	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
Total Hourly Volume [veh/h]	32	77	24	19	88	31	1	44	29	22	57	8
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
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]	9	21	7	5	24	9	0	12	8	6	16	2
Total Analysis Volume [veh/h]	36	86	27	21	98	34	1	49	32	24	63	9
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	811	820	803	768
Degree of Utilization, x	0.18	0.19	0.10	0.13

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	0.67	0.68	0.34	0.43
95th-Percentile Queue Length [ft]	16.76	17.08	8.50	10.66
Approach Delay [s/veh]	8.44	8.40	8.00	8.36
Approach LOS	A	A	A	A
Intersection Delay [s/veh]	8.34			
Intersection LOS	A			

Intersection Level Of Service Report
Intersection 2: Parking Garage Dwy (NS) at Mayne St (EW)

Control Type:	Two-way stop	Delay (sec / veh):	11.8
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.104

Intersection Setup

Name						
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		No	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	67	168	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	59	2	10	3	2	236
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	59	2	10	73	177	236
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	16	1	3	19	47	62
Total Analysis Volume [veh/h]	62	2	11	77	186	248
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.00	0.01	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	11.75	10.61	8.20	0.00	0.00	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.36	0.36	0.03	0.03	0.00	0.00
95th-Percentile Queue Length [ft/ln]	8.91	8.91	0.67	0.67	0.00	0.00
d_A, Approach Delay [s/veh]	11.72		1.02		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.43					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 3: Project Dwy (NS) at Oak St (EW)

Control Type:	Two-way stop	Delay (sec / veh):	10.9
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.035

Intersection Setup

Name											
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	1	0	6	0	0	0	0	104	3	18	101	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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
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	19	0	4	1	3	0	0	2	7
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
Total Hourly Volume [veh/h]	1	0	6	19	0	4	1	111	3	19	107	7
Peak Hour Factor	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690	0.8690
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	2	5	0	1	0	32	1	5	31	2
Total Analysis Volume [veh/h]	1	0	7	22	0	5	1	128	3	22	123	8
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	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	0.01	0.03	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	10.67	11.04	8.93	10.87	11.20	9.10	7.46	0.00	0.00	7.49	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.03	0.03	0.03	0.12	0.12	0.12	0.00	0.00	0.00	0.04	0.04	0.04
95th-Percentile Queue Length [ft/ln]	0.69	0.69	0.69	3.11	3.11	3.11	0.05	0.05	0.05	0.98	0.98	0.98
d_A, Approach Delay [s/veh]	9.14			10.54			0.06			1.08		
Approach LOS	A			B			A			A		
d_I, Intersection Delay [s/veh]	1.66											
Intersection LOS	B											

Intersection Level Of Service Report
Intersection 4: Bellflower Blvd (NS) at Alondra Blvd (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.695

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	132	500	78	106	400	69	75	466	83	99	724	118
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	15	22	30	0	58	0	0	0	46	81	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
Total Hourly Volume [veh/h]	152	542	111	110	474	72	78	485	132	184	753	123
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]	38	136	28	28	119	18	20	121	33	46	188	31
Total Analysis Volume [veh/h]	152	542	111	110	474	72	78	485	132	184	753	123
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.10	0.20	0.20	0.07	0.17	0.17	0.05	0.19	0.19	0.12	0.27	0.27
Intersection LOS	B											
Intersection V/C	0.695											

Intersection Level Of Service Report
Intersection 5: Bellflower Blvd (NS) at Mayne St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.680

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		Yes	

Volumes

Name						
Base Volume Input [veh/h]	60	603	568	108	43	24
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	82	36	20	156	40	22
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	144	663	611	268	85	47
Peak Hour Factor	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
Total 15-Minute Volume [veh/h]	36	166	153	67	21	12
Total Analysis Volume [veh/h]	144	663	611	268	85	47
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split
Signal group	0	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.25	0.27	0.27	0.05	0.03
Intersection LOS	B					
Intersection V/C	0.680					

Intersection Level Of Service Report
Intersection 6: Bellflower Blvd (NS) at Oak St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.638

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	30	582	12	23	487	82	67	7	49	5	7	14
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	3	103	0	0	36	6	15	0	7	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
Total Hourly Volume [veh/h]	34	708	12	24	542	91	85	7	58	5	7	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]	9	177	3	6	136	23	21	2	15	1	2	4
Total Analysis Volume [veh/h]	34	708	12	24	542	91	85	7	58	5	7	15
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.24	0.24	0.02	0.21	0.21	0.05	0.09	0.09	0.00	0.02	0.02
Intersection LOS	B											
Intersection V/C	0.638											

Intersection Level Of Service Report
Intersection 7: Bellflower Blvd (NS) at Flower St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.720

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	114	439	109	86	436	39	45	228	93	122	206	90
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	82	0	8	30	5	11	0	0	0	0	13
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
Total Hourly Volume [veh/h]	119	539	113	97	483	46	58	237	97	127	214	107
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]	30	135	28	24	121	12	15	59	24	32	54	27
Total Analysis Volume [veh/h]	119	539	113	97	483	46	58	237	97	127	214	107
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.24	0.24	0.06	0.20	0.20	0.04	0.10	0.10	0.08	0.10	0.10
Intersection LOS	C											
Intersection V/C	0.720											

Bellflower Mixed Use Project

Vistro File: C:\...\PME.vistro
Report File: C:\...\PMOYW.pdf

Scenario 4 Opening Year (2023) With Project PM Peak Hour
10/28/2019

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Ardmore Ave (NS) at Oak St (EW)	All-way stop	HCM 6th Edition	NB Thru	0.166	8.4	A
2	Parking Garage Dwy (NS) at Mayne St (EW)	Two-way stop	HCM 6th Edition	SB Left	0.249	13.7	B
3	Project Dwy (NS) at Oak St (EW)	Two-way stop	HCM 6th Edition	SB Left	0.019	11.4	B
4	Bellflower Blvd (NS) at Alondra Blvd (EW)	Signalized	ICU 1	EB Thru	0.791	-	C
5	Bellflower Blvd (NS) at Mayne St (EW)	Signalized	ICU 1	SB Thru	0.746	-	C
6	Bellflower Blvd (NS) at Oak St (EW)	Signalized	ICU 1	NB Thru	0.690	-	B
7	Bellflower Blvd (NS) at Flower St (EW)	Signalized	ICU 1	NB Thru	0.772	-	C

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Ardmore Ave (NS) at Oak St (EW)

Control Type:	All-way stop	Delay (sec / veh):	8.4
Analysis Method:	HCM 6th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.166

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	25	64	18	20	59	13	8	72	24	12	55	15
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	1	4	0	1	0	0	8	0	3	7	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
Total Hourly Volume [veh/h]	26	68	23	21	62	14	8	83	25	15	64	16
Peak Hour Factor	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830	0.8830
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]	7	19	7	6	18	4	2	23	7	4	18	5
Total Analysis Volume [veh/h]	29	77	26	24	70	16	9	94	28	17	72	18
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Lanes

Capacity per Entry Lane [veh/h]	796	787	801	789
Degree of Utilization, x	0.17	0.14	0.16	0.14

Movement, Approach, & Intersection Results

95th-Percentile Queue Length [veh]	0.59	0.49	0.58	0.47
95th-Percentile Queue Length [ft]	14.80	12.13	14.55	11.71
Approach Delay [s/veh]	8.42	8.32	8.37	8.28
Approach LOS	A	A	A	A
Intersection Delay [s/veh]	8.35			
Intersection LOS	A			

Intersection Level Of Service Report
Intersection 2: Parking Garage Dwy (NS) at Mayne St (EW)

Control Type:	Two-way stop	Delay (sec / veh):	13.7
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.249

Intersection Setup

Name						
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		No	

Volumes

Name						
Base Volume Input [veh/h]	0	0	0	58	223	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	133	14	16	5	4	188
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	133	14	16	65	236	188
Peak Hour Factor	0.9500	0.9500	0.9500	0.9500	0.9500	0.9500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	35	4	4	17	62	49
Total Analysis Volume [veh/h]	140	15	17	68	248	198
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.25	0.02	0.02	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.71	12.45	8.25	0.00	0.00	0.00
Movement LOS	B	B	A	A	A	A
95th-Percentile Queue Length [veh/ln]	1.09	1.09	0.04	0.04	0.00	0.00
95th-Percentile Queue Length [ft/ln]	27.22	27.22	1.08	1.08	0.00	0.00
d_A, Approach Delay [s/veh]	13.59		1.65		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	3.27					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 3: Project Dwy (NS) at Oak St (EW)

Control Type:	Two-way stop	Delay (sec / veh):	11.4
Analysis Method:	HCM 6th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.019

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	5	0	5	0	0	0	0	130	10	18	107	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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	0	2	10	0	3	4	7	2	2	6	16
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
Total Hourly Volume [veh/h]	7	0	7	10	0	3	4	142	12	21	117	16
Peak Hour Factor	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810	0.8810
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]	2	0	2	3	0	1	1	40	3	6	33	5
Total Analysis Volume [veh/h]	8	0	8	11	0	3	5	161	14	24	133	18
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	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	0.01	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
d_M, Delay for Movement [s/veh]	11.34	11.72	9.21	11.41	11.72	9.08	7.50	0.00	0.00	7.59	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.07	0.07	0.07	0.07	0.07	0.07	0.01	0.01	0.01	0.05	0.05	0.05
95th-Percentile Queue Length [ft/ln]	1.76	1.76	1.76	1.72	1.72	1.72	0.21	0.21	0.21	1.13	1.13	1.13
d_A, Approach Delay [s/veh]	10.27			10.91			0.21			1.04		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	1.39											
Intersection LOS	B											

Intersection Level Of Service Report
Intersection 4: Bellflower Blvd (NS) at Alondra Blvd (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.791

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	139	446	103	150	376	77	95	666	111	111	537	102
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	32	46	53	0	59	0	0	0	44	73	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
Total Hourly Volume [veh/h]	177	510	160	156	450	80	99	693	159	188	558	106
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]	44	128	40	39	113	20	25	173	40	47	140	27
Total Analysis Volume [veh/h]	177	510	160	156	450	80	99	693	159	188	558	106
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal group	5	2	0	1	6	0	3	8	0	7	4	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.11	0.21	0.21	0.10	0.17	0.17	0.06	0.27	0.27	0.12	0.21	0.21
Intersection LOS	C											
Intersection V/C	0.791											

Intersection Level Of Service Report
Intersection 5: Bellflower Blvd (NS) at Mayne St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.746

Intersection Setup

Name						
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	Yes		No		Yes	

Volumes

Name						
Base Volume Input [veh/h]	54	672	579	169	34	24
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	67	47	47	125	89	49
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	123	746	649	301	124	74
Peak Hour Factor	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
Total 15-Minute Volume [veh/h]	31	187	162	75	31	19
Total Analysis Volume [veh/h]	123	746	649	301	124	74
Pedestrian Volume [ped/h]	0		0		0	
Bicycle Volume [bicycles/h]	0		0		0	

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split
Signal group	0	2	6	0	3	0
Auxiliary Signal Groups						
Lead / Lag	-	-	-	-	Lead	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.27	0.30	0.30	0.08	0.05
Intersection LOS	C					
Intersection V/C	0.746					

Intersection Level Of Service Report
Intersection 6: Bellflower Blvd (NS) at Oak St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.690

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	42	606	19	38	484	81	80	10	42	23	7	40
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	8	101	1	2	80	14	11	2	6	1	2	2
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
Total Hourly Volume [veh/h]	52	731	21	42	583	98	94	12	50	25	9	44
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]	13	183	5	11	146	25	24	3	13	6	2	11
Total Analysis Volume [veh/h]	52	731	21	42	583	98	94	12	50	25	9	44
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.25	0.25	0.03	0.23	0.23	0.06	0.10	0.10	0.02	0.05	0.05
Intersection LOS	B											
Intersection V/C	0.690											

Intersection Level Of Service Report
Intersection 7: Bellflower Blvd (NS) at Flower St (EW)

Control Type:	Signalized	Delay (sec / veh):	-
Analysis Method:	ICU 1	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.772

Intersection Setup

Name												
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 Pocket	0	0	0	0	0	0	0	0	0	0	0	0
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
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name												
Base Volume Input [veh/h]	130	504	111	77	476	46	45	227	89	127	204	98
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 [%]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Growth Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	74	0	19	55	13	15	0	0	0	0	21
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
Total Hourly Volume [veh/h]	135	598	115	99	550	61	62	236	93	132	212	123
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]	34	150	29	25	138	15	16	59	23	33	53	31
Total Analysis Volume [veh/h]	135	598	115	99	550	61	62	236	93	132	212	123
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Cycle Length [s]	100
Lost time [s]	10.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	0	2	0	0	6	0	0	8	0	0	4	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	-	-	-	-	-	-

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.27	0.27	0.06	0.22	0.22	0.04	0.10	0.10	0.08	0.10	0.10
Intersection LOS	C											
Intersection V/C	0.772											

GANDDINI GROUP, INC.
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Appendix G

Parking Demand Study

RK engineering group, inc.

traffic engineering & design
transportation planning
parking
acoustical engineering
air quality & ghg

BELLFLOWER LAEMMLE MIXED-USE T.O.D. PROJECT
RESIDENTIAL PARKING DEMAND STUDY
Bellflower, CA

Prepared for:

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June 12, 2019

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1.0 Introduction

1.1 Purpose of Report & Study Objectives

The purpose of this parking study is to determine the residential parking demand for the residential component of the Bellflower Laemmle Mixed-Use Transit Oriented Development project (hereinafter referred to as project) located at 9742 Mayne Street in the City of Bellflower. This parking demand study utilizes three main approaches to estimate the future residential parking demand:

- Analysis of professionally published guidelines for parking demand (Section 4)
- Comparison to parking requirements in other municipalities (Section 5)
- Analysis of city-wide car ownership rates and comparison to TOD car ownership rates (Section 6)

1.2 Project Overview

The City of Bellflower issued a Request for Proposals (RFP) for the disposition and development of the Subject Property on April 24, 2018. The RFP requested proposals for transit-oriented development (TOD) projects comprised of commercial and residential uses. The RFP noted that the parking ratio in the City's code was meant to be a guide for developers and that alternative parking plans would be considered provided they are supported by a parking study. Following these guidelines, Serrano Development Group, Inc. (Serrano) an affiliate of the 16411 Bellflower, LLC, prepared a proposal and responded to the RFP on June 14, 2018. The City received approximately five responses to the RFP and, through a competitive review process, selected Serrano.

Since selection, Serrano has worked with City staff to incorporate their feedback and the results of site testing and due diligence to refine the project. The current proposed project, as presented to City Council on March 11, 2019, consists of ground-floor retail, a Laemmle movie theater, a pedestrian colonnade along Bellflower Blvd, and a pedestrian paseo between the movie theater and the residential component of the project. The residential component will consist of approximately 81 residential units with a mix of one and two-bedroom units. As Serrano prepares to finalize its formal submittal to the City of Bellflower Planning Department for entitlement to construct the project, Serrano engaged RK Engineering Group, Inc. to analyze the projected parking needs for the residential component and calculate the parking demand.

The parking stalls provided for the residential component of the project will be a key driver of the density and economic viability of the project. Serrano is requesting that the City provide a written approval of the projected parking demand rates recommended herein so that Serrano can proceed with the design of the residential component, finalize density calculations, and determine development costs to allow project financing to advance alongside project approvals.

1.3 Project Site & Design

The Bellflower Laemmle Mixed-Use Transit Oriented Development will be located on the approximately 1.56-acre site bordered by Mayne Street on the north, Bellflower Blvd. on the east, existing single family and multi-family structures on the west, and Oak Street on the South. The residential component will be located on approximately 1.10 acres of the 1.56 total site area. The residential component site will be bordered by Mayne Street on the north, the existing public and private alley on the east, existing single family and multi-family structures on the west, and Oak Street on the south. A location map of the project site is provided in Exhibit A.

The residential component is proposed to consist of four levels, as described below:

- Ground-Level: Street-facing retail, residential lobby, leasing office, car parking, and bicycle parking areas
- Second Floor: Residential units and resident amenities including pool, park areas, open space, and community room
- Third Floor: Residential units and resident fitness center
- Fourth Floor: Residential units and resident business/co-working space

The residential component project site area and unit count tabulation is below:

Table 1
Project Summary

Site		**Residential Units**	
Site Area	1.10 Acres	1-bed	57 Units
Density	73.6 Units/Acre	2-bed	24 Units
Total			**81 Units**

Note: Unit counts and bedroom mix are preliminary and subject to change. Please refer to preliminary site plans in Exhibit B.

The project proposes to provide 24 tandem parking spaces, with one tandem space being assigned to each two-bedroom unit. The remaining 59 parking spaces will be shared globally amongst residents and guests.

1.4 Adjacent Transportation Infrastructure

The project site is also located adjacent to the planned Bellflower Station for the Los Angeles County Metropolitan Transportation Authority (Metro) West Santa Ana Branch (WSAB) light rail transit line. Metro is currently in the process of developing this new, 19-mile light rail transit line that would connect downtown Los Angeles to southeast Los Angeles County and would serve the cities and communities of downtown Los Angeles, Florence-Graham, Vernon, Huntington Park, Bell, Cudahy, South Gate, Downey, Paramount, Bellflower, Cerritos, and Artesia. Metro reports that the transit time from Bellflower to Downtown Los Angeles will be approximately twenty minutes.

In addition, within 0.3 miles (a five-minute walk) of the project site, the following bus lines are available:

- Long Beach Transit Lines 91/93: Service to downtown Long Beach and the Fifth Street Blue-Line MTA Light Rail Station
- Los Angeles County MTA 127: Service running from Downey Community Health Center and the Downey Depot Transportation to the Martin Luther King, Jr. Transit Center Blue-Line MTA Light Rail Station
- Los Angeles County MTA 128: Service running from Cerritos College Martin Luther King, Jr. Transit Center Blue-Line MTA Light Rail Station
- Bellflower Bus: North Route service for local destinations in Bellflower

The site is also located adjacent to the Bellflower Bike Trail, which runs approximately two miles along the former Pacific Electric rail right of way. The Bike Trail begins at Caruthers Park in the south and terminates at the Somerset Avenue in the north, adjacent to the MTA 127-line bus stop allowing riders to continue their trip via public transportation to the Blue-Line MTA Light Rail Station.

2.0 Transit Oriented Developments

2.1 Defining TOD Developments

A transit-oriented development (TOD) is a broadly defined term used to describe mixed-use development projects that are near public transit, retail, entertainment, and service establishments. TOD projects emphasize the pedestrian experience, walkable neighborhoods, public open spaces, bicycle travel, and are set in an urban context of mixed land uses. TOD developments originated as a response to growing congestion and traffic in urban areas throughout the United States. By locating housing near public transit and services, traffic trips are reduced as residents utilize public transit in lieu of vehicles to commute to work and travel through the City.[1]

2.2 TOD Resident Transportation Preferences

At the heart of a TOD development is the availability of adjacent public transportation and residents' willingness to use the public transit. In a study on travel characteristics of TOD residents completed by a team of researchers from Cal Poly Pomona and UC Berkeley, researchers found that when travel by public transportation is more convenient and faster than travel by car, people will take public transportation in lieu of driving. The research also suggests that street connectivity at the beginning or end of the trip influences transportation habits; residents prefer walkable street patterns near the stations on either end of their trip. Last, research indicates that self-selection among residents plays a key role in determining whether residents utilize public transportation. In other words, people who desire to use public transportation will move to a TOD development for the convenience, proximity to the public transportation, and for less reliance on automobile transportation. [2]

2.3 Proximity to Services and Retail

Residents of TOD developments reduce their dependence on automobile parking and use by living within a five-minute walk of commonly utilized service centers and entertainment venues. For the subject property, a TOD resident can perform the following tasks within a five-minute walk of the subject property:

[1] Lund et al., *Travel Characteristics of TOD in California*
[2] Lund et al., *Travel Characteristics of TOD in California*

- **Grocery shopping**
- **Dry cleaning drop-off and pick-up**
- **Pharmacy pick-up**
- **Banking**

When it comes to entertainment, TOD residents of the project can expect to walk to nearby venues including within five minutes:

- **Restaurants**
- **Bars and breweries**
- **Coffee shops**
- **Entertainment venues such as theaters and comedy clubs**

TOD developments may also provide on-site amenities that may further reduce resident's reliance on automobiles for transportation. Such amenities may include:

- **On-site gym**
- **On-site pool and park facilities**
- **Community rooms for group gatherings**
- **Co-working and business centers**

It is reasonable to expect people who live in TOD projects to walk up to 0.3 miles (approximately 1500 feet) for general convenience trips without utilizing an automobile.[3] Please refer to Exhibit A for a five-minute walking radius showing the adjacent businesses, service establishments, and amenities. By living close to businesses and services, residents can avoid utilizing a car for most daily trips. In addition to access to transit, residents may select to live in a TOD development as a lifestyle choice. TOD residents may prefer an urban lifestyle in which they live in a walkable transit-oriented location instead of a suburban, car-dependent location.[4]

[3] City of Los Angeles Department of City Planning Report, 2011
[4] City of Palo Alto Planning & Transportation Staff Report, 2018

2.4 Changing Demographic Preferences Driven by Technology

Compared to a decade ago, there are several new technologies that have and will continue to influence how people commute and their reliance on owning a car:

- **Car sharing:** Businesses such as Zip Car offer on-demand car rental services. Subscribers to the service can rent and return cars when needed. Similar platforms such as Turo offer on-demand car rental services on a peer-to-peer basis.
- **Ride sharing**: Uber and Lyft have become ubiquitous in urban areas and offer convenient transportation to those who choose not to drive or own a vehicle.
- **Real time delivery services:** Delivery services such as Amazon Fresh for groceries, Postmates and Grubhub for food further reduce residents' reliance on vehicles for local shopping and food trips.
- **Online and mobile shopping in lieu of traditional retail:** There is an increasing trend for people to purchase items online and have these items delivered via shipping or delivery companies. The necessity for a vehicle to facilitate shopping for home goods and clothing is reduced by the abundance of online shopping and shipping options.

The conclusion is that residents of a TOD development will likely choose "a more flexible lifestyle enabled by technology" and these residents "don't have the need or the desire to own a car, even though they increasingly have the financial ability."[5]

[5] https://knowledge.wharton.upenn.edu/article/demographic-shifts-shaping-future-car-ownership/

3.0 Parking Codes and Transportation Choices

3.1 Off-Street Parking

Off-street parking was originally based on the premise that certain land uses generate a demand for parking, and that developers of new projects should provide adequate parking for the intended land use. Beginning in the 1940s, cities began to dictate the minimum required parking for various land uses through zoning codes and other land-use regulations.[6] The main benefit of providing on-site parking is to allow for convenient access to the facility by the tenants or patrons and to minimize "spillover parking," which is the use of public parking by residents or patrons during peak parking demand periods. Off-street parking has many other benefits for both the developer and the future tenants or patrons of a development including:

- **Convenience over curb parking:** Residents utilizing vehicles can drive directly to the same spot each time they park. This reduces the time spent searching for parking and allows for vehicles to be stored in the same space consistently, which better facilitates shared vehicle ownership between members of the same household.
- **Protection from theft and damage:** Cars locked within a secured garage a less susceptible to theft and damage than those on the street. Gates, security cameras, and enhanced lighting deter theft.
- **Reduction in street parking congestion:** By providing the appropriate number of parking stalls for a development, the number of street parking stalls can be preserved and utilized for district retail parking and for older buildings that cannot provide off-street parking.

However, when parking requirements exceed the actual parking demand of a site, there are several downsides that effect the developer, tenants and the local area[(7)(8)]:

- **Inhibiting ground-floor uses:** Parking is placed throughout the ground floor development and pushed to the property lines. Street level retail and residential uses are replaced with parking garages, which in turn affects the pedestrian experience and appearance of the ground-level façade.
- **Reduced density:** Residential developments can experience a substantial reduction in density for each additional parking stall required per unit. The reduction in density is driven by the space requirements for off-street parking stalls and the increased costs of

[6] Russo, Parking & Housing: Best Practices for Increasing Housing Affordability and Achieving Smart Growth, 2001
[7] Ibid
[8] City of Los Angeles Department of City Planning Report, 2011

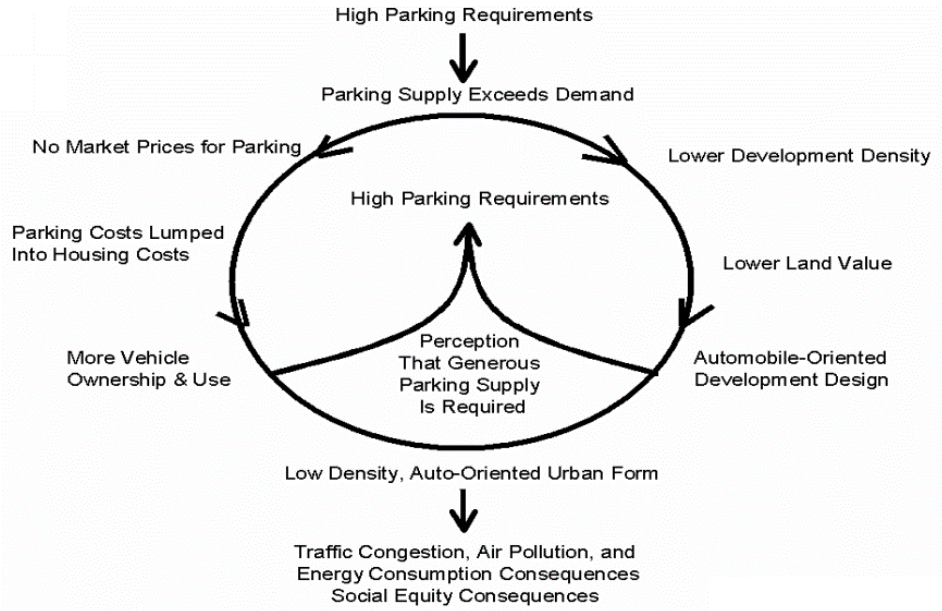
placing stalls below grade or above the first floor. As the costs of adding parking go up, there is little additional rent that the developer can recoup to pay for the costs of placing stalls below grade or creating multi-level above grade parking structures. The result is that as parking requirements increase above the economically feasible amounts of parking that can be provided, developers are economically forced to cut density to match the number of units with the amount of parking that can be economically provided.

- **Incentives and effects on transportation behavior:** Most parking is provided to the tenant at no additional charge, as the cost of parking is typically included within rental payments. Developers can try to decouple the parking costs from the rental payments, but if parking demands are below the amount of parking provided, the developer effectively has constructed an under-utilized parking garage that cannot be fully rented. The developer must then lower prices on the under-utilized parking garage spaces or include the parking stalls within rental rates as perquisites to the tenants. The tenants are then provided with subsidized parking that offsets the actual costs of total vehicular ownership. Vehicle parking is one of the major costs of car ownership and if this cost is not borne by the user, it encourages people to adopt an automotive lifestyle and drive more.

3.2 Effects of Excess Parking Requirements

The combined effects of requiring more parking than what is demanded by the market can create a cyclical effect that is self-reinforcing. As shown in the chart below[9], when too much parking is required by code, developers are forced to create an oversupply of parking that reinforces automobile-oriented, low-density housing. This type of development subsidizes the actual cost of vehicle ownership and provides unnecessary vehicle storage that allow excess vehicle ownership that promotes avoidable use. In higher-density TOD developments, residents are economically encouraged to find alternate means to conduct household and work-related business by utilizing local establishments within walking distance, ordering goods via delivery services, and taking public transportation in lieu of driving.

[9] Russo, Parking & Housing: Best Practices for Increasing Housing Affordability and Achieving Smart Growth, 2001



The counterargument to this view is that people need their cars to navigate the car-oriented environment that has developed throughout Southern California over the past 70 years. As the population of the region grows and infrastructure reaches capacity, reducing trips and reliance on the automobile is a way that developers, municipalities, and residents can work together to reduce the strain on the existing infrastructure. TOD projects, having locations central to shopping, retail, and public transportation, are a solution that gives people an opportunity to lead a lifestyle that is less car dependent than typical suburban residential developments.

When considering parking requirements for a TOD development, conducting a detailed parking demand study based on real-world data and analysis of similar municipalities can help determine the exact parking required.

4.0 Professionally Published Parking Guidelines

4.1 Institute of Transportation Engineers Parking Generation Manual

The Institute of Transportation Engineers (ITE) Parking Generation Manual (ITE Manual) is a nationally recognized source for professionally published information on parking. The ITE Manual contains parking rates for various land uses based on empirical data and observations of existing sites. The ITE Manual is regularly updated with real-world observed parking data that reflects recent parking dynamics such as the use of rideshare (Uber, Lyft, delivery services, etc.) and other elements affecting parking demand as discussed in this report.

The ITE Manual breaks down the residential land uses into several more specific categories based on factors such as density, height, location, affordability, etc. ITE further breaks down parking data based on the peak hours of demand and the peak days of the week for weekday, Saturday, and Sunday conditions.

Parking generation for the project has been evaluated utilizing the ITE Parking Generation Manual 5th Edition, 2019, Multifamily Housing (Mid-Rise) land use category number 221 in a dense multi-use urban setting. Per the ITE description, the Multifamily Housing (Mid-Rise) land use includes apartments, townhomes, and condominiums located within the same building with at least three other dwelling units and with between three and 10 levels (floors) of residence.

The following table shows the ITE observed parking rates and future parking demand estimates for the project site based on Multifamily Housing (Mid-Rise) land use in a dense multi-use urban setting. Parking demand estimates are shown with and without the future light rail line that is proposed to be completed by 2028.

Table 2
ITE Parking Demand Estimates

Multifamily Housing[1]	Quantity	Units[2]	85th Percentile Parking Rate	Parking Required (Spaces)
Less than 1/2 mile to Rail Transit	81	DU	1.17	95
	81	ODU	1.16	94
	105	Beds	0.67	71
No Nearby Rail Transit	81	DU	1.27	103
	81	ODU	1.02	83
	105	Beds	0.71	75
Maximum Required Parking				**103**
Vehicle Parking Provided by Project				**107**
Vehicle Parking Surplus/Shortage				**4**

[1] ITE Parking Generation Manual 5th Edition, 2019, Multifamily Housing (Mid-Rise) land use category number 221 in a dense multi-use urban setting
[2] DU = Dwelling Unit
ODU = Occupied Dwelling Unit
Beds = Bedrooms

5.0 Parking Requirements in Other Municipalities

5.1 Survey of Parking Requirements in TOD and Downtown Plans

The following sections identifies TOD and similar downtown specific plan parking requirements established by other municipalities throughout the greater Los Angeles area. The purpose of this analysis was to review how other comparable municipalities are determining the parking demand for TOD or high-density developments located near downtown areas and light rail stations. Please see the table 3 below for a summary of these findings. In order to provide some context on the type of downtown areas that these plans affect, please refer to columns E and F. Column E indicates the distance from the downtown area to the nearest existing or planned rail station. Column F also briefly characterizes the public parking available in the area and whether is free or paid. Last, in "G" on the right side of the table, we have applied the parking standards for each municipality standards to the subject property.

Table 3
Other Municipalities TOD And Downtown Parking Rates

(A) Jurisdiction	(B) Specific Plan/ Ordinance	(C) Unit Type	(D) Parking Stalls Req'd Per Unit	(E) Dist. to Rail Station	(F) District Parking	(G) Stalls if Applied to Project
City of Baldwin Park	Downtown TOD Specific Plan	Studio/1 bedrooms	1	.25 - .5 Miles to Metrolink Station	Metro-Link Garage	114 (1.41/unit)
		2 Bedrooms	2			
		Guest	0.10			
City of Monrovia	Avalon Monrovia Specific Plan	Studio/1 Bedrooms	1	.75 Miles to Gold Line Station	Street + MTA Garage	105 (1.30/unit)
		2+ Bedrooms	2			
City of Monrovia	5th & Huntington Specific Plan	Any	1.4	.5 Miles to Gold Line Station	MTA Garage	122 (1.50/unit)
		Guest	.10			
City of Downey	Downtown Downey Specific Plan	Any	1.5	2 miles (approx.)	No/ Free on Street	122 (1.50/unit)
		Guest	None District Lots			
City of El Segundo	City of El Segundo Downtown Specific Plan	Any	.5	1.7 Miles to Green Line Light Rail	Street + Free Parking Garage	41 (.50/unit)

Table 3
Other Municipalities TOD And Downtown Parking Rates

(A) Jurisdiction	(B) Specific Plan/ Ordinance	(C) Unit Type	(D) Parking Stalls Req'd Per Unit	(E) Dist. to Rail Station	(F) District Parking	(G) Stalls if Applied to Project
City of Inglewood	The New Downtown Inglewood TOD	Any	1	.5 Miles to Planned Light Rail Station	No / Free Street Parking	81 (1.00/unit)
City of La Verne	Old Town La Verne Specific Plan	Any	1	.25 - .5 Miles to Gold Line		81 (1.00/unit)
City of Azusa	Azusa TOD specific Plan	Studio/1 Bedrooms	1	.25 Miles to Gold Line Station	MTA Garage	93 (1.15/unit)
		2 Bedrooms	1.5			
City of El Monte	TOD Specific Plan and Master Plan	Studio/1 Bedrooms	1	Adj. to Metrolink Station	Metro-Link Parking Lot	103 (1.27/unit)
		2 Bedrooms	1.5			
		3+ Bedrooms	2			
		Guest	.125			
City of Los Angeles	Transit Oriented Communities Incentive Program Zone 3	Sliding Scale Depending on Distance to Transit and Density Incentives	.5	<750 ft. (Several Locations Throughout City)	Varies	41 (.50/unit)
County of Los Angeles	West Carson TOD Specific Plan Mixed-Use Zone 1	Studio	.6	.5 Miles to Rapid Bus Station No Rail)	Street Only	93 (1.15/unit)
		1 Bedrooms	.9			
		2 Bedrooms	1.2			
		Guest	.15			
County of Los Angeles	Willowbrook TOD Specific Plan	Studio	.6	<.5 Miles to Blue & Green Link Light Rail	Surface Lots	93 (1.15/unit)
		1 Bedrooms	.9			
		2 Bedrooms	1.2			
		Guest	.15			
City of Placentia	TOD Packing House District Development Standards	1 Bedroom	1 min/1.5 max	Adj. to planned Metrolink Station	None/ street parking	93 (1.15/unit)
		2 Bedroom	1.5/2 max			
City of Pasadena	City of Pasadena Housing Element	<650 sq. ft	1	Varies, Several Locations <.25 Miles	MTA Garages + Street Parking	105 (1.30/unit)
		>650 sq. ft	2			

Table 3
Other Municipalities TOD And Downtown Parking Rates

(A) Jurisdiction	(B) Specific Plan/ Ordinance	(C) Unit Type	(D) Parking Stalls Req'd Per Unit	(E) Dist. to Rail Station	(F) District Parking	(G) Stalls if Applied to Project
					Average	**93 (1.15/unit)**
					Subject Project as Currently Proposed	**107 (1.32/unit)**
					Bellflower Village Overlay Zone-North	**203 (2.50/Unit)**

Based on the average parking requirements established by other local municipalities for similar TOD projects, the project would be required to provide approximately 93 parking stalls at a rate of 1.15 stalls per units. Of the 14 TOD plans surveyed, only five required guest parking stalls to be provided. The Downtown Downey Specific Plan allows for guest parking to be located within public lots. Of the five TOD plans that required guest parking, the average requirement was .125 parking stalls per unit. However, all the TOD plans we reviewed were significantly lower than the BVOZ-N requirements, which are shown in the table below:

Table 4
City of Bellflower BVOZ-N Parking Requirements

(A) Jurisdiction	(B) Specific Plan/ Ordinance	(C) Unit Type	(D) Parking Stalls Req'd Per Unit	(E) Dist. to Light Rail Station	(F) District Parking	(G) Stalls if Applied to Subject
City of Bellflower	Bellflower Village Overlay Zone-North	Any	2	0.00 miles to planned WSAB Line	Yes/ Free	203 (2.50/Unit)
		Guest	0.5			

Of the surveyed plans, City of Downey and City of Monrovia had the highest requirements and would require 122 stalls for the Project. The BVOZ-N requires 203 stalls for the Project. The lowest requirements were for the City of LA Transit Oriented Communities (TOC) program and the City of El Segundo Downtown Specific Plan which would require 41, or 20% of what is required by the BVOZ-N. In order to determine why some municipalities required significantly more parking or less parking than the average of the regulations reviewed, we investigated the actual car ownership rates in each municipality and then compared it to the TOD/Downtown parking requirements for the same municipality as described in Section 5.0.

6.0 City-Wide Car Ownership Rates

6.1 Analysis of City-Wide Car Ownership Rates

Car ownership data, available on the U.S. Census website, was reviewed for each municipality with a TOD or Downtown Specific plan listed in Section 5 of this report. The Census provides statistics on car ownership rates per household by providing the percentage of each housing unit within the City or CDP that owns no cars, one car, and two cars. This study assumes that the remaining households owned three or more cars and that the exact ownership rate is estimated to be 3.25 cars for analysis purposes.

Attachment A provides a detailed summary of the surveyed car ownership rates. The City-wide total number of vehicles, cars per person, and cars per housing unit is reported along with additional data provided by the Southern California Association of Governments on population and number of housing units.

It should be note that the cities described herein cities are largely suburban, and this information is provided to help determine the appropriate reduction of car ownership in TOD areas. Please see the tables below for car ownership rates in each of the municipalities reviewed[10]:

The average city-wide vehicle ownership rates was found to be 1.87 vehicles per household among the cities with TOD/Downtown plans that we surveyed. Parking demand is mostly created by residents' decision to own a vehicle, so city-wide cars per housing unit data point is an approximate value for the parking needs throughout the city[11].

6.2 Comparison to TOD Car Ownership Rates

This section compares the city-wide car ownership data, which serves as proxy for parking requirements, with TOD area parking requirements.

Studies of car ownership rates show that households living in larger multi-family developments own between 25% and 35% fewer automobiles on average compared to suburban households. In addition, the percentage of city-wide housing units that owned no car was between 3.1% and 12.4%, while those households that live in multi-family housing, up to 24% do not own a single

[10] U.S. Census and the Southern California Association of Governments
[11] Russo, Parking & Housing: Best Practices for Increasing Housing Affordability and Achieving Smart Growth, 2001

vehicle[12]. Of the Downtown/TOD plans surveyed in Section 5.0, the parking requirements in the Downtown/TOD areas was 0.74 parking stalls per household less than the City-wide calculated parking needs.

The data suggests that a reduction in vehicle ownership should be considered when determining the appropriate TOD/Downtown parking demand. Please see the table below for a summary of the city-wide car ownership parking data compared to the TOD parking requirements:

Table 5
City-Wide Car Ownership Vs. TOD Parking Requirements

Municipality	City-Wide Cars Per Housing Unit (Parking Demand)	Req'd Parking/ Housing Unit in Downtown/ TOD Area	Demand Reduction in Downtown/TOD Area	Downtown/TOD Area Served by Rail
City of Baldwin Park	2.16	1.41	-0.75	Yes
City of Monrovia	1.82	1.30	-0.52	Yes
City of Monrovia	1.82	1.50	-0.32	Yes
City of Downey	2.00	1.50	-0.50	No >2.0 Miles
City of El Segundo	1.82	0.51	-1.31	No >1.5 Miles
City of Inglewood	1.60	1.00	-0.60	Yes
City of La Verne	2.03	1.00	-1.03	Yes
City of Azusa	1.94	1.15	-0.79	Yes
City of El Monte	1.83	1.27	-0.56	Yes
City of Los Angeles	1.56	0.50	-1.06	Yes
West Carson CDP	1.92	1.15	-0.77	No (Rapid Bus)
Willowbrook CDP	2.06	1.15	-0.91	No (Rapid Bus)
City of Placentia	2.06	1.15	-0.91	Yes (Planned)
City of Pasadena	1.58	1.30	-0.28	Partial
Average	**1.87**	**1.14**	**-0.74 (39% Reduction)**	

As shown in Table 5, there is a 39% reduction in parking demand from the city-wide household car ownership to the TOD parking demand. This is consistent with the statistic that households living in larger multi-family developments own between 25% and 35% fewer automobiles on average compared to suburban households. To be conservative, it may be concluded that a Downtown/TOD parking demand is at least 30% less than the city-wide parking demand.

As shown in Table 6, the City of Bellflower BVOZ-N requires an *additional* 0.67 additional parking stalls over the city-wide demand for parking within its Downtown/TOD area. This was the only Downtown/TOD area that required more parking than the calculated city-wide car ownership data.

[12] Ibid

Table 6
Bellflower City-Wide Car Ownership Vs. TOD Parking Requirements

Municipality	Census City-Wide Vehicle Ownership	Req'd Parking in Downtown/TOD Area	Demand Reduction in Downtown/TOD Area	Downtown/TOD Area Served by Rail
City of Bellflower	1.83	2.50	+0.67	Yes (Planned)

6.3 Other Parking Surveys

This section presents other published parking demand surveys from three TOD developments in Southern California. The referenced surveys were conducted prepared by Linscott, Law & Greenspan as part of the Fifth and Huntington Specific Plan for the City of Monrovia[13]. The survey reviewed the actual parking demand for three TOD developments:

- **Paragon at Oldtown – 700 S. Myrtle Ave. Monrovia, CA** – 163-unit apartment TOD project constructed at the southern edge of the downtown area of Monrovia along Myrtle Ave. The project is located approximately .80 miles north of the MTA Gold Line Monrovia Station.

- **Trio Apartments – 44 N. Madison Ave. Pasadena, CA** – 304-unit apartment TOD project located approximately .60 miles east of Old Town Pasadena and the Memorial Park Gold Line Metro station.

- **Main Street Village Apartments – 2555 Main Street Irvine, CA** – 481-unit apartment project located approximately one mile east of John Wayne Airport. The nearest public transportation line is the Tustin Metro Link station located approximately 2.5 miles to the north.

The parking surveys observed the parking demand at the residential TOD sites from approximately 6:00 p.m. to 12:00 a.m. The surveys included off-street guest parking stalls and observation of on-street guest parking to determine the total demand. A summary of the demand is shown in Table 7.

[13] Fifth and Huntington Specific Plan for the City of Monrovia

Table 7
Other Published Parking Surveys for TOD Projects

Project	Unit Mix	Unit Counts	Observed Parking Demand Spaces/Unit	Parking Provided Spaces/Unit
Paragon at Oldtown Monrovia, CA	Studios/1 bedrooms	82	1.26	2.17
	2 Bedrooms	81		
	Total	163		
Trio Apartments Pasadena, CA	Studio/1 Bedrooms	187	1.14	1.58
	2 Bedrooms	117		
	Total	304		
Main Street Village Apartments Irvine, CA	Studios/1 bedrooms	265	1.33	2.12
	2 Bedrooms	200		
	3 Bedrooms	16		
	Total	481		
Average:			**1.24**	**1.96**

[1] City of Monrovia Fifth and Huntington Specific Plan. Survey performed by prepared by Linscott, Law & Greenspan, 2013.

Note that the Paragon at Monrovia includes a 75-stall public parking lot that is advertised as public parking on the City's website. Parking counts for this public lot were included in the parking survey and accordingly, the counts for peak demand have been adjusted downwards by 25 stalls to account for public use of this garage that is not attributable to residential guest parking.

6.4 Comparison of Observed Parking Demand and Established Parking Rates

The following section compares the observed parking demand at the Paragon at Oldtown Monrovia Project and the Trio Apartments in Pasadena project to the established city parking rates, ITE parking demand estimates, and the estimated TOD parking requirements.

Table 8
Comparison of Observed Parking Demand and Established Parking Rates

Project	Census City-Wide Vehicle Ownership	Req'd Parking/ Housing Unit in Downtown/ TOD Area	ITE Manual Guidelines	30% Reduction from City-Wide Vehicle Ownership	Observed Parking Demand Spaces/Unit	Distance to Rail
Paragon at Oldtown Monrovia	1.82	1.50	1.27 (No Rail)	1.27	1.26	.80 miles
Trio Apartments Pasadena	1.58	1.30	1.27 (No Rail) 1.17 (With Rail)	1.11	1.14	.60 Miles

The City-wide vehicle ownership for the Paragon Apartments in Monrovia is 1.82 cars per household. Monrovia's Downtown/TOD area requires parking at 1.50 per unit. The ITE Manual with no rail recommends 1.27 stalls per unit. In section 5.1, it was calculated that the average reduction from the City-wide parking to TOD/Downtown areas to be 39%. This was in-line with academic studies that suggest residents in multi-family developments own 25% and 35% fewer automobiles on average compared to suburban households. Accordingly, a 30% reduction from city-wide vehicle ownership was applied to TOD developments; resulting in an adjusted ownership rate of 1.27 vehicles per household. As shown in the Table above, this is in-line with the observed parking demand of 1.26 spaces per unit at the roject as well as the ITE Manual's recommendations of 1.27 spaces per unit.

Applying a similar analysis to the Trio Apartments in Pasadena, the city-wide vehicle ownership is 1.58 cars per household. Pasadena's city-wide housing guidelines, which cover several downtown and TOD areas, allow for a reduction to 1.30 stalls per unit. This is in-line with the ITE Manual's recommendation of 1.27 stalls per unit. If we apply the 30% reduction from city-wide vehicle ownership, we arrive at 1.11 stalls per unit, which is very similar to the observed parking demand of 1.14 stalls per unit. The ITE manual recommends that the 1.27 stalls per unit be utilized for this site because the distance to the nearest rail line is over .5 miles. However, the nearest rail line is .6 miles, which in practical terms suggests that perhaps the ITE Manual's black-and-white recommendations may not be 100% applicable to this situation. The ITE Manual's recommended parking ratio of 1.17 stalls per unit with the observed parking demand of 1.14 suggesting that transit ridership may be a factor in off-setting vehicular ownership due to proximity to the station.

7.0 Summary of Findings

A summary of the residential parking provided by the project is shown in Table 9.

Table 9
Project Residential Parking Summary

Unit Type	Amount	Parking Provided	Parking Rate (Spaces per DU)
1-Bedroom & Guest	57 Units	59 spaces	1.035
2-Bedroom	24 Units	48 Spaces[1]	2.0
Total	**81 Units**	**107 Spaces**	**1.32**

[1] Parking for 2-bedroom units will be provided via tandem parking spaces.

The project proposes to provide 24 tandem parking spaces, with one tandem space being assigned to each two-bedroom unit. The remaining 59 parking spaces will be shared globally amongst residents and guests.

Based on the data and analysis provided in this report, the proposed project is expected to provide adequate residential parking for future tenants at the site. The TOD development is expected to require less parking than required by City code for the following reasons:

- Location in a Downtown District: As a TOD project, the project is located within a five-minute walk of numerous service, retail, and entertainment options. Future residents will rely less on vehicles to conduct personal business.

- Technology Reduces Demand for Cars: New technologies such as delivery services and ride sharing reduce residents' demand for vehicles.

- Proximity to Transit: In addition to being close to bus and bicycle lines, the site will be served by the planned WSAB light rail line that will provide transportation to Downtown Los Angeles in 20 minutes. This line will further reduce residents' dependence on vehicular transportation and reduce their parking demands.

In addition to these location-based factors, the future parking demand for the project can be estimated by using the data described within this report:

- The ITE Manual's recommends 1.27 stalls per unit for a site that is not served by rail. This is in-line with TOD/Downtown plan parking requirements, academic research on car

ownership, and other published studies showing observed parking demand.

- The average parking requirements from other local municipalities for TOD/Downtown Specific Plan areas is 1.15 stalls per unit.

- The city-wide vehicle parking demand in the City of Bellflower 1.83 vehicles per household. The data shows that parking demand is up to 39% lower in Downtown/TOD areas. Accordingly, a reduction in the city-wide parking demand of 30% from 1.83 to 1.28, would be a conservative estimate. This analysis validates that the 30% reduction from the city-wide demand is appropriate based on comparison to similar TOD/Downtown plans, academic research, and real-world observations of TOD project parking demand.

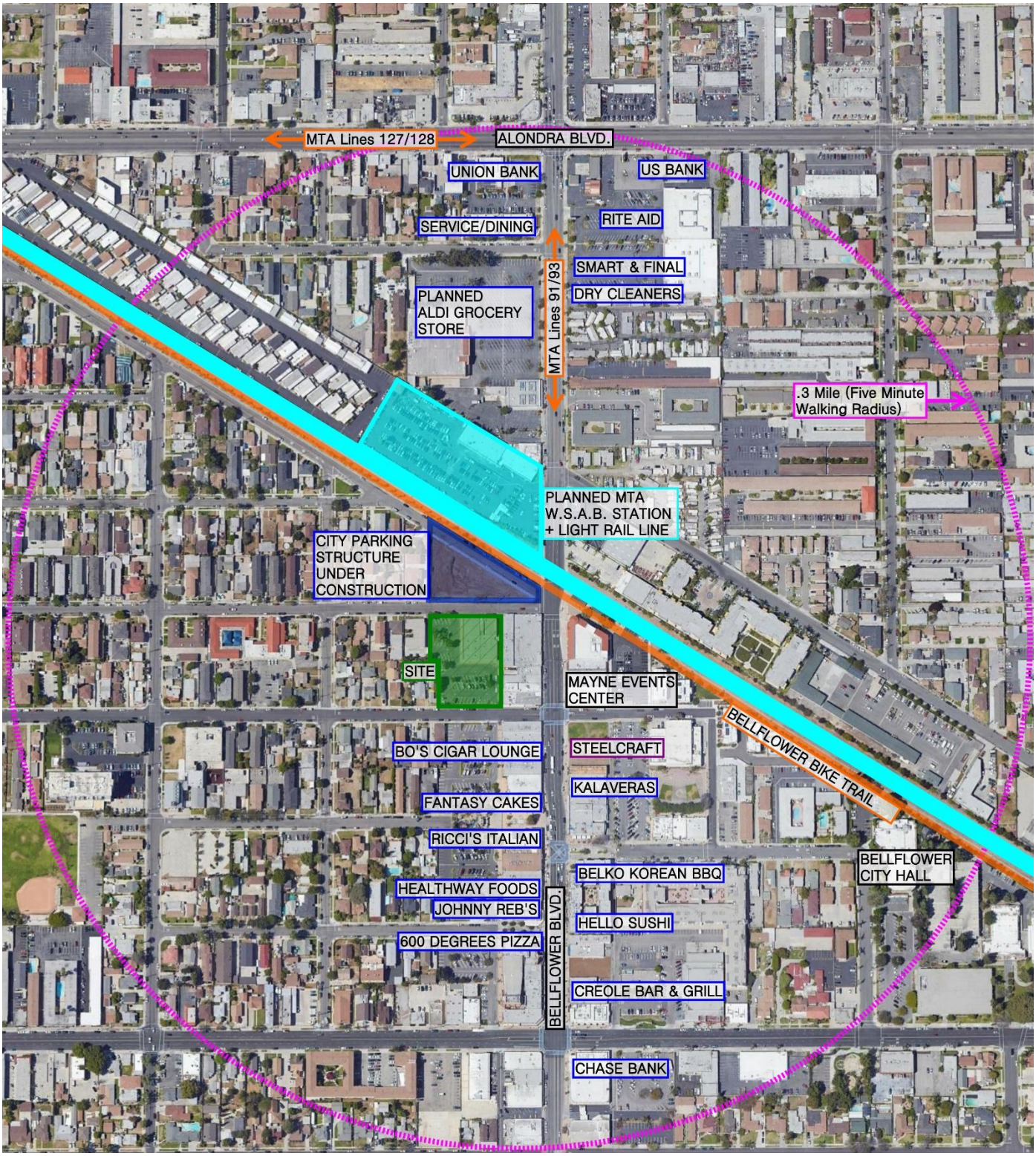
- Published parking studies in the City of Monrovia show that, for TOD developments, parking demand is at or below 1.27 stalls per unit.

Based on the information contained within this report, the proposed project is expected to provide adequate residential parking for future tenants at the site.

It is also understood that the retail/theater will be parked off-site and a separate parking analysis will be subsequently conducted to review area-wide parking supply and future demand in the BVOZ-N.

8.0 Exhibits

8.1 Exhibit A – Location Map



8.2 Exhibit B – Project Plans

BUILDING SUMMARY

SITE AREA

ACRES	1.10
SQ. FT.	48,033
DENSITY	73.6 DU/AC

UNIT COUNT — **81 UNITS**

1-BED	70%	57 UNITS
2-BED	30%	24 UNITS

PARKING SUMMARY

PARKING PROVIDED	**107 SPACES**
STANDARD	78 SPACES
TANDEM	24 SPACES
ADA	3 SPACES
GUEST	2 SPACES

PARKING REQUIRED — **105 SPACES**

1-BED: (57 UNITS x 1 SP) = 57 SPACES
2-BED: (24 UNITS x 2 SP) = 48 SPACES

RETAIL PARKING NOT PROVIDED

Bellflower Mixed-Use

BELLFLOWER, CA

CONCEPT PLAN

GRADE LEVEL

A1

2018173 | 03-06-19

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DRAFT

LEVEL 1	27 UNITS
1-BED	19 UNITS
2-BED	8 UNITS

SCALE: 1" = 20'

Bellflower Mixed-Use

CONCEPT PLAN

BELLFLOWER, CA

RESIDENTIAL LEVEL 1

A2

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LEVEL 2	27 UNITS
1-BED	19 UNITS
2-BED	8 UNITS

SCALE 1" = 20'

Bellflower Mixed-Use

CONCEPT PLAN

BELLFLOWER, CA

RESIDENTIAL
LEVEL 2

A3

2018173 | 03-06-19

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LEVEL 3	27 UNITS
1-BED	19 UNITS
2-BED	8 UNITS

Bellflower Mixed-Use

CONCEPT PLAN

BELLFLOWER, CA

RESIDENTIAL LEVEL 3

A4

2018173 | 03-06-19

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Attachment A:

City-Wide Car Ownership Data

City of Baldwin Park	Car Ownership/Household	% of Housing Units	Number of Cars
	No Car	4.6	0
	One Car	20.9	3,746
	Two Cars	37.5	13,442
	Three Or More Cars	37.0	21,552
		Total	38,741
Housing Units	17,923		
Population	76,708		
Cars Per Person	0.51		
People per Housing Unit	4.3		
Cars Per Housing Unit	2.16		

City of Monrovia	Car Ownership/Household	% of Housing Units	Number of Cars
	No Car	5.8%	0
	One Car	33.1%	4,743
	Two Cars	39.5%	11,309
	Three Or More Cars	21.6%	10,058
		Total	26,110
Housing Units	14,328		
Population	38,787		
Cars Per Person	.67		
People per Housing Unit	2.7		
Cars Per Housing Unit	1.82		

City of Downey	Car Ownership/Household	% of Housing Units	Number of Cars
	No Car	4.8%	0
	One Car	27.8%	9,463
	Two Cars	37.4%	25,460
	Three Or More Cars	30.0%	33,186
		Total	68,109
Housing Units	34,037		
Population	114,146		
Cars Per Person	.60		
People per Housing Unit	3.7		
Cars Per Housing Unit	2.00		

City of El Segundo	Car Ownership/Household	% of Housing Units	Number of Cars
	No Car	3.6	0
	One Car	35.8	2,661
	Two Cars	40.9	6,080
	Three Or More Cars	19.7	4,759
		Total	13,500
Housing Units	7,433		
Population	16,784		
Cars Per Person	0.80		
People per Housing Unit	2.3		
Cars Per Housing Unit	1.82		

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City of Inglewood	Car Ownership/Household	% of Housing Units	Number of Cars
	No Car	9.0%	0
	One Car	42.8%	15,843
	Two Cars	31.5%	23,321
	Three Or More Cars	16.7%	20,092
		Total	59,259
Housing Units	37,018		
Population	113,559		
Cars Per Person	.52		
People per Housing Unit	3.1		
Cars Per Housing Unit	1.60		

City of La Verne	Car Ownership/Household	% of Housing Units	Number of Cars
	No Car	6.7	0
	One Car	24.5	2,976
	Two Cars	36.0	8,746
	Three Or More Cars	32.8	12,949
		Total	24,671
Housing Units	12,147		
Population	33,260		
Cars Per Person	0.74		
People per Housing Unit	2.7		
Cars Per Housing Unit	2.03		

City of Azusa	Car Ownership/Household	% of Housing Units	Number of Cars
	No Car	5.1	0
	One Car	29.3	4,212
	Two Cars	39.1	11,240
	Three Or More Cars	26.5	12,380
		Total	27,832
Housing Units	14,374		
Population	49,954		
Cars Per Person	0.56		
People per Housing Unit	3.5		
Cars Per Housing Unit	1.94		

City of El Monte	Car Ownership/Household	% of Housing Units	Number of Cars
	No Car	9.2	0
	One Car	29.7	8,707
	Two Cars	36.0	21,108
	Three Or More Cars	25.1	23,915
		Total	53,729
Housing Units	29,316		
Population	117,204		
Cars Per Person	0.46		
People per Housing Unit	4.0		
Cars Per Housing Unit	1.83		

City of Los Angeles	Car Ownership/Household	% of Housing Units	Number of Cars
	No Car	12.4%	0
	One Car	38.9%	537,976
	Two Cars	32.6%	901,696
	Three Or More Cars	16.1%	723,639
		Total	2,163,311
Housing Units	1,382,970		
Population	4,059,665		
Cars Per Person	.53		
People per Housing Unit	2.93		
Cars Per Housing Unit	1.56		

West Carson CDP Los Angeles County	Car Ownership/Household	% of Housing Units	Number of Cars
	No Car	3.4	0
	One Car	35.1	2,769
	Two Cars	34.7	5,475
	Three Or More Cars	26.8	6,871
		Total	15,115
Housing Units	7,889		
Population	21,699		
Cars Per Person	0.70		
People per Housing Unit	2.8		
Cars Per Housing Unit	1.92		

Willowbrook CDP Los Angeles County	Car Ownership/Household	% of Housing Units	Number of Cars
	No Car	11.1	0
	One Car	32.1	1,683
	Two Cars	30.1	3,156
	Three Or More Cars	26.7	3,156
		Total	9,389
Housing Units	5,243		
Population	35,983		
Cars Per Person	0.26		
People per Housing Unit	6.9		
Cars Per Housing Unit	1.79		

City of Placentia	Car Ownership/Household	% of Housing Units	Number of Cars
	No Car	3.1	0
	One Car	24.6	4,224
	Two Cars	43.1	14,801
	Three Or More Cars	29.2	16,294
		Total	35,319
Housing Units	17,170		
Population	52,755		
Cars Per Person	0.67		
People per Housing Unit	3.1		
Cars Per Housing Unit	2.06		

City of Pasadena	Car Ownership/Household	% of Housing Units	Number of Cars
	No Car	10.4	0
	One Car	38.4	23,873
	Two Cars	37.6	46,752
	Three Or More Cars	13.6	27,479
		Total	98,104
Housing Units	62,170		
Population	144,388		
Cars Per Person	0.68		
People per Housing Unit	2.3		
Cars Per Housing Unit	1.58		

City of Bellflower	Car Ownership/Household	% of Housing Units	Number of Cars
	No Car	5.9%	0
	One Car	31.9%	7,513
	Two Cars	36.0%	16,957
	Three Or More Cars	26.2%	20,054
		Total	44,524
23,552	23,552		
Population	77,682		
Cars Per Person	.57		
People per Housing Unit	3.30		
Cars Per Housing Unit	1.89		

Source: U.S. Census and the Southern California Association of Governments.