LOMPA RANCH EAST

SPECIAL USE PERMIT *revised* **NOVEMBER 2022**

REAR PERSPECTIVE

FRONT PERSPECTIVE

Prepared For:

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PROJECT LOCATION

The project site is located at N. Lompa Lane and Desatoya Drive (APNs 010-741-02 and 010-741-03), totaling 23.95 acres. Please note that a Reversion to Acreage application has been submitted for review (LLD-2022-0399) which will reconfigure the parcel so that the entire project is on one parcel.

Figure 1: Project Location

EXISTING CONDITIONS

The project site is located within the Lompa Ranch North Specific Plan (LRNSP) area (Lompa Ranch East portion) and is undeveloped. The site topography is relatively flat, gently sloping to the southeast. Vegetation is moderate to heavy and typically consists of grasses, brush, and a few trees.

The site has Master Plan designations of High Density Residential (HDR) and Medium Density Residential (MDR) and is zoned a corresponding mix Multi-family apartment SPA (MFA-SPA) and Single-Family – 6,000 sf SPA (SF6-SPA).

Please note that a Reversion to Acreage application has been submitted for review (LLD-2022-0039) which will reconfigure the parcel so that the entire project is on one parcel totaling 23.95 acres.

Figure 2: Surrounding Property Designations

	Existing Master Plan	Existing Zoning	Current Land Use
North	HDR	MFA-SPA (LRNSP)	Undeveloped; approved for future multi-family use
East	MDR	SF6	Single Family Residential
South	MUR	SF6-SPA (LRNSP) Agricultural	NDOT facility (open space & trail); area approved for future park
West	OS/Interstate 580	PC-SPA; A	Carson City open space & trail

Figure 3: Reversion to Acreage Configuration-

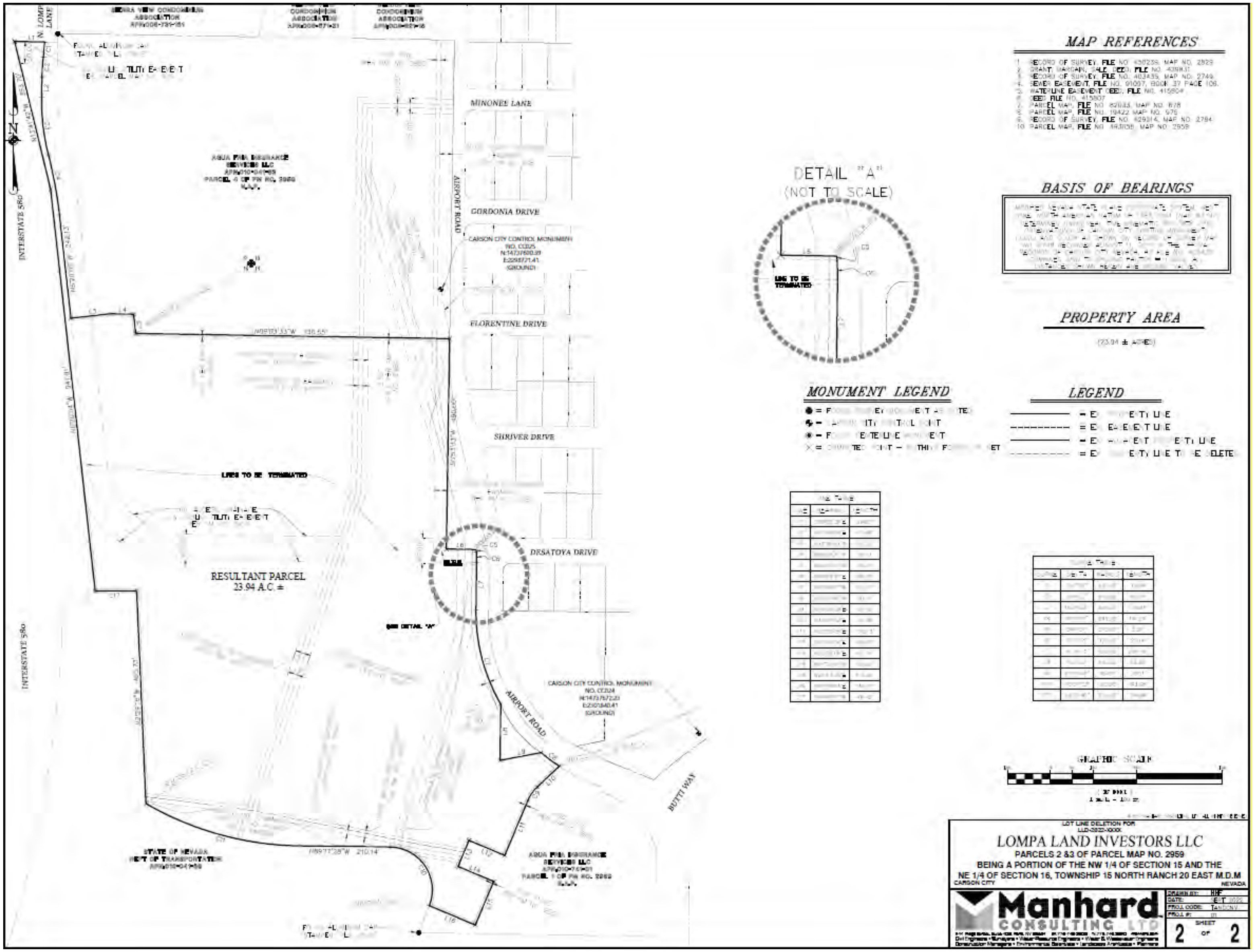


Figure 4: Existing Master Plan Designations (HDR/MDR)

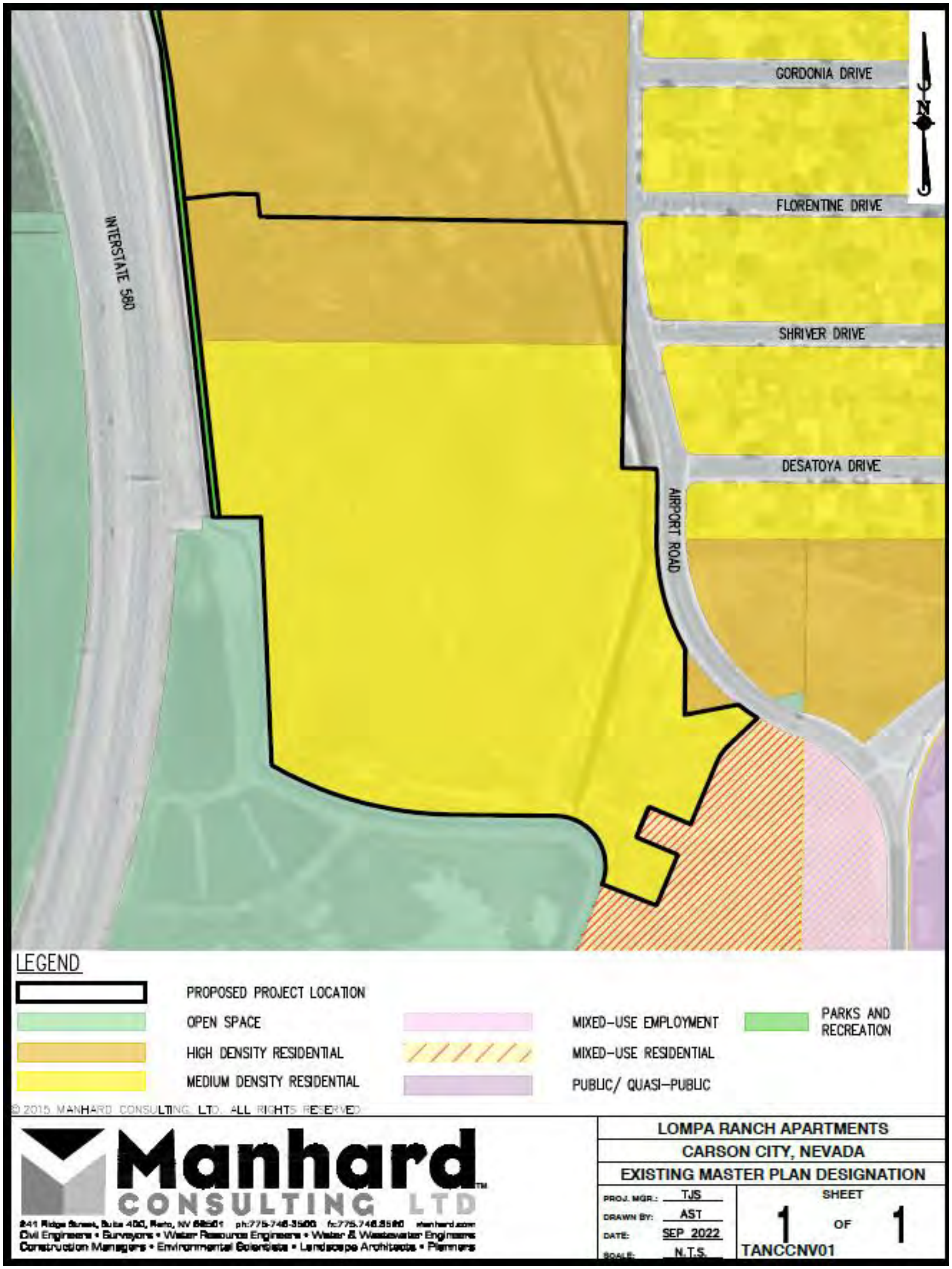
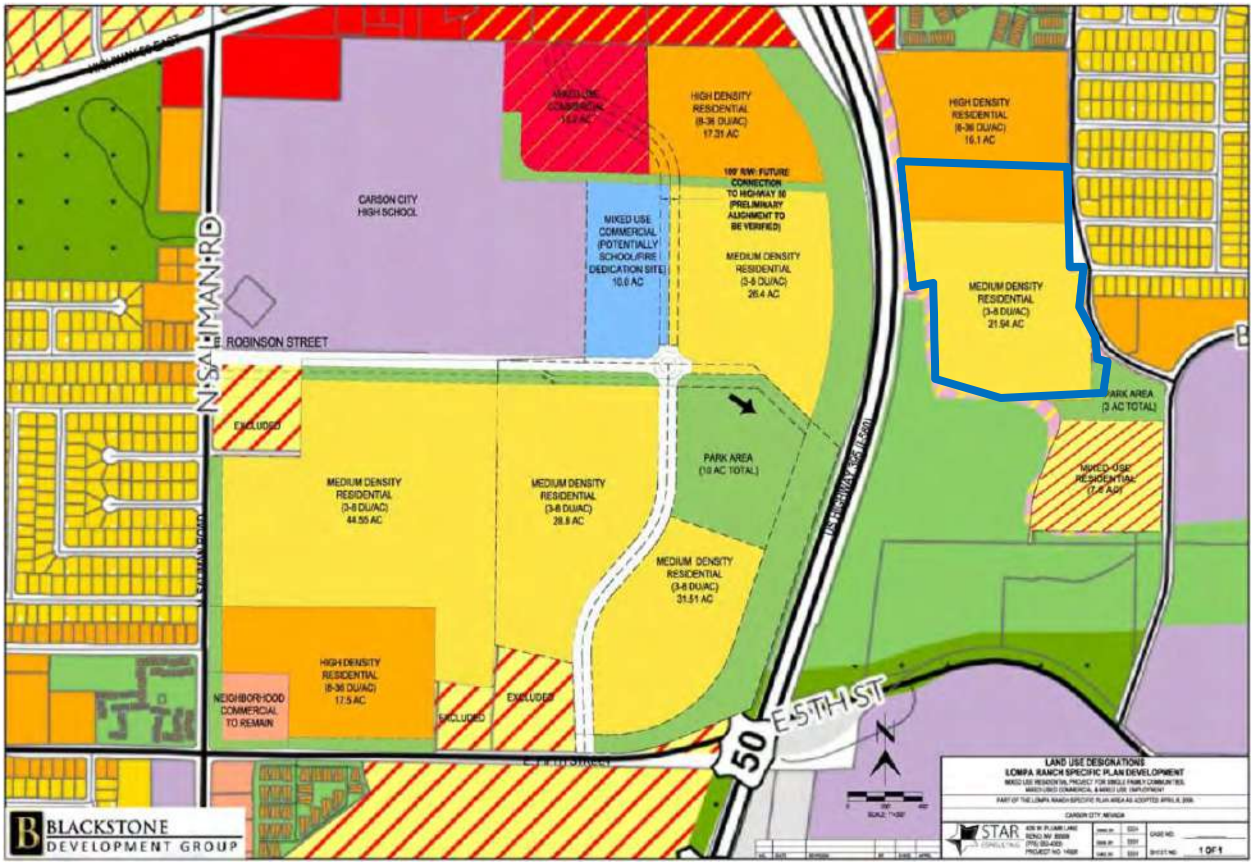


Figure 5: Lompa Ranch North Specific Plan Area (HDR/MDR)

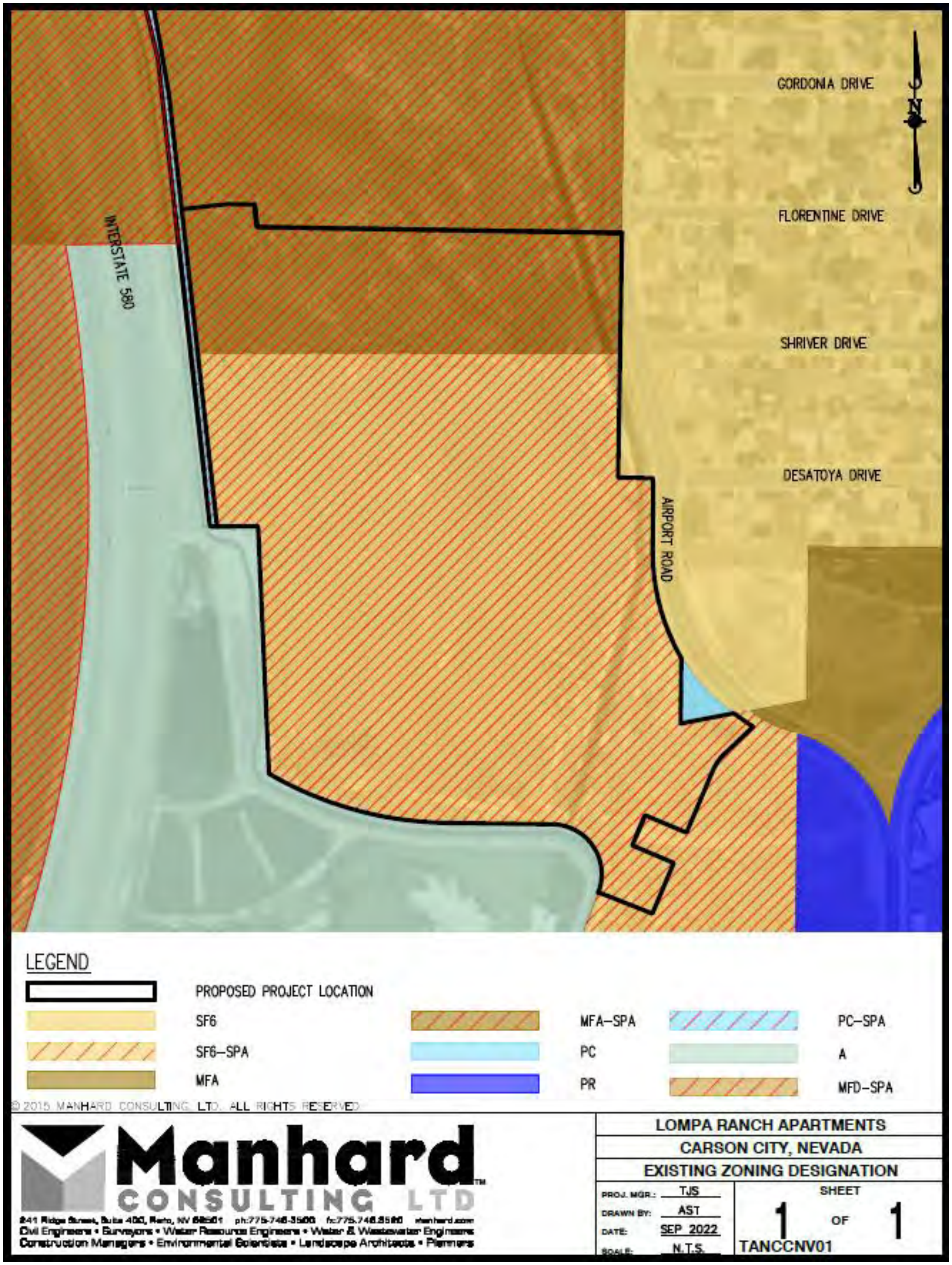


Approximate Project Area

High Density Residential

Medium Density Residential

Figure 6: Existing Zoning Designations (MFA-SPA, SF6-SPA)



APPLICATION REQUEST

The enclosed application is for a:

> **SPECIAL USE PERMIT to allow a multi-family residential use, which is allowed in the MFA zoning district, on the entire project site, pursuant to CCMC Section 18.04.020.6(d)**

PROJECT DESCRIPTION AND JUSTIFICATION

Special Use Permit

The Carson City Municipal Code allows for utilization of the entire parcel with a use that is allowed in one of the zoning districts of a split-zoned parcel for the portion of the property not zoned for the use (CCMC Section 18.04.020.6(d)). This request is to allow a multi-family residential use, which is allowed in the MFA zoning district, on the entire project site.

A Reversion to Acreage application has been submitted; the resultant parcel will have a split zoning designation (MFA-SPA and SF6-SPA) and the project site will be one parcel.

Proposed Use and Site Design

The proposed project is a 306-unit multi-family residential development, with a mix of one-, two-, and three-bedroom units with a clubhouse/amenity area, open space, and associated off-street parking. The total project area is 23.95 acres. The project has been designed to meet the requirements of the Lompa Ranch North Specific Plan (LRNSP), the Lompa Ranch North Development Agreement, and the Carson City Development Code. The project density is 12.78 units per acre (306 units / 23.95 acres).

As shown on the site plan, the Lompa Ranch East will consist of fourteen 3-story buildings, with a mix of units ranging from 850 sq. ft. to 1,225 sq. ft.

1 bedroom.......... 93
2 bedroom........ 168
3 bedroom.......... 45
TOTAL.............. 306

The project includes approximately 8.26 acres of common open space (+/- 34%). The following on-site amenities will be available to all Lompa Ranch East residents:

- Clubhouse
- Pool facility
- Fitness room
- Game room
- Play areas

- Dog park areas
- Amenity area
- Common area/open space
- Connections to existing trail system

This project is designed as a high-quality, multi-family residential development that will create a compact development pattern that is efficient for infrastructure and public services, and will enhance recreational opportunities for the development and for the public.

Figure 7: Project Summary

Project Summary	
Total Area	23.95 acres
Number of Units	306 units
Project Density	12.78 units/acre
Open Space Required	1.75 acres; 250 sq. ft. per unit = 76,500 sq. ft.
Landscaping Required	75,894 sq. ft. (1.74 acres); 20% of the site's impervious surfaces exc. building coverage
Open Space and Landscaping	+/- 360,000 sq. ft. (8.26 acres) (34%); includes common open space and landscape area
Parking Required	765 spaces (2 per unit plus .5 per unit guest parking)
Parking Provided	766 spaces

Figure 8a: Preliminary Landscape Plan *(Full size sheets in application package)*

Figure 8b: Site Plan *(Full size sheets in application package)*

Architectural Design

The project was designed to meet the requirements of the LRNSP and ensure a visually-pleasing development. Several key residential architectural elements are incorporated. Exterior porches have been integrated to provide usable outdoor space for residents as well as deep recessed shadow lines that add to the exterior articulation of the building facades. A mixture of horizontal siding, vertical siding, and exterior stucco combined with color blocking provides a variety of forms and textures for each of the building elevations. The selected roofing material is concrete tile presented in a flat form that is complimentary to the overall architectural theme and color palettes. Each roof design contains multiple roof planes with varying ridge heights. Each building contains multiple planes with varying offsets that break the horizontal building forms into distinct elements and provide additional shade and shadow.

Each of the four facades proposed for the residential buildings features the same roof, material, and wall plane elements throughout, including wall plane offsets, multiple materials, color blocking, and roof plane breaks. The color palettes include earth tones combined with muted accent colors that highlight the building's massing and articulation.

The garage buildings and accessory structures have been designed to complement the residential buildings by using similar roof designs, exterior materials, and colors with a purposeful horizontal form that is secondary to the primary residential buildings.

Figure 9a: Conceptual Floor Plans (Units) *(Full architectural package included with application)*

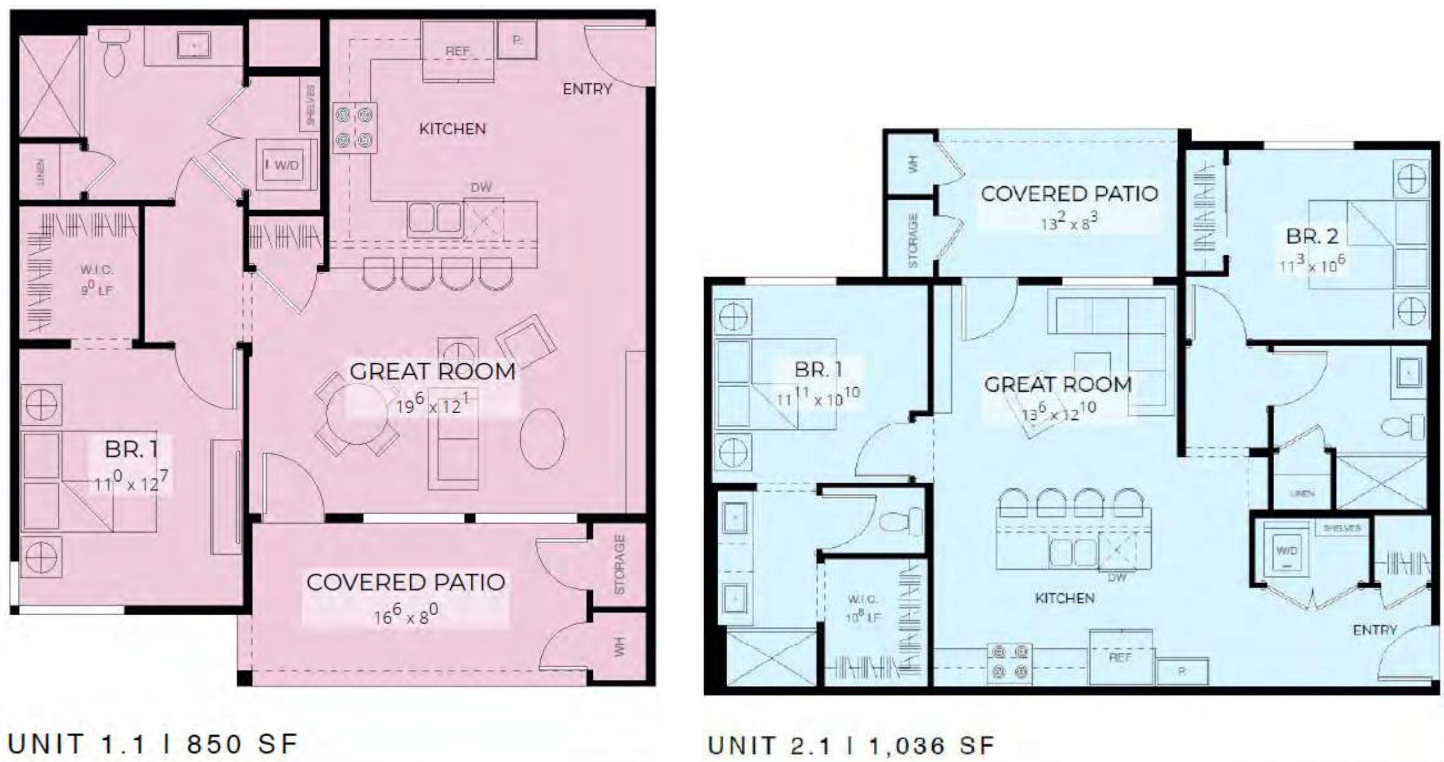
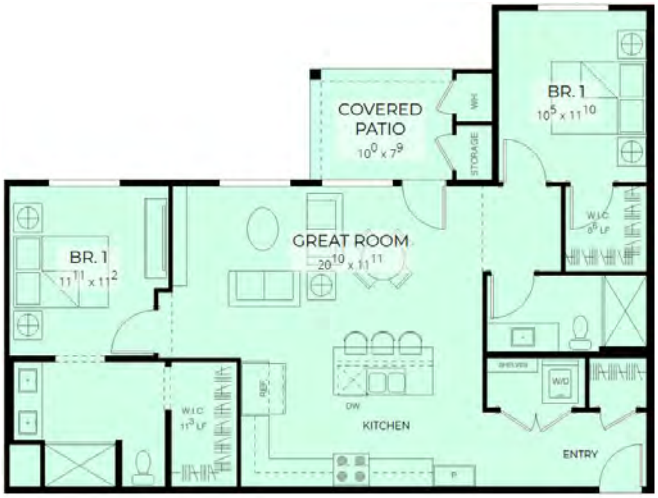


Figure 9a: Conceptual Floor Plans (Units), cont.



UNIT 3.1 I 1,131 SF

UNIT 4.1 I 1,225 SF

Figure 9a: Conceptual Floor Plans (Clubhouse), cont.

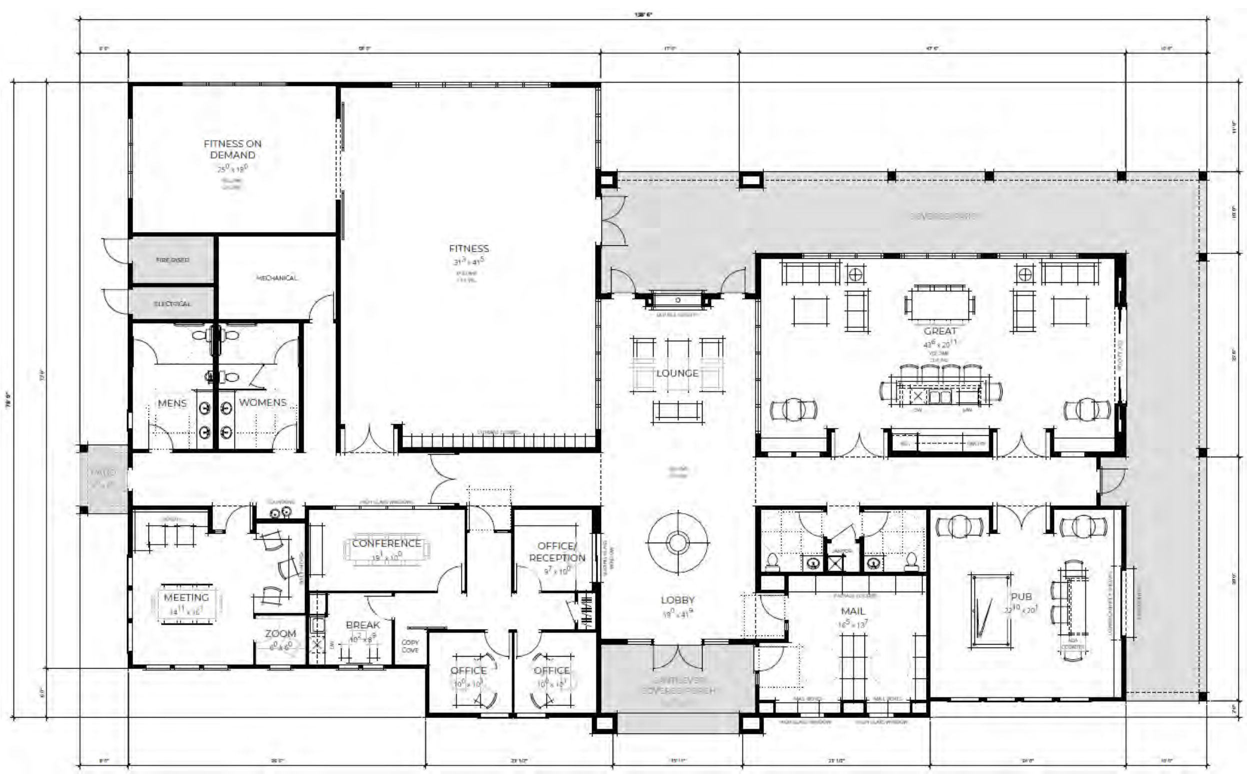


Figure 9b: Typical Building Plan

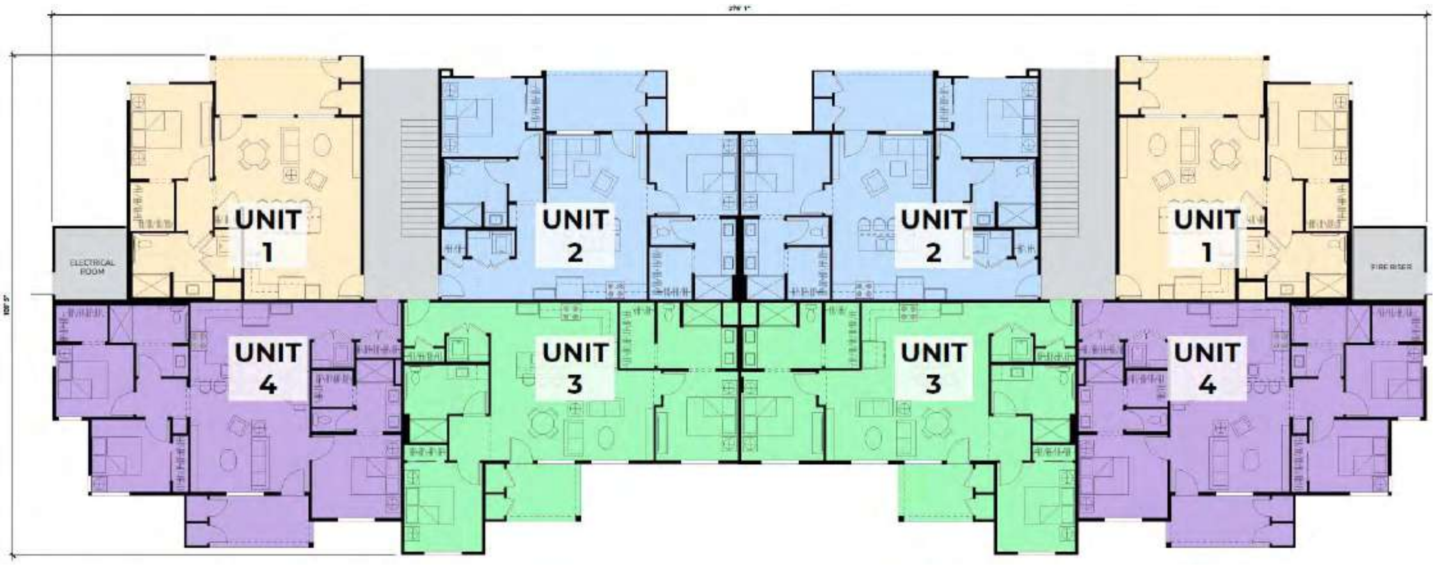


Figure 9c: Conceptual Elevations (Residential Building)

Figure 9c: Conceptual Elevations (Residential Building), cont.

REAR PERSPECTIVE

Figure 9c: Conceptual Elevations (Residential Building), cont.

FRONT PERSPECTIVE

Figure 9c: Conceptual Elevations (Residential Building), cont.

Figure 9c: Conceptual Elevations (Clubhouse), cont.

Figure 9c: Conceptual Elevations (Garage Building), cont.

Figure 9c: Conceptual Elevations (Colors and Materials), cont.

COMPLIANCE WITH DEVELOPMENT AGREEMENT

The project is subject to the "Development Agreement- Lompa Ranch North Specific Plan" (Ordinance No. 2017-25), which includes a variety of requirements, including, but not limited to:

- Fire protection and mitigation fees (Section 2.4)
- School donation fee (Section 2.5)
- Dedication of lands for parks in lieu of the residential construction tax (Section 2.6)

  Including: LRNSP 3.1.4 East Side Facilities- "The Master Developer shall work with Carson City Parks, Recreation, and Open Space Department and provide for a 3-acre minimum neighborhood park site on the east side of Interstate 580 as depicted on the land use plan. The park site shall be constructed and dedicated to the City prior to the issuance of the certificate of occupancy for the 250th residential unit located on the east side of I-580. This shall be coordinated through and agreed upon by the Carson City Parks, Recreation, and Open Space Department." … and "Planning for the park will commence with the completion of a conceptual site plan no later than the issuance of the certificate of occupancy for the 100th residential unit subject to review, approval and execution of agreed upon terms and conditions memorialized in the Development Agreement. (Section 4.1.3.1.3   3-Acre park (East))

- Maintenance of Neighborhood Parks and Public Areas within the Plan Area (Section 2.6.1)

As specified in the Development Agreement and Lompa Ranch North Specific Plan, because of the number of units proposed, this project will trigger East Side park improvements on an adjacent parcel (3-Acre Park Site), that is not part of this project site and is under separate ownership. An alternative Park Amenity Concept Plan, with additional on-site park amenities to be maintained by Tanamera, and available to the public with a public access easement, is proposed to ensure that the project meets the intent of the Specific Plan and can make the required findings. (See 3-Acre Public Park section, pg. 25)

COMPLIANCE WITH LOMPA RANCH NORTH SPECIFIC PLAN STANDARDS

The project has been designed to meet the appliable requirements and standards of the LRNSP:

Figure 10: Compliance with LRNSP Standards

	LRNSP Standard	Proposed
Chapter 1		
	SP densities range from 4 to 36 du/acre.	12.78 units/acre
	Land use is determined by zoning.	Proposed land use meets the underlying zoning with approval of this SUP.
	Uses shall conform to the underlying zoning use categories; entitlements follow CCMC.	Proposed land use meets the underlying zoning and development standards with approval of this SUP.
Chapter 2		
	Clustered buildings are preferred over single large buildings.	Clustered buildings are provided.

	LRNSP Standard	Proposed
	Open spaces shall be created to break up building mass and provide recreational areas.	Open spaces are provided throughout the site to break up building mass. Recreational areas are proposed.
	Pedestrian connections are required throughout the development.	Pedestrian connections are provided throughout the development and to the existing trail and the 3-acre park site.
	Play areas shall be centrally located and appropriate amenities are required.	Play/amenity areas are included throughout the development and additional project amenities (clubhouse, pool facility, fitness room, game room, play areas, dog park areas, amenity areas, common area/open space, connections to existing trail system) are provided.
	Setbacks shall conform to underlying zoning district standards.	Setbacks conform to MFA development standards.
	Design should take into account natural terrain, drainage, and features.	The site has been designed around the natural terrain, drainage, and other features.
	Parking is required within 400 feet of residences.	All parking spaces are within 400 feet of the residences.
	Landscaping shall conform with CCMC requirements.	Landscape areas provided exceed CCMC requirements (20% of the site's impervious surfaces excluding building coverage).
	Drought tolerant and xeriscape design is encouraged.	Will be provided.
	Parking lots which consist of more than 25 spaces in one area shall provide a minimum 400 sq. ft. landscaped island with a tree for every 10 required parking spaces.	Parking areas are proposed throughout the site. Much of the landscaped area is provided adjacent to parking areas rather than as a landscaped island. The project complies with the intent of providing additional landscaping in the parking areas and throughout the project site.
	ROW landscaping shall be a minimum 15 foot wide an provide a tree at a rate of 1 per 25 lineal feet with 6 shrubs per tree.	ROW landscaping will be provided.
	Is fencing, a berm, or other improvement proposed to eliminate potential headlight glare from affecting adjacent residents to the east?	A dense hedge or other landscape treatment will be proposed.
	Lighting fixtures over 10 feet in height will need to have shielded cutoffs.	Will be provided.
	Where the development adjoins common areas, open space, or drainageways, fencing shall be open view. Chain link is prohibited.	Open view fencing is shown on the site plan; fencing is located on the north project boundary, along N. Lompa Lane, and along Airport Road north of the south project entrance.
	Trash enclosures are required and shall be architecturally compatible with the buildings. Use of chain link for enclosure walls and gates is prohibited.	Trash enclosures are included on the site plan and will be architecturally compatible with the buildings.

	LRNSP Standard	Proposed
	Incorporate exterior residential architectural elements, acceptable roofing materials, building articulation, and building colors.	See Architectural Design section on pg. 10.
	Multi-Family Architecture shall incorporate architectural elements on all sides of the building, façade articulation, and garage building that match the main structure. Multi-Family materials and colors shall incorporate an earth tone color palette.	See Architectural Design section on pg. 10.
Chapter 3		
	A LMD is required and shall be formed by the Master Developer	Landscaping will be maintained by the property owner since the project is a single ownership.
	Sidewalk connections should be made to connect the different portions of the project with the trail/pathway system. There should also be a connection from the site to the future park to the south of the project.	There are sidewalk connections throughout the project to provide connectivity to the north and south areas. There are also +/- 4 connections to the existing trail/pathway system and to the future park to the south of the project.
	Requirements for a 3-acre park site on the east side of the freeway, and associated improvements on the City property will be triggered (Section 3.14).	See 3-Acre Public Park section on pg. 25.
	SUP will be required for development of the park site.	An SUP application will be submitted if required.
	SUP will need to identify the wetland areas within the site and shall preserve them as open space.	There is an existing perennial drainage that is identified and included in the open space area.
	Open space areas will be required to be maintained by the development (Section 3.15).	Open space areas will be maintained by the developer.
	The development will need to comply with the General Standards for Parks as outlined in the SPA Handbook (Section 3.16).	The development will comply with the standards requirements of the Handbook.
Chapter 4		
	Provide a summary of requirements outlined in the SPA Handbook and the Development Agreement and how the project is in compliance with each item.	A summary is provided with this application (Development Agreement section and this table).
	Provide a justification for how the project meets the LRNSP phasing plan.	See the Justification of Units section on pg. 23.
	An agreement for funds in lieu of RCT will be required.	A draft agreement will be provided following approval of the SUP, as required.
	A per unit contribution for Fire Department facilities and/or equipment will be required.	Will be provided as required.
	A per unit school contribution will be required for the Carson City School District.	Will be provided as required.

	LRNSP Standard	Proposed
	Coordination with other developer and property owners with the SPA is necessary to ensure the project can be developed based on timeline for unit triggers for park development and an offer of the school site.	See 5/2/22 offer letter to the school district included with application. As discussed in the 3-Acre Public Park section on pg. 25, coordination with property owner for park development is ongoing.
	Requirements for the 3 acre park are outlined. The Parks Department will be involved in park design, including providing direction on required features and elements.	The developer is coordinating with the Parks Department for park design and improvements.
	A Parks O&M manual is required.	A draft will be submitted with development of the 3-acre park site.

DEVELOPMENT STANDARDS

The proposed project has been designed to meet the relevant minimum development standards set in CCMC Sections 18.04.190 Residential districts intensity and dimensional standards, and Division 1, Section 1.17 MFA development standards, as follows:

Figure 11: MFA Development Standards

	Site Development Standards	Proposed
Minimum Area	6,000 sq. ft.	23.95 acres
Maximum Density	**MFA-** 29-36 DU/acre (depending on unit size) * 5.00 acres **SF6-** 8 DU/acre * 18.95 acres	12.78 DU/acre (306 units/23.95 acres)
Minimum Lot Width	60 ft.	Exceeds Minimum
Max. Building Height	45 feet (SUP for increase in height)	Less than 45 ft. +/- 41 ft. to top of ridge as proposed.
Min. Front Setback	20 ft.; 10 ft. (plus an additional 10 ft. for more than 2 stories)	20 ft. min. from the E/W portion of N. Lompa Lane
Min. Side Setback	10 ft. Perimeter: 10 ft. and minimum 10 ft. between residential structures.)	Perimeter: exceeds 10 ft. on all sides 15 ft. min. between structures
Min. Street Side Setback	15 ft; 10 ft. (an additional 5 ft. is required for each story above 2 stories)	19 ft. min. from the N/S portion of N. Lompa Lane 25 ft. min. from Airport Road
Min. Rear Setback	20 feet	35 ft. from north property boundary 189 ft. from south property boundary
Off-Street Parking	765 spaces (2.5 spaces per unit)	766 spaces, including carports and garage spaces

	Site Development Standards	Proposed
Common Area/Open Space	76,500 sq. ft. (1.76 acres) 250 sq. ft. total open space per unit (250 sq. ft. x 306 = 76,500 sq. ft.)	
Landscape Area	75,894 sq. ft. (1.74 acres) 20% of the impervious surfaces exc. building footprint	
TOTAL		+/- 360,000 sq. ft. (8.26 acres) Includes the Common Area/ Open Space and landscape areas

Justification of Units

The total number of proposed multi-family units (306 units) is based on the total project acreage and existing underlying zoning of the site. Approximately 5.00 acres of the site is zoned MFA-SPA and the remaining 18.95 acres is zoned SF6-SPA. This split zoning designation has been used to calculate the total density and maximum allowed units for the site.

Figure 12: Total Allowed Density and Units

	MFA	SF6	TOTAL
Acreage	5.00	18.95	23.95
Allowable Density	29-36 du/acre depending on bedroom count	8 du/acre	Up to 13.82 du/acre
Total Allowed Units	145-180 units depending on bedroom count	151.6 units	296-331 units depending on bedroom count
Proposed Density			12.78 du/acre

The proposed 306 units is below the maximum density established by the underlying zoning (a total of 331 units are allowed). The Handbook does not establish a maximum unit count for each development area or for the entire Specific Plan area. Specifically, the Handbook says that “Uses within the Lompa Ranch North shall conform to the underlying zoning district(s) assigned to the individual parcels as outlined in Title 18 of the Carson City Municipal Code (Handbook, Section 1.4.1 d). The Phasing Plan (Handbook, Chapter 4) includes a number of “To Be Determined” units per phase.

Additional studies for water, sewer, traffic, and drainage are required for each phase to demonstrate that each phase can be constructed and that there is capacity. These additional studies and reports are included with this SUP application and demonstrate there is capacity for the proposed 306 units. This phase area, Phase D2, as identified in the LRNSP, includes “190 units TBD”. Phase D1 includes “310 units TBD”, however the actual number of units in Phase D1 is not known because there is no development proposal at this time.

Open Space

Multi-Family project development standards (Title 18 Appendix, Division 1, Multi-family apartment (MFA) development standards, Section 1.17) include:

- A minimum of 150 square feet per dwelling unit of common open space must be provided
- A minimum of 100 square feet of additional open space must be provided for each unit either as private open space or common open space
- A total of 250 sq. ft. of open space per unit
- At least 100 sq. ft. per unit must be designated for recreation

Based on the proposed 306 units, a total of 76,500 sq. ft. open space is required (including a minimum of 45,900 sq. ft. of common open space, and an additional 30,600 sq. ft. of either private or common open space). As shown on the Preliminary Site Plan, 8.26 acres (+/- 34%) of common area/open space is proposed, which exceeds the minimum requirement.

Figure 13: Open Space Exhibit

Landscaping

Landscape design standards (Title 18 Appendix, Division 3) require that a minimum of 20 percent of the site's impervious surfaces excluding the building coverage must be pervious areas of landscape material. The site design includes formal landscape areas and open space with natural vegetation and revegetated areas.

Formal landscape areas include three park amenity areas, the clubhouse and pool facilities, and open space around the residential buildings. The parking areas visible from Airport Road and the existing single family residences are screened with densely-planted trees and shrubs with a mixture of adaptive native evergreen and deciduous plantings.

3-Acre Public Park

East Side Park: The LRNSP identifies a 3-acre public park on the east side of Interstate 580, south of the proposed project area. The 3-acre parcel is under different ownership. The park is to be designed to meet the provisions of the LRNSP and DA, and required to be dedicated prior to the issuance of the certificate of occupancy for the 250th residential unit located on the east side of Interstate 580. This is to be coordinated through and agreed upon by the Parks, Recreation, and Open Space Department.

As further described in a letter dated October 4, 2022 included with this application, a Park Amenity Concept Plan with additional on-site park amenities is proposed, to ensure that this project provides park and recreation amenities. The on-site park amenities will be available to the public with a public access easement and will be maintained by Tanamera. This is proposed to ensure that the project meets the intent of the Specific Plan and can make the required findings.

Figure 14: Park Amenity Concept Plan

Off-Street Parking

The Carson City Municipal Code (Title 18 Appendix, Division 2, Parking and Loading, Section 2.2) sets parking requirements by dwelling unit for multi-family units. The standard for all multi- family residential dwellings is 2 spaces per dwelling unit plus one space for every 2 units for guest parking if on-street parking is not provided. Based on 306 multi-family units, the total requirement would be 765 spaces; 766 spaces are shown on the Preliminary Site Plan, including 120 garage spaces, 331 carport spaces, and 315 parking stalls.

Figure 15: Off Street Parking

Use	CCMC Standard	Units	Parking Required	Parking Proposed
Multi-Family Residential	2 spaces per unit plus 1 space for every 2 units for guest parking	306	765 spaces	766 spaces

Traffic

A Traffic Impact Study has been prepared (attached) to further evaluate the project's potential traffic impacts, including existing and future traffic conditions. The project is anticipated to generate approximately 2,062 daily trips with 122 AM peak hour and 156 PM peak hour trips to the external roadway network.

With the addition of the project traffic, the southbound left turn movement at the 5th Street / Airport Road intersection is anticipated to degrade from LOS E to LOS F, but will be mitigated with the proposed left-turn movement. All other study intersections and movements are anticipated to operate at acceptable level of service with addition of project traffic.

Figure 16: Trip Generation Estimates

Land Use (ITE Code)	Units	Trips				
		Daily	AM	AM In/Out	PM	PM In/Out
Multifamily Housing (220)	306	2,062	122	29/93	156	98/58

As detailed in the TIA, the project proposed to construct the following improvements:

- Half-street improvements on the west side of the existing N. Lompa Lane
- The remaining N. Lompa Lane roadway segment between Modoc Court and Airport Road with two-way left-turn lane (TWLTL) striping
- 5 foot wide bicycle Lanes on both sides of N. Lompa Lane and both sides of Airport Road along the property frontage

In addition, the following mitigations are recommended:

- Northbound left turn pocket (100’ pocket) at the Airport Road / Desatoya Drive intersection
- Restripe for a 115-foot northbound left turn pocket at the US 50 / N. Lompa Lane intersection and stripe a two-way left-turn lane (TWLTL) on N. Lompa Lane (William Street/US 50 to Airport Road).
- High-T configuration at the 5th Street / Airport Road intersection enabling two-stage southbound left turns

Project Access

Access to the project is proposed from N. Lompa Lane and Airport Road. Airport Road will be improved to meet Carson City standards. No parking is proposed on the project frontage along Airport Road; however existing residences on the east side will continue to utilize on-street parking (see Street Sections A-A, B-B, and C-C). Also, in accordance with LRNSP requirements, N. Lompa Lane is proposed to be extended with half street improvements which include bike lanes in both directions, to the south of APN 008-153-08 so that N. Lompa Lane continues to US Highway 50 E (see Street Section D-D).

Figure 17: Street Sections

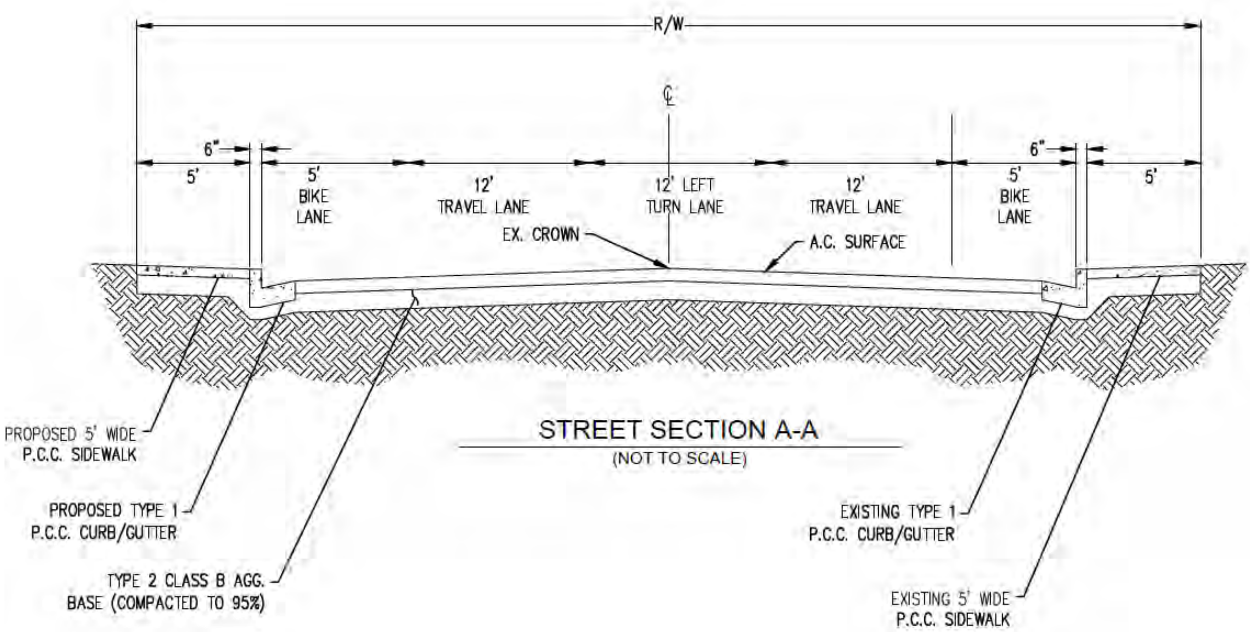
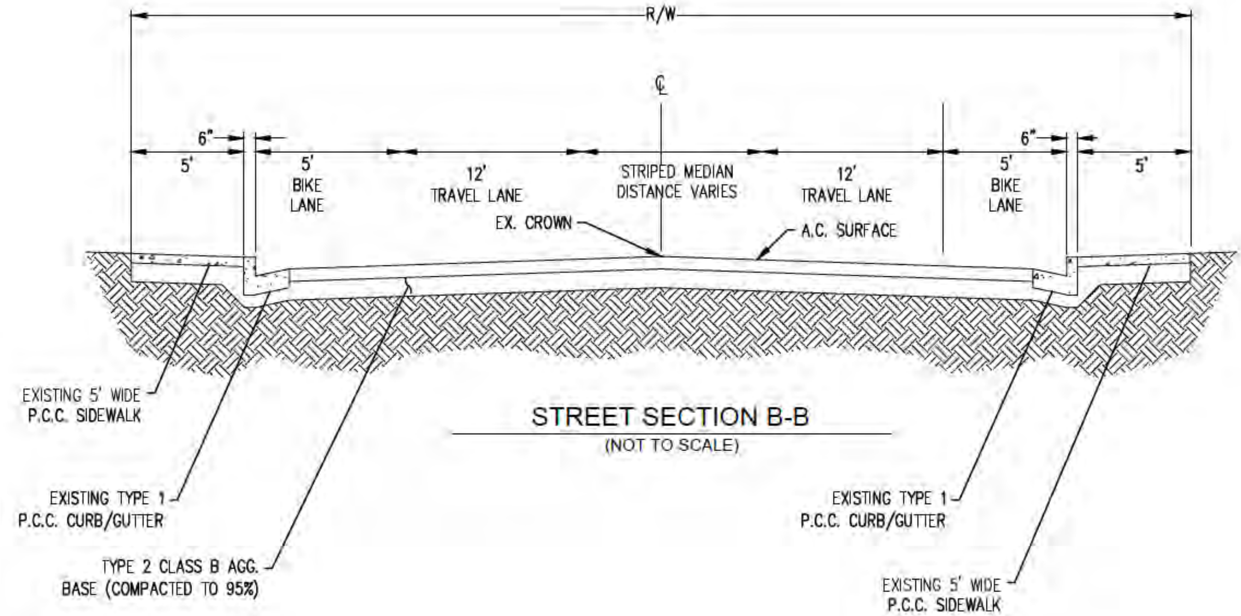
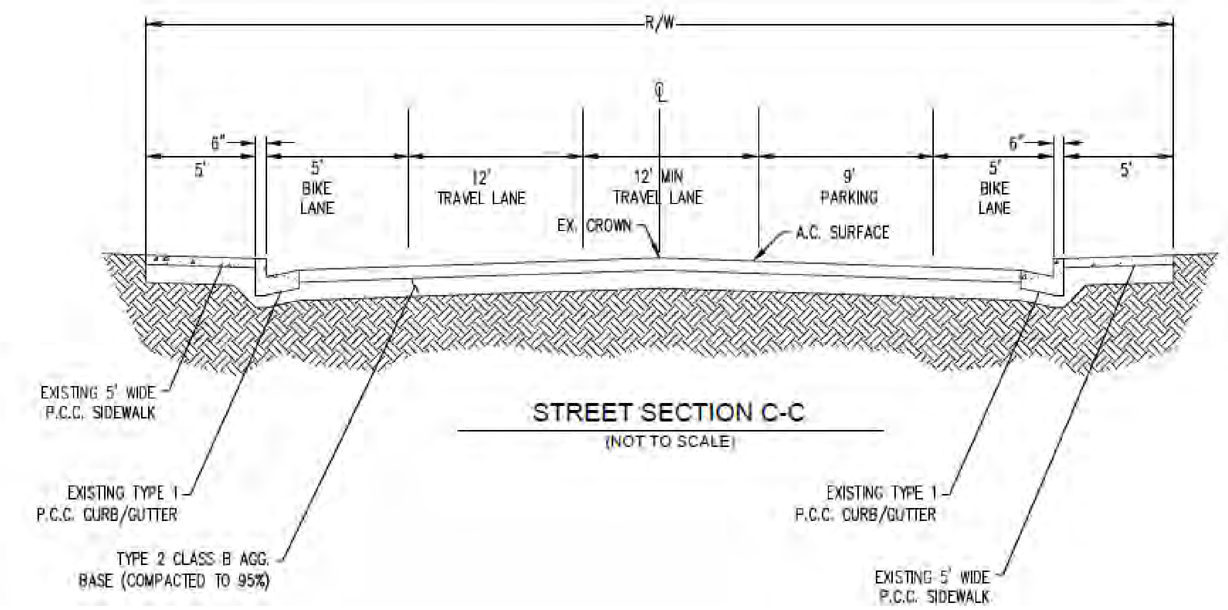
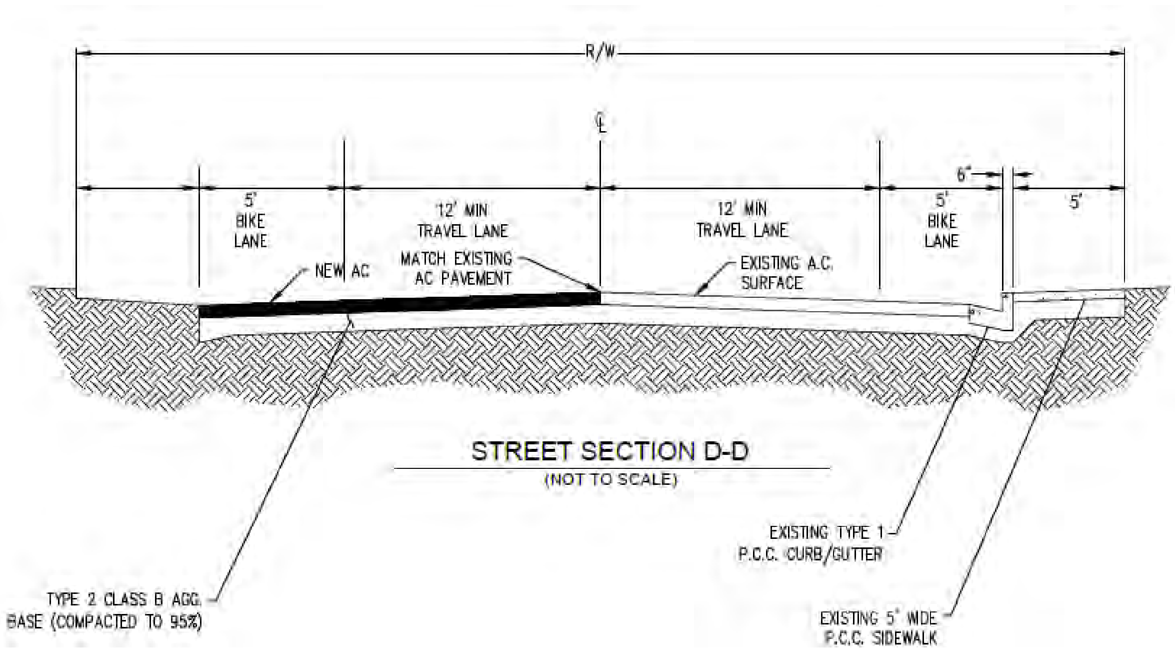


Figure 17: Street Sections, cont.







Drainage

As detailed in the Conceptual Drainage Study, the project has been designed to comply with the Carson City Drainage Manual, Carson City Municipal Code, Carson City development standards, and FEMA standards, and will not cause any adverse effects to adjacent properties.

The site gently slopes ranging from .1% to .6% generally in the north to south direction towards Kings Canyon Creek. There is an existing ephemeral ditch that receives storm drain discharge from the adjacent multi-family and single-family developments. The ephemeral ditch will remain unchanged with the exception of two road crossings that will require culverts.

Onsite drainage facilities will be maintained by the property owner. There are no offsite drainage facilities.

Floodplain impacts associated with the project can be mitigated based on the hydraulically equivalent excavation within the floodplain. Various sites are being considered for floodplain volume mitigation, which include localized onsite depressions, the onsite park area, adjacent park sites, and City-owned properties. This will be determined with final design, and mitigation will ensure no floodplain modifications.

There is an existing FEMA-approved CLOMR-F for the project and it has been determined that this CLOMR-F is valid for the proposed project. Please see attached letters from Terraphase Engineering and Carson City staff.

Aquatic Resources Delineation

There is an existing Aquatic Resources Delineation Report that was prepared for Lompa Ranch East (Resource Concepts, Inc. October 2017) and an approved NWP that has been extended. There are no wetlands on the project site. There is a perennial ditch that is incorporated in the project open space.

Figure 18: Aquatic Resources Delineation

Utilities

There is an existing water line in N. Lompa Lane and in Airport Road, which will be extended through N. Lompa Lane to provide public water to the site. Onsite water mains will be private. Proposed sewer for this project will be public and will be sized to adequately serve the project in accordance with Carson City standards. The proposed sewer will tie into the existing 18" sewer main that bisects the project site. Please see the Preliminary Water Report and Preliminary Sewer Report included with this application.

FINDINGS

In accordance with Carson City Municipal Code Section 18.02.080, this project has been designed to consider the following:

1. **Will be consistent with the objectives of the Master Plan elements.**

   The proposed multi-family residential use is consistent with the Master Plan elements and implements the Lompa Ranch North Specific Plan, including:

   - Encouraging and creating a more compact development pattern that is efficient for infrastructure, public services, and maintenance. (Guiding Principle 1, Chapter 3 Goal 1.1 and LRNSP)
   - Enhancing recreational opportunities and ensuring that new facilities are provided as needed to serve new development (Guiding Principle 2)
   - Promoting a variety of housing types (Chapter 3, Goal 2.2a)
   - Promoting walkability within the community (LRNSP)
   - Quality design and development (Guiding Principle 6)
   - Additional onsite park amenities provided, as described in the application, will ensure that that recreational opportunities are provided and available to the public and that the project meets the intent of the Specific Plan.

2. **Will not be detrimental to the use, peaceful enjoyment, economic value, or development of surrounding properties of the general neighborhood; and is compatible with and preserves the character and integrity of adjacent development and neighborhoods or includes improvements or modifications either on-site or within the public right-of-way to mitigate development related to adverse impacts such as noise, vibrations, fumes, odors, dust, glare, or physical activity.**

   This project will not be detrimental to the use, peaceful enjoyment, economic value, or development of surrounding properties of the general neighborhood. The project is implementing approved multi-family residential development. Property to the north is approved for multi-family residential development, Interstate 580 is west of the project, and there is existing single family residential to the east. Impacts to the existing single family residential development are reduced with a lower-density multi-family residential development (12.78 units/acre), enhanced landscaping, and increased setback from Airport Road.

3. **Will have little or no detrimental effect on vehicular or pedestrian traffic.**

   The project will incorporate recommendations from Traffic Impact Study (Headway Transportation, 2022) to mitigate potential impacts.

4. **Will not overburden existing public services and facilities, including schools, police and fire protection, water, sanitary sewer, public roads, storm drainage, and other public improvements.**

   As demonstrated in the Project Impact Reports for water, sewer, drainage, and traffic, there is capacity to serve the project and the project design will mitigate potential impacts. The proposed development implements the approved LRNSP, which included appropriate standards and was designed to not overburden existing public services and facilities. Public improvements that are required by Carson City are incorporated into the design of the project.

5. **Meets the definition and specific standards set forth elsewhere in this Title for such particular use and meets the purpose statement of that district.**

   The proposed use/project meets the purpose statement of the MFA-SPA zoning district, to provide for multi-family units. The proposed project meets or exceeds all of the specific intensity and dimensional standards for the zoning district, and multi-family apartment development standards as well as the Lompa Ranch North Specific Plan requirements.

6. **Will not be detrimental to the public health, safety, convenience and welfare.**

   The proposed project incorporates appropriate measures and Carson City requirements to ensure that improvements to the site will benefit public health, safety, convenience and welfare.

7. **Will not result in material damage or prejudice to other property in the vicinity, as a result of proposed mitigation measures.**

   The improvements to the site will not result in material damage or prejudice to other property in the vicinity with mitigation measures incorporated.

MASTER PLAN POLICY CHECKLIST

The purpose of the Master Plan Policy Checklist is to provide a list of answers that address whether a development proposal is in conformance with the goals and objectives of the 2006 Carson City Master Plan that are related to this SUP application. This project complies with the Master Plan and accomplishes the following objectives:

Chapter 3: A Balanced Land Use Pattern

1. The proposed project is located within the Carson City and it is served by community water and wastewater facilities as identified in the Water and Wastewater Master Plans. (1.1b)
2. It is expected that sustainable building materials and construction techniques will be utilized. (1.1e)
3. The site is located along a major gateway corridor, which is an area to prioritize infill development. (1.2a)
4. Connection and access to adjacent lands is provided throughout the project. (1.4a)
5. Disturbance to distinctive topographic features on site is minimized. (1.4c)
6. A mix of housing type and density within an urbanized area is provided by this project. (2.2a)
7. The proposed project is designed to protect environmentally sensitive areas. (3.1b)
8. The appropriate level of services will be provided for the proposed project, consistent with the land use designation on site.
9. As described, the proposed project meets the applicable policies of the North Lompa Ranch Specific Plan.

Chapter 4: Equitable Distribution of Recreational Opportunities

10. The proposed project will provide additional park and recreational facilities to the area. (4.1a)
11. Commensurate with the created demand, the proposed project will provide park facilities for all residents. (4.1b)
12. The proposed project, including provided open space, is consistent with the Open Space Master Plan. (4.3a)
13. Expansion and enhancement of the open space network will be provided with this project. (4.3b)

Chapter 5: Economic Vitality

14. The proposed project provides a housing mix consistent with population needs. (5.1j)

Chapter 6: Livable Neighborhoods and Activity Centers

15. The proposed project is expected to utilize durable, long-lasting building materials. (6.1a)
16. Variety and visual interest in design, as described by the architectural design, will be promoted. (6.1c)

17. Appropriate height, density and setback transitions and connectivity to surrounding development is provided and is designed in a manner that minimizes impacts and is compatible with the existing neighborhoods. (6.2a, 9.3b)
18. The proposed project promotes a mix of housing types in the area, and provides a housing model and density consistent with the adjacent urbanized area. (9.1a)

Chapter 7: A Connected City

19. Due to the density, transit supportive development type along a major travel corridor to facilitate future transit is promoted by the project. (11.2b)
20. The proposed project maintains and enhances roadway connections and network consistency, provides a transit supportive development pattern, and improves connectivity which will support the feasibility of broader transit service. (11.2c)
21. Appropriate pathways throughout the development, including to publicly usable lands, is provided with the project. (12.1a, 12.1c)

Carson City Planning Division
108 E. Proctor Street · Carson City NV 89701
Phone: (775) 887-2180 • E-mail: planning@carson.org

FILE

APPLICANT	PHONE #
Tanamera Construction, LLC	775-850-4200

MAILING ADDRESS, CITY, STATE, ZIP
5560 Longley Lane, Ste. 200 Reno, NV 89511

EMAIL ADDRESS
kknudsen@tcnev.com

PROPERTY OWNER	PHONE #
Lompa Land Investors, LLC	775-850-4200

MAILING ADDRESS, CITY, STATE, ZIP
5560 Longley Lane, Ste. 200 Reno, NV 89511

EMAIL ADDRESS
kknudsen@tcnev.com

APPLICANT AGENT/REPRESENTATIVE	PHONE #
Manhard Consulting/Karen Downs	775-321-6538

MAILING ADRESS, CITY STATE, ZIP
241 Ridge Street, Ste. 400 Reno, NV 89501

EMAIL ADDRESS
kdowns@manhard.com

FOR OFFICE USE ONLY:

CCMC 18.02.080

SPECIAL USE PERMIT

FEE*: $2,450.00 MAJOR
$2,200.00 MINOR (Residential zoning districts)
+ noticing fee
***Due after application is deemed complete by staff**

- ☐ **SUBMITTAL PACKET – 4 Complete Packets (1 Unbound Original and 3 Copies) including:**
  - ☐ Application Form
  - ☐ Detailed Written Project Description
  - ☐ Site Plan
  - ☐ Building Elevation Drawings and Floor Plans
  - ☐ Special Use Permit Findings
  - ☐ Master Plan Policy Checklist
  - ☐ Applicant's Acknowledgment Statement
  - ☐ Documentation of Taxes Paid-to-Date
  - ☐ Project Impact Reports (Engineering)
- ☐ **CD or USB DRIVE with complete application in PDF**

Application Received and Reviewed By:

____

Submittal Deadline: Planning Commission application submittal schedule.

Note: Submittals must be of sufficient clarity and detail for all departments to adequately review the request. Additional information may be required.

Project's Assessor Parcel Number(s):	Street Address
010-741-02, 010-741-03	Airport Road

Project's Master Plan Designation	Project's Current Zoning	Nearest Major Cross Street(s)
HDR & MDR	MFA-SPA & SF6-SPA	Airport Road

Please provide a brief description of your proposed project and/or proposed use below. Provide additional pages to describe your request in more detail.
The proposed project is a 306 unit multi-family residential apartment complex within the Lompa Ranch North Specific Plan area.

Please see attached detailed project description.

PROPERTY OWNER'S AFFIDAVIT

I, Kreg Rowe, being duly deposed, do hereby affirm that I am the record owner of the subject property, and that I have knowledge of, and I agree to, the filing of this application.

Signature ______ Address 5560 Longley LN Reno, NV Date 9-2-22

Use additional page(s) if necessary for additional owners.

STATE OF NEVADA)
COUNTY Washoe)

On Sept 2, 2022 Kreg Rowe, personally appeared before me, a notary public, personally known (or proved) to me to be the person whose name is subscribed to the foregoing document and who acknowledged to me that he/she executed the foregoing document.

Notary Public

SARAJ LORENZ
Notary Public - State of Nevada
Appointment Recorded in Washoe County
No: 10-1383-2 - Expires February 27, 2026

NOTE: If your project is located within the Historic District or airport area, it may need to be scheduled before the Historic Resources Commission or the Airport Authority in addition to being scheduled for review by the Planning Commission. Planning staff can help you make this determination.

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CONSULTING

Civil Engineering
Surveying
Water Resources Management
Construction Management
Landscape Architecture
Land Planning

CELEBRATING 50 YEARS

October 5, 2022
Carson City Community Development
108 E. Proctor Street
Carson City, NV 89701

RE: Lompa Ranch East – SUP Application

To whom it may concern,

The application was signed and notarized on September 2, 2022. The applicant and owner contact email address has since changed. Can you please use the below email address for owner and applicant correspondence:

JNORTHON@TCNEV.COM

All other contact information remains unchanged.

Best regards,

Corey Dowell | **Project Coordinator**
241 Ridge Street, Suite 400, Reno, NV 89501
d: 775.321.6533 | manhard.com

If there is any additional information that would provide a clearer picture of your proposal that you would like to add for presentation to the Planning Commission, please be sure to include it in your detailed description.

Please type and sign the statement on the following page at the end of your findings response.

ACKNOWLEDGMENT OF APPLICANT

I certify that the forgoing statements are true and correct to the best of my knowledge and belief. I agree to fully comply with all conditions as established by the Planning Commission. I am aware that this permit becomes null and void if the use is not initiated within one-year of the date of the Planning Commission's approval; and I understand that this permit may be revoked for violation of any of the conditions of approval. I further understand that approval of this application does not exempt me from all City code requirements.

Applicant's Signature

KRAIG KNUDSEN
Print Name

9/2/22
Date

Carson City Property Inquiry 010-741-02 : 2022 Shopping Cart

Property Information

Parcel ID	010-741-02	Parcel Acreage	14.3500
Tax Year	2022	Assessed Value	512,295
Land Use Group	VAC	Tax Rate	3.5700
Land Use	120 - Vacant - Single Family Residential	Total Tax Fiscal Year (2022 - 2023)	$18,290.89
Zoning	MFA/SF6/PR	Total Unpaid All Years	$9,144.46
Tax District	024		Pay Taxes
Site Address	AIRPORT RD		
Neighborhood	Book 10, Lompa Ranch East		

No Sketches or Photos

Assessments

Assessor Descriptions

No Personal Exemptions

Billing Fiscal Year (2022 - 2023)

Installment	Date Due	Tax Billed	Cost Billed	Penalty/Interest	Total Due	Amount Paid	Total Unpaid
1	8/15/2022	$4,574.20	$0.00	$0.00	$4,574.20	$4,574.20	$0.00
2	10/3/2022	$4,572.23	$0.00	$0.00	$4,572.23	$4,572.23	$0.00
3	1/2/2023	$4,572.23	$0.00	$0.00	$4,572.23	$0.00	$4,572.23
4	3/6/2023	$4,572.23	$0.00	$0.00	$4,572.23	$0.00	$4,572.23
Total		$18,290.89	$0.00	$0.00	$18,290.89	$9,146.43	$9,144.46

Payment History

	Fiscal Year	Total Due	Total Paid	Amount Unpaid
	(2022 - 2023)	$18,290.89	$9,146.43	$9,144.46
	(2021 - 2022)	$17,932.30	$17,932.30	$0.00
	(2020 - 2021)	$17,930.68	$17,930.68	$0.00
	(2019 - 2020)	$17,930.68	$17,930.68	$0.00

Carson City Property Inquiry 010-741-03 : 2022 Shopping Cart Ne

Property Information

Parcel ID	010-741-03	**Parcel Acreage**	9.6000
Tax Year	2022	**Assessed Value**	514,080
Land Use Group	VAC	**Tax Rate**	3.5700
Land Use	120 - Vacant - Single Family Residential	**Total Tax Fiscal Year (2022 - 2023)**	$18,354.62
Zoning	MFA/SF6/PR	**Total Unpaid All Years**	$9,176.34
Tax District	024		Pay Taxes
Site Address	AIRPORT RD		
Neighborhood	Book 10, Lompa Ranch East		

No Sketches or Photos

Assessments

Assessor Descriptions

No Personal Exemptions

Billing Fiscal Year (2022 - 2023)

Installment	Date Due	Tax Billed	Cost Billed	Penalty/Interest	Total Due	Amount Paid	Total Unpaid
1	8/15/2022	$4,590.11	$0.00	$0.00	$4,590.11	$4,590.11	$0.00
2	10/3/2022	$4,588.17	$0.00	$0.00	$4,588.17	$4,588.17	$0.00
3	1/2/2023	$4,588.17	$0.00	$0.00	$4,588.17	$0.00	$4,588.17
4	3/6/2023	$4,588.17	$0.00	$0.00	$4,588.17	$0.00	$4,588.17
Total		**$18,354.62**	**$0.00**	**$0.00**	**$18,354.62**	**$9,178.28**	**$9,176.34**

Payment History

	Fiscal Year	Total Due	Total Paid	Amount Unpaid
	(2022 - 2023)	$18,354.62	$9,178.28	$9,176.34
	(2021 - 2022)	$17,994.77	$17,994.77	$0.00
	(2020 - 2021)	$17,993.15	$17,993.15	$0.00
	(2019 - 2020)	$17,993.15	$17,993.15	$0.00

Master Plan Policy Checklist

Special Use Permits & Major Project Reviews & Administrative Permits

PURPOSE

The purpose of a development checklist is to provide a list of questions that address whether a development proposal is in conformance with the goals and objectives of the 2006 Carson City Master Plan that are related to non-residential and multi-family residential development. This checklist is designed for developers, staff, and decision-makers and is intended to be used as a guide only.

Development Name: Lompa Ranch East

Reviewed By: Corey Dowell

Date of Review: October 4, 2022

DEVELOPMENT CHECKLIST

The following five themes are those themes that appear in the Carson City Master Plan and which reflect the community's vision at a broad policy level. Each theme looks at how a proposed development can help achieve the goals of the Carson City Master Plan. A check mark indicates that the proposed development meets the applicable Master Plan policy. The Policy Number is indicated at the end of each policy statement summary. Refer to the Comprehensive Master Plan for complete policy language.

CHAPTER 3: A BALANCED LAND USE PATTERN

The Carson City Master Plan seeks to establish a balance of land uses within the community by providing employment opportunities, a diverse choice of housing, recreational opportunities, and retail services.

Is or does the proposed development:

- ☑ Meet the provisions of the Growth Management Ordinance (1.1d, Municipal Code 18.12)?
- ☑ Use sustainable building materials and construction techniques to promote water and energy conservation (1.1e, f)?
- ☑ Located in a priority infill development area (1.2a)?
- ☑ Provide pathway connections and easements consistent with the adopted Unified Pathways Master Plan and maintain access to adjacent public lands (1.4a)?

- ☑ Protect existing site features, as appropriate, including mature trees or other character-defining features (1.4c)?
- ☑ At adjacent county boundaries or adjacent to public lands, coordinated with the applicable agency with regards to compatibility, access and amenities (1.5a, b)?
- ☑ In identified Mixed-Use areas, promote mixed-use development patterns as appropriate for the surrounding context consistent with the land use descriptions of the applicable Mixed-Use designation, and meet the intent of the Mixed-Use Evaluation Criteria (2.1b, 2.2b, 2.3b, Land Use Districts, Appendix C)?
- ☑ Meet adopted standards (e.g. setbacks) for transitions between non-residential and residential zoning districts (2.1d)?
- ☑ Protect environmentally sensitive areas through proper setbacks, dedication, or other mechanisms (3.1b)?
- ☑ Sited outside the primary floodplain and away from geologic hazard areas or follows the required setbacks or other mitigation measures (3.3d, e)?
- ☑ Provide for levels of services (i.e. water, sewer, road improvements, sidewalks, etc.) consistent with the Land Use designation and adequate for the proposed development (Land Use table descriptions)?
- ☑ If located within an identified Specific Plan Area (SPA), meet the applicable policies of that SPA (Land Use Map, Chapter 8)?

CHAPTER 4: EQUITABLE DISTRIBUTION OF RECREATIONAL OPPORTUNITIES

The Carson City Master Plan seeks to continue providing a diverse range of park and recreational opportunities to include facilities and programming for all ages and varying interests to serve both existing and future neighborhoods.

Is or does the proposed development:

- ☑ Provide park facilities commensurate with the demand created and consistent with the City's adopted standards (4.1b)?
- ☑ Consistent with the Open Space Master Plan and Carson River Master Plan (4.3a)?

CHAPTER 5: ECONOMIC VITALITY

The Carson City Master Plan seeks to maintain its strong diversified economic base by promoting principles which focus on retaining and enhancing the strong employment base, include a broader range of retail services in targeted areas, and include the roles of technology, tourism, recreational amenities, and other economic strengths vital to a successful community.

Is or does the proposed development:

- ☑ Encourage a citywide housing mix consistent with the labor force and non-labor force populations (5.1j)
- ☑ Encourage the development of regional retail centers (5.2a)
- ☑ Encourage reuse or redevelopment of underused retail spaces (5.2b)?
- ☑ Support heritage tourism activities, particularly those associated with historic resources, cultural institutions and the State Capitol (5.4a)?
- ☑ Promote revitalization of the Downtown core (5.6a)?
- ☑ Incorporate additional housing in and around Downtown, including lofts, condominiums, duplexes, live-work units (5.6c)?

CHAPTER 6: LIVABLE NEIGHBORHOODS AND ACTIVITY CENTERS

The Carson City Master Plan seeks to promote safe, attractive and diverse neighborhoods, compact mixed-use activity centers, and a vibrant, pedestrian-friendly Downtown.

Is or does the proposed development:

- ☑ Use durable, long-lasting building materials (6.1a)?
- ☑ Promote variety and visual interest through the incorporation of varied building styles and colors, garage orientation and other features (6.1b)?
- ☑ Provide variety and visual interest through the incorporation of well-articulated building facades, clearly identified entrances and pedestrian connections, landscaping and other features consistent with the Development Standards (6.1c)?
- ☑ Provide appropriate height, density and setback transitions and connectivity to surrounding development to ensure compatibility with surrounding development for infill projects or adjacent to existing rural neighborhoods (6.2a, 9.3b 9.4a)?
- ☑ If located in an identified Mixed-Use Activity Center area, contain the appropriate mix, size and density of land uses consistent with the Mixed-Use district policies (7.1a, b)?
- ☑ If located Downtown:
  - ☑ Integrate an appropriate mix and density of uses (8.1a, e)?
  - ☑ Include buildings at the appropriate scale for the applicable Downtown Character Area (8.1b)?
  - ☑ Incorporate appropriate public spaces, plazas and other amenities (8.1d)?
- ☑ Incorporate a mix of housing models and densities appropriate for the project location and size (9.1a)?

CHAPTER 7: A CONNECTED CITY

The Carson City Master Plan seeks promote a sense of community by linking its many neighborhoods, employment areas, activity centers, parks, recreational amenities and schools with an extensive system of interconnected roadways, multi-use pathways, bicycle facilities, and sidewalks.

Is or does the proposed development:

- ☑ Promote transit-supportive development patterns (e.g. mixed-use, pedestrian-oriented, higher density) along major travel corridors to facilitate future transit (11.2b)?
- ☑ Maintain and enhance roadway connections and networks consistent with the Transportation Master Plan (11.2c)?
- ☑ Provide appropriate pathways through the development and to surrounding lands, including parks and public lands, consistent with the Unified Pathways Master Plan (12.1a, c)?

Call 811
Call before you Dig
Avoid cutting underground utility lines. It's costly.

GRAPHIC SCALE
60 0 30 60 120 240
(IN FEET)
1 inch = 60 ft.

DRAWN BY	CHECK BY	REVISIONS	DATE

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Construction Managers • Environmental Scientists • Landscape Architects • Planners

LOMPA RANCH
CARSON CITY, NEVADA
EXISTING SITE LAYOUT

PROFESSIONAL ENGINEER STATE OF NEVADA
TRAVIS J. SULEZICH
Exp: 6-30-24
CIVIL
No. 24960
10/4/22

PROJ. MGR.:	TJS
PROJ. ASSOC.:	AFG
DRAWN BY:	AFG
DATE:	OCT 2022
SCALE:	AS SHOWN

SHEET
1 OF 8
TANCCNV01

PENDING AGENCY APPROVAL

GRAPHIC SCALE

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(IN FEET)
1 inch = 60 ft.

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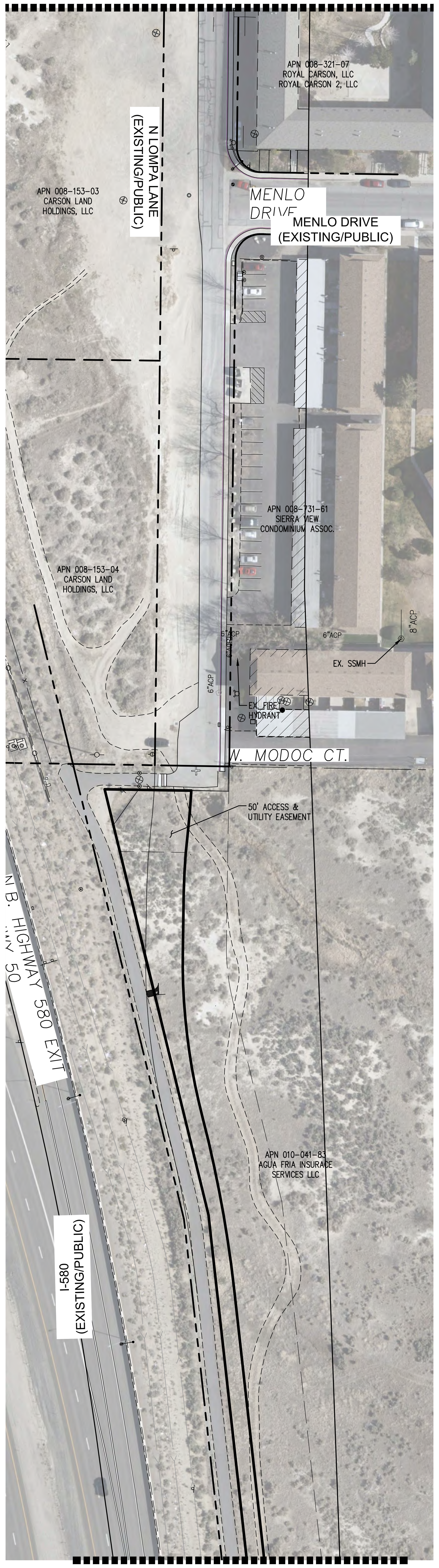
N

MATCHLINE
SEE RIGHT



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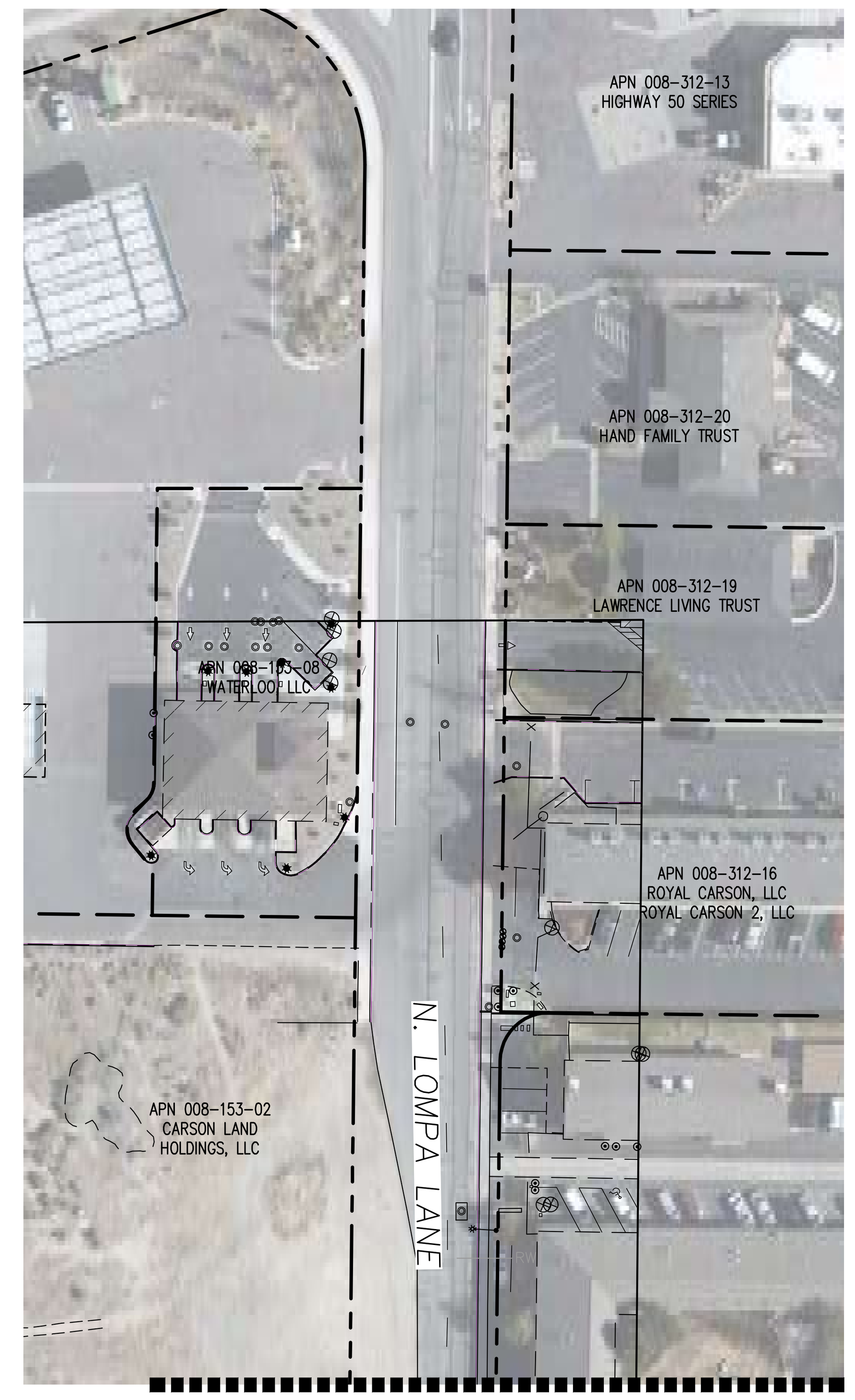

MATCHLINE
SEE LEFT

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Construction Managers • Environmental Scientists • Landscape Architects • Planners

DATE	REVISIONS	DRAWN BY	CHECK BY

LOMPA RANCH

CARSON CITY, NEVADA

EXISTING SITE LAYOUT

PROFESSIONAL ENGINEER STATE OF NEVADA
TRAVIS J. SULEZICH
Exp: 6-30-24
CIVIL
No. 24960
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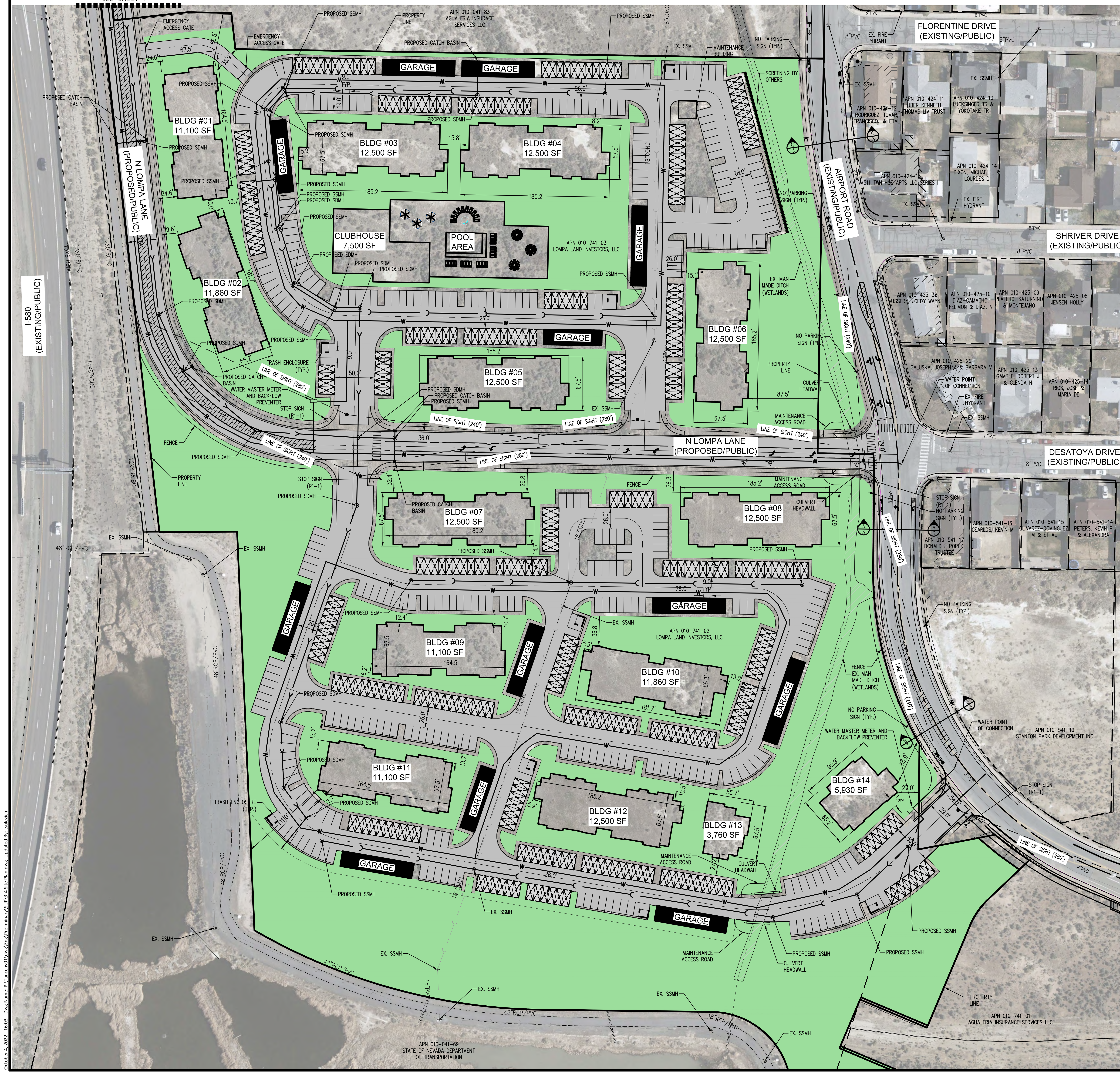
PROJ. ASSOC.:	AFG
DRAWN BY:	AFG
DATE:	OCT 2022
SCALE:	AS SHOWN

SHEET
2 OF 8
TANCCNV01

PENDING AGENCY APPROVAL

October 4, 2022 - 15:30 Dwg Name: P:\Tanccnv01\dwg\Eng\Preliminary\SUP\L-2 Existing Site Layout.dwg Updated By: tsulezich



GRAPHIC SCALE

(IN FEET)
1 inch = 60 ft.

306 UNIT MULTI-FAMILY RESIDENTIAL PROJECT	
TOTAL PARCEL SIZE:	23.95 AC
COMMON AREA/OPEN SPACE:	10.43 AC
AC PAVEMENT:	379,471 SF
CARPORT PARKING PROVIDED:	331
GARAGE SPACES PROVIDED:	120
PARKING STALLS PROVIDED:	315
TOTAL PARKING PROVIDED:	766
PARKING STALLS REQUIRED:	765

NOTES

1. ALL LANDSCAPING WILL BE LOCATED IN THE AREAS DESIGNATED OPEN SPACE AND AMENITY SPACE.
2. ALL SANITARY SEWER AND STORM DRAIN LINES WITHIN THE PROJECT SITE TO BE PRIVATE LINES WITHIN THE PRIVATE DRIVE AISLES AS SHOWN ON THE PLANS AND MAINTAINED BY THE OWNERS EXCEPT THE EXISTING PUBLIC SANITARY SEWER LOCATED WITHIN THE 10 FOOT EASEMENT THAT GOES THROUGH THE SITE AND THE UTILITIES LOCATED WITHIN N LOMPA LANE.
3. DEVELOPMENT WILL NEED TO INCORPORATE CARSON CITY TRANSIT ROUTE PLAN WHICH INCLUDES TRANSIT STOPS ALONG AIRPORT ROAD AND/OR N. LOMPA LANE WITH COVERED SHELTER AND LIGHTING. CONTACT CARSON CITY TO DISCUSS PROPOSED LOCATIONS.
4. FDC AND FIRE SERVICES TO BE INCLUDED AND SHOWN WITH FINAL PLANS. THERE MUST BE A FIRE HYDRANT WITHIN 100' OF THE FDC

HATCH LEGEND

- A.C. PAVEMENT AREA
- COMMON AREA/OPEN SPACE
- EX. MAN MADE DITCH

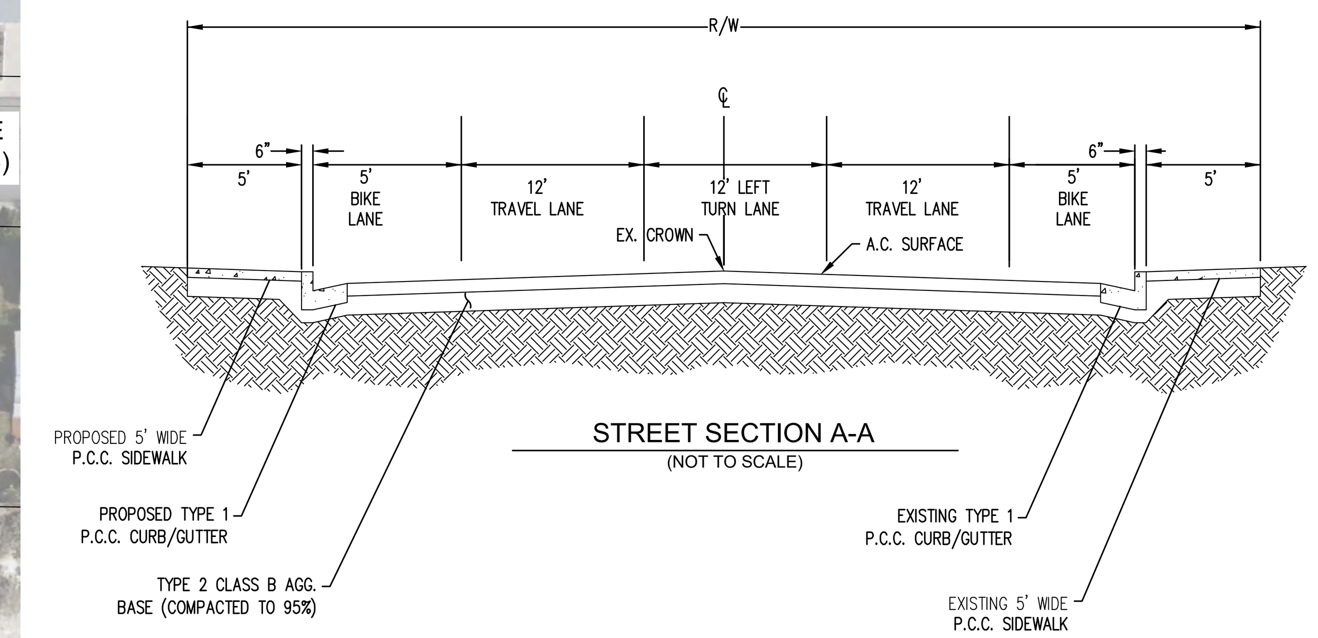
LEGEND

- CARPORTS
- GARAGES
- TRASH ENCLOSURES

UTILITY LEGEND

EXISTING / PROPOSED

- STORM SEWER
- SANITARY SEWER MAIN
- SANITARY SEWER LATERAL
- WATER MAIN
- SANITARY MANHOLE
- STORM MANHOLE
- CATCH BASIN
- FIRE RISER ROOM



STREET SECTION A-A
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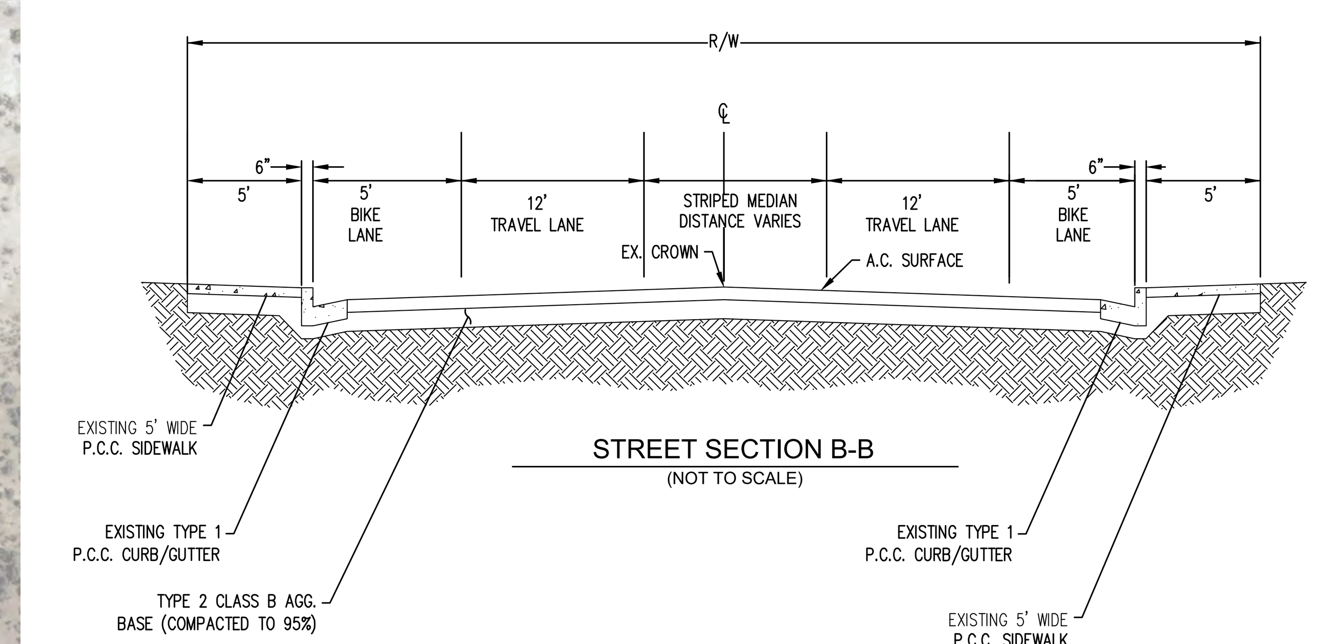

STREET SECTION B-B
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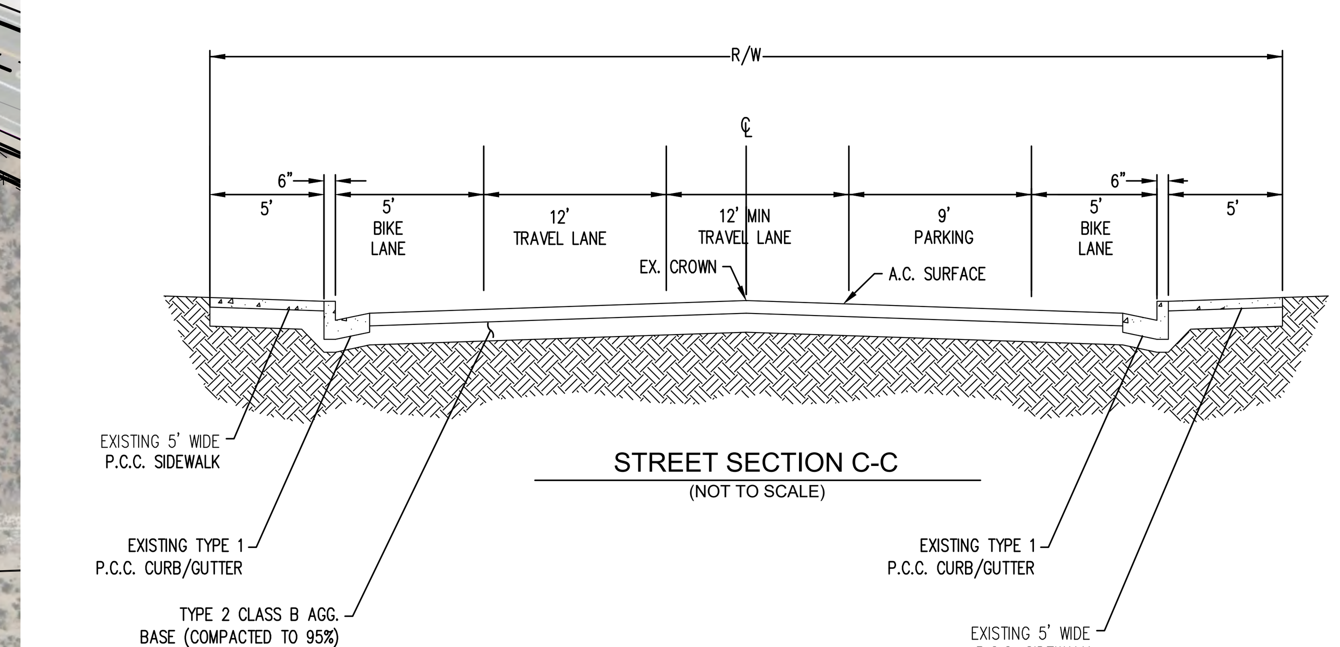

STREET SECTION C-C
(NOT TO SCALE)

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241 Ridge Street, Suite 400, Reno, NV 89501 ph:775-746-3500 fx:775.746.3520 manhard.com
Civil Engineers • Surveyors • Water Resource Engineers • Water & Wastewater Engineers
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LOMPA RANCH
CARSON CITY, NEVADA
SITE PLAN

PROFESSIONAL ENGINEER STATE OF NEVADA
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PROJ. MGR.:	TJS
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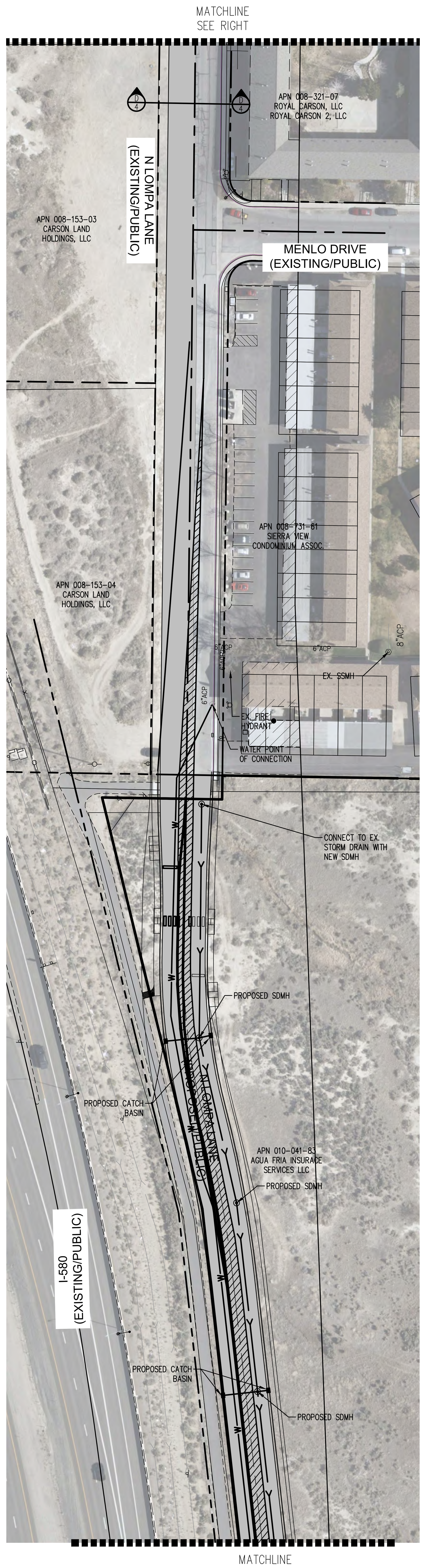
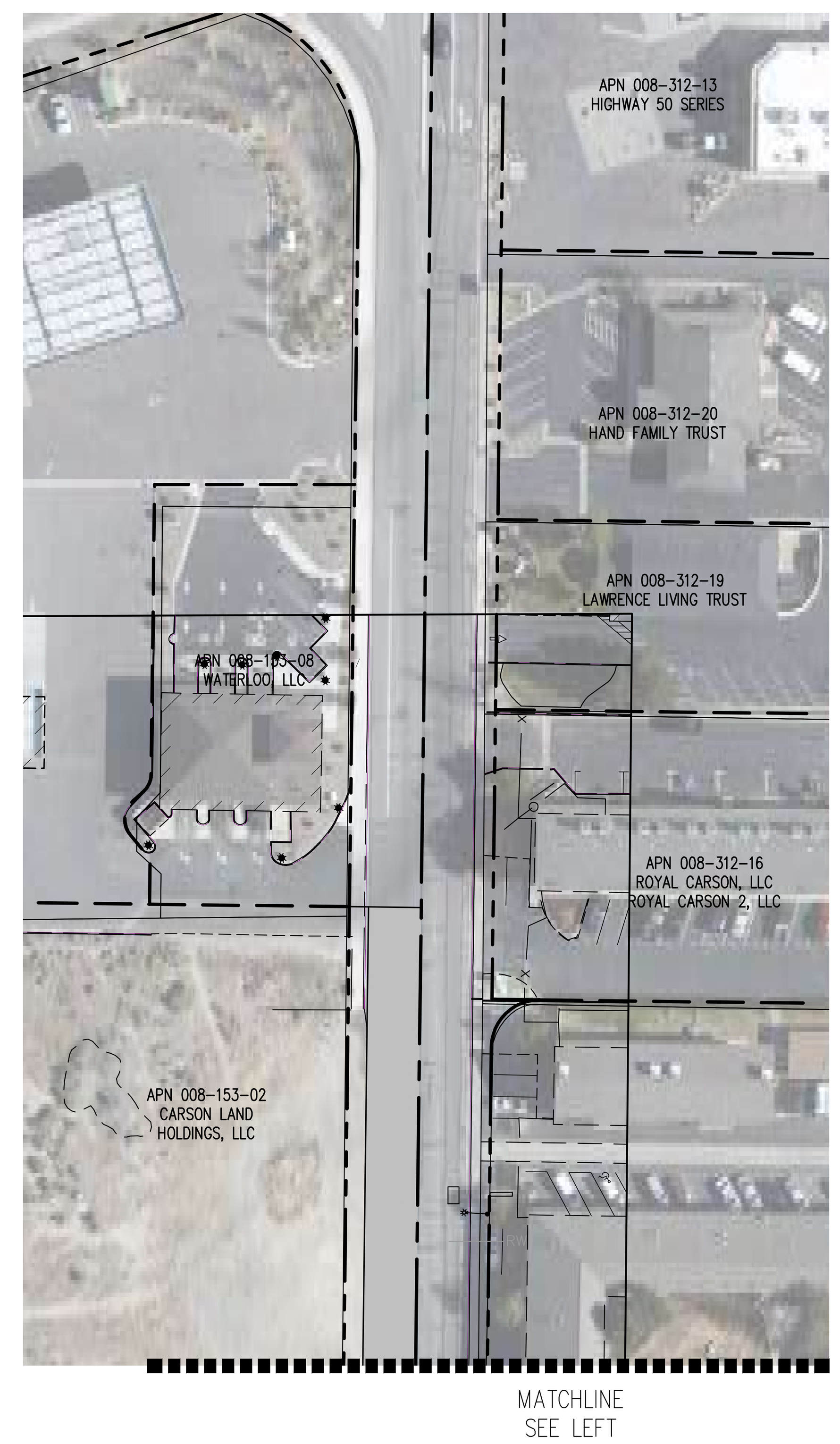
SHEET 3 OF 8
TANCCNV01

PENDING AGENCY APPROVAL





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NOTES

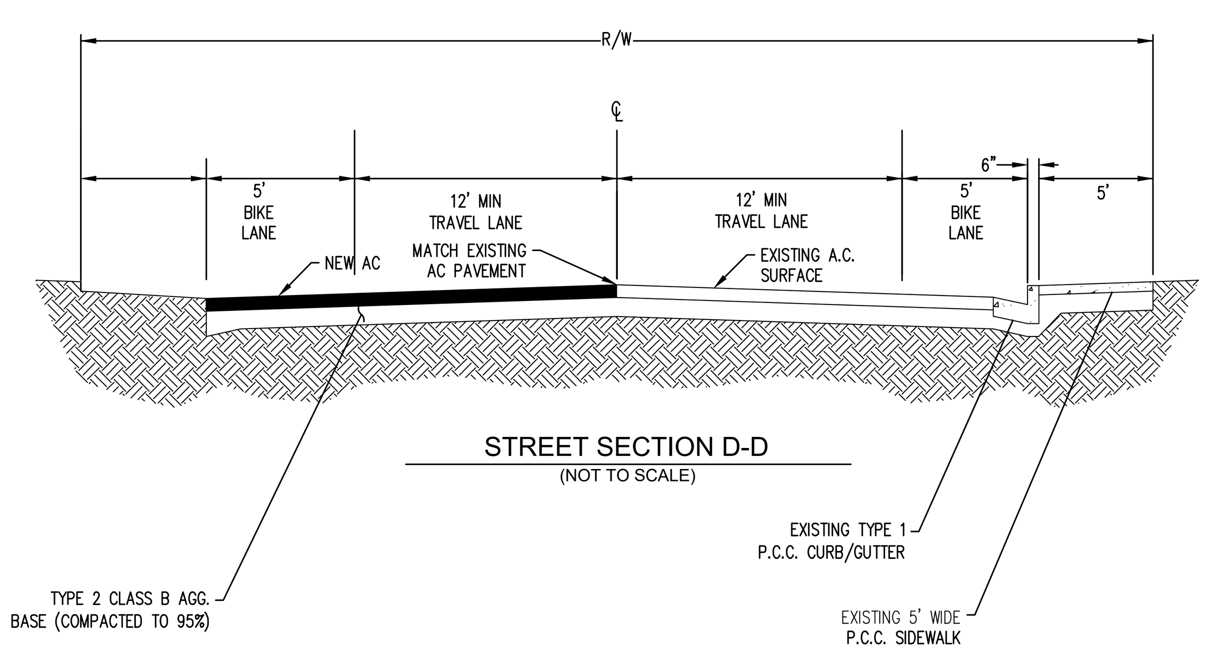
1. ALL LANDSCAPING WILL BE LOCATED IN THE AREAS DESIGNATED OPEN SPACE AND AMENITY SPACE.
2. ALL SANITARY SEWER AND STORM DRAIN LINES WITHIN THE PROJECT SITE TO BE PRIVATE LINES WITHIN THE PRIVATE DRIVE AISLES AS SHOWN ON THE PLANS AND MAINTAINED BY THE OWNERS EXCEPT THE EXISTING PUBLIC SANITARY SEWER LOCATED WITHIN THE 10 FOOT EASEMENT THAT GOES THROUGH THE SITE AND THE UTILITIES LOCATED WITHIN N LOMPA LANE.
3. DEVELOPMENT WILL NEED TO INCORPORATE CARSON CITY TRANSIT ROUTE PLAN WHICH INCLUDES TRANSIT STOPS ALONG AIRPORT ROAD AND/OR N. LOMPA LANE WITH COVERED SHELTER AND LIGHTING. CONTACT CARSON CITY TO DISCUSS PROPOSED LOCATIONS.
4. FDC AND FIRE SERVICES TO BE INCLUDED AND SHOWN WITH FINAL PLANS. THERE MUST BE A FIRE HYDRANT WITHIN 100' OF THE FDC

HATCH LEGEND

A.C. PAVEMENT AREA

UTILITY LEGEND

EXISTING		PROPOSED
	STORM SEWER	
	SANITARY SEWER MAIN	
	SANITARY SEWER LATERAL	
W	WATER MAIN	W
	SANITARY MANHOLE	
	STORM MANHOLE	
	CATCH BASIN	
	FIRE RISER ROOM	F



STREET SECTION D-D
(NOT TO SCALE)

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241 Ridge Street, Suite 400, Reno, NV 89501 ph:775-746-3500 fx:775-746-3520 manhard.com
Civil Engineers • Surveyors • Water Resource Engineers • Water & Wastewater Engineers
Construction Managers • Environmental Scientists • Landscape Architects • Planners

LOMPA RANCH
CARSON CITY, NEVADA
SITE PLAN

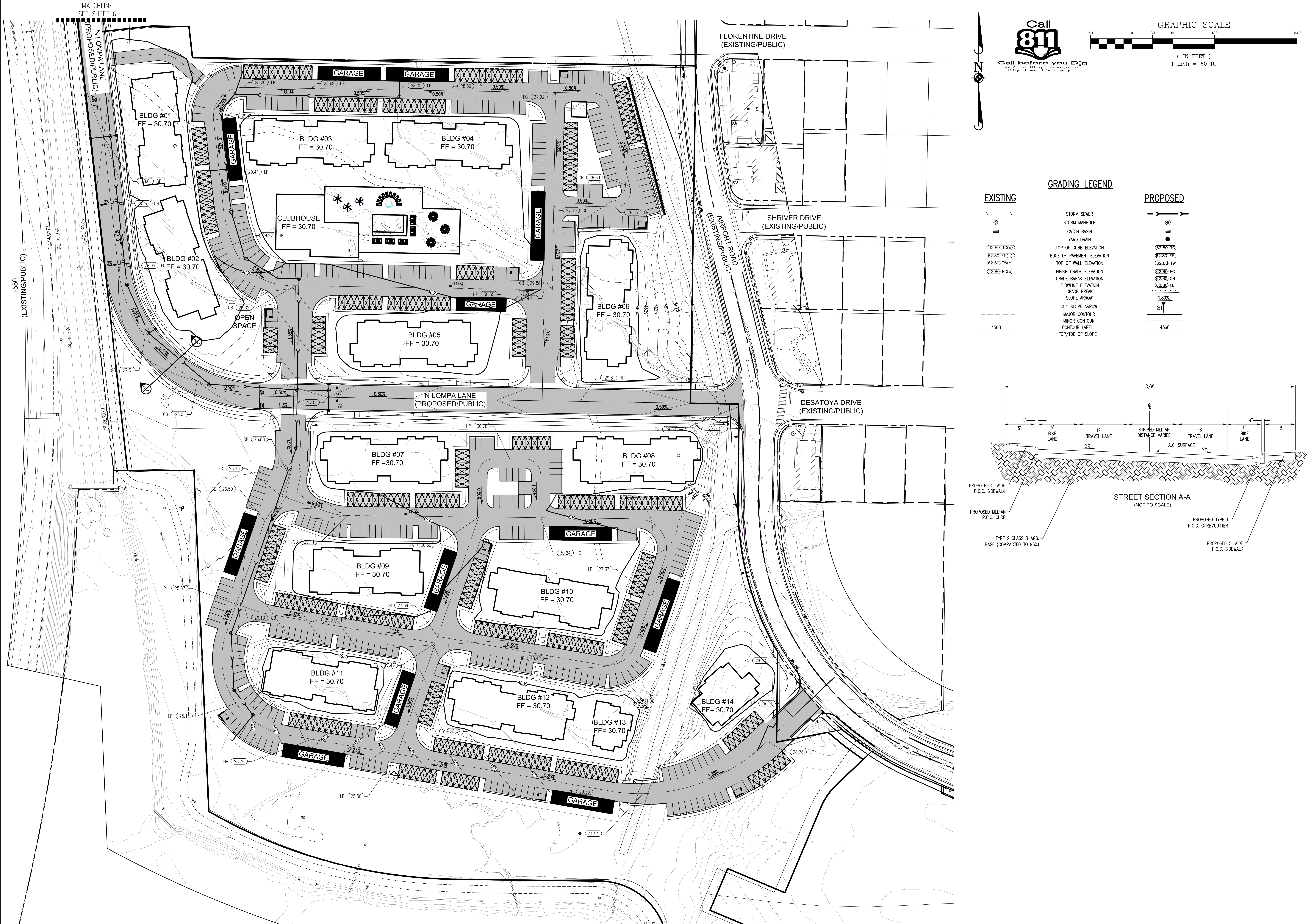
DATE	REVISIONS	DRAWN BY	CHECK BY

PROFESSIONAL ENGINEER STATE OF NEVADA
TRAVIS J. SULEZICH
Exp: 6-30-24
CIVIL
No. 24960
10/4/22

PROJ. MGR.:	TJS
PROJ. ASSOC.:	AFG
DRAWN BY:	---
DATE:	OCT 2022
SCALE:	AS SHOWN

SHEET
4 OF 8
TANCCNV01

PENDING AGENCY APPROVAL



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DRAWN BY | CHECK BY | REVISIONS | DATE

LOMPA RANCH
CARSON CITY, NEVADA
GRADING PLAN

PROFESSIONAL ENGINEER - STATE OF NEVADA
TRAVIS J. SULEZICH
Exp: 6-30-24
CIVIL
No. 24960
10/4/22

PROJ. MGR.: TJS
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DATE: OCT 2022
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SHEET 5 OF 8
TANCCNV01

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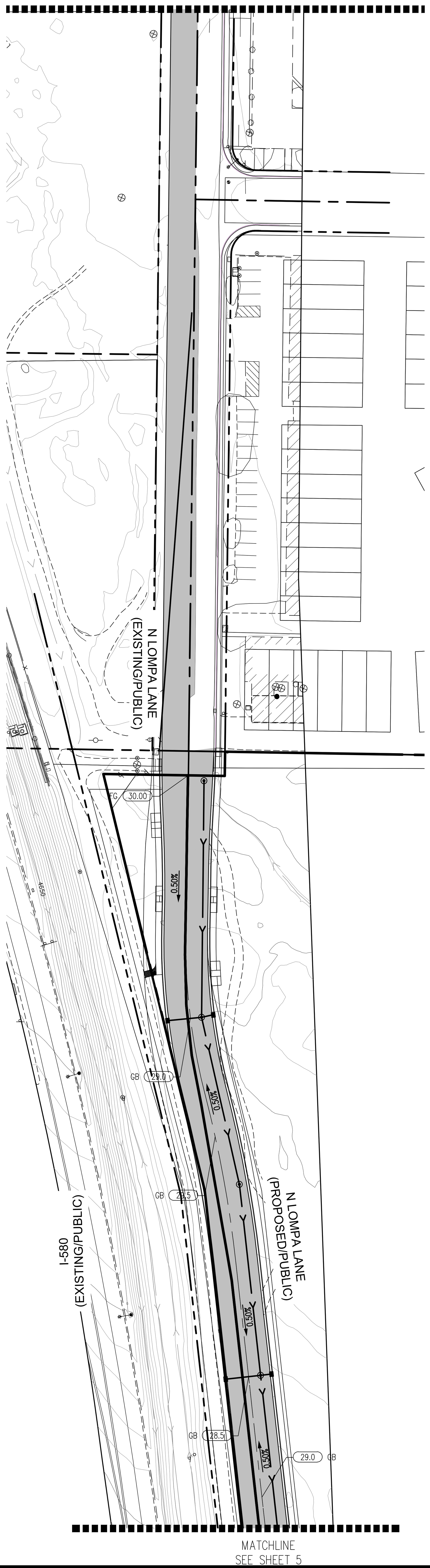

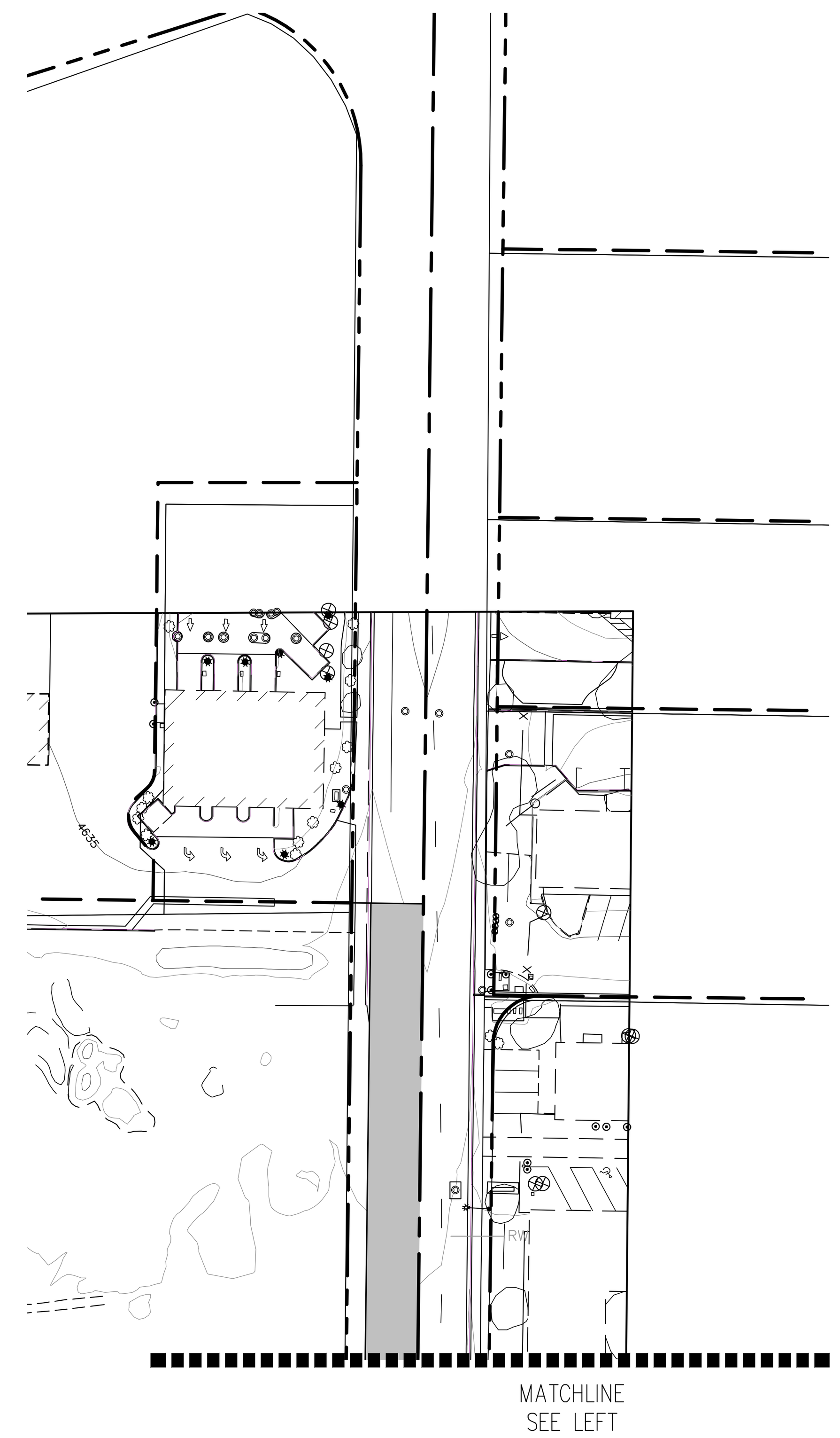

Call 811
Call before you Dig
Avoid cutting underground utility lines. It's costly.

GRAPHIC SCALE
60 0 30 60 120 240
(IN FEET)
1 inch = 60 ft.

GRADING LEGEND

EXISTING		PROPOSED
	STORM SEWER	
	STORM MANHOLE	
	CATCH BASIN	
	YARD DRAIN	
62.80 TC(e)	TOP OF CURB ELEVATION	62.80 TC
62.80 EP(e)	EDGE OF PAVEMENT ELEVATION	62.80 EP
62.80 TW(e)	TOP OF WALL ELEVATION	62.80 TW
62.80 FG(e)	FINISH GRADE ELEVATION	62.80 FG
	GRADE BREAK ELEVATION	62.80 GB
	FLOWLINE ELEVATION	62.80 FL
	GRADE BREAK	
	SLOPE ARROW	1.80%
	X:1 SLOPE ARROW	2:1
	MAJOR CONTOUR	
	MINOR CONTOUR	
4560	CONTOUR LABEL	4560
	TOP/TOE OF SLOPE	

GRADING NOTES

1. FOR NORTH LOMPA LANE, SAWCUT CLEAN LINE TO MATCH EXISTING GRADE FOR NEW AC PAVEMENT. GRADING FOR NEW AC PAVEMENT TO BE DESIGNED AT FINAL DESIGN. FULL STREET RECONSTRUCTION MAY BE REQUIRED TO ACCOMMODATE GRADES.

DATE	REVISIONS	DRAWN BY	CHECK BY

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LOMPA RANCH
CARSON CITY, NEVADA
GRADING PLAN

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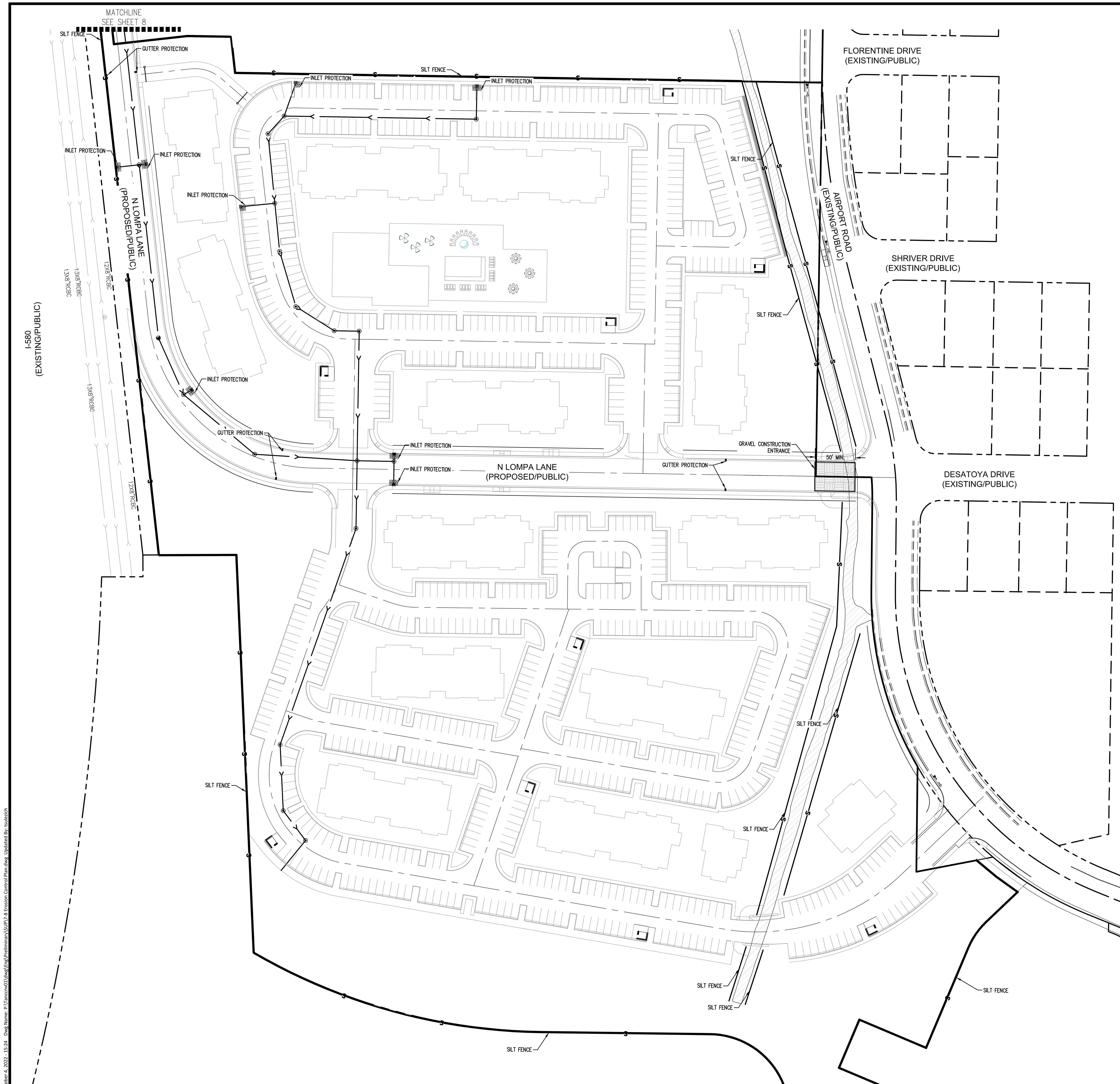
SHEET 6 OF 8
TANCCNV01

PENDING AGENCY APPROVAL



Call 811
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Avoid cutting underground utility lines. It's costly.

GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)
1 inch = 60 ft.

N

EROSION CONTROL NOTES

1. TEMPORARY SEDIMENT AND EROSION CONTROL DEVICES TO BE CONSTRUCTED PRIOR TO OR CONCURRENT WITH ANY GRADING ACTIVITY.
2. INSTALL AND MAINTAIN TEMPORARY SILT CONTROL STRUCTURES AT EXISTING STORM DRAIN INLETS RECEIVING RUNOFF FROM THE CONSTRUCTION SITE.
3. EQUIPMENT AND VEHICLES SHALL NOT TRAVEL BEYOND THE LIMITS OF GRADING TO PREVENT TRACKING OF DIRT INTO TRAVEL WAY.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATE PLACEMENT OF TEMPORARY SEDIMENT AND EROSION CONTROL DEVICES. THE LAYOUT SHOWN ON THESE PLANS ARE INTENDED AS GENERAL GUIDELINE ONLY.
5. TEMPORARY BMPS SHALL COMPLY WITH THE TRUCKEE MEADOWS CONSTRUCTION SITE BEST MANAGEMENT PRACTICES HANDBOOK – FEBRUARY 2015 UPDATE.
6. CONTRACTOR SHALL ENSURE THAT ACCESS TO AREAS NOT UNDER CONSTRUCTION IS MAINTAINED AT ALL TIMES.

EROSION CONTROL LEGEND

GUTTER PROTECTION LOCATIONS
GRAVEL BAGS SHALL BE USED FOR PROTECTION AT ALL LOCATIONS SPECIFIED ON THE PLANS. ALL PROTECTION MEASURES SHALL BE INSTALLED PER THE MANUFACTURER'S SPECIFICATIONS.

SILT FENCE

INLET PROTECTION LOCATIONS
GRAVEL BAGS AND/OR FIBER ROLLS SHALL BE USED FOR PROTECTION AT ALL LOCATIONS SPECIFIED ON THE PLANS. SILT SACKS SHALL BE USED IN CONJUNCTION WITH GRAVEL BAGS AT ALL STORM DRAIN INLETS IN PAVED AREAS. ALL PROTECTION MEASURES SHALL BE INSTALLED PER THE MANUFACTURER'S SPECIFICATIONS.

GRAVEL CONSTRUCTION ENTRANCE
GRAVEL CONSTRUCTION ENTRANCE SHALL BE INSTALLED PRIOR TO COMMENCEMENT OF GRADING AND SHALL CONSIST OF 2–4" NOMINAL SIZE GRAVEL PLACED OVER AN AREA NO SMALLER THAN 15' WIDE, 50' LONG, AND 12" DEEP. ENTRANCE SPECIFICATIONS SHALL BE MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT. ENTRANCE SHALL BE REMOVED PRIOR TO PLACING BASE FOR PAVING.

DATE	REVISIONS	DRAWN BY	CHECK BY

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LOMPA RANCH
CARSON CITY, NEVADA
EROSION CONTROL PLAN

PROFESSIONAL ENGINEER STATE OF NEVADA
TRAVIS J. SULEZICH
Exp: 6-30-24
CIVIL
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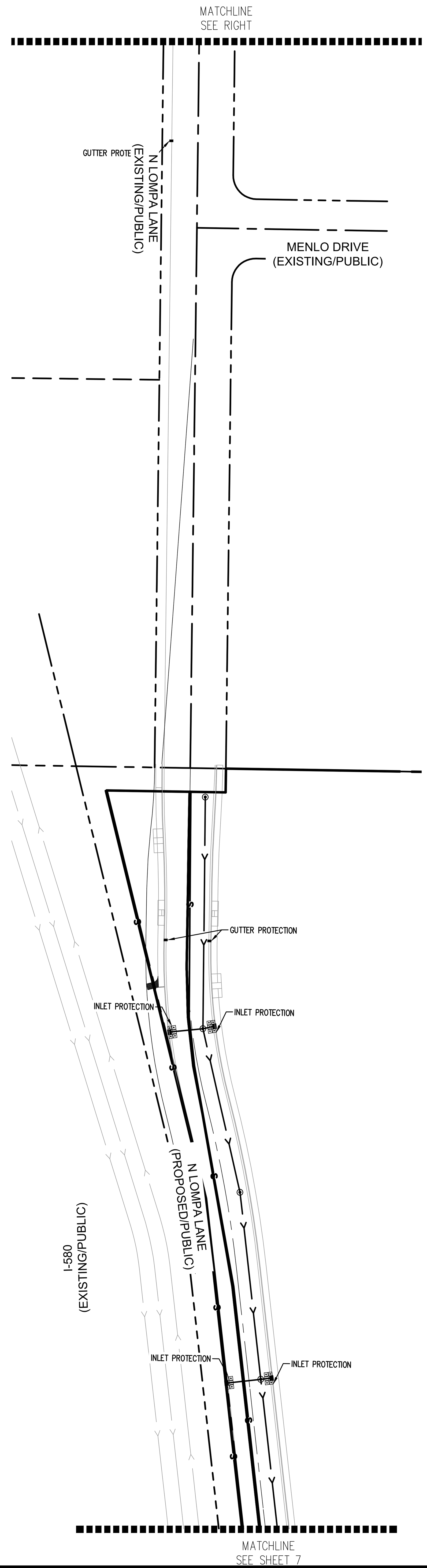
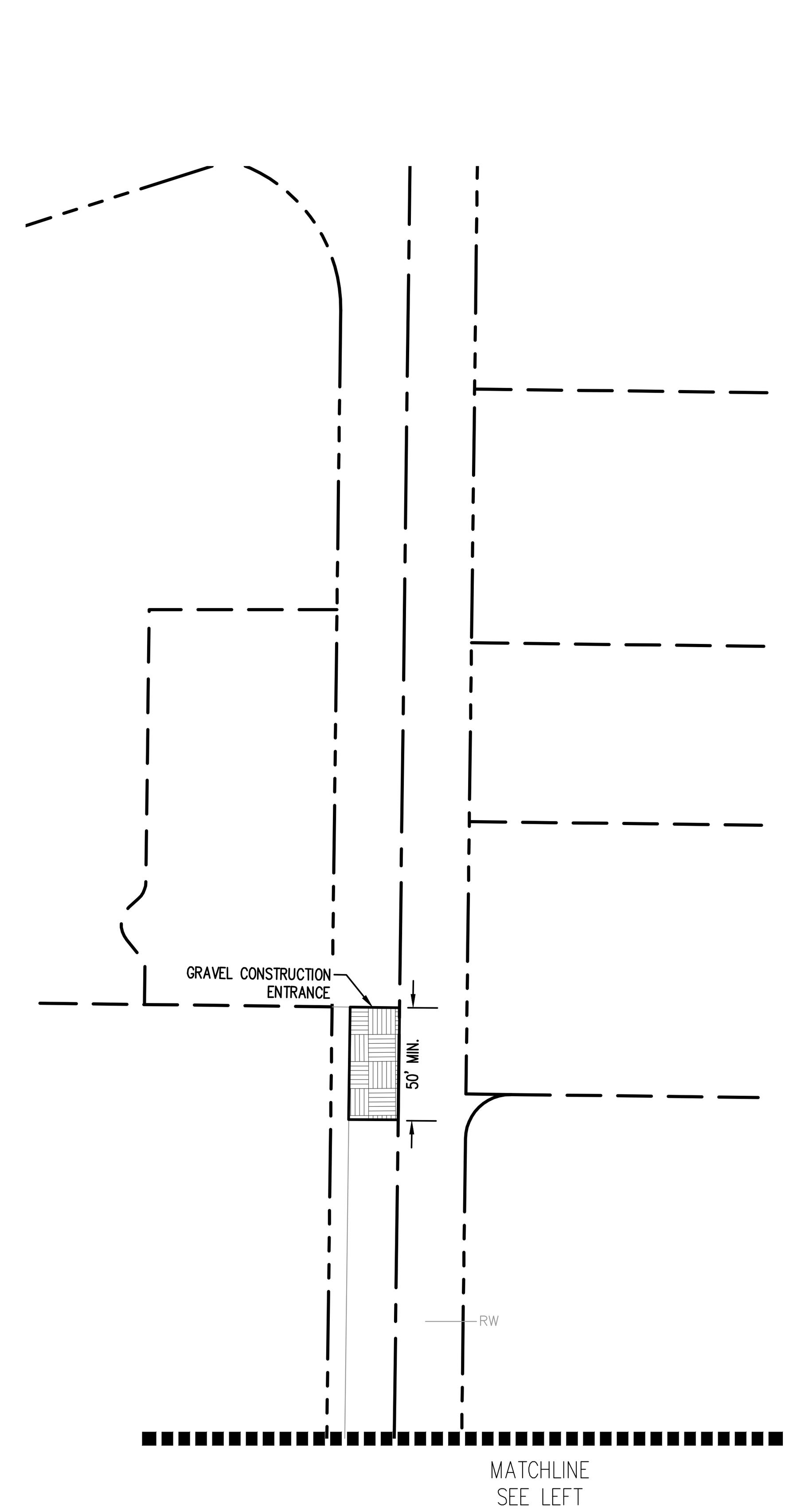
SHEET
7 OF 8
TANCCNV01

PENDING AGENCY APPROVAL





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DATE	REVISIONS	DRAWN BY	CHECK BY

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LOMPA RANCH
CARSON CITY, NEVADA
EROSION CONTROL PLAN

PROFESSIONAL ENGINEER STATE OF NEVADA
TRAVIS J. SULEZICH
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PROJ. MGR.:	TJS
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DATE:	OCT 2022
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SHEET 8 OF 8
TANCCNV01

PENDING AGENCY APPROVAL

October 4, 2022 - 15:24 Dwg Name: P:\Tanccnv01\dwg\Eng\Preliminary\SUP\7-8 Erosion Control Plan.dwg Updated By: tsulezich

AMENITY LEGEND

- TREES
- PICNIC AREAS (GROUP)
- E — ADA EXERCISE STATIONS
- P — PET WASTE STATIONS
- B — BENCHES
- PASSIVE PARK AREAS

GENERAL NOTE

PLAN IS CONCEPTUAL AND IS INTENDED TO GIVE A GENERAL DEPICTION OF POTENTIAL AMENITY ELEMENTS THAT COULD BE INCORPORATED INTO THE PROJECT.

L.A. StudioNevada
the landscape architecture studio
1552 C Street
Sparks, NV 89431
(775) 323-2223
NV RLA #440
www.lastudionevada.com

REGISTERED LANDSCAPE ARCHITECT
RYAN HANSEN
440
9/30/22
Expires: 6/30/2023
STATE OF NEVADA

Nevada

Park/Amenity Concept Plan
LOMPA RANCH EAST
Tanamera Construction, LLC

Carson City

No.	Revision Date

LA No: 071-584-04-22
Designed: RAH
Drawn: KMK
Checked: RAH
Date: 9/30/2022

Sheet L1 of 1

PLANT LEGEND

- ORNAMENTAL TREES
- DECIDUOUS SHADE TREES
- STREET TREES
- EVERGREEN TREES
- COMMON AREA LANDSCAPE
- PASSIVE PARK AREAS
- AMENITY AREAS
  FINAL LOCATIONS AND ELEMENTS TO BE CHOSEN DURING FINAL DESIGN. AREAS COULD INCLUDE ONE OR MORE OF THE FOLLOWING:
  - ADA EXERCISE STATIONS
  - BENCHES
  - BBQ/PICNIC AREAS
  - COMMUNITY GARDEN/ORCHARD
  - DOG AREA & PET STATION
  - MULTI-USE TRAILS
  - PLAY AREAS

LANDSCAPE DATA

SITE AREA: 1,043,262 SQ FT (23.95 ACRES)
JURISDICTION: CARSON CITY, CC MPR-2022-0196 AND THE SPA HANDBOOK
LOMPA RANCH NORTH SPECIFIC PLAN
ZONING: MFA & SF6 (MULTI-FAMILY & SINGLE FAMILY 6)
APNS: 010-741-02 & 03

REQUIRED OPEN SPACE = 76,500 SQ FT (1.76 ACRES)
- (250 SQ FT PER UNIT (306 UNITS PROVIDED)

POVIDED OPEN SPACE
- 76,500 SQ FT MIN.

REQUIRED LANDSCAPE AREA = 75,894 SQ FT MIN.
- (20% OF IMPERVIOUS SITE AREA (379,471 SQ FT))

PROVIDED LANDSCAPE AREA = 75,894 SQ FT MIN.

REQUIRED TREES = 275
- ONE TREE PER 400 SQ FT OF REQUIRED LANDSCAPE AREA = 190
- ONE TREE PER 30 LN SQ FT OF STREET FRONTAGE = 85
  LOMPA LANE = 61
  AIRPORT ROAD = 24

INCLUDES
- ONE TREE PER 10 PARKING SPACES (798 SPACES PROVIDED) = 80

REQUIRED SHRUBS = 1,648 MIN.
- (6 SHRUBS PER PROPOSED TREE, MIN.)

GENERAL NOTES

1. ALL PLANTING AND IRRIGATION SHALL BE INSTALLED PER LOCAL GOVERNING CODES.
2. TREES
   - DECIDUOUS TREES SHALL HAVE A MINIMUM CALIPER OF 2 INCHES.
   - EVERGREEN TREES SHALL HAVE A MINIMUM HEIGHT OF 6 FEET.
   - ADDITIONAL TREES, BEYOND THOSE REQUIRED BY CODE, MAY BE REDUCED IN SIZE AT INSTALLATION AND PROVIDED AT THE DISCRETION OF THE OWNER.
3. FINAL PLANT SELECTION AND LAYOUT WILL BE BASED ON SOUND HORTICULTURAL PRACTICES RELATING TO MICRO-CLIMATE, SOIL, AND WATER REGIMES. ALL TREES WILL BE STAKED SO AS TO REMAIN UPRIGHT AND PLUMB FOLLOWING INSTALLATION. PLANT SIZE AND QUALITY AT TIME OF PLANTING WILL BE PER THE AMERICAN STANDARD FOR NURSERY STOCK (ANSI Z60.1-1990).
4. ALL SHRUB BEDS WILL RECEIVE 3" DEPTH MULCH WITH WEED CONTROL.
5. ALL LANDSCAPING WILL BE AUTOMATICALLY IRRIGATED. CONTAINER PLANTINGS WILL BE DRIP IRRIGATED BASED ON THE SPECIFIC HORTICULTURAL REQUIREMENTS OF EACH SPECIES. A REDUCED-PRESSURE-TYPE BACKFLOW PREVENTER WILL BE PROVIDED ON THE IRRIGATION SYSTEM AS REQUIRED PER CODE.
6. PLANTING PLAN IS CONCEPTUAL. PLANT QUANTITIES INDICATED ARE PER CARSON CITY CODE REQUIREMENTS. PLANT LOCATIONS, FINAL SPECIES SELECTION, AND SIZE AT PLANTING SHALL BE DETERMINED DURING DEVELOPMENT OF FINAL CONSTRUCTION DOCUMENTS.
7. AMENITIES AND AMENITY AREAS ARE CONCEPTUAL. FINAL SELECTION SHALL BE DETERMINED DURING DEVELOPMENT OF FINAL CONSTRUCTION DOCUMENTS.
8. THE DEVELOPMENT WILL COMPLY WITH THE GENERAL STANDARDS FOR PARKS AS OUTLINED IN THE SPA HANDBOOK.

L.A. Studio Nevada
the landscape architecture studio
1552 C Street Sparks, NV 89431 (775) 323-2223 NV RLA #440
www.lastudionevada.com

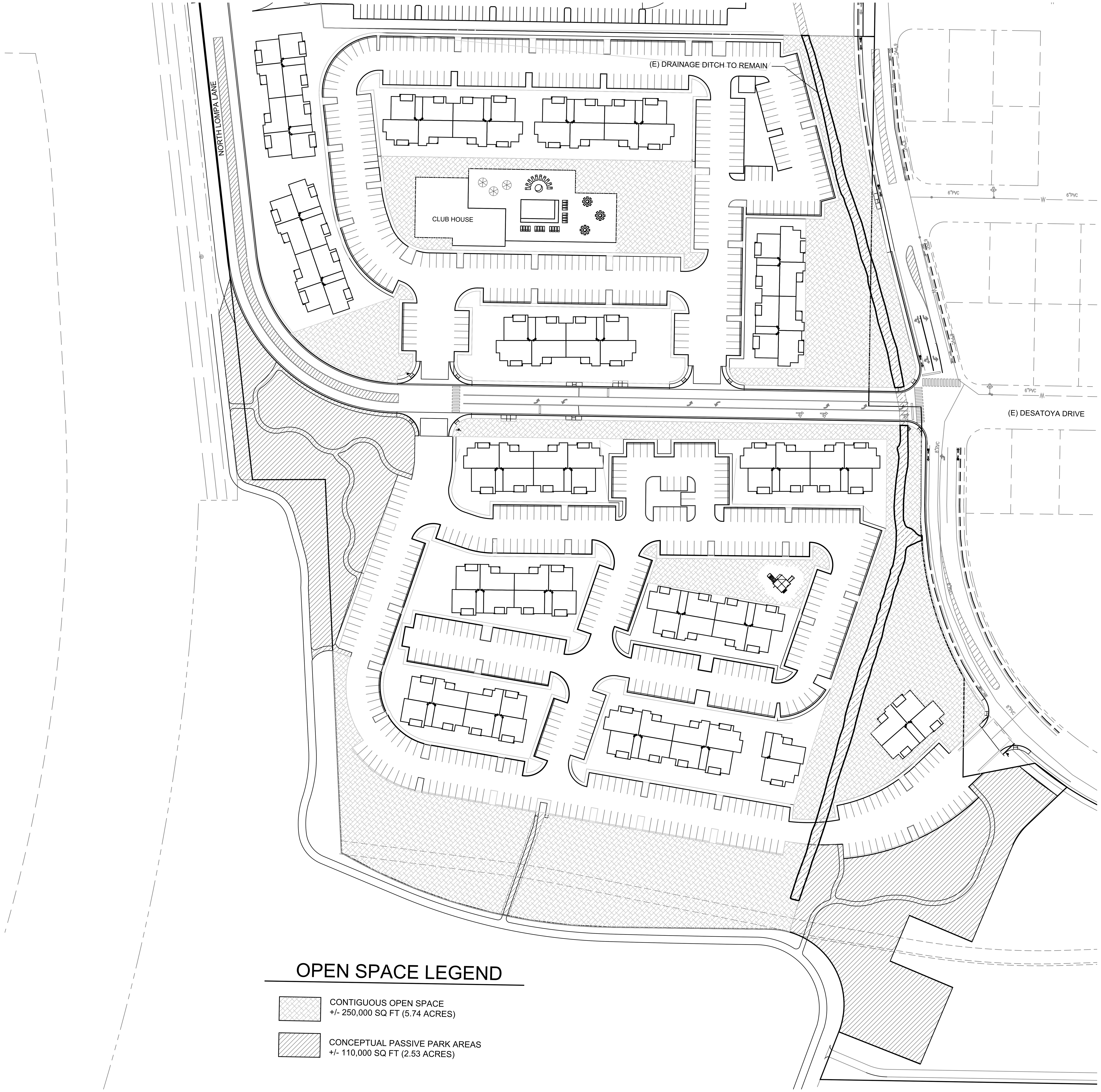
REGISTERED LANDSCAPE ARCHITECT
RYAN HANSEN
440
9/30/22
Expires: 6/30/2023
STATE OF NEVADA

Preliminary Landscape Plan
LOMPA RANCH EAST
Tanamera Construction, LLC
Carson City Nevada

No.	Revision Date

LA No: 071-584-04-22
Designed: KRD
Drawn: KRD
Checked: RAH
Date: 5/--/22

Sheet L1 of 1



OPEN SPACE LEGEND

CONTIGUOUS OPEN SPACE
+/- 250,000 SQ FT (5.74 ACRES)

CONCEPTUAL PASSIVE PARK AREAS
+/- 110,000 SQ FT (2.53 ACRES)

GENERAL NOTE

PLAN IS CONCEPTUAL AND IS INTENDED TO GIVE A GENERAL DEPICTION OF POTENTIAL OPEN SPACE AREAS THAT COULD BE INCORPORATED INTO THE PROJECT. OPEN SPACE BOUNDARIES WILL BE DETERMINED DURING FINAL DESIGN.

0' 70' 140' 210'

Scale in Feet

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REGISTERED LANDSCAPE ARCHITECT
RYAN HANSEN
440
9/30/22
Expires: 6/30/2023
STATE OF NEVADA

Open Space Exhibit

LOMPA RANCH EAST

Tanamera Construction, LLC

Carson City

Nevada

No.	Revision Date

LA No: 077-584-04-22
Designed: KRD
Drawn: KRD
Checked: RAH
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Sheet L1 of 1

O. 775.823.2900
One East Liberty Street
Suite 300
Reno, NV 89501-2128
lewisroca.com

Garrett D. Gordon
Partner
775.321.3420 direct
775.823.2929 fax
ggordon@lewisroca.com

LEWIS ROCA

October 4, 2022

Hope Sullivan
Community Development Director
Carson City Planning Division
201 N. Carson Street
Carson City, NV 89701

Dear Ms. Sullivan:

This letter is written on behalf of Tanamera Construction, LLC (the "Applicant") in regards to the enclosed special use permit application (the "Application") for the development of a portion of Lompa Ranch North that lies east of Interstate 580. The purpose of this letter is to confirm our August 16th conversation that this Application includes a 3-acre neighborhood park site on the Applicant's subject property (the "Alternative Park Amenity Concept Plan") in lieu of the 3-acre neighborhood park site as depicted on the land use plan in the Lompa Ranch North Specific Plan (the "Land Use Plan Park Site"). This modification is necessary since the Applicant does not own the Land Use Plan Park Site and the owner of Land Use Plan Park Site is not participating in the design or construction of a 3-acre park on the Land Use Plan Park Site.

Pursuant to Section 3.1.4 of the Lompa Ranch North Specific Plan dated March 17, 2016, a 3-acre minimum neighborhood park site shall be constructed and dedicated on the Land Use Plan Site prior to the certificate of occupancy for the 250th residential unit located on the east side of I-580. The Application proposes more than 250 residential units so the Applicant initiated communications with the owner of the Land Use Plan Park Site in anticipation of this future obligation. Unfortunately, despite good faith efforts by the Applicant, the owner of the Land Use Plan Park Site has not agreed to participate in the design and construction of the Land Use Plan Park Site.

Pursuant to Section 2.8 of the Development Agreement - Lompa Ranch North Specific Plan dated November 16, 2017, if there is non-participation by one of the Phase Developers, either voluntarily or by non-action, "only the parcels owned by such Phase Developer shall be impacted by the Phase Developer's lack of compliance and all remaining Phases will continue to be subject to Existing Approvals..." Moreover, the participating Phase Developer "will not be prohibited from pulling building permits and developing its Phase regardless of the status of the other Phases." Given the non-participation by the Land Use Plan Park Site owner, the Applicant sent a "cure letter" to the Land Use Plan Park Site owner, dated June 14, 2022, to put them on notice of their failure to perform their obligations under the Lompa Ranch North Specific Plan and to give the owner the opportunity to cure the breach. At this time, the Land Use Plan Park Site owner has not cured the breach; therefore, the Applicant is forced to move forward with the Application subject to the non-participatory provisions in the Development Agreement. The Applicant will continue to make efforts to participate with the Land Use Plan Park Site owner and will keep the City apprised of any updates.

In accordance with the Development Agreement, the Application includes the Alternative Park Amenity Concept Plan, with additional on-site park amenities to be maintained by the Applicant and available to the public with a public access easement, to ensure the project meets the intent of the Lompa Ranch North Specific Plan. Based on our August 16th conversation, this proposal will satisfy the 3-acre minimum neighborhood park site requirement in the Lompa Ranch North Specific Plan and the issuance of the Applicant's building permits and/or certificates of occupancy will not be delayed or negatively impacted.

Please let me know if you have any additional questions or comments. Thanks again.

Sincerely,

Garrett Gordon

Garrett D. Gordon
Lewis Roca Rothgerber Christie LLP

LOMPA LAND INVESTORS, LLC

June 14, 2022

Mr. Navneet Sharda
Agua Fria Insurance Services, LLC
C/O: Registered Agents, Inc.
401 Ryland Street, Suite 200-A
Reno, NV 89502
Via Registered Mail & Email
nnsharda@protonmail.com

Re: Your 3.0 acres of raw land identified as Carson City County Assessor's Parcel Number 010-741-01 as illustrated in **Exhibit "A"** attached hereto and made a part of this letter (the "**Park Land**") and the Development Agreement for the Lompa Ranch North Specific Plan – Ordinance No. 2017.25 Recorded May 24, 2010 (hereinafter the "**Development Agreement**") – included with our letter.

Dear Mr. Sharda:

This letter is being sent to formally request your participation and cooperation in implementing the Development Agreement set forth above. As I believe you are aware, my partnership acquired the 23.95 acres of raw land (the "**LLI Land**"), as shown on Exhibit "A" contiguous to the Park Land, in December of 2021. We are currently working with the city of Carson City (the "**City**") pursuant to a Special Use Permit ("**SUP**") to allow for the development of 306 apartment units on the LLI Land. As outlined in the Specific Plan, the various developers within the Specific Plan area are required to cooperate with each other in designing, constructing, and dedicating to the City, at their sole cost and expense, a City park (hereinafter the "**Park**") located on the Park Land as part of their development in lieu of paying a Residential Construction Tax as set forth more specifically in Section 2.6 of the approved Specific Plan included with this letter as well as various other sections of the Development Agreement.

In talking with the City, when the Development Agreement for the SUP and the SUP was approved it was anticipated the Park Land and the LLI Land would be owned by one party but as we know, that is not the case today. In our current situation, we are both required to cooperate regarding the Park, as outlined in the Development Agreement, pursuant to the development of our individual properties. For this to occur, however, we will need to have your cooperation in negotiating a fair and equitable agreement to participate in the design, construction, and dedication of the Park. In the event the LLI Land is developed before your property to the north of the LLI Land, identified as Carson City County Assessor's Parcel Number 010-041-83 and depicted on **Exhibit "A-1"** attached hereto and made a part of this letter (the "**Sharda Land**"), we will need to have your cooperation pursuant to the costs associated with the Park and due to the fact that we do not own the Park Land, also your agreement to allow us to build on the Park Land and for you to deed the Park Land to the City when the improvements are completed, free and clear of any debt and without any compensation for this property. This may also require your authorization for us to submit a development application to the City for the development and construction of the Park on the Park Land.

To this end, I am hereby requesting that you please contact me as soon as possible at the address or email address listed below and let me know if (i) you are willing to help us in this matter and to cooperate with the terms of the Development Agreement and the Specific Plan and (ii) if so, when you would have time to get together either in person or by Zoom to discuss this matter further and how we can work together pursuant to a sharing agreement in writing required to meet the requirements of the City for our mutual benefit. In accordance with the Development Agreement, Section 3.1, we are requesting a response to this letter within 30 calendar days (by July 15, 2022) indicating your willingness to participate and cooperation so that we can hopefully avoid a default of the Development Agreement.

Respectfully yours,
Lompa Land Investors, LLC
DDH Financial Corp, Manager

Kreg D. Rowe, President
(775) 250-2790
5560 Longley Lane, Suite 200
Reno, NV 89511
krowe@tcnev.com

EXHIBIT " A "

ILLUSTRATION OF THE LLI LAND & THE PARK LAND

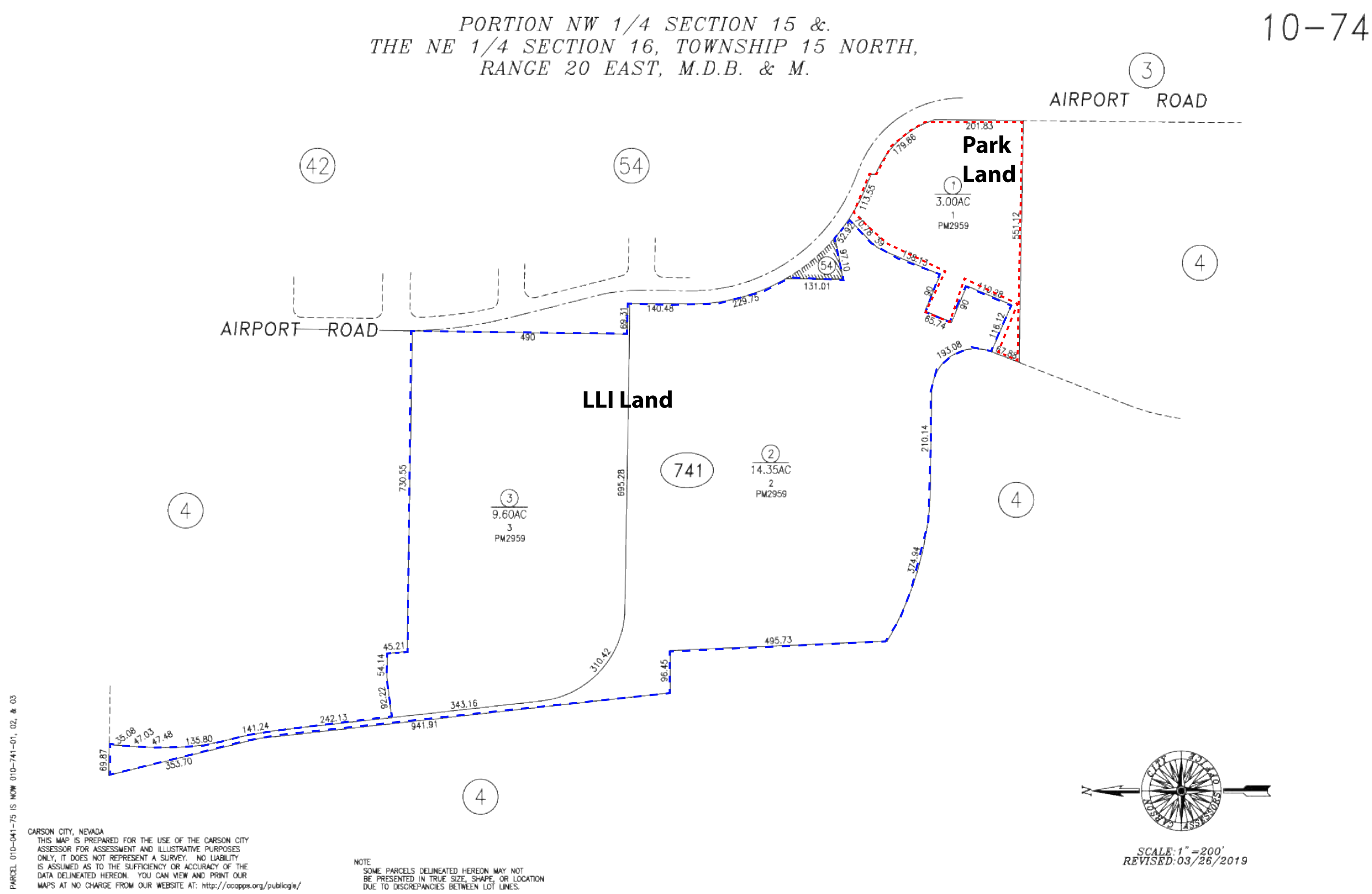
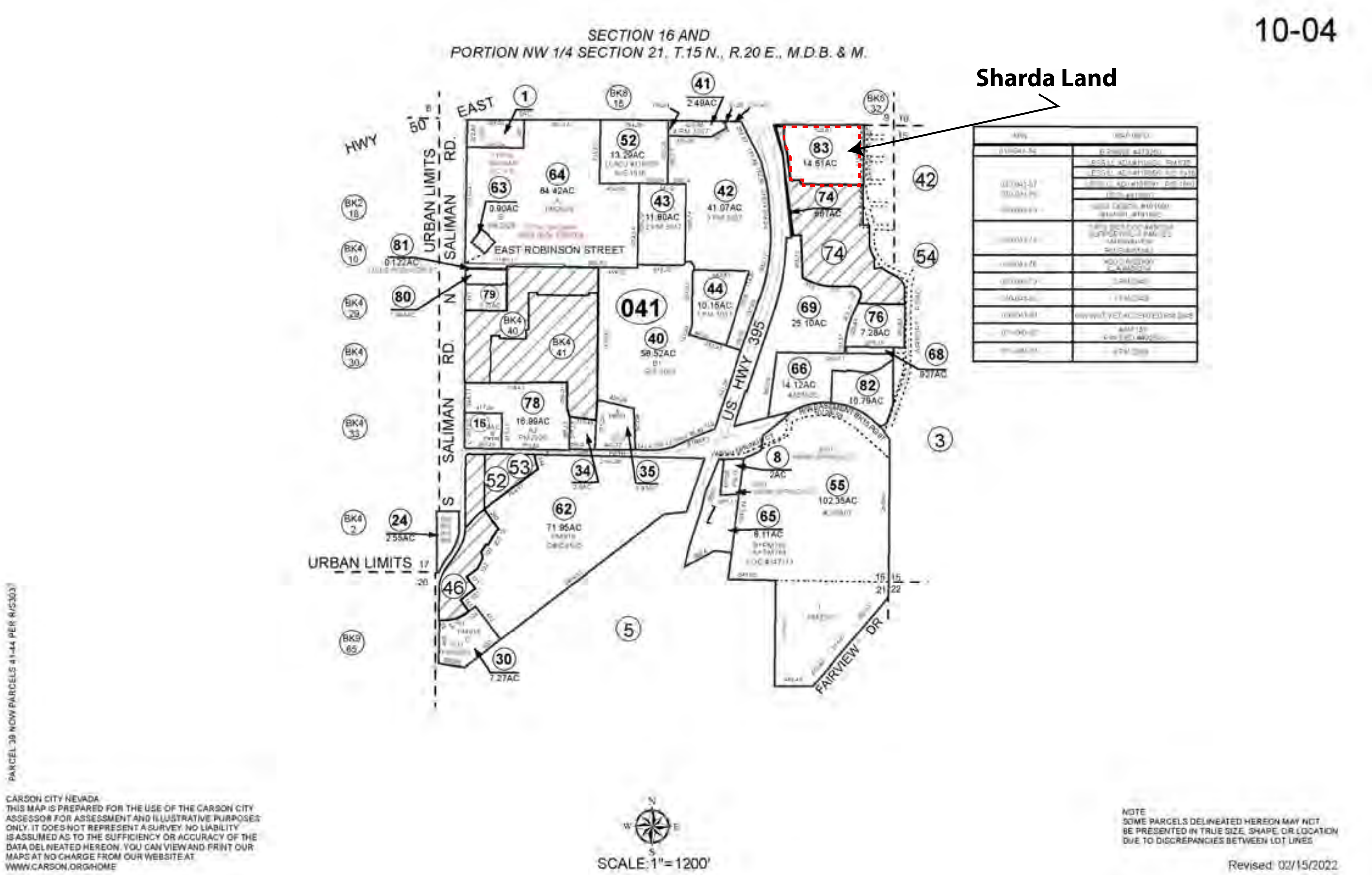


EXHIBIT " A-1 "

ILLUSTRATION OF THE SHARDA LAND



*5560 Longley Lane, Suite 200 * Reno, NV 89511*
(775) 850-4200 (775) 850-4252 fax

CARSON CITY NEVADA
Consolidated Municipality and State Capital
PUBLIC WORKS

MEMO

TO: Mark Gookin, P.E. – Terraphase Engineering

FROM: Robert D Fellows, P.E. – Carson City Floodplain Manager

SUBJECT: CLOMR-F Determination (Lompa Ranch East Subdivision)

DATE: March 7, 2022

I agree with your letter dated, March 7, 2022, that the FEMA approved CLOMR-F (case No. 21-09-0285C) is valid for the proposed change to the subdivision.

Attachment: Terrphase Engineering letter dated March 7, 2022

3505 Butti Way, Carson City, NV 89701 (775) 887-2355 FAX (775) 887-2112
Operations: Water, Sewer, Streets, Wastewater, Landfill, Environmental
Engineering, Transportation, Capital Projects

March 7, 2022

Carson City
Attn: Robb Fellows, PE, Senior Project Manager - Stormwater
3505 Butti Way
Carson City, NV 89701

sent via email to rfellows@carson.org

Subject: **Applicability of prior CLOMR-F to Lompa Ranch East Project**

Dear Mr. Fellows:

Thank you for the opportunity to meet with you on March 2, 2022 to discuss flood-related issues associated with the Lompa Ranch East project. The purpose of this letter is to provide information and our expert opinion regarding the applicability of a previous Conditional Letter of Map Revision based on Fill (CLOMR-F) for the subject property which was approved by the Federal Emergency Management Agency (FEMA) on January 6, 2021 (attached). The prior CLOMR-F is based on a different site layout than currently proposed (12.17.2021 Review Draft Schematic Site Plan - attached). Although the site layout is different than previously contemplated, FEMA's previous determination is applicable and should allow the project to proceed through Carson City's review process without redoing the CLOMR-F for the following reasons.

- The portions of the currently planned development which are proposed for fill are located within an Ineffective Flow Area in the hydraulic model (as presented by Jeff House in his November 30, 2018 memorandum, Figure 2 – attached and confirmed by Terraphase).
- Due to the FEMA modeling of this area as Ineffective Flow, no conveyance is provided in the areas proposed for fill. Thus, any change to the site layout will have no effect on Base Flood Elevations (BFEs) in the area – the flood benefits of the site are limited to flood volume storage which will be mitigated as required by Carson City development code.

FEMA's January 6, 2021 CLOMR-F approval identifies a BFE of 4629.0. This BFE will serve as the basis for proposed structure elevations (with inclusion of an additional 2 feet as required by Carson City Development Code). Close examination of FEMA's flood profile in the area suggests a slightly lower BFE (4628.7) could have been employed, however, Terraphase proposes to proceed with the development planning based on the more conservative 4629.0 value. This will help to ensure expeditious processing with FEMA once the Letter of Map Revision based on Fill (LOMR-F) is submitted following substantial completion of the project construction.

Closing

Please respond confirming Carson City's acceptance or our proposed approach which skips a duplicative CLOMR-F step based on the above. Thank you in advance for your help. Don't hesitate to reach out should you have any questions.

Sincerely,

for Terraphase Engineering Inc.

Mark Gookin, PE, CFM
Principal Engineer

Attachments: 1) FEMA CLOMR-F approval; 2) Currently proposed schematic site plan; and, 3) Jeff House memo Figure 2

Cc: Brianna Greenlaw
Cindy Steele

Page 1 of 4		Date: January 06, 2021	Case No.: 21-09-0285C	CLOMR-F

Federal Emergency Management Agency
Washington, D.C. 20472

CONDITIONAL LETTER OF MAP REVISION BASED ON FILL
COMMENT DOCUMENT

COMMUNITY AND MAP PANEL INFORMATION		LEGAL PROPERTY DESCRIPTION
COMMUNITY	CITY OF CARSON CITY, INDEPENDENT CITY, NEVADA	Lots 1 through 137, and Buildings 1 through 22, Proposed Lompa Ranch East
	COMMUNITY NO.: 320001	
AFFECTED MAP PANEL	NUMBER: 3200010111H	
	DATE: 6/20/2019	
FLOODING SOURCE: KINGS CANYON CREEK; GONI CANYON CREEK		APPROXIMATE LATITUDE & LONGITUDE OF PROPERTY:39.169670, -119.736117 SOURCE OF LAT & LONG: LOMA LOGIC DATUM: NAD 83

COMMENT TABLE REGARDING THE PROPOSED PROPERTY (PLEASE NOTE THAT THIS IS NOT A FINAL DETERMINATION. A FINAL DETERMINATION WILL BE MADE UPON RECEIPT OF AS-BUILT INFORMATION REGARDING THIS PROPERTY.)

LOT	BLOCK/ SECTION	SUBDIVISION	STREET	OUTCOME WHAT WOULD BE REMOVED FROM THE SFHA	FLOOD ZONE	1% ANNUAL CHANCE FLOOD ELEVATION (NAVD 88)	LOWEST ADJACENT GRADE ELEVATION (NAVD 88)	LOWEST LOT ELEVATION (NAVD 88)
1-137	--	Lompa Ranch East	--	Property	X (shaded)	4629.0 feet	--	4630.3 feet

Special Flood Hazard Area (SFHA) - The SFHA is an area that would be inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood).

ADDITIONAL CONSIDERATIONS (Please refer to the appropriate section on Attachment 1 for the additional considerations listed below.)

CONDITIONAL LOMR-F DETERMINATION
STATE LOCAL CONSIDERATIONS

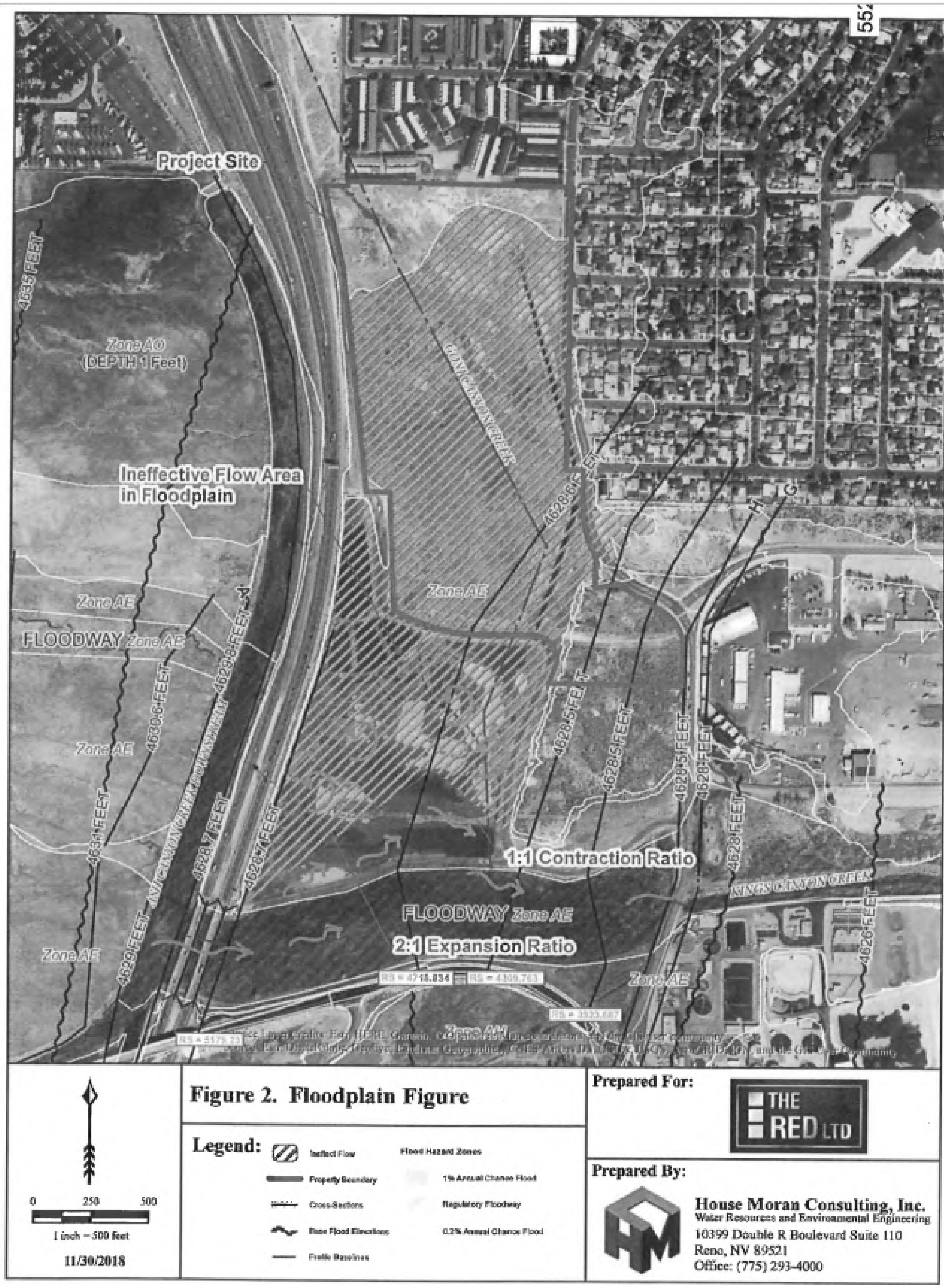
This document provides the Federal Emergency Management Agency's comment regarding a request for a Conditional Letter of Map Revision based on Fill for the property described above. Using the information submitted and the effective National Flood Insurance Program (NFIP) map, we have determined that the proposed property(ies) would not be located in the SFHA, an area inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) if built as proposed. Our final determination will be made upon receipt of a copy of this document, as-built elevations, and a completed Community Acknowledgement form. Proper completion of this form certifies the subject property is reasonably safe from flooding in accordance with Part 65.5(a)(4) of our regulations. Further guidance on determining if the subject property is reasonably safe from flooding may be found in FEMA Technical Bulletin 10-01. A copy of this bulletin can be obtained by calling the FEMA Map Assistance Center toll free at (877) 336-2627 (877-FEMA MAP) or from our web site at http://www.fema.gov/mit/tb1001.pdf. This document is not a final determination; it only provides our comment on the proposed project in relation to the SFHA shown on the effective NFIP map.

This comment document is based on the flood data presently available. The enclosed documents provide additional information regarding this request. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at (877) 336-2627 (877-FEMA MAP) or by letter addressed to the Federal Emergency Management Agency, Engineering Library, 3601 Eisenhower Ave Ste 500, Alexandria, VA 22304-6426.

Luis V. Rodriguez, P.E., Director
Engineering and Modeling Division
Federal Insurance and Mitigation Administration

Attachment 1. FEMA January 26, 2021 CLOMR-F Approval

Attachment 2. Review Draft Schematic Site Plan (currently proposed)



Attachment 3. Jeff House November 28, 2018 Memo Figure 2 excerpt

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT
1325 J STREET
SACRAMENTO CA 95814-2922

May 17, 2022

Regulatory Division (SPK-2016-00867)

Tanamera Construction, LLC
Attn: Mr. Kraig Knudsen
5560 Longley Lane Suite 200
Reno, Nevada 89511
kknudsen@tcnev.com

Dear Mr. Knudsen:

We are responding to your March 4, 2022, request for reverification under the 2021 Nationwide Permits for the Lompa East project. The approximately 23.4-acre project site is located near Mexican Ditch at the intersection of Modoc Court and Airport Road on the East side of Highway 50, Latitude 39.1695°, Longitude, -119.7364°, Carson City, Nevada (Enclosure 1).

Based on the information you provided to this office, the Lompa East project involves the discharge of fill material into 0.056 acre of waters of the United States for the construction of a residential subdivision, subject to Section 404 of the Clean Water Act. The specific activities that require DA authorization are the placement of two 30-inch diameter concrete pipes and a total of 156-cubic yards of backfill and riprap at two locations (0.056-acre/142 linear feet total) below the ordinary high-water mark (OHWM) of an unnamed perennial channel. These activities will result in permanent impacts to approximately 0.056 acre of perennial stream channel. The proposed activities would be conducted in accordance with the Lompa Ranch Hills East (figures 3-4) plans (enclosure 2).

We have determined that activities in waters of the U.S. associated with the project are authorized by Nationwide Permit Number (NWP) 29, Residential Developments.

You must comply with all terms and conditions of the NWP (enclosure 3) and applicable regional conditions (enclosure 4). Information about the NWP terms and conditions and Sacramento District regional conditions for Nevada, including the Lake Tahoe Basin in California are available on our website at www.spk.usace.army.mil/Missions/Regulatory/Permitting/NationwidePermits.aspx. In addition, your work must comply with the following special conditions:

1. You shall comply with all terms and condition of the attached August 6, 2018, Section 401 Water Quality Certification (enclosure 5).

2. Within 30 days after completion of the authorized work, you must sign the enclosed Compliance Certification (enclosure 6) and return it to this office with the information required by Sacramento District Regional Condition C(9) for Nevada.

This verification is valid until March 14, 2026, when the existing NWPs are scheduled to be modified, reissued, or revoked. Furthermore, if you commence or are under contract to commence this activity before the date the NWP is modified, reissued, or revoked, you will have 12 months from the date of the modification, reissuance or revocation to complete the activity under the present terms and conditions. Failure to comply with the general and regional conditions of this NWP, or the project-specific special conditions of this authorization, may result in the suspension or revocation of your authorization.

We would appreciate your feedback on this permit action including your interaction with our staff and processes. For more information about our program or to complete our Regulatory Program national customer service survey, visit our website at www.spk.usace.army.mil/Missions/Regulatory.aspx.

Please refer to identification number SPK-2016-00867 in any correspondence concerning this project. If you have any questions, please contact Sarah West at 300 Booth Street, Room 3050, Reno, Nevada, 89509-1328, by email at Sarah.E.West@usace.army.mil, or telephone at (775) 784-5305.

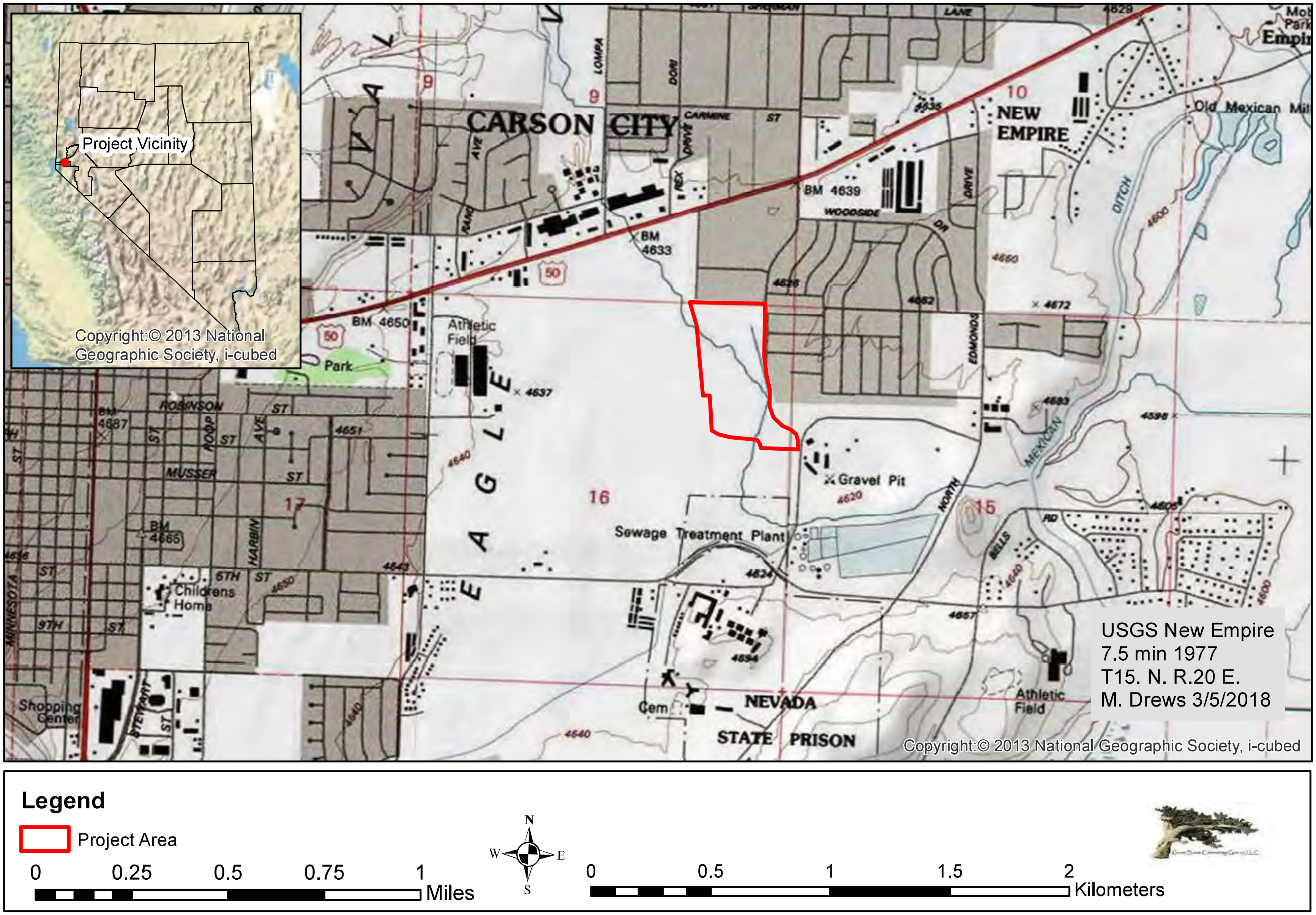
Sincerely,

Michael Nepstad

Michael Nepstad
Deputy Chief, Regulatory Division

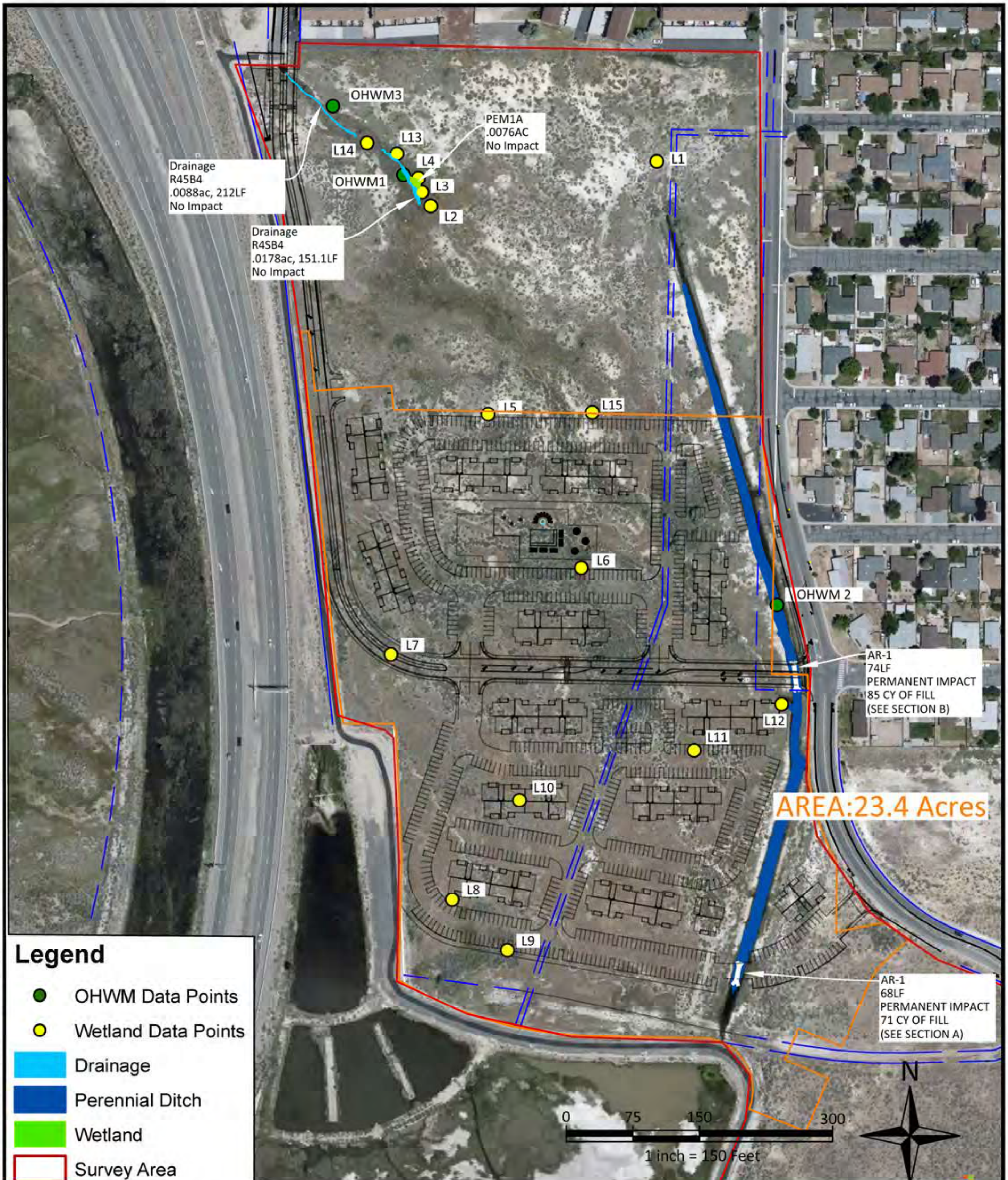
Enclosures

cc:
Russell Huddleston, USEPA, Wetlands Office, huddleston.russell@epa.gov
NDEP 401 Certification, ndep401@ndep.nv.gov
Zachary Carter, NDEP, zcarter@ndep.nv.gov
Birgit Widegren, NDEP, bwidegren@ndep.nv.gov
Meredith Gosejohan, Nevada Division of State Lands, mgosejohan@lands.nv.gov
Lucy Wong, Nevada Division of State Lands, lwong@lands.nv.gov
Rebecca Palmer, State Historic Preservation Officer, rlpalmer@shpo.nv.gov
Mr. Lucas Paz, Terraphase Engineering, Inc., lucas.paz@terraphase.com



Map 1. Project Location

Enclosure 1



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Project: Lompa Ranch Hill East County: Carson City Section 16. T. 15N., R 20 E., M.D.M. Date: May 2016, rev. Sept. 2017 Source "Carson City, Nevada, United States. "39° 10' 05.58" N, 119° 44' 07.69"W, Eye alt:8736 feet. Google Earth. April 16, 2015. Datum: D_North_American_1983	CLIENT: Tanamera Contruction PROJECT: Lompa Ranch Hills East PROJECT NUMBER: N014.001	Lompa Ranch Hills East Project Impacts to Aquatic Resources Figure 1

Enclosure 2

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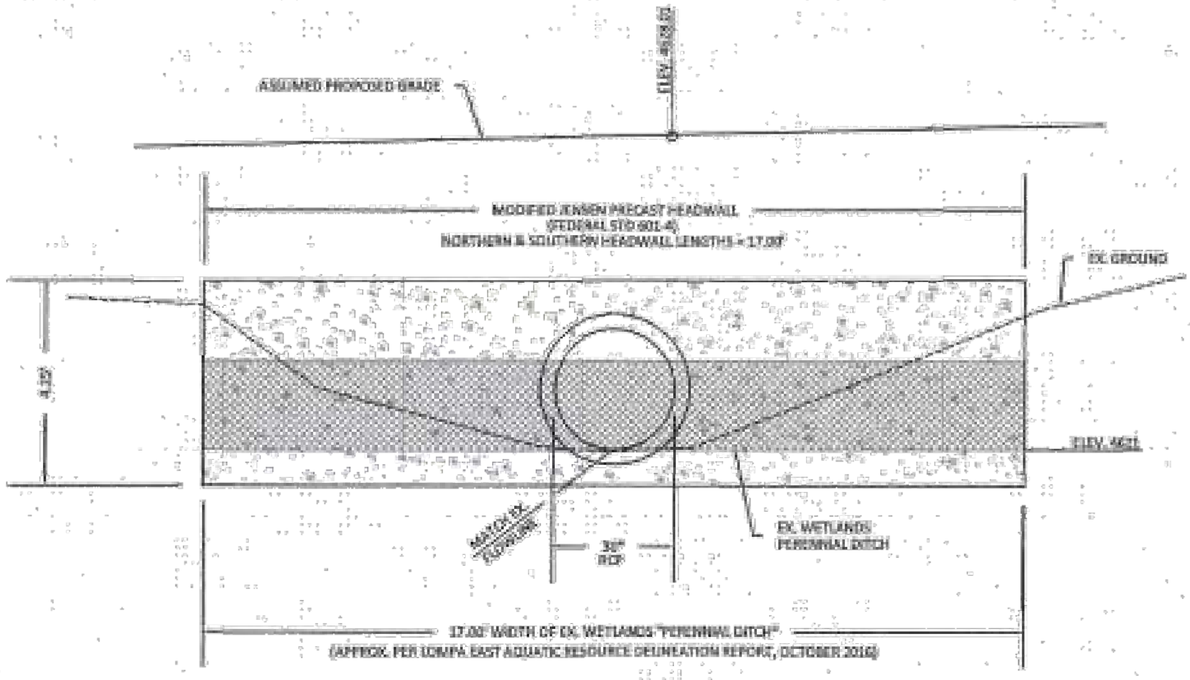
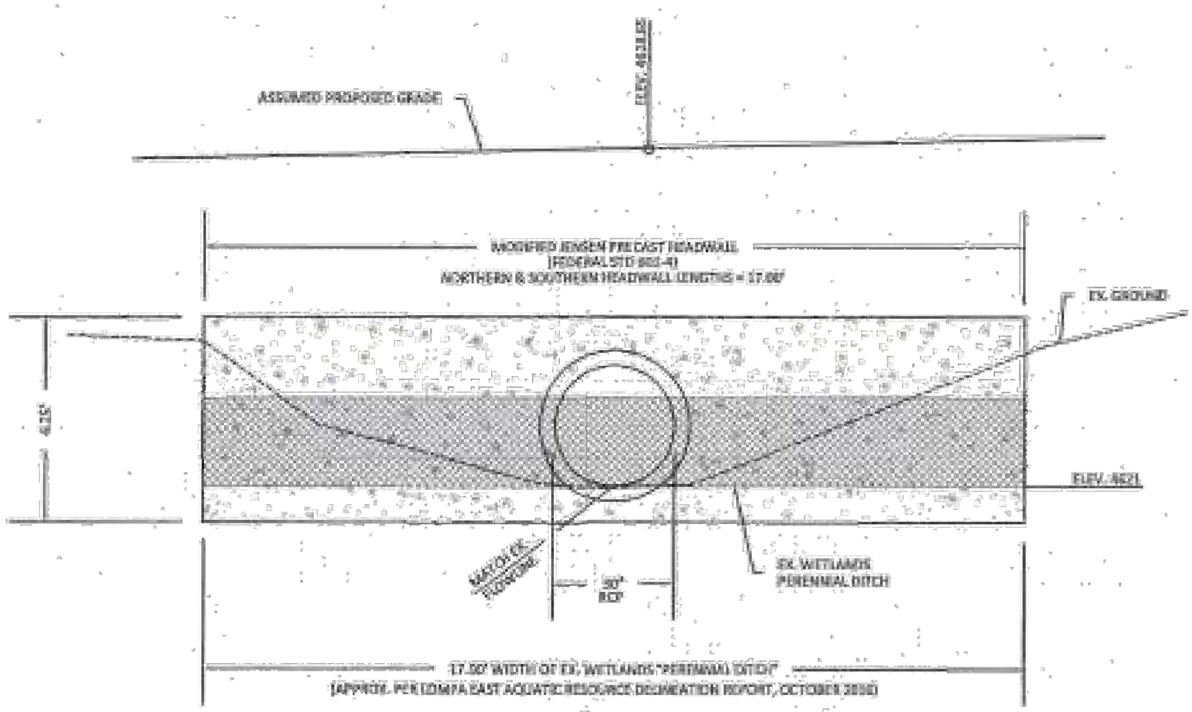


Section A

No Scale



Section B

No Scale

Project: Lompa Ranch Hill East County: Carson City Section 16. T. 15N., R 20 E., M.D.M. Date: May 2016, rev. Sept. 2017 Source "Carson City, Nevada, United States. "39° 10' 05.58" N, 119° 44' 07.69"W, Eye alt:8736 feet. Google Earth. April 16, 2015. Datum: D_North_American_1983	CLIENT: Tanamera Contruction PROJECT: Lompa Ranch Hills East PROJECT NUMBER: N014.001	Lompa Ranch Hills East Project Impacts to Aquatic Resources Culvert Sizing Figure 2

U S Army Corps of Engineers
Sacramento District

2021 Nationwide Permit Summary

33 CFR Part 330; Issuance of Nationwide Permits – March 15, 2021

29. Residential Developments. Discharges of dredged or fill material into non-tidal waters of the United States for the construction or expansion of a single residence, a multiple unit residential development, or a residential subdivision. This NWP authorizes the construction of building foundations and building pads and attendant features that are necessary for the use of the residence or residential development. Attendant features may include but are not limited to roads, parking lots, garages, yards, utility lines, storm water management facilities, septic fields, and recreation facilities such as playgrounds, playing fields, and golf courses (provided the golf course is an integral part of the residential development).

The discharge must not cause the loss of greater than 1/2-acre of non-tidal waters of the United States. This NWP does not authorize discharges of dredged or fill material into non-tidal wetlands adjacent to tidal waters.

Subdivisions: For residential subdivisions, the aggregate total loss of waters of United States authorized by this NWP cannot exceed 1/2-acre. This includes any loss of waters of the United States associated with development of individual subdivision lots.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity. (See general condition 32.) (Authorities: Sections 10 and 404)

A. **2021 Regional Conditions**

1. [**Regional Conditions for California**]
2. [**Regional Conditions for Nevada and Utah**]

B. **2021 Nationwide Permit General Conditions**

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP. Every person who may wish to obtain permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR 330.1 through 330.6 apply to every NWP authorization. Note especially 33 CFR 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

☐ 1. **Navigation**.

☐ (a) No activity may cause more than a minimal adverse effect on navigation.

☐ (b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

☐ (c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his or her authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

☐ 2. **Aquatic Life Movements**. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species. If a bottomless culvert cannot be used, then the crossing should be designed and constructed to minimize adverse effects to aquatic life movements.

☐ 3. **Spawning Areas**. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

☐ 4. **Migratory Bird Breeding Areas**. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

Enclosure 3

☐ 5. **Shellfish Beds**. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

☐ 6. **Suitable Material**. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see section 307 of the Clean Water Act).

☐ 7. **Water Supply Intakes**. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

☐ 8. **Adverse Effects From Impoundments**. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

☐ 9. **Management of Water Flows**. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization, storm water management activities, and temporary and permanent road crossings, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

☐ 10. **Fills Within 100-Year Floodplains**. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

☐ 11. **Equipment**. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

☐ 12. **Soil Erosion and Sediment Controls**. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow, or during low tides.

☐ 13. **Removal of Temporary Fills**. Temporary structures must be removed, to the maximum extent practicable, after their use has been discontinued. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

☐ 14. **Proper Maintenance**. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

☐ 15. **Single and Complete Project**. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

☐ 16. **Wild and Scenic Rivers**.

☐ (a) No NWP activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status.

☐ (b) If a proposed NWP activity will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, the permittee must submit a pre-construction notification (see general condition 32). The district engineer will coordinate the PCN with the Federal agency with direct management responsibility for that river. Permittees shall not begin the NWP activity until notified by the district engineer that the Federal agency with direct management responsibility for that river has determined in writing that the proposed NWP activity will not adversely affect the Wild and Scenic River designation or study status.

☐ (c) Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: https://www.rivers.gov/.

☐ 17. **Tribal Rights**. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

☐ 18. **Endangered Species**.

☐ (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify designated critical habitat or critical habitat proposed for such designation. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless ESA section 7 consultation addressing the consequences of the proposed activity on listed species or critical habitat has been completed. See 50 CFR 402.02 for the definition of "effects of the action" for the purposes of ESA section 7 consultation, as well as 50 CFR 402.17, which provides further explanation under ESA section 7 regarding "activities that are reasonably certain to occur" and "consequences caused by the proposed action."

☐ (b) Federal agencies should follow their own procedures for complying with the requirements of the ESA (see 33 CFR 330.4(f)(1)). If pre-construction notification is required for the proposed activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be necessary for the activity and the respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA.

☐ (c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed such designation) might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat or critical habitat proposed for such designation, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation), the pre-construction notification must include the name(s) of the endangered or threatened species (or species proposed for listing) that might be affected by the proposed activity or that utilize the designated critical habitat (or critical habitat proposed for such designation) that might be affected by the proposed activity. The district engineer will determine whether the proposed activity “may affect” or will have “no effect” to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps’ determination within 45 days of receipt of a complete pre-construction notification. For activities where the non-Federal applicant has identified listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation) that might be affected or is in the vicinity of the activity, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification that the proposed activity will have “no effect” on listed species (or species proposed for listing or designated critical habitat (or critical habitat proposed for such designation), or until ESA section 7 consultation or conference has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

☐ (d) As a result of formal or informal consultation or conference with the FWS or NMFS the district engineer may add species-specific permit conditions to the NWPs.

☐ (e) Authorization of an activity by an NWP does not authorize the “take” of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with “incidental take” provisions, etc.) from the FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word “harm” in the definition of “take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

☐ (f) If the non-federal permittee has a valid ESA section 10(a)(1)(B) incidental take permit with an approved Habitat Conservation Plan for a project or a group of projects that includes the proposed NWP activity, the non-federal applicant should provide a copy of that ESA section 10(a)(1)(B) permit with the PCN required by paragraph (c) of this general condition. The district engineer will coordinate with the agency that issued the ESA section 10(a)(1)(B) permit to determine whether the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation conducted for the ESA section 10(a)(1)(B) permit. If that coordination results in concurrence from the agency that the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation for the ESA section 10(a)(1)(B) permit, the district engineer does not need to conduct a separate ESA section 7 consultation for the proposed NWP activity. The district engineer will notify the non-federal applicant within 45 days of receipt of a complete pre-construction notification whether the ESA section 10(a)(1)(B) permit covers the proposed NWP activity or whether additional ESA section 7 consultation is required.

☐ (g) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the FWS and NMFS or their world wide web pages at https://www.fws.gov/ or https://www.fws.gov/ipac/ and https://www.fisheries.noaa.gov/topic/endangered-species-conservation respectively.

☐ 19. **Migratory Birds and Bald and Golden Eagles**. The permittee is responsible for ensuring that an action authorized by an NWP complies with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The permittee is responsible for contacting the appropriate local office of the U.S. Fish and Wildlife Service to determine what measures, if any, are necessary or appropriate to reduce adverse effects to migratory birds or eagles, including whether "incidental take" permits are necessary and available under the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act for a particular activity.

☐ 20. **Historic Properties**.

☐ (a) No activity is authorized under any NWP which may have the potential to cause effects to properties listed, or eligible for listing, in the National Register of Historic Places until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

☐ (b) Federal permittees should follow their own procedures for complying with the requirements of section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)(1)). If pre-construction notification is required for the proposed NWP activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation is not submitted, then additional consultation under section 106 may be necessary. The respective federal agency is responsible for fulfilling its obligation to comply with section 106.

☐ (c) Non-federal permittees must submit a pre-construction notification to the district engineer if the NWP activity might have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties might have the potential to be affected by the proposed NWP activity or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of, or potential for, the presence of historic properties can be sought from the State Historic Preservation Officer, Tribal Historic Preservation Officer, or designated tribal representative, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts commensurate with potential impacts, which may include background research, consultation, oral history interviews, sample field investigation, and/or field survey. Based on the information submitted in the PCN and these identification efforts, the district engineer shall determine whether the proposed NWP activity has the potential to cause effects on the historic properties. Section 106 consultation is not required when the district engineer determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR 800.3(a)). Section 106 consultation is required when the district engineer determines that the activity has the potential to cause effects on historic properties. The district engineer will conduct consultation with consulting parties identified under 36 CFR 800.2(c) when he or she makes any of the following effect determinations for the purposes of section 106 of the NHPA: no historic properties affected, no adverse effect, or adverse effect.

☐ (d) Where the non-Federal applicant has identified historic properties on which the proposed NWP activity might have the potential to cause effects and has so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects to historic properties or that NHPA section 106 consultation has been completed. For non-federal permittees, the district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA section 106 consultation is required. If NHPA section 106 consultation is required, the district engineer will notify the non-Federal applicant that he or she cannot begin the activity until section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

☐ (e) Prospective permittees should be aware that section 110(k) of the NHPA (54 U.S.C. 306113) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

☐ 21. **Discovery of Previously Unknown Remains and Artifacts**. Permittees that discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by an NWP, they must immediately notify the district engineer of what they have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal, and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

☐ 22. **Designated Critical Resource Waters**. Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.

☐ (a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, 52, 57 and 58 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

☐ (b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, 38, and 54, notification is required in accordance with general condition 32, for any activity proposed by permittees in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after she or he determines that the impacts to the critical resource waters will be no more than minimal.

☐ 23. **Mitigation**. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal:

☐ (a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

☐ (b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal.

☐ (c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects.

☐ (d) Compensatory mitigation at a minimum one-for-one ratio will be required for all losses of stream bed that exceed 3/100-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. This compensatory mitigation requirement may be satisfied through the restoration or enhancement of riparian areas next to streams in accordance with paragraph (e) of this general condition. For losses of stream bed of 3/100-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects. Compensatory mitigation for losses of streams should be provided, if practicable, through stream rehabilitation, enhancement, or preservation, since streams are difficult-to-replace resources (see 33 CFR 332.3(e)(3)).

☐ (e) Compensatory mitigation plans for NWP activities in or near streams or other open waters will normally include a requirement for the restoration or enhancement, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, the restoration or maintenance/protection of riparian areas may be the only compensatory mitigation required. If restoring riparian areas involves planting vegetation, only native species should be planted. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to restore or maintain/protect a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or maintaining/protecting a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of minimization or compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

☐ (f) Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

☐ (1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in no more than minimal adverse environmental effects. For the NWPs, the preferred mechanism for providing compensatory mitigation is mitigation bank credits or in-lieu fee program credits (see 33 CFR 332.3(b)(2) and (3)). However, if an appropriate number and type of mitigation bank or in-lieu credits are not available at the time the PCN is submitted to the district engineer, the district engineer may approve the use of permittee-responsible mitigation.

☐ (2) The amount of compensatory mitigation required by the district engineer must be sufficient to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.1(e)(3)). (See also 33 CFR 332.3(f).)

☐ (3) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, aquatic resource restoration should be the first compensatory mitigation option considered for permittee-responsible mitigation.

☐ (4) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) through (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)). If permittee-responsible mitigation is the proposed option, and the proposed compensatory mitigation site is located on land in which another federal agency holds an easement, the district engineer will coordinate with that federal agency to determine if proposed compensatory mitigation project is compatible with the terms of the easement.

☐ (5) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan needs to address only the baseline conditions at the impact site and the number of credits to be provided (see 33 CFR 332.4(c)(1)(ii)).

☐ (6) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan (see 33 CFR 332.4(c)(1)(ii)).

☐ (g) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any NWP activity resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that an NWP activity already meeting the established acreage limits also satisfies the no more than minimal impact requirement for the NWPs.

☐ (h) Permittees may propose the use of mitigation banks, in-lieu fee programs, or permittee-responsible mitigation. When developing a compensatory mitigation proposal, the permittee must consider appropriate and practicable options consistent with the framework at 33 CFR 332.3(b). For activities resulting in the loss of marine or estuarine resources, permittee-responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

☐ (i) Where certain functions and services of waters of the United States are permanently adversely affected by a regulated activity, such as discharges of dredged or fill material into waters of the United States that will convert a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse environmental effects of the activity to the no more than minimal level.

☐ 24. **Safety of Impoundment Structures**. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state or federal, dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

☐ 25. **Water Quality**.

☐ (a) Where the certifying authority (state, authorized tribe, or EPA, as appropriate) has not previously certified compliance of an NWP with CWA section 401, a CWA section 401 water quality certification for the proposed discharge must be obtained or waived (see 33 CFR 330.4(c)). If the permittee cannot comply with all of the conditions of a water quality certification previously issued by certifying authority for the issuance of the NWP, then the permittee must obtain a water quality certification or waiver for the proposed discharge in order for the activity to be authorized by an NWP.

☐ (b) If the NWP activity requires pre-construction notification and the certifying authority has not previously certified compliance of an NWP with CWA section 401, the proposed discharge is not authorized by an NWP until water quality certification is obtained or waived. If the certifying authority issues a water quality certification for the proposed discharge, the permittee must submit a copy of the certification to the district engineer. The discharge is not authorized by an NWP until the district engineer has notified the permittee that the water quality certification requirement has been satisfied by the issuance of a water quality certification or a waiver.

☐ (c) The district engineer or certifying authority may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

☐ 26. **Coastal Zone Management**. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). If the permittee cannot comply with all of the conditions of a coastal zone management consistency concurrence previously issued by the state, then the permittee must obtain an individual coastal zone management consistency concurrence or presumption of concurrence in order for the activity to be authorized by an NWP. The district engineer or a state may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

☐ 27. **Regional and Case-By-Case Conditions**. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its CWA section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

☐ 28. **Use of Multiple Nationwide Permits**. The use of more than one NWP for a single and complete project is authorized, subject to the following restrictions:

☐ (a) If only one of the NWPs used to authorize the single and complete project has a specified acreage limit, the acreage loss of waters of the United States cannot exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1⁄3-acre.

☐ (b) If one or more of the NWPs used to authorize the single and complete project has specified acreage limits, the acreage loss of waters of the United States authorized by those NWPs cannot exceed their respective specified acreage limits. For example, if a commercial development is constructed under NWP 39, and the single and complete project includes the filling of an upland ditch authorized by NWP 46, the maximum acreage loss of waters of the United States for the commercial development under NWP 39 cannot exceed 1/2-acre, and the total acreage loss of waters of United States due to the NWP 39 and 46 activities cannot exceed 1 acre.

☐ 29. **Transfer of Nationwide Permit Verifications**. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

“When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.”

____

(Transferee)

____

(Date)

☐ 30. **Compliance Certification**. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and implementation of any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

☐ (a) A statement that the authorized activity was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;

☐ (b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

☐ (c) The signature of the permittee certifying the completion of the activity and mitigation.

The completed certification document must be submitted to the district engineer within 30 days of completion of the authorized activity or the implementation of any required compensatory mitigation, whichever occurs later.

☐ 31. **Activities Affecting Structures or Works Built by the United States**. If an NWP activity also requires review by, or permission from, the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers (USACE) federally authorized Civil Works project (a “USACE project”), the prospective permittee must submit a pre-construction notification. See paragraph (b)(10) of general condition 32. An activity that requires section 408 permission and/or review is not authorized by an NWP until the appropriate Corps office issues the section 408 permission or completes its review to alter, occupy, or use the USACE project, and the district engineer issues a written NWP verification.

☐ 32. **Pre-Construction Notification**.

☐ (a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

☐ (1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

☐ (2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or are in the vicinity of the activity, or to notify the Corps pursuant to general condition 20 that the activity might have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)) has been completed. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

☐ (b) <u>Contents of Pre-Construction Notification</u>: The PCN must be in writing and include the following information:

☐ (1) Name, address and telephone numbers of the prospective permittee;

☐ (2) Location of the proposed activity;

☐ (3) Identify the specific NWP or NWP(s) the prospective permittee wants to use to authorize the proposed activity;

☐ (4)

☐ (i) A description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; a description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity; and any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings for linear projects that require Department of the Army authorization but do not require pre-construction notification. The description of the proposed activity and any proposed mitigation measures should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no more than minimal and to determine the need for compensatory mitigation or other mitigation measures.

☐ (ii) For linear projects where one or more single and complete crossings require pre-construction notification, the PCN must include the quantity of anticipated losses of wetlands, other special aquatic sites, and other waters for each single and complete crossing of those wetlands, other special aquatic sites, and other waters (including those single and complete crossings authorized by an NWP but do not require PCNs). This information will be used by the district engineer to evaluate the cumulative adverse environmental effects of the proposed linear project, and does not change those non-PCN NWP activities into NWP PCNs.

☐ (iii) Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the activity and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

☐ (5) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial and intermittent streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. Furthermore, the 45-day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

☐ (6) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands or 3/100-acre of stream bed and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

☐ (7) For non-federal permittees, if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation) might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat (or critical habitat proposed for such designation), the PCN must include the name(s) of those endangered or threatened species (or species proposed for listing) that might be affected by the proposed activity or utilize the designated critical habitat (or critical habitat proposed for such designation) that might be affected by the proposed activity. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with the Endangered Species Act;

☐ (8) For non-federal permittees, if the NWP activity might have the potential to cause effects to a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, the PCN must state which historic property might have the potential to be affected by the proposed activity or include a vicinity map indicating the location of the historic property. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with section 106 of the National Historic Preservation Act;

☐ (9) For an activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, the PCN must identify the Wild and Scenic River or the "study river" (see general condition 16); and

☐ (10) For an NWP activity that requires permission from, or review by, the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, the pre-construction notification must include a statement confirming that the project proponent has submitted a written request for section 408 permission from, or review by, the Corps office having jurisdiction over that USACE project.

☐ (c) Form of Pre-Construction Notification: The nationwide permit pre-construction notification form (Form ENG 6082) should be used for NWP PCNs. A letter containing the required information may also be used. Applicants may provide electronic files of PCNs and supporting materials if the district engineer has established tools and procedures for electronic submittals.

☐ (d) Agency Coordination:

☐ (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the activity's adverse environmental effects so that they are no more than minimal.

☐ (2) Agency coordination is required for: (i) all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States; (ii) NWP 13 activities in excess of 500 linear feet, fills greater than one cubic yard per running foot, or involve discharges of dredged or fill material into special aquatic sites; and (iii) NWP 54 activities in excess of 500 linear feet, or that extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes.

☐ (3) When agency coordination is required, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (FWS, state natural resource or water quality agency, EPA, and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to notify the district engineer via telephone, facsimile transmission, or e-mail that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse environmental effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure that the net adverse environmental effects of the proposed activity are no more than minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

☐ (4) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

☐ (5) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

C. **2021 District Engineer's Decision**

☐ 1. In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. If a project proponent requests authorization by a specific NWP, the district engineer should issue the NWP verification for that activity if it meets the terms and conditions of that NWP, unless he or she determines, after considering mitigation, that the proposed activity will result in more than minimal individual and cumulative adverse effects on the aquatic environment and other aspects of the public interest and exercises discretionary authority to require an individual permit for the proposed activity. For a linear project, this determination will include an evaluation of the single and complete crossings of waters of the United States that require PCNs to determine whether they individually satisfy the terms and conditions of the NWP(s), as well as the cumulative effects caused by all of the crossings of waters of the United States authorized by an NWP. If an applicant requests a waiver of an applicable limit, as provided for in NWPs 13, 36, or 54, the district engineer will only grant the waiver upon a written determination that the NWP activity will result in only minimal individual and cumulative adverse environmental effects.

☐ 2. When making minimal adverse environmental effects determinations the district engineer will consider the direct and indirect effects caused by the NWP activity. He or she will also consider the cumulative adverse environmental effects caused by activities authorized by an NWP and whether those cumulative adverse environmental effects are no more than minimal. The district engineer will also consider site specific factors, such as the environmental setting in the vicinity of the NWP activity, the type of resource that will be affected by the NWP activity, the functions provided by the aquatic resources that will be affected by the NWP activity, the degree or magnitude to which the aquatic resources perform those functions, the extent that aquatic resource functions will be lost as a result of the NWP activity (e.g., partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (e.g., watershed or ecoregion), and mitigation required by the district engineer. If an appropriate functional or condition assessment method is available and practicable to use, that assessment method may be used by the district engineer to assist in the minimal adverse environmental effects determination. The district engineer may add case-specific special conditions to the NWP authorization to address site-specific environmental concerns.

☐ 3. If the proposed activity requires a PCN and will result in a loss of greater than 1/10-acre of wetlands or 3/100-acre of stream bed, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for NWP activities with smaller impacts, or for impacts to other types of waters. The district engineer will consider any proposed compensatory mitigation or other mitigation measures the applicant has included in the proposal in determining whether the net adverse environmental effects of the proposed activity are no more than minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse environmental effects are no more than minimal, after considering mitigation, the district engineer will notify the permittee and include any activity-specific conditions in the NWP verification the district engineer deems necessary. Conditions for compensatory mitigation requirements must comply with the appropriate provisions at 33 CFR 332.3(k). The district engineer must approve the final mitigation plan before the permittee commences work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the proposed compensatory mitigation plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure that the NWP activity results in no more than minimal adverse environmental effects. If the net adverse environmental effects of the NWP activity (after consideration of the mitigation proposal) are determined by the district engineer to be no more than minimal, the district engineer will provide a timely written response to the applicant. The response will state that the NWP activity can proceed under the terms and conditions of the NWP, including any activity-specific conditions added to the NWP authorization by the district engineer.

☐ 4. If the district engineer determines that the adverse environmental effects of the proposed activity are more than minimal, then the district engineer will notify the applicant either: (a) that the activity does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (b) that the activity is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal; or (c) that the activity is authorized under the NWP with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse environmental effects, the activity will be authorized within the 45-day PCN period (unless additional time is required to comply with general conditions 18, 20, and/or 31), with activity-specific conditions that state the mitigation requirements. The authorization will include the necessary conceptual or detailed mitigation plan or a requirement that the applicant submit a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal. When compensatory mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan or has determined that prior approval of a final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation.

D. **2021 Further Information**

1. District engineers have authority to determine if an activity complies with the terms and conditions of an NWP.

2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.

3. NWPs do not grant any property rights or exclusive privileges.

4. NWPs do not authorize any injury to the property or rights of others.

5. NWPs do not authorize interference with any existing or proposed Federal project (see general condition 31).

E. **2021 Nationwide Permit Definitions**

Best management practices (BMPs): Policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from development. BMPs are categorized as structural or non-structural.

Compensatory mitigation: The restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.

Direct effects: Effects that are caused by the activity and occur at the same time and place.

Discharge: The term "discharge" means any discharge of dredged or fill material into waters of the United States.

Ecological reference: A model used to plan and design an aquatic habitat and riparian area restoration, enhancement, or establishment activity under NWP 27. An ecological reference may be based on the structure, functions, and dynamics of an aquatic habitat type or a riparian area type that currently exists in the region where the proposed NWP 27 activity is located. Alternatively, an ecological reference may be based on a conceptual model for the aquatic habitat type or riparian area type to be restored, enhanced, or established as a result of the proposed NWP 27 activity. An ecological reference takes into account the range of variation of the aquatic habitat type or riparian area type in the region.

Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s) but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Establishment (creation): The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area.

High Tide Line: The line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.

Historic Property: Any prehistoric or historic district, site (including archaeological site), building, structure, or other object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR part 60).

Independent utility: A test to determine what constitutes a single and complete non-linear project in the Corps Regulatory Program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Indirect effects: Effects that are caused by the activity and are later in time or farther removed in distance but are still reasonably foreseeable.

Loss of waters of the United States: Waters of the United States that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. The loss of stream bed includes the acres of stream bed that are permanently adversely affected by filling or excavation because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the United States is a threshold measurement of the impact to jurisdictional waters or wetlands for determining whether a project may qualify for an NWP; it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and services. Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the United States. Impacts resulting from activities that do not require Department of the Army authorization, such as activities eligible for exemptions under section 404(f) of the Clean Water Act, are not considered when calculating the loss of waters of the United States.

Navigable waters: Waters subject to section 10 of the Rivers and Harbors Act of 1899. These waters are defined at 33 CFR part 329.

Non-tidal wetland: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. Non-tidal wetlands contiguous to tidal waters are located landward of the high tide line (i.e., spring high tide line).

Open water: For purposes of the NWPs, an open water is any area that in a year with normal patterns of precipitation has water flowing or standing above ground to the extent that an ordinary high-water mark can be determined. Aquatic vegetation within the area of flowing or standing water is either non-emergent, sparse, or absent. Vegetated shallows are considered to be open waters. Examples of "open waters" include rivers, streams, lakes, and ponds.

Ordinary High Water Mark: The term ordinary high water mark means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

Perennial stream: A perennial stream has surface water flowing continuously year-round during a typical year.

Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Pre-construction notification: A request submitted by the project proponent to the Corps for confirmation that a particular activity is authorized by nationwide permit. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Pre-construction notification may be required by the terms and conditions of a nationwide permit, or by regional conditions. A pre-construction notification may be voluntarily submitted in cases where pre-construction notification is not required, and the project proponent wants confirmation that the activity is authorized by nationwide permit.

Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions.

Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function but does not result in a gain in aquatic resource area.

Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation.

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.

Riparian areas: Riparian areas are lands next to streams, lakes, and estuarine-marine shorelines. Riparian areas are transitional between terrestrial and aquatic ecosystems, through which surface and subsurface hydrology connects riverine, lacustrine, estuarine, and marine waters with their adjacent wetlands, non-wetland waters, or uplands. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality. (See general condition 23).

Shellfish seeding: The placement of shellfish seed and/or suitable substrate to increase shellfish production. Shellfish seed consists of immature individual shellfish or individual shellfish attached to shells or shell fragments (i.e., spat on shell). Suitable substrate may consist of shellfish shells, shell fragments, or other appropriate materials placed into waters for shellfish habitat.

Single and complete linear project: A linear project is a project constructed for the purpose of getting people, goods, or services from a point of origin to a terminal point, which often involves multiple crossings of one or more waterbodies at separate and distant locations. The term "single and complete project" is defined as that portion of the total linear project proposed or accomplished by one owner/developer or partnership or other association of owners/developers that includes all crossings of a single water of the United States (i.e., a single waterbody) at a specific location. For linear projects crossing a single or multiple waterbodies several times at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

Single and complete non-linear project: For non-linear projects, the term "single and complete project" is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete non-linear project must have independent utility (see definition of "independent utility"). Single and complete non-linear projects may not be "piecemealed" to avoid the limits in an NWP authorization.

Stormwater management: Stormwater management is the mechanism for controlling stormwater runoff for the purposes of reducing downstream erosion, water quality degradation, and flooding and mitigating the adverse effects of changes in land use on the aquatic environment.

Stormwater management facilities: Stormwater management facilities are those facilities, including but not limited to, stormwater retention and detention ponds and best management practices, which retain water for a period of time to control runoff and/or improve the quality (i.e., by reducing the concentration of nutrients, sediments, hazardous substances and other pollutants) of stormwater runoff.

Stream bed: The substrate of the stream channel between the ordinary high-water marks. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the stream bed, but outside of the ordinary high-water marks, are not considered part of the stream bed.

Stream channelization: The manipulation of a stream's course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized jurisdictional stream remains a water of the United States.

Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.

Tidal wetland: A tidal wetland is a jurisdictional wetland that is inundated by tidal waters. Tidal waters rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by other waters, wind, or other effects. Tidal wetlands are located channel ward of the high tide line.

Tribal lands: Any lands title to which is either: 1) held in trust by the United States for the benefit of any Indian tribe or individual; or 2) held by any Indian tribe or individual subject to restrictions by the United States against alienation.

Tribal rights: Those rights legally accruing to a tribe or tribes by virtue of inherent sovereign authority, unextinguished aboriginal title, treaty, statute, judicial decisions, executive order or agreement, and that give rise to legally enforceable remedies.

Vegetated shallows: Vegetated shallows are special aquatic sites under the 404(b)(1) Guidelines. They are areas that are permanently inundated and under normal circumstances have rooted aquatic vegetation, such as seagrasses in marine and estuarine systems and a variety of vascular rooted plants in freshwater systems.

Waterbody: For purposes of the NWPs, a waterbody is a "water of the United States." If a wetland is adjacent to a waterbody determined to be a water of the United States, that waterbody and any adjacent wetlands are considered together as a single aquatic unit (see 33 CFR 328.4(c)(2)).

Final 2021 Nationwide Permit (NWP) Regional Conditions for the States of Nevada and Utah

(Effective February 25, 2022 until March 14, 2026)

A. Regional Conditions for the States of Nevada and Utah:

1. The permittee shall submit a pre-construction notification (PCN), in accordance with General Condition 32, in the following circumstances:

    a. Activities involving new bank stabilization that do not incorporate bioengineering techniques. Bioengineering techniques include using live plants alone or in combination with dead or inorganic materials, including rock, sand, or gravel;

    b. Activities resulting in a discharge of dredged or fill material in waters of the U.S. on Tribal Lands; and,

    c. Activities involving the permanent channelization, realignment, or relocation of streams.

2. The use of NWPs 4, 5, 7, 12 - 15, 17, 18, 21 - 23, 25, 29 – 31, 33, 34, 39 - 51, 57, or 58, authorizing the discharge of dredged and/or fill material is prohibited:

    a. in peatlands[1] containing histosols, including bogs and fens; and,

    b. below the ordinary high-water mark of the Great Salt Lake containing bioherms (microbialites).

B. 401 Water Quality Certification (401 WQC) Regional Conditions for Nevada:

1. For NWPs 3, 5 – 7, 13, 14, 18 – 20, 23, 25, 27, 31 – 33, 36 – 38, 41, 45, 46 and 59, on **tribal lands within U.S. Environmental Protection Agency (EPA) Region 9[2] boundaries in the State of Nevada**, the permittee shall comply with all terms and conditions of the attached October 12, 2021, 401 WQC granted by the U.S. EPA, Region 9.

[1]A peatland is defined as a wetland with saturated organic soil (greater than or equal to 16 inches in thickness) that is classified as a histosol in the Natural Resources Conservation Service (NRCS) Field Indicators of Hydric Soils in the United States (Version 8.0, 2016). A copy of the document can be obtained from the NRCS at: http://www.nrcs.usda.gov/Internet/_DOCUMENTS/nrcs142p2_053171.pdf

[2]EPA, Region 9 401 WQC does not apply to activities proceeding in the territories of the 25 tribes in Region 9 that have been approved as Section 401 certifying authorities – the Navajo Nation, Paiute-Shoshone of the Bishop Community, Big Pine Paiute-Shoshone Tribe, Twenty-Nine Palms Band of Mission Indians, Hoopa Valley Tribe, Hopi Tribe, Pyramid Lake Paiute Tribe, Dry Creek Rancheria of Pomo Indians, Pala Band of Mission Indians, Cortina Band of Wintun Indians, Walker River Paiute Tribe, Yerington Paiute, Duck Valley, Confederated Tribes of the Goshute Reservation, Gila River Indian Community, San Carlos Apache, Morongo Band of Mission Indians, Big Pine Paiute Tribe of Owen Valley, Rincon Band of Luiseno Indians, Cabazon, Quartz Valley, Karuk, White Mountain Apache Tribe, Table Mountain Rancheria, Resighini Rancheria, La Posta Band of Diegueno Mission Indians. In limited circumstances some lands within tribal boundaries fall outside a tribe's Section 401 certifying authority and are subject to this certification.

Enclosure 4

2. For NWP 43, on **tribal lands within U.S. Environmental Protection Agency (EPA) Region 9[2] boundaries in the State of Nevada**, the permittee shall comply with all terms and conditions of the attached December 11, 2020, 401 WQC granted by the U.S. EPA, Region 9.

C. 401 Water Quality Certification (401 WQC) Regional Conditions for Utah:

1. For all NWPs, except those that involve dam maintenance/rehabilitation or reservoir dewatering, on **non-tribal lands within the State of Utah**, the permittee shall comply with all terms and conditions of the attached December 8, 2020, 401 WQC granted by the State of Utah, Department of Environmental Quality.

2. For NWPs 3, 5 – 7, 13 – 15, 18 – 20, 23, 25, 27, 30 – 33, 36 – 38, 41, 45, 46, and 59, on **Indian country[3] in the State of Utah (except Indian country lands of the Navajo Nation and the Confederated Tribes of the Goshute Reservation)** the permittee shall comply with all terms and conditions of the attached October 12, 2021, 401 WQC granted by the U.S. EPA, Region 8.

3. For NWPs 3, 5 – 7, 13 – 15, 18 – 20, 23, 25, 27, 30 – 33, 36, 38, 41, 43, 45, 46, 57, and 59, except NWPs applied "after-the-fact" (i.e., after the discharge has occurred) or to NWPs where a waiver on limits has been granted by the District or Division Engineer, on the **Ute Mountain Ute Reservation in the State of Utah**, the permittee shall comply with all terms and conditions of the attached December 14, 2020, 401 WQC granted by Ute Mountain Ute Tribe.

[3]Indian country in Utah generally includes: (1) lands within the exterior boundaries of the following Indian reservations located within Utah, in part or in full: the Goshute Reservation, the Navajo Indian Reservation, the reservation lands of the Paiute Indian Tribe of Utah (Cedar Band of Paiutes, Kanosh Band of Paiutes, Koosharem Band of Paiutes, Indian Peaks Band of Paiutes, and Shivwits Band of Paiutes), the Skull Valley Indian Reservation, the Uintah and Ouray Reservation (subject to federal court decisions removing certain lands from Indian country status within the Uintah and Ouray Reservation), and the Washakie Reservation; (2) any land held in trust by the United States for an Indian tribe; and (3) any other areas that are "Indian country" within the meaning of 18 U.S.C. section 1151.

NEVADA DIVISION OF
ENVIRONMENTAL
PROTECTION

STATE OF NEVADA
Department of Conservation & Natural Resources
Brian Sandoval, Governor
Bradley Crowell, Director
Greg Lovato, Administrator

August 6, 2018

Mr. Aaron Park
U.S. Army Corps of Engineers
Sacramento District – Reno Office
300 Booth Street Rm 3050
Reno, NV 89509

Dear Mr. Park,

The Nevada Division of Environmental Protection (NDEP) grants 401 Water Quality Certification (NV401-18-031) for the Lompa Ranch East Hills Project in Carson City, Nevada. Project involves construction of a 41.65-acre residential development. An ephemeral drainage and one small emergent wetland will be filled impacting approximately 0.03 acres. Flow will be rerouted to the northern and eastern boundaries of the project site to discharge into a perennial channel that collects stormwater and urban runoff. This channel is tributary to Kings Canyon Creek and the Carson River. Two road crossings will be constructed impacting approximately 0.05 acres below the channel OHWM.

Photographs, which document conditions before, during and after construction, should be submitted to the Bureau of Water Quality Planning (BWQP) after project completion and must include BMPs used to prevent erosion, control sediment and protect water quality. Photos taken at each stage of the project should be documented using the same locations, camera position, view angles and zoom. If natural materials such as mulch or straw bales are selected as BMPs, they should be certified as weed free. Any modifications to original project submittal must be reviewed and approved by this office prior to implementation.

<u>All conditions of the Temporary Authorization to Discharge (Working in Waterways permit) or other permits issued by NDEP for the project must be followed</u>. A **copy** of the Final Report submitted to the Bureau of Water Pollution Control (BWPC) for the Temporary Discharge permit will also satisfy BWQP's post project reporting requirement.

This Section 401 Water Quality Certification is subject to the acquisition of all necessary local, regional, state and federal permits and approvals as required by law. Failure to meet any conditions of this Certification, any other permit required by NDEP for this project or any violation of NAC 445A may result in the revocation of this 401 Water Quality Certification.

If you have any questions, please contact me via jstone@ndep.nv.gov or at (775) 687-9456.

Sincerely yours,

Jeanmarie Stone

Jeanmarie Stone
Environmental Scientist III
Bureau of Water Quality Planning

cc: Jaimee Yoshizawa, Lompa Ranch East Hills, LLC
JoAnne Michael, RCI
Donette Barreto, NDEP BWPC

Enclosure 5

COMPLIANCE CERTIFICATION

Permit File Name: Lompa East

Action ID: SPK-2016-00867

Nationwide Permit Number: 29

Permittee: Tanamera Construction, LLC
Attn: Mr. Kraig Knudsen
5560 Longley Lane Ste. 200
Reno, Nevada 89511
Attn: Mr. Knudsen

County: Carson City

Date of Verification: May 16, 2022

Within 30 days after completion of the activity authorized by this permit, sign this certification and return it to the following address:

U.S. Army Corps of Engineers
Sacramento District
Reno Regulatory Field Office
300 Booth Street, Room 3050
Reno, Nevada 89509
SPKRegulatoryMailbox@usace.army.mil

Please note that your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with the terms and conditions of the permit your authorization may be suspended, modified, or revoked. If you have any questions about this certification, please contact the U.S. Army Corps of Engineers.

* * * * * * * * * *

I hereby certify that the work authorized by the above-referenced permit, including all the required mitigation, was completed in accordance with the terms and conditions of the permit verification.

Permittee Signature ______________________ Date ____________

Enclosure 6

108 E. Proctor Street
Carson City, Nevada 89701
(775) 887-2180
Hearing Impaired: 711

June 2, 2022

Lompa Land Investors, LLC
Attn: Kraig Knudsen
5560 Longley Lane Ste 200
Reno, NV 89511

Electronic Delivery to: kdowns@manhard.com

Major Project Review: MPR-2022-0196

Project Description: The project proposes construction of a total of 306 multifamily units on two parcels separated totaling 23.95 acres in size located on the west side of Airport Road and to the east of I-580 within the Lompa Ranch North Specific Plan Area. The application proposes a reversionary map and special use permit for a use that is allowed in one of the zones on a split zoned property to be allowed across the site in its entirety.

Review Date: May 3, 2022

Major Project Review Comments

The following requirements and comments are provided for your use in preparing final plans and submittals for the project. Please be advised that the comments presented in this letter are based on the plans submitted with the Major Project Review application and may not include all the requirements or conditions which may be placed on the project at the time of submittal of planning applications for approval (if applicable) or final plans for building permits. It is hoped, however, that this review will expedite the completion of your project.

Some of the requirements noted below may have already been shown or otherwise indicated in the plans and need only be submitted in the final improvement plan form. Final on- and off-site improvement plans shall be submitted to the Building Division, (108 E. Proctor Street). These plans must contain all appropriate requirements of Development Engineering, Health, Utilities, Fire, and Planning Divisions/Departments.

Planning applications (if applicable), such as Master Plan Amendments, Zoning Changes, Special Use Permits, Variances, Lot Line Adjustments, Parcel Maps, etc. shall be submitted to the Planning Division (108 E. Proctor Street) for review and approval.

SITE INFORMATION:

Address: West side of Airport Road & Desatoya Drive and to the east of I-580
APNs: 010-741-02 & 03
Site Size: 23.95 acres
Master Plan Designation: High Density Residential and Medium Density Residential and all properties are located within the Lompa Ranch North Specific Plan Area and must be developed in accordance with the SPA Handbook, Development Agreement, and the approved Phasing Plan.
Zoning: MFA & SF6

PLANNING DIVISION
Heather Manzo, Associate Planner

1. Allowable Use – The multifamily use is allowed within the MFA zoning district; however multifamily development is not a listed allowed use within the SF6 zone. The application states that the intent is to utilize CCMC 18.04.020(6) and to file for a SUP as allowed by this section of CCMC.
   a. A reversionary map must be recorded to combine the parcels for 18.04.020(6) to be applied to the project site.
   b. A Special Use Permit application may be submitted when an applicant wishes to utilize the entire parcel for a use that is allowed in one of the zones as provided in 18.04.020(6)(d).
   c. The SUP application needs to address the required findings for a Special Use Permit as outlined in CCMC 18.08.080. Compliance with the SPA Handbook and other approved and adopted documents related to the Lompa Ranch North SPA will need to be addressed in the findings.
   d. The Special Use Permit application must include an open space exhibit that clearly demonstrates compliance with Division 1.17, subsection 5. Please provide both qualitative and quantitative information.
   e. If the project will be constructed in phases, a phasing plan should be provided with the SUP application to demonstrate that each phase is a standalone project.

2. Setbacks – Division 1.17 and CCMC 18.04.190 (Residential)

The information provided below assumes design will be the result of a SUP to allow for the MFA standards to be utilized across the site. CCMC 18.04.190 outlines the minimum setbacks in the MFA zoning district. Division 1.17 further expands on the base zoning setbacks for multifamily development. Where standards differ, the more restrictive will apply.

The setbacks for the MFA zone are: Front = 10, Side = 10, Street Side = 10, and Rear = 20, however the setbacks may be modified by the standards for arterial street frontages and residential adjacency as outlined in CCMC 18.04.190 and CCDS 1.17.

If fences/walls are located within setbacks that exceed fence/wall height limits, a special use permit will be required.

The following summarizes some of the CCMC standards contained in Division 1.17:

- Density is determined by the zoning district. A table identifying the density calculations based on the zone should be provided with the SUP.
- The Maximum height is 45 feet. From plans that have been presented, it appears the project has been designed with buildings that are 45 feet tall. Site plans will need to depict distances from property lines with the SUP application.
- Setbacks for the project are: F = 20, S = 10, SS = 15, R = 20. The project appears to meet all required setbacks.
- Code required parking is equal to 2.5 parking stalls per unit if no on-street parking is available adjacent to the site. The proposed plan identifies code compliance. Distance from parking to building will need to comply with the SPA Handbook requirements.
- The project appears to comply with open space requirements. A plan identifying the 1) general required landscape area, 2) private common open space (if any), and 3) common open space will be required at the time of SUP. As noted in CCMC, landscaping along street frontages may not be counted toward the common open space requirements.

All proposed structures should be shown on the site plan as part of the special use permit application including carport structures.

3. Parking and Loading – Carson City Development Standards, Division 2

The number of parking spaces required for various uses is described in Carson City Development Standards, Division 2.2. Based on the required parking ratio of 2 spaces per unit plus 1 space for every 2 units for guest parking, your project requires a total of 765 parking spaces are required if no on-street parking is available. As currently designed, the project provides a sufficient amount of parking.

Excess parking is not prohibited. Should a need arise for an alternative parking standard, Division 2 allows for the director to consider an alternative parking standard if the request is substantiated by an accredited source (e.g. Institute of Transportation Engineers). The request would need to be filed in writing for possible approval.

- Parking areas need to be screened to prevent impacts on adjacent residences resulting from headlight glare.
- Excess parking on the southeast portion of the site may be used for public/overflow parking for the park site.

4. Architectural Design - Carson City Development Standards, Division 1

The building elevations must be submitted with the Special Use Permit and demonstrate compliance with the architectural standards outlined in the Development Standards, Division 1.1, including but not limited to the following:

a. Variations of building details, form, line, color, and materials shall be employed to create visual interest. Variations in wall planes, roof lines and direction are encouraged to prevent monotonous appearance in buildings. Large expanses of walls devoid of any articulation or embellishment shall be avoided. Similarly, vertical variation in the roof line is encouraged. Mansard roofs shall wrap around the entire building. (Development Standards, Division 1.1.3)

b. All building elevations shall receive architectural treatment, except in special situations where an elevation is not visible from an adjoining property or street. (Development Standards, Division 1.1.4)

c. Exterior building colors should blend with surrounding development and not cause abrupt changes. Primary building surfaces (excluding trim areas) should be muted or earth-tone in color. Bold colors shall be avoided except when used as accent or trim. (Development Standards, Division 1.1.6)

5. <u>Height</u> - CCMC 18.04.190 (Residential)

The maximum height is 45 feet in the MFA zoning district. Please identify the height, per CCMC definitions with the SUP request.

6. <u>Lompa Ranch North SPA Handbook</u> – Carson City Master Plan

The site is subject to the SPA Handbook. While the following does not address all elements of the SPA Handbook, key requirements have been provided to ensure the SUP application materials depict and describe compliance with the Handbook. Where the SPA Handbook standards are more restrictive or specific than CCMC, the SPA Handbook shall apply. Any modification to the SPA Handbook would require a SPA amendment. Any request to modify the SPA Handbook, including the location or timing for development of the park site will require additional discussion. If a SPA amendment is desired, it is recommended that a MPR be filed prior to entitlement application and the MPR should include evidence that modifications would be beneficial/appropriate, findings can be made, and the change would be in keeping with the intent of the SPA.

Since this request will trigger both the design and construction of the 3 acre park site at the location shown in the Handbook and on the phasing plan. Because the park site will be triggered by this development, a preliminary plan will be necessary which depicts the park site boundary, any potential site constraints or grading needs, and if necessary, should include conceptual drainage study may be necessary to facilitate discussion during the MPR process.

<u>Chapter 1</u>

- SPA densities range from 4 to 36 du/ac

- Land Use is determined by zoning
- Uses shall conform to the underlying zoning use categories, entitlements follow CCMC

Chapter 2

- Single Family Residential Areas
    - Densities within single family areas shall be 3-8 du/ac
    - Density shall relate to adjoining areas and provide transitions between different uses
- 2.3 Multifamily Residential Site Planning
    - Clustered buildings are preferred over single large buildings
    - Open spaces shall be created to break up building mass and provide recreational areas
    - Pedestrian connections are required throughout the development
    - Play areas shall be centrally located and appropriate amenities are required
    - Setbacks shall conform to underlying zoning district standards
    - Design should take into account natural terrain, drainage, and features
    - Parking is required within 400 feet of residences
    - Landscaping shall conform with CCMC requirements
    - Drought tolerant and xeriscape design is encouraged
    - Parking lots which consist of more than 25 spaces in one area shall provide a minimum 400sq ft landscaped island with a tree for every 10 required parking spaces
    - ROW landscaping shall be minimum 15 foot wide and provide a tree at a rate of 1/25 lineal feet w/ 6 shrubs per tree
    - Is fencing, a berm, or other improvement proposed to eliminate potential headlight glare from affecting adjacent residents to the east?
    - Lighting fixtures over 10 feet in height will need to have shielded cutoffs.
    - Where the development adjoins common areas, open space, or drainageways – fencing shall be open view. Chain link is prohibited.
    - Trash enclosures are required and shall be architecturally compatible with the buildings. Use of chain link for enclosure walls and gates is prohibited.
    - The architectural renderings do not appear to comply with the residential design standards. Flat roofs are prohibited. A minimum of 4 separate roof planes is required on primary elevations. Additional standards can be found in Section 2.4.2 (Residential Architectural Elements).
    - 2.4.12 through 2.4.15 (Multifamily Architecture) are required to be met. The SUP will need to include elevations that demonstrate the standards are met by the request.

- **Chapter 3**
- Parks, Open Space and Trails
    - 3.1.1 (a) - A LMD is required and shall be formed by the Master Developer. Options include formation of a Master Developer Association for the east side of the freeway, or joining the LMD for the west side to establish one LMD for the entire SPA area. The LMD will need to be in place before the

first permit is issued. It is highly recommended that a draft LMD be submitted with the SUP application. If an alternative to a LMD is proposed, please coordinate discussion with staff early in the process.

- Sidewalk connections should be made to connect the different portions of the project with the trail/pathway system. There should also be a connection from the site to the future park site to the south of the project.
- 3.1.4 – This request will trigger the requirement of the 3-acre park site on the east side of the freeway, additionally, improvements on the City property will also be triggered by this request and will need to be planned and constructed with the park amenities. Plans will need to include the park site along with details on how the project will comply with the triggers established by the SPA Handbook. Please coordinate with staff on process and design/construction requirements and timelines.
- A special use permit is required for development of the park site based on the zoning district. This SUP can be applied for with the SUP request.
- 3.1.5 – The SUP will need to identify the wetland areas within the site and shall preserve them as open space.
- Open space areas will be required to be maintained by the development.
- 3.1.6 – The development will need to comply with the General Standards for Parks as outlined in the SPA Handbook.

- **Chapter 4**
  - The SUP application will need to provide a summary of requirements outlined in the SPA Handbook and the Development Agreement, and how the project is in compliance with each.
  - The Lompa Ranch North SPA phasing plan identifies an anticipated number of residential units for the east side of the freeway. The justification that was provided in an email dated May 20, 2022 should be included with an entitlement application.
  - An agreement for funds in lieu of RCT will be required. It is recommended that the draft agreement be submitted with the SUP application.
  - A per unit contribution for Fire Department facilities and/or equipment will be required.
  - A per unit school contribution will be required for the Carson City School District.
  - There are unit triggers for park development, an offer of the school site, and other items that will affect this project. Coordination with other developers and property owners within the SPA will be necessary to ensure your project can be developed based on the timeline for other triggers. Please include the 5/2/2022 offer letter to the school district with your SUP application.
  - This Chapter outlines requirements for the 3 acre park. Prior to initiating plans for the park's design, please meet with the Parks Department so they can provide direction on required features/elements.
  - A Parks O&M manual will be required with this project. It is recommended that a draft be submitted with the SUP application.

7. Growth Management - CCMC 18.12

Growth Management applies to all residential, commercial, and industrial property that is required to be served by city water and/or sewer service within the consolidated municipality of Carson City.

ENGINEERING AND UTILITIES

Lisa Perryman, Development Engineering

Site Constraints:

1. If the project is phased, the phases must be able to stand alone and meet all applicable development standards. Please provide an exhibit showing the desired phasing of buildings so City staff can discuss the required phasing of on-site and off-site improvements.

2. The improvement plans shall include all improvements identified in the approved Phasing Plan, which is part of the Lompa Ranch Specific Plan.

3. Based on our conversation at the MPR, it is our understanding that there is an active 404 permit that will be expiring soon. Please submit the newest 404 permit from the Army Corp of Engineers. Any mitigation required by the Army Corp shall be incorporated into the construction plan.

Transportation:

4. Please update the Traffic Impact Study dated April 7, 2022, based on Carson City comments:
    a. Please provide sight distance/triangles analysis for each intersection and each approach. Please refer to Title 18 Appendix of Carson City Municipal Code (CCMC) Division 12.11 for design requirements.
    b. Please provide an intersection queue length analysis and summary for each intersection and please provide any recommendations or mitigations.
    c. In addition to the intersection LOS, please provide segment LOS analysis for the following segments: Airport Road, N. Lompa Lane/Desatoya Drive. Understanding that Carson City does not have segment LOS criteria, please follow guidance outlined in CCMC Title 18 Appendix Division 12.13. Please contact Carson City Transportation Division to discuss a selected segment LOS criterion.
    d. Please provide a stop warrant analysis for the intersection of N. Lompa Lane/Desatoya and Airport Road.
    e. If the project is phased, please provide an analysis on how both the interim and future condition will operate and function, and please provide any recommendations or mitigations as needed.
    f. Please discuss if the traffic signals utilized existing signal timing or if optimum timing were used in the analysis.

g. The Lompa East Development was an entitled during the last update to the CAMPO Travel Demand Model (TDM) in 2020. Because of this, future year 2030 and 2050 traffic volumes in the TDM account for development's anticipated traffic. If the past development is no longer moving forward as described in the traffic study completed by Red Ltd, then please adjust the future background traffic growth projections removing any trips generated from past development assumptions to reflect a more accurate projection of future background trips.

5. Half street improvements, including paving, curb, gutter, striping, and sidewalk, must be reconstructed along the Airport Road frontage.

6. Development will need to incorporate Carson City Transit Route Plan which includes transit stops along Airport Road and/or N. Lompa Lane with covered shelter and lighting. Contact Carson City to discuss proposed locations.

7. Provide multi-use and pedestrian walkway connections plan to the existing multi-use path for the following locations:
   a. Southeast portion of parcel 01-074-102 to proposed park.
   b. Connection from center drive aisle on southern portion of parcel 01-074-102 to the existing multi-use path. Connection is to also provide maintenance access for SSMH.
   c. Prior to termination of sidewalk on the southwest corner of N. Lompa, provide connection to multi-use path
   d. Midblock connection across N. Lompa Lane near parcel boundary of 01-074-103 and 01-004-183
   e. A 10' wide off-street, PCC paved, shared use path must be constructed from the crosswalk at the intersection of Airport Road and Butti Way to the southern limit of parcel 01-074-101. Sidewalk to be constructed north of this cross to development limits. N. Lompa roadway section needs to comply with Carson City urban minor collector road standards, detail C-5.1.8

8. All public streets must have a minimum asphalt thickness of 4 inches or per the geotechnical engineer's recommendations, whichever is thicker.

9. Airport Road must accommodate urban collector width that is striped for parking on east side, bike lanes, and travel lanes. Where intersections occur, streets may need to be widen or implement no parking for the limit of turn pocket transitions.

10. Airport Rd must have "No Parking" signs posted along the frontage of the project on the west side of the street only, to allow existing residences to continue to utilize parking. Airport Rd must meet the City Standard Detail for an urban collector with bike lanes and parking on one side. Airport Rd must be widened anywhere that the street does not meet the minimum width for the number of lanes per the Standard Details.

11. The drive isles and parking spaces must meet City Standard details for parking lots.

12. If security gates are utilized on private entrances, the gates must be placed to meet the *minimum recommended* queuing storage lengths provided by an approved Traffic Impact Study.

13. Per CCDS, the curve in N Lompa Lane must have a reverse crown. The site improvement plans must include a separate street section detail for this segment of the street, and the transition from the standard crown to the reverse crown must be designed with a smooth transition.

14. Landscaped medians in N Lompa Ln must be maintained by the HOA or similar entity.

15. N. Lompa is to continue to Airport Rd where the street will change from N Lompa to Desatoya Dr at the intersection

16. N. Lompa Lane half Street improvements including bike lanes in both directions, no curb or sidewalk on west side. Widen up to parcel 00-815-308. Full street reconstruction may be required to accommodate grades.

Water:

17. A water main analysis signed by a professional engineer must be submitted in accordance with CCDS 15.3.1(a) to show that adequate pressure will be delivered to the meter and fire flows meet the minimum requirements of the Carson City Fire Department. Please contact the Michael Friend at (775) 283-7713 or mfriend@carson.org to schedule a fire hydrant flow test.

18. It is noted that the project proposes a public water main extension along the Desatoya Dr. and N. Lompa Lane frontages. The minimum mainline size of the main extension shall be 8". All public mains shall be located in rights of way.

19. Project shall be master metered with master meter(s) serving the section south of the proposed Desatoya Dr. and the section N. of Desatoya Dr. It is suggested that looped water systems be utilized. If irrigation meters are desired, master irrigation meters may be utilized to serve the north and south areas of the project.

20. Internal Looping after master meter is not required but is advisable.

21. All meters shall be located per City Standards including the typical utility lateral detail, on property frontages. Reduced pressure principle backflow prevention assemblies are required on all water services and shall be located directly behind meters. Water meters shall be located outside driving surfaces.

22. The fire line must have a double check valve backflow preventer if it is Class 1-3, or a reduced pressure principle assembly if it is Class 4-6. These backflow preventers must be above ground in a hot box, and must be located as close to the property line as possible. The irrigation service will need a reduced pressure backflow preventer if a vacuum breaker system cannot be designed to operate properly.

23. All onsite water piping shall be private. All onsite fire piping shall be private and shall incorporate single check valves at property lines to demarcate transition to private piping.

24. No private piping shall cross public rights of way.

25. Dead end water mains will not be allowed to be constructed during the phased construction of the project. Phasing shall incorporate the looping of water mains to avoid water quality issues including connecting to the existing water main on N Lompa Ln.

26. Due to minimal water information provided in the MPR application, additional requirements may apply. Project shall comply with all City and State codes and standards.

Sewer:

27. There is an existing 18" concrete line running through the middle of both parcels. This main is approximately 60% full (d/D).

28. The existing sewer manholes within the project limits will need to be removed and replaced or rehabilitated to the satisfaction of the city. These manholes will need to be constructed on corrosion resistant material. It is strongly recommended that odor control measures be implemented in this replacement for the benefit of the project.

29. A sewer main analysis signed by a professional engineer must be submitted that includes addressing the effect of flows on the existing City system. See section 15.3.2 of CCDS.

30. Parking spaces must be located at least 20 feet away from sewer manholes, but may be located above the sewer main in the easement.

31. The utility plans for the construction permit must indicate precast manholes and bases. Cast in place manholes will not be allowed, regardless of depth of new sewer mains. Riser depths must meet Carson City Standard Details.

Storm Drainage and Flooding:

32. In July 2021, the Carson City Drainage Manual became effective and is required for all new and redeveloped parcels. The detention design storm requirements changed from a 5-year, 24-hour event to a 10-year 24-hour event. The Drainage Manual includes Low Impact Development (LID) design requirements. The manual is available here: https://www.carson.org/home/showpublisheddocument/76280/637624691903200000

33. Not only on-site drainage but off-site drainage will need to be managed. The plans did not show the underground system to be able to comment.

34. At the south end the North Lompa Lane is the start of an underground storm drain system which will need to carried south.

35. The new project states that the structure layout will free up space to account for the flood volume mitigation. This mitigation will need to be shown and confirmed.

36. Public storm drains must be routed around the project.

37. Onsite storm drains must be privately owned and maintained.

38. A LOMR will be required to be submit to FEMA after construction has been completed.

39. The CC&R's must clearly state that a Landscape Maintenance Association (LMA), a Homeowners Association (HOA) or a similar entity is responsible for maintaining private storm drain infrastructure including any mains, basins, and LID infrastructure.

40. The site improvement drainage study must demonstrate the ability of downstream and surrounding drainage facilities to handle increased runoff if detention is not used.

41. The Technical Drainage Study for the site improvement plans must include an analysis of proposed culverts and existing downstream culverts to determine sufficient capacity.

42. Access must be provided to the basin/channel adjacent to Airport Rd to allow for HOA (or similar entity) maintenance.

43. A FEMA elevation certificate must be included with the construction plan submittal. All FEMA requirements for this flood zone must be met.

City Lands:

44. Easements may be needed for the stormdrain system crossing both parcels described above.

45. Sewer main easement must be increased in width to be 20 feet plus width necessary for bench excavation. Permanent Structures need to be set back a minimum of 20' from the sewer main.

General Comments:

46. A geotechnical report will be required for the subdivision prior to approval of any construction permits.

47. Any commercial or industrial developments with an average daily water usage of 15,000 gallons per day or more must submit a growth management application.

48. Water and sewer connection fees must be paid. If these fees were paid in the past, then the difference between the old and new amounts of water/sewer usages must be paid for. Please see CCMC 12.01.030 for the water connection fee schedule and 12.03.020 for the sewer connection fee schedule.

49. Any engineering work done on this project must be wet stamped and signed by an engineer licensed in Nevada. This will include site, grading, utility and erosion control plans as well as standard details.

50. All construction work must be to Carson City Development Standards (CCDS) and meet the requirements of the Carson City Standard Details.

51. Addresses for units will be provided during the building permit review process.

52. Fresh water must be used for dust control. Contact the Public Works Water Operations Supervisor at 283-7382 for more information.

53. A private testing agreement will be necessary for the compaction and material testing in the street right of way. The form can be obtained through Carson City Permit Engineering.

54. An erosion control plan meeting section 13 of CCDS will be required in the plan set.

55. If an existing water service is to be re-used, it must be checked for condition. It may need to be replaced. Any existing water and sewer services not being used must be abandoned at the main.

56. New electrical service must be underground.

57. Please show sufficient utility information to ensure that minimum spacing is met between water meters and dry utilities.

58. Any work performed in the street right of way will require a traffic control plan and a time line type schedule to be submitted before the work can begin. A minimum of one week notice must be given before any work can begin in the street right of way.

59. Please show any easements on the construction drawings.

60. A Construction Stormwater Permit from the Nevada Division of Environmental Protection (NDEP) will be required for the construction of projects 1 acre or greater.

61. A Dust Control Permit from NDEP will be required for any project 5 acres or greater.

62. A NDOT Encroachment permit from District II Headquarters must be obtained before construction work is begun.

FIRE DEPARTMENT
Casey Drews, Fire Inspector

1. The project must comply with the International Fire Code (IFC) and Northern Nevada fire code amendments as adopted by Carson City.

2. Apartment buildings and buildings greater than 5,000 square feet in size require fire sprinkler, fire alarm, and Knox box.

3. There must be a fire hydrant within 100 feet of the fire department connection (FDC).

4. Additional fire hydrants are required and spacing must meet Appendix C of the IFC.

5. For buildings 30 feet tall or more, an aerial fire apparatus road must be at least 15 feet, but not more than 30 feet from the side of the building envelope, per IFC Appendix D.

6. All portions of a project must meet emergency access standards. Each phase of development will need to stand alone and not rely on future phases to comply with standards. The current proposed plan on the north side of the proposed N Lompa Lane needs to have two separate access roads. The two roads need to be remote from each other which means they shall be placed a distance apart equal to not less than ½ the length of the maximum overall diagonal dimension (currently 360 feet) of the area to be served (currently 1,000 feet).

7. All buildings will require separate addresses.

BUILDING DIVISION
Corey Coleman, Building Official

1. Design to the 2018 Code Series and Northern Nevada Amendments (Building and Fire) and the State of Nevada Blue Book.

2. Provide submittal digitally to the permit center at permitcenter.carson.org. Initial reviews may take up to 15 days.

3. Accessibility units need to be spaced out throughout the project and meet Chapter 11 of the IBC and the ICC ANSI A117.1 regulations.

4. Provide source document fire assembly on plans, as an example Gypsum and UL allows for their design to be copied on the plans.

DIVISION OF HEALTH AND HUMAN SERVICES
Dustin Boothe, Health Department

1. Plans will need to be submitted to Carson City Building Department for Health Department review.

2. If proposed, the pool/spa would need to be built in accordance with Nevada Administrative Code (NAC) 444.

PARKS, RECREATION, AND OPEN SPACE
Nick Wentworth, Parks Department

1. The City will not be responsible for any landscape or irrigation system maintenance on the project. All landscaping and landscape maintenance in the right of way will be the sole responsibility of the owner/HOA. The developer is required to maintain all common landscape, open space areas within the development and adjacent 3 acre park including any landscaping in the street(s) right of ways in perpetuity.

2. Carson City is a Bee City, USA. As a result, the developer shall use approximately 50% pollinator friendly plant material for any required landscaping on the project site. Also, any remaining landscape plant material selection needs to be consistent with the City's approved tree species list or other tree species, as approved by the City. The Carson City Pollinator Plant list and other plant selection resources can be found at www.carson.org/beecityusa

3. The developer is required to incorporate "best management practices" into their construction documents and specifications to reduce the spread of noxious weeds. The spread of invasive and noxious weeds is a significant issue in construction projects that involve land disturbance. Earth moving activities contribute to the spread of weeds, as does the use of contaminated construction fill, seed, or erosion-control products. Experience has demonstrated that prevention is the least

expensive and most effective way to halt the spread of noxious and invasive weeds. Preventing the establishment or spread of weeds relies upon:
• Educating workers about the importance of managing weeds on an ongoing basis;
• Properly identifying weed species to determine most appropriate treatment strategies;
• Avoiding or treating existing weed populations; and
• Incorporating measures into projects that prevent weed seeds or other plant parts from establishing new or bigger populations such as certification of weed-free products.

For more information on "best management practices" please contact The Carson City Parks, Rec. and Open Space Dept.

4. Deciduous trees must be planted a minimum of 5' from any city/public street, sidewalk or pathway. Evergreen trees must be planted a minimum of 10' from any city/public street, sidewalk or pathway. Fruit bearing, "non-fruiting" flowering or any other trees that drop debris such as seed pods will not be permitted near or placed where they will eventually hang over city/public sidewalks or pathways.

5. Carson City Municipal Code: Title 18, Division 3 should be reviewed by any/all parties involved in the proposed landscape design prior to landscape plans being submitted to the city for final approval of a building or site improvement permit. Note: Special care and consideration should be taken in the protection of existing trees on-site. https://library.municode.com/nv/carson_city/codes/code_of_ordinances?nodeId=TIT18_APPENDIXCADEST_DIV3LA

6. The project proposes 306 units which meets the 250 unit threshold identified in the Lompa Ranch Specific Plan to design, build and dedicate a 3 acre park to Carson City.

7. The developer shall make a minimum of 3 access points connecting internal sidewalks and open space to the City's multi-use pathway west of the project.

Conclusion

These comments are based on a very general site plan and do not indicate a complete review. All pertinent requirements of Nevada State Law, Carson City Code, and Carson City Development Standards will still apply whether mentioned in this letter or not.

Due to changing conditions of business and requirements for zoning, master plan and development codes of Carson City, this MPR information will expire and may need to be updated with a new MPR if the developer has not applied for a special use permit, or building permit if a special use permit is not required, within one year of the date of the MPR meeting. Please provide a copy of this MPR letter with any submittal in relation to the proposed project.

The aforementioned comments are based on the Major Project Review Committee's review. If you have any questions, please feel free to contact the following members of staff, Monday through Friday 8:00 AM to 4:00 PM.

Planning Division –
Heather Manzo, Associate Planner
(775) 283-7075
Email: hmanzo@carson.org

Engineering Division –
Lisa Perryman, Development Engineering
(775) 283-7669
Email: lperryman@carson.org

Fire Prevention –
Casey Drews, Fire Inspector
(775) 283-7160
Email: cdrews@carson.org

Building Division –
Corey Coleman, Building Official
(775) 283-7052
Email: ccoleman@carson.org

Health and Human Services
Dustin Boothe, Health Department
(775) 283-7220
Email: dboothe@carson.org

Sincerely,
Community Development Department, Planning Division

HManzo

Heather Manzo
Associate Planner

cc: MPR-2022-0196
Karen Downs kdowns@manhard.com

108 E. Proctor Street
Carson City, Nevada 89701
(775) 887-2180
Hearing Impaired: 711

June 2, 2022

Lompa Land Investors, LLC
Attn: Kraig Knudsen
5560 Longley Lane Ste 200
Reno, NV 89511

Electronic Delivery to: kdowns@manhard.com

Major Project Review: MPR-2022-0196

Project Description: The project proposes construction of a total of 306 multifamily units on two parcels separated totaling 23.95 acres in size located on the west side of Airport Road and to the east of I-580 within the Lompa Ranch North Specific Plan Area. The application proposes a reversionary map and special use permit for a use that is allowed in one of the zones on a split zoned property to be allowed across the site in its entirety.

Review Date: May 3, 2022

Major Project Review Comments

The following requirements and comments are provided for your use in preparing final plans and submittals for the project. Please be advised that the comments presented in this letter are based on the plans submitted with the Major Project Review application and may not include all the requirements or conditions which may be placed on the project at the time of submittal of planning applications for approval (if applicable) or final plans for building permits. It is hoped, however, that this review will expedite the completion of your project.

Some of the requirements noted below may have already been shown or otherwise indicated in the plans and need only be submitted in the final improvement plan form. Final on- and off-site improvement plans shall be submitted to the Building Division, (108 E. Proctor Street). These plans must contain all appropriate requirements of Development Engineering, Health, Utilities, Fire, and Planning Divisions/Departments.

Planning applications (if applicable), such as Master Plan Amendments, Zoning Changes, Special Use Permits, Variances, Lot Line Adjustments, Parcel Maps, etc. shall be submitted to the Planning Division (108 E. Proctor Street) for review and approval.

SITE INFORMATION:

Address: West side of Airport Road & Desatoya Drive and to the east of I-580
APNs: 010-741-02 & 03
Site Size: 23.95 acres
Master Plan Designation: High Density Residential and Medium Density Residential and all properties are located within the Lompa Ranch North Specific Plan Area and must be developed in accordance with the SPA Handbook, Development Agreement, and the approved Phasing Plan.
Zoning: MFA & SF6

PLANNING DIVISION

Heather Manzo, Associate Planner

1. Allowable Use – The multifamily use is allowed within the MFA zoning district; however multifamily development is not a listed allowed use within the SF6 zone. The application states that the intent is to utilize CCMC 18.04.020(6) and to file for a SUP as allowed by this section of CCMC.
   a. A reversionary map must be recorded to combine the parcels for 18.04.020(6) to be applied to the project site.
   b. A Special Use Permit application may be submitted when an applicant wishes to utilize the entire parcel for a use that is allowed in one of the zones as provided in 18.04.020(6)(d).
   c. The SUP application needs to address the required findings for a Special Use Permit as outlined in CCMC 18.08.080. Compliance with the SPA Handbook and other approved and adopted documents related to the Lompa Ranch North SPA will need to be addressed in the findings.
   d. The Special Use Permit application must include an open space exhibit that clearly demonstrates compliance with Division 1.17, subsection 5. Please provide both qualitative and quantitative information.
   e. If the project will be constructed in phases, a phasing plan should be provided with the SUP application to demonstrate that each phase is a standalone project.

2. Setbacks – Division 1.17 and CCMC 18.04.190 (Residential)

The information provided below assumes design will be the result of a SUP to allow for the MFA standards to be utilized across the site. CCMC 18.04.190 outlines the minimum setbacks in the MFA zoning district. Division 1.17 further expands on the base zoning setbacks for multifamily development. Where standards differ, the more restrictive will apply.

The setbacks for the MFA zone are: Front = 10, Side = 10, Street Side = 10, and Rear = 20, however the setbacks may be modified by the standards for arterial street frontages and residential adjacency as outlined in CCMC 18.04.190 and CCDS 1.17.

If fences/walls are located within setbacks that exceed fence/wall height limits, a special use permit will be required.

The following summarizes some of the CCMC standards contained in Division 1.17:

- Density is determined by the zoning district. A table identifying the density calculations based on the zone should be provided with the SUP.
- The Maximum height is 45 feet. From plans that have been presented, it appears the project has been designed with buildings that are 45 feet tall. Site plans will need to depict distances from property lines with the SUP application.
- Setbacks for the project are: F = 20, S = 10, SS = 15, R = 20. The project appears to meet all required setbacks.
- Code required parking is equal to 2.5 parking stalls per unit if no on-street parking is available adjacent to the site. The proposed plan identifies code compliance. Distance from parking to building will need to comply with the SPA Handbook requirements.
- The project appears to comply with open space requirements. A plan identifying the 1) general required landscape area, 2) private common open space (if any), and 3) common open space will be required at the time of SUP. As noted in CCMC, landscaping along street frontages may not be counted toward the common open space requirements.

All proposed structures should be shown on the site plan as part of the special use permit application including carport structures.

3. Parking and Loading – Carson City Development Standards, Division 2

The number of parking spaces required for various uses is described in Carson City Development Standards, Division 2.2. Based on the required parking ratio of 2 spaces per unit plus 1 space for every 2 units for guest parking, your project requires a total of 765 parking spaces are required if no on-street parking is available. As currently designed, the project provides a sufficient amount of parking.

Excess parking is not prohibited. Should a need arise for an alternative parking standard, Division 2 allows for the director to consider an alternative parking standard if the request is substantiated by an accredited source (e.g. Institute of Transportation Engineers). The request would need to be filed in writing for possible approval.

- Parking areas need to be screened to prevent impacts on adjacent residences resulting from headlight glare.
- Excess parking on the southeast portion of the site may be used for public/overflow parking for the park site.

4. Architectural Design - Carson City Development Standards, Division 1

The building elevations must be submitted with the Special Use Permit and demonstrate compliance with the architectural standards outlined in the Development Standards, Division 1.1, including but not limited to the following:

a. Variations of building details, form, line, color, and materials shall be employed to create visual interest. Variations in wall planes, roof lines and direction are encouraged to prevent monotonous appearance in buildings. Large expanses of walls devoid of any articulation or embellishment shall be avoided. Similarly, vertical variation in the roof line is encouraged. Mansard roofs shall wrap around the entire building. (Development Standards, Division 1.1.3)

b. All building elevations shall receive architectural treatment, except in special situations where an elevation is not visible from an adjoining property or street. (Development Standards, Division 1.1.4)

c. Exterior building colors should blend with surrounding development and not cause abrupt changes. Primary building surfaces (excluding trim areas) should be muted or earth-tone in color. Bold colors shall be avoided except when used as accent or trim. (Development Standards, Division 1.1.6)

5. Height - CCMC 18.04.190 (Residential)

The maximum height is 45 feet in the MFA zoning district. Please identify the height, per CCMC definitions with the SUP request.

6. Lompa Ranch North SPA Handbook – Carson City Master Plan

The site is subject to the SPA Handbook. While the following does not address all elements of the SPA Handbook, key requirements have been provided to ensure the SUP application materials depict and describe compliance with the Handbook. Where the SPA Handbook standards are more restrictive or specific than CCMC, the SPA Handbook shall apply. Any modification to the SPA Handbook would require a SPA amendment. Any request to modify the SPA Handbook, including the location or timing for development of the park site will require additional discussion. If a SPA amendment is desired, it is recommended that a MPR be filed prior to entitlement application and the MPR should include evidence that modifications would be beneficial/appropriate, findings can be made, and the change would be in keeping with the intent of the SPA.

Since this request will trigger both the design and construction of the 3 acre park site at the location shown in the Handbook and on the phasing plan. Because the park site will be triggered by this development, a preliminary plan will be necessary which depicts the park site boundary, any potential site constraints or grading needs, and if necessary, should include conceptual drainage study may be necessary to facilitate discussion during the MPR process.

Chapter 1

- SPA densities range from 4 to 36 du/ac

- Land Use is determined by zoning
- Uses shall conform to the underlying zoning use categories, entitlements follow CCMC

Chapter 2

- Single Family Residential Areas
  - Densities within single family areas shall be 3-8 du/ac
  - Density shall relate to adjoining areas and provide transitions between different uses
- 2.3 Multifamily Residential Site Planning
  - Clustered buildings are preferred over single large buildings
  - Open spaces shall be created to break up building mass and provide recreational areas
  - Pedestrian connections are required throughout the development
  - Play areas shall be centrally located and appropriate amenities are required
  - Setbacks shall conform to underlying zoning district standards
  - Design should take into account natural terrain, drainage, and features
  - Parking is required within 400 feet of residences
  - Landscaping shall conform with CCMC requirements
  - Drought tolerant and xeriscape design is encouraged
  - Parking lots which consist of more than 25 spaces in one area shall provide a minimum 400sq ft landscaped island with a tree for every 10 required parking spaces
  - ROW landscaping shall be minimum 15 foot wide and provide a tree at a rate of 1/25 lineal feet w/ 6 shrubs per tree
  - Is fencing, a berm, or other improvement proposed to eliminate potential headlight glare from affecting adjacent residents to the east?
  - Lighting fixtures over 10 feet in height will need to have shielded cutoffs.
  - Where the development adjoins common areas, open space, or drainageways – fencing shall be open view. Chain link is prohibited.
  - Trash enclosures are required and shall be architecturally compatible with the buildings. Use of chain link for enclosure walls and gates is prohibited.
  - The architectural renderings do not appear to comply with the residential design standards. Flat roofs are prohibited. A minimum of 4 separate roof planes is required on primary elevations. Additional standards can be found in Section 2.4.2 (Residential Architectural Elements).
  - 2.4.12 through 2.4.15 (Multifamily Architecture) are required to be met. The SUP will need to include elevations that demonstrate the standards are met by the request.

- **Chapter 3**
- Parks, Open Space and Trails
  - 3.1.1 (a) - A LMD is required and shall be formed by the Master Developer. Options include formation of a Master Developer Association for the east side of the freeway, or joining the LMD for the west side to establish one LMD for the entire SPA area. The LMD will need to be in place before the

first permit is issued. It is highly recommended that a draft LMD be submitted with the SUP application. If an alternative to a LMD is proposed, please coordinate discussion with staff early in the process.
- Sidewalk connections should be made to connect the different portions of the project with the trail/pathway system. There should also be a connection from the site to the future park site to the south of the project.
- 3.1.4 – This request will trigger the requirement of the 3-acre park site on the east side of the freeway, additionally, improvements on the City property will also be triggered by this request and will need to be planned and constructed with the park amenities. Plans will need to include the park site along with details on how the project will comply with the triggers established by the SPA Handbook. Please coordinate with staff on process and design/construction requirements and timelines.
- A special use permit is required for development of the park site based on the zoning district. This SUP can be applied for with the SUP request.
- 3.1.5 – The SUP will need to identify the wetland areas within the site and shall preserve them as open space.
- Open space areas will be required to be maintained by the development.
- 3.1.6 – The development will need to comply with the General Standards for Parks as outlined in the SPA Handbook.

- **Chapter 4**
  - The SUP application will need to provide a summary of requirements outlined in the SPA Handbook and the Development Agreement, and how the project is in compliance with each.
  - The Lompa Ranch North SPA phasing plan identifies an anticipated number of residential units for the east side of the freeway. The justification that was provided in an email dated May 20, 2022 should be included with an entitlement application.
  - An agreement for funds in lieu of RCT will be required. It is recommended that the draft agreement be submitted with the SUP application.
  - A per unit contribution for Fire Department facilities and/or equipment will be required.
  - A per unit school contribution will be required for the Carson City School District.
  - There are unit triggers for park development, an offer of the school site, and other items that will affect this project. Coordination with other developers and property owners within the SPA will be necessary to ensure your project can be developed based on the timeline for other triggers. Please include the 5/2/2022 offer letter to the school district with your SUP application.
  - This Chapter outlines requirements for the 3 acre park. Prior to initiating plans for the park's design, please meet with the Parks Department so they can provide direction on required features/elements.
  - A Parks O&M manual will be required with this project. It is recommended that a draft be submitted with the SUP application.

7. Growth Management - CCMC 18.12

Growth Management applies to all residential, commercial, and industrial property that is required to be served by city water and/or sewer service within the consolidated municipality of Carson City.

ENGINEERING AND UTILITIES
Lisa Perryman, Development Engineering

Site Constraints:

1. If the project is phased, the phases must be able to stand alone and meet all applicable development standards. Please provide an exhibit showing the desired phasing of buildings so City staff can discuss the required phasing of on-site and off-site improvements.

2. The improvement plans shall include all improvements identified in the approved Phasing Plan, which is part of the Lompa Ranch Specific Plan.

3. Based on our conversation at the MPR, it is our understanding that there is an active 404 permit that will be expiring soon. Please submit the newest 404 permit from the Army Corp of Engineers. Any mitigation required by the Army Corp shall be incorporated into the construction plan.

Transportation:

4. Please update the Traffic Impact Study dated April 7, 2022, based on Carson City comments:
   a. Please provide sight distance/triangles analysis for each intersection and each approach. Please refer to Title 18 Appendix of Carson City Municipal Code (CCMC) Division 12.11 for design requirements.
   b. Please provide an intersection queue length analysis and summary for each intersection and please provide any recommendations or mitigations.
   c. In addition to the intersection LOS, please provide segment LOS analysis for the following segments: Airport Road, N. Lompa Lane/Desatoya Drive. Understanding that Carson City does not have segment LOS criteria, please follow guidance outlined in CCMC Title 18 Appendix Division 12.13. Please contact Carson City Transportation Division to discuss a selected segment LOS criterion.
   d. Please provide a stop warrant analysis for the intersection of N. Lompa Lane/Desatoya and Airport Road.
   e. If the project is phased, please provide an analysis on how both the interim and future condition will operate and function, and please provide any recommendations or mitigations as needed.
   f. Please discuss if the traffic signals utilized existing signal timing or if optimum timing were used in the analysis.

g. The Lompa East Development was an entitled during the last update to the CAMPO Travel Demand Model (TDM) in 2020. Because of this, future year 2030 and 2050 traffic volumes in the TDM account for development's anticipated traffic. If the past development is no longer moving forward as described in the traffic study completed by Red Ltd, then please adjust the future background traffic growth projections removing any trips generated from past development assumptions to reflect a more accurate projection of future background trips.

5. Half street improvements, including paving, curb, gutter, striping, and sidewalk, must be reconstructed along the Airport Road frontage.

6. Development will need to incorporate Carson City Transit Route Plan which includes transit stops along Airport Road and/or N. Lompa Lane with covered shelter and lighting. Contact Carson City to discuss proposed locations.

7. Provide multi-use and pedestrian walkway connections plan to the existing multi-use path for the following locations:
   a. Southeast portion of parcel 01-074-102 to proposed park.
   b. Connection from center drive aisle on southern portion of parcel 01-074-102 to the existing multi-use path. Connection is to also provide maintenance access for SSMH.
   c. Prior to termination of sidewalk on the southwest corner of N. Lompa, provide connection to multi-use path
   d. Midblock connection across N. Lompa Lane near parcel boundary of 01-074-103 and 01-004-183
   e. A 10' wide off-street, PCC paved, shared use path must be constructed from the crosswalk at the intersection of Airport Road and Butti Way to the southern limit of parcel 01-074-101. Sidewalk to be constructed north of this cross to development limits. N. Lompa roadway section needs to comply with Carson City urban minor collector road standards, detail C-5.1.8

8. All public streets must have a minimum asphalt thickness of 4 inches or per the geotechnical engineer's recommendations, whichever is thicker.

9. Airport Road must accommodate urban collector width that is striped for parking on east side, bike lanes, and travel lanes. Where intersections occur, streets may need to be widen or implement no parking for the limit of turn pocket transitions.

10. Airport Rd must have "No Parking" signs posted along the frontage of the project on the west side of the street only, to allow existing residences to continue to utilize parking. Airport Rd must meet the City Standard Detail for an urban collector with bike lanes and parking on one side. Airport Rd must be widened anywhere that the street does not meet the minimum width for the number of lanes per the Standard Details.

11. The drive isles and parking spaces must meet City Standard details for parking lots.

12. If security gates are utilized on private entrances, the gates must be placed to meet the *minimum recommended* queuing storage lengths provided by an approved Traffic Impact Study.

13. Per CCDS, the curve in N Lompa Lane must have a reverse crown. The site improvement plans must include a separate street section detail for this segment of the street, and the transition from the standard crown to the reverse crown must be designed with a smooth transition.

14. Landscaped medians in N Lompa Ln must be maintained by the HOA or similar entity.

15. N. Lompa is to continue to Airport Rd where the street will change from N Lompa to Desatoya Dr at the intersection

16. N. Lompa Lane half Street improvements including bike lanes in both directions, no curb or sidewalk on west side. Widen up to parcel 00-815-308. Full street reconstruction may be required to accommodate grades.

Water:

17. A water main analysis signed by a professional engineer must be submitted in accordance with CCDS 15.3.1(a) to show that adequate pressure will be delivered to the meter and fire flows meet the minimum requirements of the Carson City Fire Department. Please contact the Michael Friend at (775) 283-7713 or mfriend@carson.org to schedule a fire hydrant flow test.

18. It is noted that the project proposes a public water main extension along the Desatoya Dr. and N. Lompa Lane frontages. The minimum mainline size of the main extension shall be 8". All public mains shall be located in rights of way.

19. Project shall be master metered with master meter(s) serving the section south of the proposed Desatoya Dr. and the section N. of Desatoya Dr. It is suggested that looped water systems be utilized. If irrigation meters are desired, master irrigation meters may be utilized to serve the north and south areas of the project.

20. Internal Looping after master meter is not required but is advisable.

21. All meters shall be located per City Standards including the typical utility lateral detail, on property frontages. Reduced pressure principle backflow prevention assemblies are required on all water services and shall be located directly behind meters. Water meters shall be located outside driving surfaces.

22. The fire line must have a double check valve backflow preventer if it is Class 1-3, or a reduced pressure principle assembly if it is Class 4-6. These backflow preventers must be above ground in a hot box, and must be located as close to the property line as possible. The irrigation service will need a reduced pressure backflow preventer if a vacuum breaker system cannot be designed to operate properly.

23. All onsite water piping shall be private. All onsite fire piping shall be private and shall incorporate single check valves at property lines to demarcate transition to private piping.

24. No private piping shall cross public rights of way.

25. Dead end water mains will not be allowed to be constructed during the phased construction of the project. Phasing shall incorporate the looping of water mains to avoid water quality issues including connecting to the existing water main on N Lompa Ln.

26. Due to minimal water information provided in the MPR application, additional requirements may apply. Project shall comply with all City and State codes and standards.

Sewer:

27. There is an existing 18" concrete line running through the middle of both parcels. This main is approximately 60% full (d/D).

28. The existing sewer manholes within the project limits will need to be removed and replaced or rehabilitated to the satisfaction of the city. These manholes will need to be constructed on corrosion resistant material. It is strongly recommended that odor control measures be implemented in this replacement for the benefit of the project.

29. A sewer main analysis signed by a professional engineer must be submitted that includes addressing the effect of flows on the existing City system. See section 15.3.2 of CCDS.

30. Parking spaces must be located at least 20 feet away from sewer manholes, but may be located above the sewer main in the easement.

31. The utility plans for the construction permit must indicate precast manholes and bases. Cast in place manholes will not be allowed, regardless of depth of new sewer mains. Riser depths must meet Carson City Standard Details.

Storm Drainage and Flooding:

32. In July 2021, the Carson City Drainage Manual became effective and is required for all new and redeveloped parcels. The detention design storm requirements changed from a 5-year, 24-hour event to a 10-year 24-hour event. The Drainage Manual includes Low Impact Development (LID) design requirements. The manual is available here: https://www.carson.org/home/showpublisheddocument/76280/637624691903200000

33. Not only on-site drainage but off-site drainage will need to be managed. The plans did not show the underground system to be able to comment.

34. At the south end the North Lompa Lane is the start of an underground storm drain system which will need to carried south.

35. The new project states that the structure layout will free up space to account for the flood volume mitigation. This mitigation will need to be shown and confirmed.

36. Public storm drains must be routed around the project.

37. Onsite storm drains must be privately owned and maintained.

38. A LOMR will be required to be submit to FEMA after construction has been completed.

39. The CC&R's must clearly state that a Landscape Maintenance Association (LMA), a Homeowners Association (HOA) or a similar entity is responsible for maintaining private storm drain infrastructure including any mains, basins, and LID infrastructure.

40. The site improvement drainage study must demonstrate the ability of downstream and surrounding drainage facilities to handle increased runoff if detention is not used.

41. The Technical Drainage Study for the site improvement plans must include an analysis of proposed culverts and existing downstream culverts to determine sufficient capacity.

42. Access must be provided to the basin/channel adjacent to Airport Rd to allow for HOA (or similar entity) maintenance.

43. A FEMA elevation certificate must be included with the construction plan submittal. All FEMA requirements for this flood zone must be met.

City Lands:

44. Easements may be needed for the stormdrain system crossing both parcels described above.

45. Sewer main easement must be increased in width to be 20 feet plus width necessary for bench excavation. Permanent Structures need to be set back a minimum of 20' from the sewer main.

General Comments:

46. A geotechnical report will be required for the subdivision prior to approval of any construction permits.

47. Any commercial or industrial developments with an average daily water usage of 15,000 gallons per day or more must submit a growth management application.

48. Water and sewer connection fees must be paid. If these fees were paid in the past, then the difference between the old and new amounts of water/sewer usages must be paid for. Please see CCMC 12.01.030 for the water connection fee schedule and 12.03.020 for the sewer connection fee schedule.

49. Any engineering work done on this project must be wet stamped and signed by an engineer licensed in Nevada. This will include site, grading, utility and erosion control plans as well as standard details.

50. All construction work must be to Carson City Development Standards (CCDS) and meet the requirements of the Carson City Standard Details.

51. Addresses for units will be provided during the building permit review process.

52. Fresh water must be used for dust control. Contact the Public Works Water Operations Supervisor at 283-7382 for more information.

53. A private testing agreement will be necessary for the compaction and material testing in the street right of way. The form can be obtained through Carson City Permit Engineering.

54. An erosion control plan meeting section 13 of CCDS will be required in the plan set.

55. If an existing water service is to be re-used, it must be checked for condition. It may need to be replaced. Any existing water and sewer services not being used must be abandoned at the main.

56. New electrical service must be underground.

57. Please show sufficient utility information to ensure that minimum spacing is met between water meters and dry utilities.

58. Any work performed in the street right of way will require a traffic control plan and a time line type schedule to be submitted before the work can begin. A minimum of one week notice must be given before any work can begin in the street right of way.

59. Please show any easements on the construction drawings.

60. A Construction Stormwater Permit from the Nevada Division of Environmental Protection (NDEP) will be required for the construction of projects 1 acre or greater.

61. A Dust Control Permit from NDEP will be required for any project 5 acres or greater.

62. A NDOT Encroachment permit from District II Headquarters must be obtained before construction work is begun.

FIRE DEPARTMENT
Casey Drews, Fire Inspector

1. The project must comply with the International Fire Code (IFC) and Northern Nevada fire code amendments as adopted by Carson City.

2. Apartment buildings and buildings greater than 5,000 square feet in size require fire sprinkler, fire alarm, and Knox box.

3. There must be a fire hydrant within 100 feet of the fire department connection (FDC).

4. Additional fire hydrants are required and spacing must meet Appendix C of the IFC.

5. For buildings 30 feet tall or more, an aerial fire apparatus road must be at least 15 feet, but not more than 30 feet from the side of the building envelope, per IFC Appendix D.

6. All portions of a project must meet emergency access standards. Each phase of development will need to stand alone and not rely on future phases to comply with standards. The current proposed plan on the north side of the proposed N Lompa Lane needs to have two separate access roads. The two roads need to be remote from each other which means they shall be placed a distance apart equal to not less than ½ the length of the maximum overall diagonal dimension (currently 360 feet) of the area to be served (currently 1,000 feet).

7. All buildings will require separate addresses.

BUILDING DIVISION
Corey Coleman, Building Official

1. Design to the 2018 Code Series and Northern Nevada Amendments (Building and Fire) and the State of Nevada Blue Book.

2. Provide submittal digitally to the permit center at permitcenter.carson.org. Initial reviews may take up to 15 days.

3. Accessibility units need to be spaced out throughout the project and meet Chapter 11 of the IBC and the ICC ANSI A117.1 regulations.

4. Provide source document fire assembly on plans, as an example Gypsum and UL allows for their design to be copied on the plans.

DIVISION OF HEALTH AND HUMAN SERVICES
Dustin Boothe, Health Department

1. Plans will need to be submitted to Carson City Building Department for Health Department review.

2. If proposed, the pool/spa would need to be built in accordance with Nevada Administrative Code (NAC) 444.

PARKS, RECREATION, AND OPEN SPACE
Nick Wentworth, Parks Department

1. The City will not be responsible for any landscape or irrigation system maintenance on the project. All landscaping and landscape maintenance in the right of way will be the sole responsibility of the owner/HOA. The developer is required to maintain all common landscape, open space areas within the development and adjacent 3 acre park including any landscaping in the street(s) right of ways in perpetuity.

2. Carson City is a Bee City, USA. As a result, the developer shall use approximately 50% pollinator friendly plant material for any required landscaping on the project site. Also, any remaining landscape plant material selection needs to be consistent with the City's approved tree species list or other tree species, as approved by the City. The Carson City Pollinator Plant list and other plant selection resources can be found at www.carson.org/beecityusa

3. The developer is required to incorporate "best management practices" into their construction documents and specifications to reduce the spread of noxious weeds. The spread of invasive and noxious weeds is a significant issue in construction projects that involve land disturbance. Earth moving activities contribute to the spread of weeds, as does the use of contaminated construction fill, seed, or erosion-control products. Experience has demonstrated that prevention is the least

expensive and most effective way to halt the spread of noxious and invasive weeds. Preventing the establishment or spread of weeds relies upon:

• Educating workers about the importance of managing weeds on an ongoing basis;

• Properly identifying weed species to determine most appropriate treatment strategies;

• Avoiding or treating existing weed populations; and

• Incorporating measures into projects that prevent weed seeds or other plant parts from establishing new or bigger populations such as certification of weed-free products.

For more information on "best management practices" please contact The Carson City Parks, Rec. and Open Space Dept.

4. Deciduous trees must be planted a minimum of 5' from any city/public street, sidewalk or pathway. Evergreen trees must be planted a minimum of 10' from any city/public street, sidewalk or pathway. Fruit bearing, "non-fruiting" flowering or any other trees that drop debris such as seed pods will not be permitted near or placed where they will eventually hang over city/public sidewalks or pathways.

5. Carson City Municipal Code: Title 18, Division 3 should be reviewed by any/all parties involved in the proposed landscape design prior to landscape plans being submitted to the city for final approval of a building or site improvement permit. Note: Special care and consideration should be taken in the protection of existing trees on-site. https://library.municode.com/nv/carson_city/codes/code_of_ordinances?nodeId=TIT18_APPENDIXCADEST_DIV3LA

6. The project proposes 306 units which meets the 250 unit threshold identified in the Lompa Ranch Specific Plan to design, build and dedicate a 3 acre park to Carson City.

7. The developer shall make a minimum of 3 access points connecting internal sidewalks and open space to the City's multi-use pathway west of the project.

Conclusion

These comments are based on a very general site plan and do not indicate a complete review. All pertinent requirements of Nevada State Law, Carson City Code, and Carson City Development Standards will still apply whether mentioned in this letter or not.

Due to changing conditions of business and requirements for zoning, master plan and development codes of Carson City, this MPR information will expire and may need to be updated with a new MPR if the developer has not applied for a special use permit, or building permit if a special use permit is not required, within one year of the date of the MPR meeting. Please provide a copy of this MPR letter with any submittal in relation to the proposed project.

The aforementioned comments are based on the Major Project Review Committee's review. If you have any questions, please feel free to contact the following members of staff, Monday through Friday 8:00 AM to 4:00 PM.

Planning Division –
Heather Manzo, Associate Planner
(775) 283-7075
Email: hmanzo@carson.org

Engineering Division –
Lisa Perryman, Development Engineering
(775) 283-7669
Email: lperryman@carson.org

Fire Prevention –
Casey Drews, Fire Inspector
(775) 283-7160
Email: cdrews@carson.org

Building Division –
Corey Coleman, Building Official
(775) 283-7052
Email: ccoleman@carson.org

Health and Human Services
Dustin Boothe, Health Department
(775) 283-7220
Email: dboothe@carson.org

Sincerely,
Community Development Department, Planning Division

HManzo

Heather Manzo
Associate Planner

cc: MPR-2022-0196
Karen Downs kdowns@manhard.com

GEOTECHNICAL INVESTIGATION

LOMPA RANCH EAST

Carson City, Nevada

Submitted To
Mr. Kraig Knudsen
Tanamera Construction, LLC
5560 Longley Lane, Suite 200
Reno, Nevada 89511

Project No.
2702083

May 2022

PROFESSIONAL ENGINEER - STATE OF NEVADA
JUSTIN M. MCDOUGAL
Exp. 12/31/23
CIVIL
No. 24474

Justin M. McDougal, PE
PE Number -24474 (NV)

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EXECUTIVE SUMMARY

The project consists of constructing multiple apartment structures, typically three stories in height, and a community center clubhouse with a pool. Buildings are anticipated to be wood-framed and will incorporate reinforced concrete foundations with slab-on-grade flooring or structural slab-on-grade foundations. Foundation loads are anticipated to be light. An unlined channel is located along the eastern perimeter of the project site. It is our understanding the current alignment will remain essentially unchanged, but the water will be piped and backfilled to finish grade. All street improvements will be dedicated to Carson City. Underground utilities will be provided by a variety of public and private companies.

Site topography is relatively flat, gently sloping to the southeast. Several natural drainage channels transect the property. Vegetation is moderate to heavy and typically consists of grasses, brush and a few trees.

Soils encountered in our explorations typically consisted of moist to very moist, low to medium plasticity blends of sand, silt and clay. Near surface moisture levels were typically at or near predicted optimum for the native soils. Free water or sidewall seepage was encountered in the majority of the exploratory test pits typically at depths approach 5-feet. According to the April 2022 Manhard Consulting LTD grading plan, the site is slated to receive imported fills ranging from 2 to 7 feet in thickness. The current plan is to import fill from the property directly south of the project area and from the property east of Airport Road and adjacent to Butti Way. Import soils are anticipated to consist of granular and fine-grained soils.

Due to the higher moisture contents noted from our laboratory tests, subgrade stabilization may be required during site preparation. Potential mitigation recommendations have been addressed in the report.

Liquefaction is modeled to occur during the design event. Calculated liquefaction settlements approach 4½-inches with anticipated differential settlement on the order of 2 ½ to 3-inches over a span of 50-feet. As presented in 2020 NEHRP (National Earthquake Hazards Reduction Program) Recommended Seismic Provisions for New Buildings and Other Structures, liquefaction mitigation alternatives can incorporate structural approaches including: reinforced concrete foundations and post-tensioned slabs-on-grade.

With the incorporation of site preparation and grading requirements as recommended in this report, reinforced concrete foundations or structural slab-on-grade foundations should perform adequately for the planned improvements. It should be highlighted that the level of performance targeted by the IBC is to provide earthquake resistance.

1.0 INTRODUCTION

Presented herein are the results of Wood Rodgers' geotechnical exploration, laboratory testing, and associated geotechnical design recommendations for the proposed development in Carson City, Nevada. The assessments and recommendations presented in this geotechnical report have been framed, in part, around the surface and subsurface conditions identified by our exploration program which was developed to be consistent with locally accepted industry practices regarding exploratory methods and geotechnical investigations for similar type projects. The proposed structures, topography, grading design, soils, and geology are all unique and therefore the engineering judgment employed by those in responsible charge of geotechnical design considerations, as defined by the State of Nevada, is considered the established and accepted standard of care for evaluations and analyses associated with this report.

This report has been prepared in consideration of the applicable provisions set forth in the International Building Code (IBC, 2018), ASCE 7, and the amendments and modifications adopted by Carson City. These documents establish the minimum level of structural integrity, life safety, fire safety and livability for inhabitants of dwelling units. Geotechnical considerations for public improvements have been formulated around the requirements of the Carson City Standard Details for Public Works Construction and the Standard Specifications for Public Works Construction. Performance standards around which our primary recommendations have been framed are based upon the requirements of the referenced documents. Any expectations of performance inconsistent with, outside the purview of, or exceeding the requirements of the referenced documents are subjective and, therefore, a function of materials, design, workmanship, and ownership. Unless these expectations of performance are specifically stipulated or quantified herein, they are considered in excess to the scope and design standards of this report.

The objectives of this study were to:

1. Explore, test, and assess general soil, geology, and ground water conditions pertaining to design and construction considerations for the proposed development.
2. Provide recommendations associated with the design and construction of the project, as related to the identified geotechnical conditions and the stipulated design levels and performance standards established herein.

Project location is indicated on Plate A-1a in Appendix A. The area specifically covered by this report is shown in Figure 1 and on Plate A-1b (Site Map) in Appendix A. Our study included field exploration, laboratory testing, and engineering analyses to identify the physical and mechanical properties of the various on-site materials. Results of our field exploration and testing programs are included in this report; in consideration of the stated design levels and performance standards, these results form the basis for our conclusions and recommendations.

2.0 PROJECT DESCRIPTION

The project consists of constructing multiple apartment structures, typically three stories in height, and a community center clubhouse with a pool. Buildings are anticipated to be wood-framed and will incorporate reinforced concrete foundations with slab-on-grade flooring or structural slab-on-grade foundations. Foundation loads are anticipated to be light.

An unlined channel is located along the eastern perimeter of the project site. It is our understanding the current alignment will remain essentially unchanged, but the water will be piped and backfilled to finish grade.

All street improvements will be dedicated to Carson City. Underground utilities will be provided by a variety of public and private companies.

According to the April 2022 Manhard Consulting LTD grading plan, the site is slated to receive imported fills ranging from 2 to 7 feet in thickness. The current plan is to import fill from the property directly south of the project area and from the property east of Airport Road and adjacent to Butti Way.

FIGURE 1 - PROJECT DEVELOPMENT AREA

3.0 SITE CONDITIONS

As shown in Figure 1, the project area is bordered by undeveloped land to the north, Airport Road and residential housing to the east, open land to the south, and Interstate 580 (I-580) to the west. The overall site, located in Carson City, Nevada, encompasses an area of approximately 22 acres, and based on representative latitude and longitude, is located at 39.1685°N and -119.7358°E, respectively.

Site topography is relatively flat, gently sloping to the southeast. Several natural drainage channels transect the property. Vegetation is moderate to heavy and typically consists of grasses, brush and a few trees.

4.0 EXPLORATION

The project was explored on March 9 & 10, 2022, by excavating a series of 8 test pits using a CAT 420F Backhoe. The approximate locations of the test pits are shown on Plate A-1b – Site Map. Maximum depth of test pit advance extended 11 feet below the existing ground surface. Bulk samples for index testing were collected from specific depths in targeted soil horizons. In addition to the test pits, four (4) Cone Penetrometer Test (CPT) soundings were advanced. The CPT soundings were relied upon in the assessment of liquefaction risk.

Wood Rodgers' personnel examined and classified soils in the field in general conformance with ASTM D2488 (Description and Identification of Soils). During exploration, representative bulk samples were placed in sealed plastic bags and subsequently returned to our Reno, Nevada laboratory for testing. Additional soil classifications, as well as verification of the field classifications, were performed in accordance with ASTM D2487 (Unified Soil Classification System [USCS]) upon completion of laboratory testing as described below in the Laboratory Testing section. Logs of the test pits are presented as Plate A-2. A USCS explanatory chart of soil unit symbols and related descriptions has been included as Plate A-3 - Unified Soil Classification and Key to Soil Descriptions.

Shear wave velocity measurements have been relied upon for the development of geotechnical design characterization of soil stiffness. This information also aids in the determination of an appropriate Site Class (IBC, ASCE 7). Plate A-5 presents the geophysical profile. V_{S100} was measured to be on the order of 700 fps.

5.0 LABORATORY TESTING

Soil testing performed in the Wood Rodgers' laboratory was conducted in general accordance with the standards and methods described in Volume 4.08 (Soil and Rock; Dimension Stone; Geosynthetics) of the ASTM Standards. Samples of significant soil types were analyzed to determine in-situ moisture contents (ASTM D2216), grain size distributions (ASTM D6913), and plasticity indices (ASTM D4318). Results of the testing is presented in Appendix A on Plates A-4a through A-4b. Table 1 also presents a summary of the test data. The test results were used to classify the soils according the USCS (ASTM D2487) and to verify the field logs which were then updated.

Table 1 – Summary of Test Data

Test Hole	Depth (Ft.)	Moisture (%)	%Gravel (+ #4)	% Sand (#4-#200)	%Fines (-#200)	Liquid Limit	Plastic Index	USCS
ASTM Standard		D2216	D6913			D4318		D2487
TP-2	2.0 – 4.0	26.1	0.1	57.7	42.2	35	15	SC
TP-3	0.0 – 5.0	34.9	0.1	39.3	60.6	45	17	ML
TP-4	2.0 – 4.0	26.9	0	35.7	64.3	28	9	CL
TP-6	1.0 – 3.0	16.4	0	29.3	70.7	---	---	CL
TP-6	4.0 – 5.0	24.7	0	28.8	71.2	42	18	CL

Table 1 – Summary of Test Data

Test Hole	Depth (Ft.)	Moisture (%)	%Gravel (+ #4)	% Sand (#4-#200)	%Fines (-#200)	Liquid Limit	Plastic Index	USCS
ASTM Standard		D2216	D6913			D4318		D2487
TP-7	1.5 – 3.0	6.9	---	---	---	---	---	SP
TP-7	3.0 – 5.0	7.6	---	---	---	---	---	SM
TP-7	6.0 – 7.0	17.8	---	---	---	---	---	SC
TP-8	2.0 – 4.0	17.3	---	---	---	---	---	SC-SM
TP-8	4.0 – 6.0	29.2	---	---	---	---	---	CL

6.0 GEOLOGIC AND GENERAL SOIL AND GROUNDWATER CONDITIONS

Based on the Geologic Map of the New Empire Quadrangle (Bingler, 1977), presented in Figure 2, the site is mapped in an area of Quaternary Alluvium deposits (Qal), aged as middle to late Pleistocene and generally characterized as unbedded to poorly bedded, poorly to moderately sorted, yellowish brown to gray fine silty sand to sandy silt with minor sandy gravel.

Natural Resources Conservation Service (NRCS) Soil Survey Maps indicate that the insitu soils consist mostly of lean clay, silt, clayey sand, and silty sand to depths of 5 feet below the ground surface. Somewhat consistent with the geologic map and the NRCS soil survey map, the soils encountered in our explorations typically consisted of clayey sand, silty sand, sandy silt, and sandy lean clay.

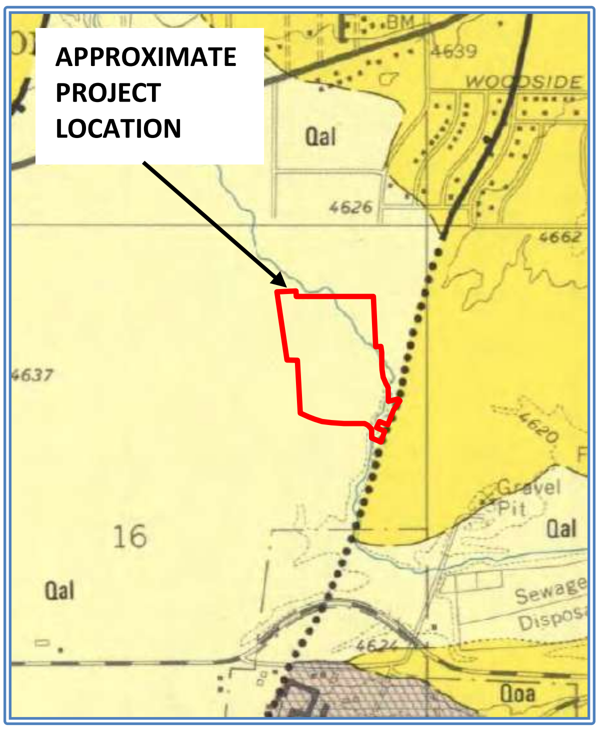

FIGURE 2 - GEOLOGIC MAP

Free water and/or sidewall seepage was encountered in test pits TP-1 thru TP-5, and TP-8 at depths ranging from 5-feet to 10-feet below the ground surface. CPT soundings indicate that seasonal high ground water levels can be as shallow as 2-feet below ground surface.

7.0 SEISMIC HAZARDS

The International Building Code (IBC) requires that structures assigned to Seismic Design Category D, E, or F be evaluated for the following potential geologic and seismic hazards***, including*** surface rupture or displacement due to faulting, liquefaction including the potential for seismically induced spreading or lateral flow, slope instability, and seismic induced settlement. Therefore, the following sections present our discussion and assessments of the stipulated hazards. Discussions regarding total and differential settlement are discussed and incorporated with the foundation design considerations (Section 8.8) of this report.

7.1 Surface Rupture

7.1.1 Evaluation Guidelines

In 1998, the Nevada Earthquake Safety Council formulated guidelines for evaluating potential surface rupture due to faulting. The intent of the guidelines is to provide *a standardized minimum level of investigation for fault rupture in Nevada*; these guidelines have been adopted with the 2018 Northern Nevada Amendments of the IBC. Specifically, the guidelines state that investigation of sites for potential surface rupture or hazards shall be included in all geotechnical investigations; and further, if any Quaternary age surface rupture is mapped or otherwise interpreted to be present on the site, the feature is to be investigated further.

In addition to establishing the minimum level of investigation for fault rupture, the guidelines also offer recommendations for dealing with or mitigating identified hazards:

- Holocene active faults (evidence of movement within the past 10,000 years) shall be set-back a minimum distance of 50-feet for occupied structures.
- Late Quaternary (evidence of movement within the past 130,000 years) faults shall not be spanned by any critical facilities (hospitals, schools, fire stations, etc.); the facility under investigation does not meet the requisite requirements to be considered critical.

These guidelines allow for set-back distances to be adjusted by the competent professional. No additional constraints with regard to fault-structure location are presented.

7.1.2 Investigation

The USGS U.S. Quaternary Faults Map was accessed to review the proximity of any active faults as previously characterized. A middle to late Quaternary aged (i.e., < 750,000 years) fault of the New Empire fault zone is mapped crossing the southeast corner of the project area. A fault study performed by Resource Concepts, Incorporated found no evidence of the mapped structure (RCI, 2018). For ease of reference, this report is presented in Appendix C.

7.2 Liquefaction

Liquefaction is a loss of soil shear strength that can occur during a seismic event, as excessive pore water pressure, between the soil grains, is induced by cyclic shear stresses. This phenomenon is limited to poorly consolidated (Standard Penetration Test less than 30, overburden stress corrected shear wave velocity less than 700 fps) clean to silty sand/sandy silt lying below the ground water table (typically less than 50 feet deep).

Per the 2018 IBC and ASCE 7-16, the site peak ground acceleration is 0.961g (Appendix B, ASCE Seismic Hazard Report) and this is the design value around which liquefaction must be examined. Based on the CPT soundings performed during our March 2022 investigation, liquefaction induced settlement could be triggered with strong ground motion. It is our opinion the current level of analysis, in conjunction with the liquefaction mitigation discussions presented in Resource Paper 12 (as referenced in the 2020 NEHRP *Recommended Seismic Provisions for New Buildings and Other Structures*), provide a meaningful basis around which to develop a structural alternative for liquefaction mitigation. Measures mitigating liquefaction, which incorporate foundation considerations (specifically Resource Paper 12), will be discussed, and presented in the Foundation section of this report.

7.2.1 Total and Differential Settlement

An assessment of potential liquefaction settlement was performed by utilizing the CPT soundings, following protocols presented by NCEER 1998, and employing the CPT liquefaction assessment software, CLiq, which is presented in Appendix D. A liquefaction settlement potential on the order of 4.4-inches was determined from the model. Complemented by Resource Paper 12, differential settlement can be modeled by reducing total settlement by a factor of 0.5 to 0.75, or 2.2 to 3.3 inches. Differential settlement is typically modeled to occur over a distance of 50 feet.

7.2.2 Lateral Spread

Due to the relatively level local topography, the potential for liquefaction induced horizontal ground displacement from lateral spreading or flow failure would be considered remote.

7.3 Slope Instability

The site and surrounding topography are such that the potential for slope instability at the site due to seismic activity is considered remote.

7.4 Seismic Compression

Seismic compression is an accrual of volumetric strains during seismic events in unsaturated soil. Due to the presence of high groundwater, the potential for significant settlement due to seismic compression is considered negligible and notable seismic settlement is anticipated to manifest through liquefaction.

8.0 DISCUSSION AND RECOMMENDATIONS

8.1 General Information

The following definitions characterize terms utilized in this report:

- Rock fill possesses more than 30-perent retained on the 3/4-inch sieve. Subject to the geotechnical engineer, rock fill may or may not present oversize, i.e., particles greater than 6-inches.
- Fine-grained soil possesses more than 50 percent by weight passing the number 200 sieve and exhibits a plasticity index lower than or equal to 15.
- Clay soil possesses more than 30 percent passing the number 200 sieve and exhibits a plasticity index greater than 15.
- Granular soil does not meet the above criteria and presents a maximum particle size less than 6-inches.

It should be noted these definitions have been formulated around anticipated soil behavior and may not coincide with classifications provided by the Unified Soil Classification System.

The recommendations provided herein, particularly under Site Preparation, Grading and Filling, Foundations, Site Drainage, and Construction Observations and Testing Services are intended to reduce risks of structural distress related to consolidation or expansion of native soils and/or structural fills. These recommendations, along with proper design and construction of the planned structure(s) and associated improvements, work together as a system to improve overall performance. If any aspect of this system is ignored or poorly implemented, the performance of the project will suffer. Any evaluation of the site for the presence of surface or subsurface hazardous substances is beyond the scope of this study. When suspected hazardous substances are encountered during routine geotechnical investigations, they are noted in the exploration logs and reported to the client. No such substances were identified during our exploration.

The test pits were advanced at the approximate locations shown on the site map. Each test pit was backfilled upon completion of the field portion of our study, and the backfill was compacted to the extent possible with the equipment on hand. However, the backfill was not compacted to the requirements presented herein under Grading and Filling. If structures, concrete flatwork, pavement, utilities or other improvements are to be located in the vicinity of any of the test pits, the backfill should be removed and re-compacted in accordance with the requirements contained in the soils report. Failure to properly compact backfill could result in excessive settlement of improvements located over test pits.

The site-specific Stormwater Pollution Prevention Plan (SWPPP), as required by the State of Nevada, will be the responsibility of the general contractor and/or owner. Recommendations presented herein regarding moisture conditioning are for the benefit of creating a targeted fill behavior. Moisture conditioning recommendations are not intended to direct the contractor in their means and methods for dust and SWPPP control.

Structural areas referred to in this report include all areas of fills, buildings, concrete slabs, asphalt pavements, as well as pads for any minor structures or retaining walls. In addition, structural zones shall also be considered to extend at a 1:1 (H:V) slope out from the edge of the structural area. Areas behind or under retaining structures are considered structural zones. All compaction requirements presented in this report are relative to ASTM D 1557 (ASTM Volume 4, 2022).

8.2 Soil Profile Type Amplification Factors

Per ASCE 7-16, the site's modified Peak Ground Acceleration to be used for engineering analyses is 0.961g. Site soils are vulnerable to potential failure or collapse due to liquefaction. However, because the 3-story structures likely have fundamental periods equal to or less than 0.5s, Site Class D has been assigned based on V_{S100} (Sections 20.3 and 20.3.1 of ASCE 7-16) in lieu of assigning Site Class F. Seismic design values were determined based on a representative latitude and longitude of 39.1685°N and -119.7358°E, respectively. The ASCE 7 Hazards Reports, presenting Risk Category II and III for the Structural Engineer's consideration, are presented in Appendix B. Structure period should be verified by the Structural Engineer.

8.3 Site Preparation

All vegetation and topsoil should be cleared and grubbed from structural areas. A minimum stripping depth of 0.3 to 0.5 feet is anticipated. Localized deeper areas may be required in areas of large brush and trees, particularly around the project perimeter, or where large root balls are encountered. In addition to the vegetation, drainages transect the property (typically trending northwest-southeast). These drainages present zones of organics and wet soils which will require removal prior to the onset of grading. The depth of removal can typically be considered 8-inches along the drainage sidewalls and 12-inches along the drainage invert. Because of the potential of deteriorating grade due to repeated passes with construction equipment, some vegetation and wet soils may remain in-place as long as the bulk of the soil surface is clear, and the initial lift of fill can be placed.

Vegetation and organic debris should be disposed of offsite or placed in designated non-structural areas. If placement in nonstructural areas is approved, vegetation should be blended with soil (at a maximum ratio of 1:10 vegetation to soil, by mass) prior to placement in nonstructural fill or landscape areas. It is recommended that the organic materials be broken up using a large sheep's foot roller or chipper prior to blending with soil and moisture conditioning. Placement of tree trunks, root balls, or limbs within any fill profile is prohibited.

Based on the results of our soil testing, site soils are over optimum moisture content. Therefore, care must be exercised during grading to limit the potential to disturb and/or destabilize the subgrade soils during site preparation and placement of import. In lieu of scarifying and compacting subgrade, we recommend the initial 12-inch loose lift of moisture conditioned structural fill (Table 3) be spread out and compacted to between 87 and 92-percent of the soil's maximum dry density. Vibratory compaction equipment should be avoided during compaction of this initial lift. As part of the acceptance of this initial lift, in addition to meeting the compaction requirements, some deflection under construction equipment is acceptable if the minimum compaction levels can be achieved in subsequent lifts.

Where encountered, pumping soils may be scarified and allowed to dry or removed and replaced with a layer of clean, angular, 12-inch minus rock fill or stabilized with a geogrid. The size of the rock could vary depending on the soil's consistency and depth of soft, saturated soils. Typically, a stabilization depth of 12 to 18-inches is adequate to develop a firm and relatively unyielding subgrade, but variations may exist. The rock zone should be separated from the adjacent soils by encasing the rock in a geomembrane such as Mirafi 160N. The use of a stabilizing geogrid (such as Tensar TX160) is typically complemented by an aggregate layer to bridge unstable and/or pumping subgrade. The aggregate layer allowed by the manufacturer should be compared against the structural fill specification in Table 3.

The contractor should propose a stabilization protocol that is consistent with their readily available means and methods and submit the process for review and concurrence by the owner, the general contractor, and grading inspector. Subgrade stabilization is a trial-and-error process and approach should be verified by a test section of suitable depth and length as part of the approval process. For the design considerations presented in this report, subgrade stabilization is considered adequate if deflection within the initial fill lift is limited to less than 1-inch when proof rolled with a fully loaded water truck.

It is anticipated the bulk of the import soils will meet the definition of granular and/or fine-grained soils and the separation requirements presented in Table 2 will not be required. However, if import soils exceed the structural fill specification presented in Table 3, the separation requirements in Table 2 will need to be observed within the surface fills. These separation requirements do not include the prescribed base course thicknesses.

Table 2 - Separation Requirements from Clay Soils

Improvement	Minimum Separation (ft)
Post-tensioned (PT) Slabs-on-Grade	0.0[1, 2]
Standard Spread Footings	1.0[3]
Site Work (curbs, gutter, sidewalk, exterior slabs)[1]	1.0[2]
Asphalt Pavements[1]	1.0[2, 4]

[1] Slab is designed to account for center lift and edge lift of expansive soils.
[2] Does not include the aggregate base course layer.
[3] Separation is from footing grade and is continuous across the building footprint.
[4] Consisting of an R-Value ≥ 20.

8.4 Grading and Filling

As previously discussed, import fill will be sourced from the property directly to the south of the project as well as from the property east of Airport Road and north of the intersection with Butti Way. Based on the findings of a Geotechnical Investigation report by Black Eagle Consulting, the property to the south of the project area may be used as a borrow source for imported structural fill (Black Eagle Consulting, 2020). Soils from the property to the east of Airport Road has not been qualified; material from this location must be tested and qualified for use as structural fill prior to import. However, based on the regional geology and depositional history of the site soils, it is anticipated soils from both sites will be similar to those encountered on the project.

Imported granular and fine-grained structural fill should be substantially free of organic matter, any deleterious material, and meet the requirements of Table 3.

Table 3 - Guideline Specification for Import Structural Fill

Sieve Size (ASTM D6913)	Percent by Weight Passing Sieve
6 Inch	100
4 Inch	90 - 100
¾ Inch	70 - 100
No. 40	15-70
No. 200	15-50
Maximum Liquid Limit (ASTM D4318)(1)	40
Maximum Plasticity Index (ASTM D4318)(1)	15
Soluble Sulfate Level (ACI 318, Table 4.3.1)	Negligible
R-Value (ASTM D2844)	20 Min.

Adjustments to the recommended limits presented in Table 3 can be provided to allow the use of other granular or fine-grained, non-expansive material, including rock fills. Any such adjustments must be made and approved by the geotechnical engineer, in writing, prior to importing fill to the site.

Structural fill should be moisture conditioned to within 3-percent of optimum, placed in maximum 12-inch thick (loose) lifts, and densified to at least 90 percent relative compaction (ASTM D1557). Higher moisture contents are acceptable if the soil lifts are stable and required relative compaction can be attained in the fill lift and subsequent fill lifts. A reasonable likelihood exists that import soils will be at or above optimum. Therefore, steps should be taken to process and moisture condition the material prior to import. Nonstructural fill placed under softscape areas (without concrete or paver elements) shall be moisture conditioned to near optimum moisture content and compacted to not less than 85 percent of the soil's maximum dry density in accordance with ASTM D1557.

The exterior face of embankments should be constructed with an inclination no steeper than 2H:1V. The surface of the slope should be compacted to the same percent compaction as the body of the fill. This may be accomplished by compacting the surface of the embankment as it is constructed or by overbuilding the fill and cutting back to its compacted core. However, the cut away material should be placed and compacted as outlined above rather than left at the base of the slope. Minor variations in slope gradient due to sculpting or landscaping of the slope face are considered consistent with the recommendations of this report.

8.5 Testing and Observation

Verification of fills should be performed by a firm that is AASHTO Materials Reference Laboratory (AMRL) accredited in ASTM E329. Special inspection of fill soils is required during mass grading of the development; the Special Inspector should be ICC certified in soils or NAQTC certified in Sampling and Density disciplines.

Density testing of fills should be in accordance with ASTM D6938 (Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods) or ASTM D1556 (Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method) unless rock fill is approved which will then be subject to performance based full time field observation. Subgrade, structural fill, nonstructural fill, bedding and backfill shall be density tested by the appropriate means and methods.

For soils meeting ASTM gradations that allow for density testing by nuclear methods, testing frequency shall be as prescribed herein. Subgrade should be density tested approximately every 500 square yards. Fill should be density tested once for every 1,000 square yards per lift of material placed during mass grading and one test per 300 feet of footing trenches or overexcavation of footings. Bedding and backfill should be density tested per foot of thickness, the more restrictive of one test between manholes or valves, or one test every 500 lineal feet, including laterals. One density test should be performed for each 500 square yards or per each lift for smaller, localized fill zones. Construction observation is required for mass graded fills and full-time observation is required for any rock fill placement. The testing frequency should be increased if the contractor is having difficulty achieving and maintaining the required moisture levels. Nonstructural fills should be density tested for every 2,000 yards or for every 2-feet of fill for smaller, localized fill zones.

8.6 Trenching and Excavation

Regulations amended in Part 1926, Volume 54, Number 209 of the Federal Register (Table B-1, October 31, 1989) require that the temporary sidewall slopes be limited to maintain trench stability. Minimum sidewall slopes and acceptable trench configurations are also presented in the referenced register. Based on the results of our exploration program, it is our opinion that the bulk of the native site soils appear to be predominately Type C, although variations exist. All fills should conservatively be considered Type C unless directed otherwise by the contractor’s qualified representative trained in trench safety. All trenching should be performed and stabilized in accordance with local, state, and OSHA standards. Bank stability is the responsibility of the contractor or contractor’s qualified representative who is present at the site, able to observe changes in ground conditions, and has control over personnel and equipment.

Trench bedding and backfill shall be consistent with the requirements of the Standard Specifications for Public Works Construction and the requirements of the private utilities. Based on our testing program, the on-site soils do not meet the requirements of Class E backfill. Importing Class E material or blending the native soil with granular import may be required.

Seepage was encountered as shallow as 5-feet below the existing ground surface. Provisions for wet trench conditions should be included in construction planning and cost estimates. Excavations for utility trenches that approach free water or that extend to within the zone of influence of free water will have a greater tendency to slough or cave and this condition must be adequately considered and planned for by the contractor. If underground storage tanks are placed within the free water depth, then tie down anchors may be required to counteract hydrostatic pressure acting on the tank when empty.

8.7 Foundations

The liquefaction assessment predicted differential seismic settlements of approximately 2 ½ to 3-inches which is typically modeled to occur over a distance of 50-feet. Consistent with the measures used to reduce the liquefaction hazard, as presented in 2020 NEHRP (via Resource Paper 12), mitigation could rely on structural methods. Wood Rodgers recommends foundation alternatives which consist of a structural slab-on-grade (PT Slab), a mat foundation, or a reinforced concrete foundation that includes reinforced concrete perimeter wall footings with reinforced concrete interior wall footings tied into the perimeter walls. Specifically, Resource Paper 12 indicates that these foundation systems provide increased resistance to damage and have performed well where ground displacements are less than one-foot; this also includes up to one-foot of lateral spread displacement. Per NEHRP, these foundation systems act as diaphragms which cause the soil to yield, thereby limiting fracture of the foundations and propagation of differential displacements into the superstructure. From a geotechnical perspective, the preferred alternative is the post tensioned slab-on-grade approach for an earthquake resistant system.

8.7.1 Reinforced Concrete Foundation

Reinforced Concrete Foundation (RCF) refers to a system of reinforced concrete interior footings tied, via grade beams, to the perimeter walls. Provided the foundation soils have been prepared in accordance with the recommendations of this report, the bearing values presented in Table 4 may be used for design.

Table 4 - Allowable Foundation Bearing Pressures

Loading Condition	Maximum Net Allowable Bearing Pressure (PSF)[1]
Dead Load Plus Full Time Live Load	2,500
Dead Load Plus Live Loads, Plus Transient Wind or Seismic Loads	3,325

[1] Net allowable bearing pressure is that pressure at the base of the footing in excess of the adjacent overburden pressure.

For frost protection, footings should be founded at least two feet below adjacent outside or unheated interior finish grades. Interior footings not located within frost prone areas should be founded at least 12 inches below surrounding ground or slab level for confinement. Regardless of loading, foundations should meet minimum width and embedment requirements as required by code.

Lateral loads, such as wind or seismic, may be resisted by passive soil pressure and friction on the bottom of the footing. Coefficients of base friction of 0.35 are typical to the recommended structural fill soils. Design values for active and passive equivalent fluid pressures of 37 and 325 pounds per square foot per foot of depth, respectively, can be utilized. However, in designing for passive pressure, the upper one foot of the soil profile should be ignored unless confined concrete slab, or pavement. These design values are based on spread footings bearing on structural fill and backfilled with structural fill.

Wood Rodgers does not practice in the field of moisture vapor transmission evaluation/mitigation. Therefore, if a vapor retarder system more rigorous than the requirements of the IBC is desired, we recommend that a qualified person/firm be engaged/consulted with to evaluate the general and specific moisture vapor transmission paths and any impact on the proposed construction. This person/firm should provide recommendations for mitigation of potential adverse impact of moisture vapor transmission on various components of the structure as deemed appropriate. If special conditions do not exist, Wood Rodgers typically recommends a moisture vapor retarder, consisting of Stego Wrap (15 mil), or equal, to be placed beneath the aggregate base course as part of the moisture vapor system.

Total settlement for the structures, in the absence of seismic settlements, is anticipated to be on the order of 1-inch, or less. When considering the combination of static plus seismic settlement, total settlement is calculated to approach approximately 5-inches. The combination of differential static plus potential differential liquefaction settlement accounts for a total differential settlement approaching 3 ½-inches over a distance of 50 feet.

8.7.2 Post-Tensioned Concrete Slab-on-Grade

The design values presented in Table 5 have been developed for use when considering design of post tensioned (PT) structural foundations. The design profile for Table 5 has been based on the explorations performed for this study, the anticipated resulting fill profile, and the laboratory testing program. These values do not consider potential differential movement due to liquefaction which could account for up to approximately 2 ½ to 3-inches across a span of 50-feet.

Table 5 - Structural Slab-on-Grade Design Recommendations

Design Values	Condition	Center Lift	Edge Lift
Post-Tensioning Institute (PTI)	Edge Moisture Variation - e_m (ft.)	9.0	4.8
	Differential Soil Movement - y_m (in.)	- 0.56	0.64

An allowable bearing value of 2,000 pounds per square foot may be utilized for design of the two-foot turndown and the slab. This value may be increased by a factor of 1.33 when considering wind or seismic loading. A k-value of 100 pci may be used for design; this value is based on published data of plate load testing on similar soils and is not corrected for footing size.

Turn downs for structural slabs must extend to a depth of two feet below finished adjacent exterior grade or be designed to resist the effects of frost-heave (such as insulation as presented in ASCE 32). It should be pointed out, however, that potential movement due to frost-heave would be in addition to edge-lift caused by clay activity and, therefore, the design edge-lift value should consider the cumulative effects of the two influences. In addition, the 2018 Northern Nevada Code Amendments require that deflection calculations "would need to show that the maximum combined frost and expansive soil heaving, as localized at slab edges, with resultant non-uniformly distributed deflections, as well as whole slab deflections would not result in super structure racking or excessive truss, roof, or wall frame movement." Minimum slab thickness and recommended turn-down should be established by the Structural Engineer.

The preferred slab profile has been selected to consist of a 15-mil moisture vapor retarder such as Stego Wrap covered by a minimum two-inch layer of compact Type 2 Class B aggregate base placed near optimum and compacted by at least three complete passes with a vibroplate. Per Figure R6.2 (PTI DC10.5-12), Table 6 presents the recommended coefficients of friction, μ, for first and average subsequent movements based on the design slab support profile. A sand layer or size No. 67 concrete aggregate is not recommended for direct slab support. If location of the polyethylene sheeting significantly impacts the design or tensioning protocol, we recommend placement of the vapor retarder be indicated as a special inspection item.

Table 6 - Coefficient of Friction, μ, for 5-inch Slabs

Material	First Movement	Average Subsequent Movements
Aggregate Base	1.95	1.37
Structural Fill	1.72	0.88
Polyethylene Sheeting[1]	0.88	0.55

[1]For normal construction practice, $\mu = 0.75$

Post-tensioned foundations, when compared to conventionally reinforced slabs, are expected to deform. The flexibility of the slab distributes localized soil movement to a more uniform slab shape; however, it is important that other consultants be cognizant of this behavior so that their products and design can be made compatible with a flexible foundation system. Typically, roof trusses, load concentrations, architectural features spanning between the active and non-active zones, non-flexible exterior siding, brittle floor coverings, and areas that slope to drain and utility connections warrant closer scrutiny.

Post-construction practices must be incorporated to help ensure the successful performance of the structural slabs. To help minimize movements in soils due to post-construction factors, not climate related, the following maintenance procedures are required:

- Uniform landscaping should be provided adjacent to the perimeter of the foundation, and excellent drainage provided and maintained away from the residence. It is strongly recommended that only drip irrigation, if any, be installed within five feet of foundations. Never allow water to pond adjacent to the structure.
- A six-inch-thick clay (SC,CL) plug should be placed at the edge of the foundation if backfilled with granular material.
- Recommended positive drainage is a minimum of six inches of fall in ten feet (5%), and impervious surfaces within ten feet of the building foundation should be sloped a minimum of two percent away from the foundation.
- Water should be applied in a uniform, systematic manner as equally as possible on all sides of the residence to keep the soil moist. Areas without ground cover may require more moisture due to the potential for increased evaporation.
- Soaker hoses, if used, should be placed a minimum of five feet away from foundation edges. Sprinklers should not be allowed to spray directly on building foundations.
- Trees should not be planted within 10 feet of the structure.
- Check gutters and downspouts to be sure they are clear and water discharges a minimum of five feet from foundation.
- The foundation perimeter should be observed during extreme hot and dry periods to help ensure that adequate watering is being provided to prevent the soil from separating from the foundation.

It is recommended that an annual survey of foundations be conducted and any maintenance necessary to improve drainage and prevent ponding of water adjacent to these structures is performed. This is especially important during the first ten years after construction because that is usually when the most severe adjustment between the new foundation and supporting soil occurs. Following the above listed procedures should help limit detrimental foundation movement caused by expansive soils. These recommendations should be provided to homeowners and any landscape contractors to preclude adverse grading, watering or planting. Landscape contracts should contain specific language regarding the necessity of maintaining code grading requirements as well as the planting and watering limitations presented herein.

8.8 Lateral Earth Pressures

Clay soils or soils blended with organics shall not be placed in areas to be retained by or supporting retaining structures. Recommended lateral earth pressures for consideration in the design of retaining structures are presented in Table 7 assuming level backfill behind the wall. Changes in earth pressures due to seismic influences were assessed via the Mononobe-Okabe protocol. The values presented in Table 7 do not consider hydrostatic pressures or surcharge loading. Traffic loading should be modeled by increasing the wall backfill load by an additional height of two feet. Unless confined by slab or pavement, the surface foot of soil should be ignored when considering passive resistance. If retaining walls contain sloping backfill or are greater than six feet in exposed height, the Engineer shall be consulted for a case-by-case basis.

Table 7 - Lateral Earth Pressures

Condition	Active (psf/f)	Passive (psf/f)	At Rest (psf/f)
	Static	Static	
Level	37	325	56

Excessive retaining wall pressures can be developed due to heavy compaction equipment proximate to the wall during backfill placement. Therefore, due care during placement and compaction of backfill is required. Backfill behind retaining structures should be compacted to not less than 90 percent of the soils' maximum dry density. French drains, a drainage backfill geotextile such as Mirafi 140 N, or a pre-manufactured drain system such as Tensor ® DC1200 may be utilized to reduce the potential of hydrostatic build-up. Soil preparation for retaining wall foundations and allowable bearing capacities shall be consistent with the Site Preparation, Grading and Filling, and Foundations sections of this report.

8.9 Erosion Control

Erosion potential is dependent on numerous factors involving grain size distribution, cohesion, moisture content, slope angle and the velocity of the water or wind on the ground surface. Erosion protection should be in accordance with Carson City requirements.

Temporary (during construction) and permanent (after construction) erosion control will be required for all disturbed areas. In compliance with all applicable city, county, state and federal regulations the contractor shall prevent dust from being generated during construction, and the contractor shall submit an acceptable dust control plan prior to starting site preparation or earthwork. The project specifications should include an indemnification of the Owner and Engineer by the Contractor for any dust generation during the construction period. The owner will be responsible for mitigation of dust after acceptance of the project.

8.10 Site Drainage

Adequate surface drainage must be constructed and maintained away from the structures. The permanent finish slopes away from the structure should be sufficient to allow water to drain away quickly from and prevent any ponding of water adjacent to the structure. All runoff should be collected within permanent drainage paths that can convey water off the property. A system of roof gutters and downspouts is recommended to collect roof drainage and direct it away from the foundations.

Foundation and stem wall backfill should be densified to at least 90-percent relative compaction in accordance with the requirements given in the Grading and Filling Section. Compacting the backfill material decreases permeability and reduces the amount of irrigation and storm water available to enter under floor areas.

8.11 Concrete

Sulfate testing on the native soils within the project boundaries resulted in sulfate levels in the moderate range. Type II cement with fly ash (min. 25%), pozzolan, or slag as an additive silicate component is required to address the sulfate exposures. For all flat work and foundations, the concrete should have a specified minimum 28-day compressive strength of 4,000 psi, be air entrained (min. 6%), and have a low water to cementitious ratio (0.45 or less). In addition, exterior concrete and flatwork should be placed and finished in accordance with ACI-318 recommendations for concrete subject to freeze thaw conditions. The use of water reducing super plasticizer is strongly recommended to maintain the low water cement ratio and facilitate finishing of slabs.

When considering chlorides, ACI 318-11, Table 4.2.1 rates the severity of corrosion as Moderate or Exposure Class C1 for concrete exposed to moisture but not to external sources of chlorides." External sources of chlorides include exposure to deicing chemicals. ACI indicates that this chloride exposure would elevate the exposure class to Severe or Exposure Class C2. Exposure Class C2 would require a minimum compressive strength of 5,000 psi and a maximum water to cementitious materials ratio of 0.40 for exterior slabs-on-grade. The Standard Specification for Public Works Construction, Section 337.10.01.03, presents concrete requirements for public improvements when considering freeze-thaw cycles, salt and sulfates. These considerations should be extended to include private improvements. It should also be highlighted that the Standard Specifications for Public Works Construction requires that air entrained concrete for exterior improvements shall be under the direct supervision of an ACI certified Concrete Flatwork Finisher.

Resistivity, pH, chlorides, oxidation-reduction potential, sulfides and moisture were tested to aid others in the assessment of potential corrosivity to ductile iron pipe and/or steel reinforcement. Refer to Appendix A, Plate A-4c for test methods and results. Wood Rodgers, Inc. is not a corrosion engineering firm. Therefore, a Corrosion Engineer or Structural Engineer knowledgeable in the project steel specifications should be consulted for final assessments of corrosion potential at the site.

8.11.1 Concrete Slab-on-Grade

A 4-inch minimum compacted aggregate base course (Type 2, Class B, Standard Specifications for Public Works Construction) compacted to 95-percent relative compaction is recommended beneath interior or exterior concrete slabs-on-grade subject solely to foot traffic. The recommended base course section should be increased to 6-inches where vehicle traffic is anticipated. Dedicated and public easement improvements shall be constructed in accordance with Carson City standards and the Standard Specifications for Public Works Construction.

Wood Rodgers does not practice in the field of moisture vapor transmission evaluation/mitigation. Therefore, if a vapor retarder system more rigorous than the requirements of the IBC is desired, we recommend that a qualified person/firm be engaged/consulted with to evaluate the general and specific moisture vapor transmission paths and any impact on the proposed construction. This person/firm should provide recommendations for mitigation of potential adverse impact of moisture vapor transmission on various components of the structure as deemed appropriate. Some floor coverings, such as tile or linoleum, are sensitive to moisture that can be transmitted through slabs. Floor coverings should be installed in accordance with the manufacturer's recommendations including restrictions related to maximum vapor transmission rates. If special conditions do not exist, Wood Rodgers typically recommends a moisture vapor retarder, consisting of Stego Wrap (15 mil), or equal, to be placed beneath the aggregate base course as part of the moisture vapor system.

Concrete placement and curing should be performed in accordance with procedures outlined by the American Concrete Institute. Special considerations, as specified in ACI 318, should be given to concrete placed and cured during windy, low humidity, hot or cold (including freezing) weather conditions.

Proper curing, finishing, control joints and reinforcing should be provided to minimize any damage resulting from shrinkage including cracks and slab curling. Western Nevada is a region with absorptive aggregates and exceptionally low relative humidity. As a consequence, concrete flatwork will shrink and curl in a manner which is not typical of many other US regions. Proper site preparation and placement of reinforcement are imperative to the performance of slab-on-grade improvements. Joint spacing, locally, is typically on 10-to-12-foot centers for large slabs and no more than five feet for sidewalks. Cracking that occurs within the slab-on-grade floors will often reflect through overlying improvements even if adequate substrate preparation has occurred. Control of the rate of moisture loss in concrete slab-on-grade improvements by the use of curing compounds, fogging or other suitable means is integral to protecting the slab from excessive curling.

Conventional concrete slab-on-grade recommendations presented herein, as well as the information presented in the referenced publications, are intended to reduce the potential for cracking of slabs as a result of differential movement and reducing slab curling. However, even with the incorporation of the recommendations presented herein, slabs-on-grade will still exhibit some cracking and curling. The occurrence of concrete shrinkage cracks is independent of the soil supporting characteristics. Their occurrence may be reduced and/or controlled by limiting the amount of water within the mix (water cement ratio of 0.45 or less), the incorporation of crack control joints and proper concrete placing and curing practices including ACI 318 provisions for areas subject to freeze thaw conditions. The use of mid-range plasticizers should be considered to reduce the need to add water by the contractor.

8.12 Structural Pavement Sections

Table 8 presents the recommended minimum structural pavement sections for the development based on planned use. Aggregate base used to support pedestrian and flexible or concrete pavements should be compacted to a minimum of 95% relative compaction.

Table 8 - Structural Pavement Sections

Condition	Pavement Thickness (In.)	Pavement Type[1]	Type II Class B Base Course Thickness (In.)[2]
Local Street	3	Type 3 + Lime	6
Collector Street	4	Type 2 + Lime	8
Local Access Drives and Parking Areas	3	Type 3 + Lime	6
Main Access Drives	4	2" Type 3 + Lime / 2" Type 2	6
Dumpster Aprons[3]	6	Reinforced Portland Cement Concrete	6

[1] Per the Standard Specifications for Public Works Construction
[2] Base Course thickness is in addition to structural fill separation requirements
[3] Dumpster aprons should extend far enough from the trash enclosure so that the wheel loads are confined to the reinforced concrete pad.

Roadway construction shall be in accordance with the approved plans, the Standard Specifications for Public Works Construction and Carson City design standards. Roadway subgrade shall be prepared in accordance with the requirements of this report.

The Contractor should submit a pavement mix design to the Owner or Engineer, for approval, at least five working days prior to paving. When pavement is placed directly adjacent to concrete flatwork, the finish compacted grade of the pavement should be at least ½ of an inch higher than the edge of adjacent concrete surface to allow adequate compaction of the pavement without damaging the concrete.

8.13 Asphalt Design Life

Maintenance is mandatory to ensure long-term pavement performance and to meet or exceed the assumed 20-year design life. Maintenance refers to any activity performed on the pavement that is intended to preserve its original service life or load-carrying capacity. Examples of maintenance activities include patching, crack or joint sealing, and seal coats. If these maintenance activities are ignored or deferred, premature failure of the pavement will occur.

Premature failure of asphaltic concrete frequently occurs adjacent to poorly graded ponding areas and/or landscape areas. Failures may occur due to excessive precipitation, irrigation and landscaping water infiltrating into the subgrade soils causing subgrade failure. As such, in areas where saturation of the subgrade soils beneath asphaltic pavement may occur, we strongly recommend the owner/project manager include provisions by design for a subdrain system to eliminate the potential for saturation of subgrade soils. The subdrain system should discharge into a permanent drainage area that will not impede drainage flow to cause the system to back-up and/or clog. Appropriate maintenance procedures should be implemented to ensure the subdrain system does not plug and allow for proper drainage of surface and subsurface water beneath paved areas. Subdrain location and configuration should be evaluated once final grading and landscaping plans have been prepared. If the ultimate traffic exceeds the anticipated levels, it may be necessary to reevaluate and overlay the pavement at some time in the future.

PG 64-28 NV (polymerized asphalt oil) is required on public streets and recommended on private streets because it is known for substantially reducing cracking due to thermal stresses prevalent in the freeze thaw environment. The savings in long term maintenance of the pavement including crack sealing is in our opinion worth the extra expense. However, this asphalt oil recommendation should be considered optional for private streets in that it is relative to frequency of maintenance only and does not affect structural calculations.

The cost associated with proper maintenance is generally much less than the cost for reconstruction due to the premature failure of the pavement. Therefore, since pavement quality is an integral consideration in the formulation of our design recommendations, we strongly recommend the owner/project manager implement a pavement management program.

9.0 CONSTRUCTION OBSERVATION AND TESTING SERVICES

The recommendations presented in this report assume that the contractors perform their work as required by the project documents and that owner/project manager provides sufficient field-testing and construction review during each phase of construction. Prior to construction, the owner/project manager should schedule a pre-construction conference including, but not limited to representatives of the owner, architect, civil engineer, the general contractor, earthwork, and materials subcontractors, building official, and geotechnical engineer. It is the owner's/project manager responsibility to set-up this meeting and contact all responsible parties. The conference will allow parties to review the project plans, specifications, scheduling, and recommendations presented in this report, and discuss applicable material quality and mix design requirements. Quality control reports should be submitted to the owner/project manager for review and distributed to the appropriate parties. It is essential that any changes or revisions to project plans be provided to Wood Rodgers in a timely fashion to ensure contractor compliance and avoid construction delays or the need to remove completed work.

During construction, Wood Rodgers Incorporated should have the opportunity to provide sufficient on-site observation of site preparation and grading, over-excavation, fill placement, foundation installation, and paving. These observations would allow us to document the geotechnical conditions are in fact just as anticipated and that the contractor's work meets with the criteria in the approved plans and specifications. Verification of horizontal and vertical control must be provided by whoever was responsible for establishing those boundaries and constructing associated improvements.

10.0 EXPECTATION OF PERFORMANCE

The planned structures will incorporate either a standard slab-on-grade foundation with perimeter footings extending to a minimum depth of 24 inches below finished exterior grade or a structural slab-on-grade foundation. It must be considered by the developer that site fills will be imported from an adjacent property using cut-to-fill practices and will not be purchased from a commercial source. Therefore, even with reasonable material verification protocols in place during grading, the potential exists that some soils within various building pads may fall outside the specified limits of Structural Fill (Table 3). This deviation should not be considered a failure to adhere to construction documents and the recommendations of this report but should be considered a condition of mass-grading when a natural, virgin material is used for a fill source. These inherent variations should not be considered to comprise a non-conformity with the grading recommendations unless the Weighted Plasticity (% of material passing the #200 sieve x Plasticity Index) of the weighted structural fill profile exceeds 10 for standard spread foundations or 15 for post-tensioned slabs-on-grade.

Multi-family residential construction results in a complex composite of steel, concrete, lumber, and earth. Each element responds differently to loading and as a consequence cracking and distortion occur. Occurrence of cracking or distortion is not in and of itself evidence of the structure failing to meet a reasonable standard or level of performance. Repair of unsightly, non-structural, cracks should be considered part of the overall maintenance program. Cracks that continue to reappear or widen or propagate may be indicative of extenuating issues that require redress. Wood Rodgers’ design protocols and recommended construction testing procedures rely upon ASTM Standards and Guidelines; therefore, any subsequent studies to evaluate completed product or construction practices shall be in accordance with ASTM E 141 AND shall employ the same testing means and methods available at the time of construction. Where access or testing limits do not allow continuity in testing methods, a correlation program must be performed that establishes that the testing and evaluation methods employed by the reviewing agency present results consistent with and comparable to the test methods prescribed by this report and employed during construction. Failure to follow these prescribed protocols would result in post-construction test data being compromised when compared to ASTM standards and requirements. In addition, failure to follow the referenced statistical and sampling ASTM assessment protocols would result in a forensic assessment program rife with inconsistencies and variations which would result in the forensic investigation failing to meet the level of precision necessary to accurately evaluate the site conditions and potential structural performance.

11.0 STANDARD LIMITATION CLAUSE

This report has been prepared in accordance with generally accepted local geotechnical practices. The analyses and recommendations submitted are based upon field exploration performed at the specific locations identified and the conditions encountered, as discussed in our report. No guarantee or warranty as to the continuity of soil conditions between exploration points is implied or intended. Therefore, this report does not reflect soil variations that may become evident during the construction period, at which time re-evaluation of the recommendations may be necessary. Final plans and specifications should be reviewed by the design engineer responsible for this geotechnical report to determine if they have been prepared in accordance with the recommendations contained in this report prior to submitting to the building department for review. It is the owner's/project manager responsibility to provide the plans and specifications to the engineer. We recommend our firm be retained to perform construction observation in all phases of the project related to geotechnical factors to document compliance with our recommendations. The owner/project manager is responsible for distribution of this geotechnical report to all designers and contractors whose work is related to geotechnical factors.

It is the contractor's responsibility for the grading and construction of the designed improvements. This responsibility includes the means, methods, techniques, sequence, and procedures of construction and safety of construction at the site. All construction shall conform to the requirements of the most recently adopted version of the Standard Specifications for Public Works Construction and the requirements of Carson City, Nevada. Failure to inspect the work shall not relieve the contractor from his obligation to perform sound and reliable work as described herein and as described in the Standard Specifications for Public Works Construction.

This report is issued with the understanding that it is the responsibility of the owner or their representative to ensure that the information and recommendations contained herein are brought to the attention of the design team for the project and incorporated into the plans and specifications, and that the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

In the event of changes in the design, location, or ownership of the project after presentation of this report, our recommendations should be reviewed and possibly modified by the Geotechnical Engineer. If the Geotechnical Engineer is not accorded the privilege of making this recommended review, we can assume no responsibility for misinterpretation or misapplication of our recommendations or their validity in the event changes have been made in the original design concept without our prior review. The engineer makes no other warranties, either expressed or implied, as to the professional advice provided under the terms of this agreement and included in this report.

This report was prepared by Wood Rodgers, Inc. for the benefit of Tanamera Construction, LLC and their duly assigned agents or other responsible parties. The material in it reflects Wood Rodgers' best judgment in consideration of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Wood Rodgers accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made by third parties or actions based on this report without consultation with Wood Rodgers and written approval for such actions.

12.0 REFERENCES

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APPENDIX A
GEOTECHNICAL PLATES

Image Reference: Google Earth, Imagery Date: 10/23/2020, Accessed 3/14/2022

WOOD RODGERS
1361 Corporate Boulevard, Reno, NV 89502
Phone 775.823.4068 Fax 775.823.4066

VICINITY MAP

Geotechnical Investigation

Lompa Ranch East
Tanamera Construction, LLC
Carson City, Nevada

Project No.: 2702083
Date: 03/14/22

PLATE A-1a

Image Reference: Esri World Imagery, Updated: 2/24/2022, Accessed 3/14/2022

WOOD RODGERS
1361 Corporate Boulevard, Reno, NV 89502
Phone 775.823.4068 Fax 775.823.4066

SITE MAP

Geotechnical Investigation
Lompa Ranch East
Tanamera Construction, LLC
Carson City, Nevada

Project No.: 2702083
Date: 03/14/22

PLATE A-1b

Wood Rodgers Inc.
1361 Corporate Blvd
Reno NV 89521
Telephone: 775-823-4068
Fax: 775-823-4066

TEST PIT NUMBER TP-1

CLIENT Tanamera Construction, LLC
PROJECT NAME Lompa Ranch East
PROJECT NUMBER 2702083
PROJECT LOCATION Carson City, Nevada
DATE STARTED 3/9/22 **COMPLETED** 3/9/22
GROUND ELEVATION **TEST PIT SIZE** 24 inches
EXCAVATION CONTRACTOR Joy Engineering
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 420F Backhoe
AT TIME OF EXCAVATION 8.0 ft
LOGGED BY Jackson Beadell **CHECKED BY** Justin McDougal
AT END OF EXCAVATION ---
NOTES:
24hrs AFTER EXCAVATION 6.50 ft

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	R-VALUE	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		SILTY SAND, (SM) loose, moist, dark brown, slightly plastic	GB 1A									
		POORLY GRADED SAND, (SP) loose, moist, light tan, nonplastic	GB 1B									
2.5		CLAYEY SAND, (SC) medium dense, moist, brown, low plasticity	GB 1C									
5.0		CLAYEY SAND, (SC) medium dense to dense, very moist to wet, gray brown, low plasticity, gleyed										
7.5			GB 1D									
10.0												

Bottom of Test Pit at 10.0 Feet.

Wood Rodgers Inc.
1361 Corporate Blvd
Reno NV 89521
Telephone: 775-823-4068
Fax: 775-823-4066

TEST PIT NUMBER TP-2

CLIENT Tanamera Construction, LLC
PROJECT NAME Lompa Ranch East
PROJECT NUMBER 2702083
PROJECT LOCATION Carson City, Nevada
DATE STARTED 3/10/22 **COMPLETED** 3/10/22
GROUND ELEVATION **TEST PIT SIZE** 24 inches
EXCAVATION CONTRACTOR Joy Engineering
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 420F Backhoe
AT TIME OF EXCAVATION 7.5 ft
LOGGED BY Jackson Beadell **CHECKED BY** Justin McDougal
AT END OF EXCAVATION ---
NOTES:
AFTER EXCAVATION ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	R-VALUE	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0.0		SILTY, CLAYEY SAND, (SC-SM) medium dense, moist, light brown, slightly plastic	GB 2A									
2.5		CLAYEY SAND, (SC) medium dense, moist, light brown, medium plasticity	GB 2B					26.1	35	20	15	42.2
5.0												
7.5		POORLY GRADED SAND WITH SILT, (SP-SM) medium dense, wet, gray, nonplastic, gleyed	GB 2C									
10.0												

Bottom of Test Pit at 10.0 Feet.

GEOTECH BH COLUMNS PLATE - GINT STD US LAB.GDT - 3/25/22 15:26 - \\WOODRODGERS.LOC\PRODUCTIONDATA\JOBS-RENO\JOBS\2702_TANAMERA DEV\083_LOMPA_EAST\GEOTECH\GEOTECH\04 GINT\LOMPA RANCH EAST.GPJ

Wood Rodgers Inc.
1361 Corporate Blvd
Reno NV 89521
Telephone: 775-823-4068
Fax: 775-823-4066

TEST PIT NUMBER TP-3

CLIENT Tanamera Construction, LLC
PROJECT NAME Lompa Ranch East
PROJECT NUMBER 2702083
PROJECT LOCATION Carson City, Nevada
DATE STARTED 3/10/22 **COMPLETED** 3/10/22
GROUND ELEVATION **TEST PIT SIZE** 24 inches
EXCAVATION CONTRACTOR Joy Engineering
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 420F Backhoe
▽ **AT TIME OF EXCAVATION** 5.5 ft
LOGGED BY Jackson Beadell **CHECKED BY** Justin McDougal
AT END OF EXCAVATION ---
NOTES:
AFTER EXCAVATION ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	R-VALUE	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		SANDY SILT, (ML) stiff, moist to very moist, brown, medium plasticity										
2.5			GB 3A					34.9	45	28	17	60.6
5.0		▽										
		SILTY SAND, (SM) medium dense, wet, gray, nonplastic, gleyed	GB 3B									
7.5												
10.0		POORLY GRADED SAND WITH SILT, (SP-SM) medium dense, wet, tan, nonplastic	GB 3C									

Bottom of Test Pit at 11.0 Feet.

Wood Rodgers Inc.
1361 Corporate Blvd
Reno NV 89521
Telephone: 775-823-4068
Fax: 775-823-4066

TEST PIT NUMBER TP-4

CLIENT Tanamera Construction, LLC
PROJECT NAME Lompa Ranch East
PROJECT NUMBER 2702083
PROJECT LOCATION Carson City, Nevada
DATE STARTED 3/10/22 **COMPLETED** 3/10/22
GROUND ELEVATION **TEST PIT SIZE** 24 inches
EXCAVATION CONTRACTOR Joy Engineering
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 420F Backhoe
AT TIME OF EXCAVATION 9.0 ft
LOGGED BY Jackson Beadell **CHECKED BY** Justin McDougal
AT END OF EXCAVATION ---
NOTES:
AFTER EXCAVATION ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	R-VALUE	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (%)
0.0		CLAYEY SAND TO SANDY LEAN CLAY, (SC-CL) medium dense to stiff, moist, brown, low plasticity	GB 4A									
2.5		SANDY LEAN CLAY, (CL) stiff, moist, brown, low plasticity	GB 4B GB 4C					26.9	28	19	9	64.3
5.0												
7.5		SILTY SAND, (SM) medium dense, wet, gray, nonplastic, gleyed	GB 4D									
10.0												

Bottom of Test Pit at 11.0 Feet.

Wood Rodgers Inc.
1361 Corporate Blvd
Reno NV 89521
Telephone: 775-823-4068
Fax: 775-823-4066

TEST PIT NUMBER TP-5

CLIENT Tanamera Construction, LLC
PROJECT NAME Lompa Ranch East
PROJECT NUMBER 2702083
PROJECT LOCATION Carson City, Nevada
DATE STARTED 3/10/22 **COMPLETED** 3/10/22
GROUND ELEVATION **TEST PIT SIZE** 24 inches
EXCAVATION CONTRACTOR Joy Engineering
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 420F Backhoe
AT TIME OF EXCAVATION 10.0 ft
LOGGED BY Jackson Beadell **CHECKED BY** Justin McDougal
AT END OF EXCAVATION ---
NOTES:
AFTER EXCAVATION ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	R-VALUE	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (%)
0.0		SILTY SAND, (SM) medium dense, moist, dark brown, slightly plastic	GB 5A									
2.5		SANDY LEAN CLAY, (CL) stiff, moist, brown, low plasticity	GB 5B									
5.0												
7.5		SILTY SAND, (SM) medium dense, wet, gray, nonplastic, gleyed	GB 5C									
10.0												

Bottom of Test Pit at 11.0 Feet.

Wood Rodgers Inc.
1361 Corporate Blvd
Reno NV 89521
Telephone: 775-823-4068
Fax: 775-823-4066

TEST PIT NUMBER TP-6

CLIENT Tanamera Construction, LLC
PROJECT NAME Lompa Ranch East
PROJECT NUMBER 2702083
PROJECT LOCATION Carson City, Nevada
DATE STARTED 3/10/22 **COMPLETED** 3/10/22
GROUND ELEVATION **TEST PIT SIZE** 24 inches
EXCAVATION CONTRACTOR Joy Engineering
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 420F Backhoe
AT TIME OF EXCAVATION --- NO FREE WATER ENCOUNTERED
LOGGED BY Jackson Beadell **CHECKED BY** Justin McDougal
AT END OF EXCAVATION --- NO FREE WATER ENCOUNTERED
NOTES:
AFTER EXCAVATION --- NO FREE WATER ENCOUNTERED

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	R-VALUE	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		LEAN CLAY WITH SAND, (CL) stiff, moist, tan gray, low plasticity										
2.5			GB 6A					16.4				70.7
		SANDY LEAN CLAY, (CL) stiff, moist, brown, medium plasticity										
5.0			GB 6B					24.7	42	24	18	71.2
7.5		CLAYEY SAND, (SC) medium dense, wet, gray, low plasticity, gleyed										
10.0			GB 6C									

Bottom of Test Pit at 11.0 Feet.

Wood Rodgers Inc.
1361 Corporate Blvd
Reno NV 89521
Telephone: 775-823-4068
Fax: 775-823-4066

TEST PIT NUMBER TP-7

CLIENT Tanamera Construction, LLC
PROJECT NAME Lompa Ranch East
PROJECT NUMBER 2702083
PROJECT LOCATION Carson City, Nevada
DATE STARTED 3/10/22 **COMPLETED** 3/10/22
GROUND ELEVATION **TEST PIT SIZE** 24 inches
EXCAVATION CONTRACTOR Joy Engineering
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 420F Backhoe
AT TIME OF EXCAVATION --- NO FREE WATER ENCOUNTERED
LOGGED BY Jackson Beadell **CHECKED BY** Justin McDougal
AT END OF EXCAVATION --- NO FREE WATER ENCOUNTERED
NOTES:
AFTER EXCAVATION --- NO FREE WATER ENCOUNTERED

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	R-VALUE	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		SILTY, CLAYEY SAND, (SC-SM) medium dense, moist, dark brown, slightly plastic	GB 7A									
2.5		POORLY GRADED SAND, (SP) medium dense, moist, white tan, nonplastic	GB 7B					6.9				
5.0		SILTY SAND, (SM) dense, moist, light brown, nonplastic	GB 7C					7.6				
7.5		CLAYEY SAND, (SC) dense, moist, light brown, low plasticity	GB 7D					17.8				
10.0												

Bottom of Test Pit at 10.0 Feet.

GEOTECH BH COLUMNS PLATE - GINT STD US LAB.GDT - 3/25/22 15:26 - \\WOODRODGERS.LOC\PRODUCTIONDATA\JOBS-RENO\JOBS\2702_TANAMERA DEV\083_LOMPA_EAST\GEOTECH\GEOTECH\04 GINT\LOMPA RANCH EAST.GPJ

Wood Rodgers Inc.
1361 Corporate Blvd
Reno NV 89521
Telephone: 775-823-4068
Fax: 775-823-4066

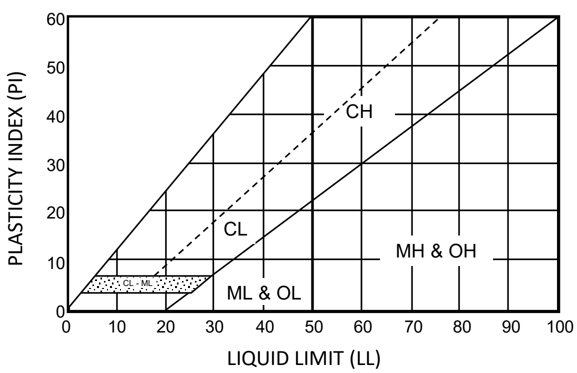
TEST PIT NUMBER TP-8

CLIENT Tanamera Construction, LLC
PROJECT NAME Lompa Ranch East
PROJECT NUMBER 2702083
PROJECT LOCATION Carson City, Nevada
DATE STARTED 3/10/22 **COMPLETED** 3/10/22
GROUND ELEVATION **TEST PIT SIZE** 24 inches
EXCAVATION CONTRACTOR Joy Engineering
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 420F Backhoe
▽ **AT TIME OF EXCAVATION** 5.0 ft
LOGGED BY Jackson Beadell **CHECKED BY** Justin McDougal
AT END OF EXCAVATION ---
NOTES:
AFTER EXCAVATION ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	R-VALUE	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		SILTY, CLAYEY SAND, (SC-SM) medium dense, moist, brown, slightly plastic to low plasticity	GB 8A									
2.5			GB 8B					17.3				
		LEAN CLAY, (CL) stiff, wet, gray, low to medium plasticity										
5.0	▽		GB 8C					29.2				
		SILTY SAND, (SM) medium dense, wet, gray, nonplastic										
7.5			GB 8D									
10.0												

Bottom of Test Pit at 10.0 Feet.

MAJOR DIVISION				TYPICAL NAMES
COARSED-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVEL MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, SILTY GRAVELS WITH SAND
			GC	CLAYEY GRAVELS, CLAYEY GRAVELS WITH SAND
	SAND MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
			SP	POORLY GRADED SAND WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS WITH OR WITHOUT GRAVEL
			SC	CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILT AND CLAY LIQUID LIMIT 50% OR LESS		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTS WITH SANDS AND GRAVELS
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY CLAYS WITH SANDS AND GRAVELS, LEAN CLAYS
			OL	ORGANIC SILTS OR CLAYS OF LOW PLASTICITY
	SILT AND CLAY LIQUID LIMIT GREATER THAN 50%		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOLID, ELASTIC SILTS
			CH	INORGANIC CLAYS OR HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC SILTS OR CLAYS MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS



CONSISTENCY		RELATIVE DENSITY	
SILTS & CLAYS	SPT BLOW* COUNTS (N)	SANDS & GRAVELS	SPT BLOW* COUNTS (N)
VERY SOFT	0 - 2	VERY LOOSE	0 - 4
SOFT	3 - 4	LOOSE	5 - 10
MEDIUM STIFF	5 - 8	MEDIUM DENSE	11 - 30
STIFF	9 - 15	DENSE	31 - 50
VERY STIFF	16 - 30	VERY DENSE	50 +
HARD	30 +		

* The Standard Penetration Resistance (N) In blows per foot is obtained by the ASTM D1585 procedure using 2" O.D., 1 3/8" I.D. samplers.

EXPLORATION PLASTICITY DESCRIPTIONS			
DESCRIPTION	RANGE	DESCRIPTION	RANGE
Nonplastic	<5	Medium	10-20
Low	< 10	Medium - High	15 - 25
Low - Medium	5 - 15	High	>25

DESCRIPTION OF ESTIMATED PERCENTAGES OF GRAVEL, SAND, AND FINES	
TRACE	Particles are present but est. < 5%
FEW	5% - 10%
LITTLE	15% - 20%
SOME	30% - 45%
MOSTLY	50% - 100%

NOTE: Percentages are presented within soil description for soil horizon with laboratory tested soil samples.

DEFINITIONS OF SOIL FRACTIONS	
SOIL COMPONENT	PARTICLE SIZE RANGE
BOULDERS	> 12 INCHES
COBBLES	3 to 12 Inches
GRAVEL	3 IN. TO NO. 4 SIEVE
COARSE GRAVEL	3 IN. TO 3/4 IN.
FINE GRAVEL	3/4 IN. TO NO. 4 SIEVE
SAND	NO. 4 TO NO. 200
COARSE SAND	NO. 4 TO NO. 10
MEDIUM SAND	NO. 10 TO NO. 40
FINE SAND	NO. 40 TO NO. 200
FINES (SILT OR CLAY)	MINUS NO. 200 SIEVE

WOOD RODGERS
1361 Corporate Boulevard, Reno, NV 89502
Phone 775.823.4068 Fax 775.823.4066

UNIFIED SOIL CLASSIFICATION AND KEY TO SOIL DESCRIPTIONS

Geotechnical Investigation
Lompa Ranch East
Tanamera Construction, LLC
Carson City, Nevada

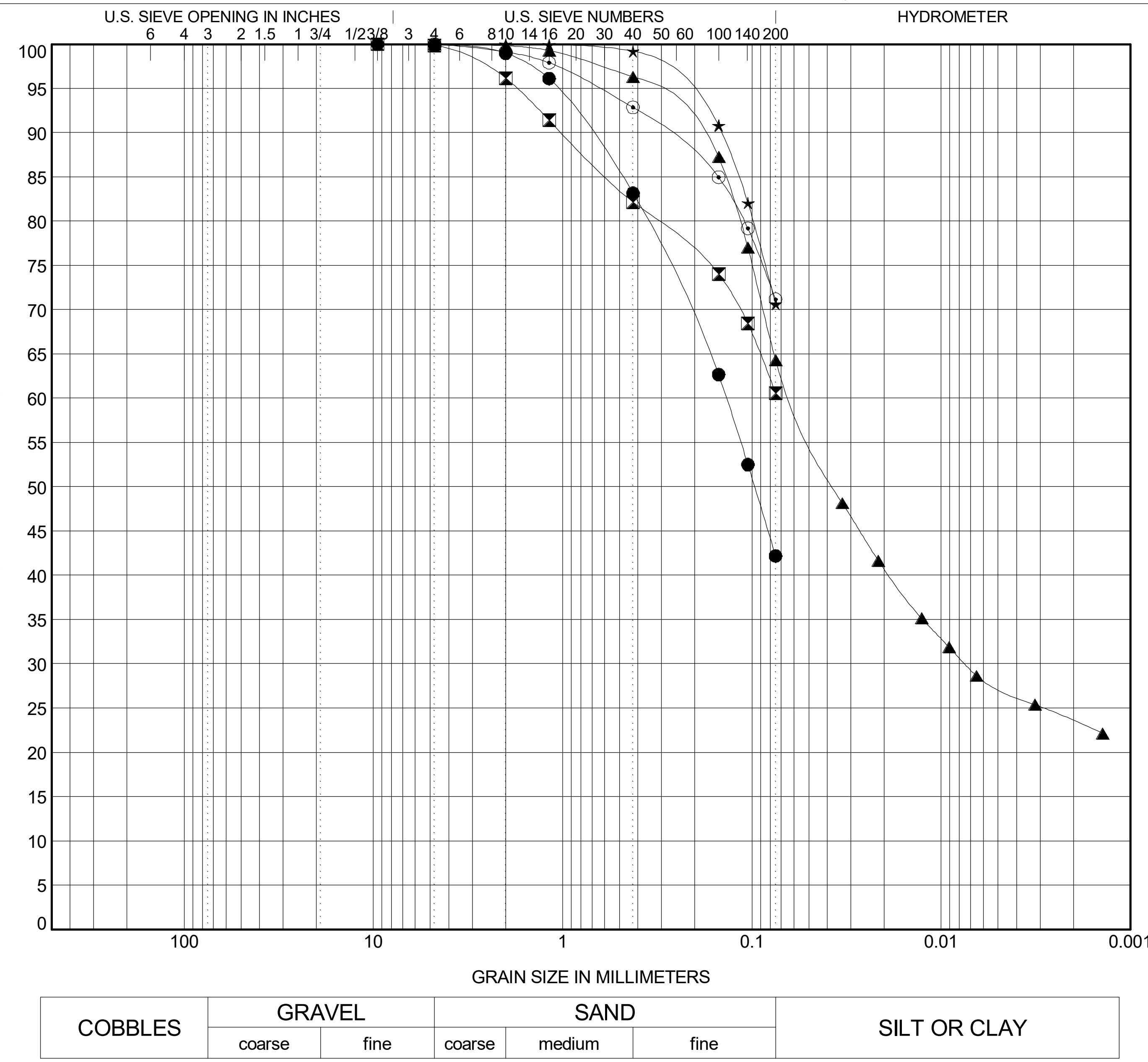
Project No.: 2702083
Date: 03/14/22

PLATE A-3

Wood Rodgers Inc.
1361 Corporate Blvd
Reno NV 89521
Telephone: 775-823-4068
Fax: 775-823-4066

GRAIN SIZE DISTRIBUTION

CLIENT Tanamera Construction, LLC
PROJECT NAME Lompa Ranch East
PROJECT NUMBER 2702083
PROJECT LOCATION Carson City, Nevada



TEST PIT	MID-DEPTH	Classification	LL	PL	PI	Cc	Cu
● TP-2	2.0	**CLAYEY SAND(SC)**	35	20	15		
⧗ TP-3	0.0	**SANDY SILT(ML)**	45	28	17		
▲ TP-4	2.0	**SANDY LEAN CLAY(CL)**	28	19	9		
★ TP-6	1.0						
⊙ TP-6	4.0	**LEAN CLAY with SAND(CL)**	42	24	18		

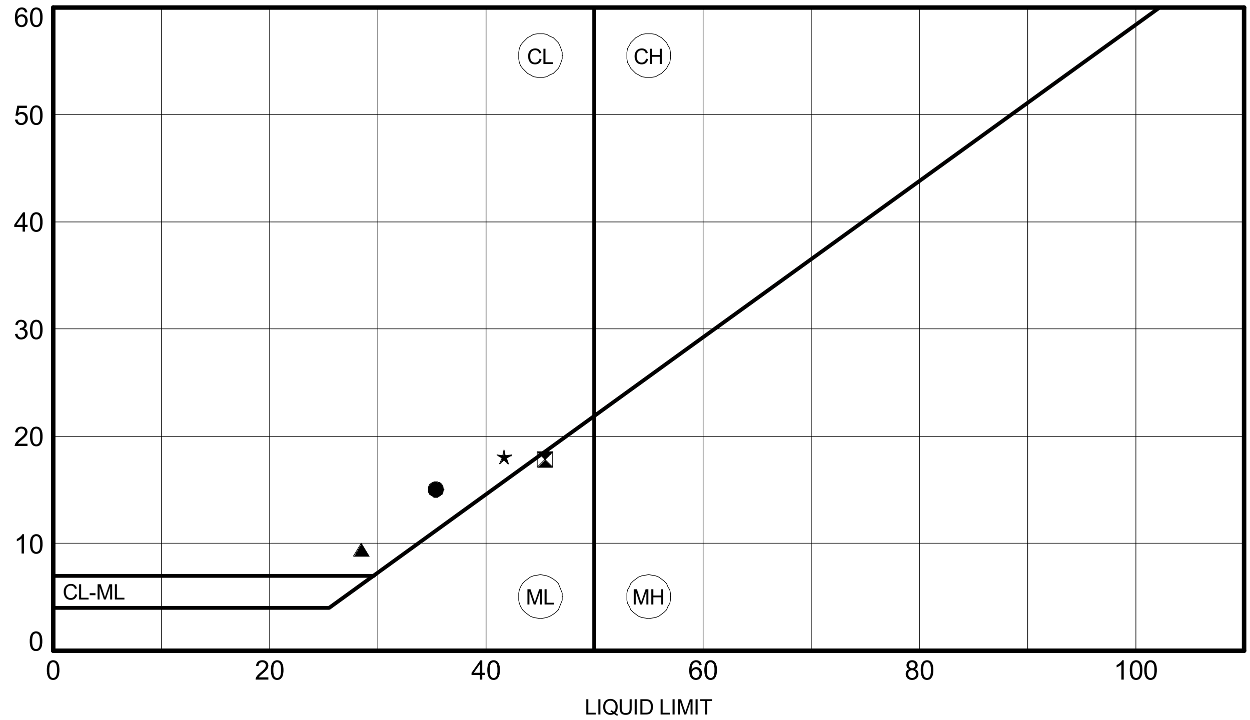
TEST PIT	MID-DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● TP-2	2.0	9.5	0.137			0.1	57.7	42.2	
⧗ TP-3	0.0	9.5				0.1	39.3	60.6	
▲ TP-4	2.0	4.75	0.06	0.007		0.0	35.7	36.9	27.4
★ TP-6	1.0	2				0.0	29.3	70.7	
⊙ TP-6	4.0	4.75				0.0	28.8	71.2	

GRAIN SIZE - GINT STD US LAB.GDT - 3/25/22 15:02 - \\WOODRODGERS.LOC\PRODUCTIONDATA\JOBS-RENO\JOBS\2702_TANAMERA DEV\083_LOMPA_EAST\GEOTECH\GEOTECH\04 GINT\LOMPA RANCH EAST.GPJ

Wood Rodgers Inc.
1361 Corporate Blvd
Reno NV 89521
Telephone: 775-823-4068
Fax: 775-823-4066

ATTERBERG LIMITS' RESULTS

CLIENT Tanamera Construction, LLC
PROJECT NAME Lompa Ranch East
PROJECT NUMBER 2702083
PROJECT LOCATION Carson City, Nevada



	TEST PIT	MID-DEPTH	LL	PL	PI	Fines	Classification
●	**TP-2**	**2.0**	**35**	**20**	**15**	**42.2**	**CLAYEY SAND(SC)**
⧗	**TP-3**	**0.0**	**45**	**28**	**17**	**60.6**	**SANDY SILT(ML)**
▲	**TP-4**	**2.0**	**28**	**19**	**9**	**64.3**	**SANDY LEAN CLAY(CL)**
★	**TP-6**	**4.0**	**42**	**24**	**18**	**71.2**	**LEAN CLAY with SAND(CL)**

Silver State Labs-Reno
1135 Financial Blvd
Reno, NV 89502
(775) 857-2400 FAX: (888) 398-7002
www.ssalabs.com

Analytical Report

Workorder#: 22030949
Date Reported: 3/30/2022

Client: Wood Rodgers
Project Name: 2702083/ Lompa Ranch East Lab Log# 6302/ TP-3 0-5
PO #: LAB 3961
Sampled By: Client

Laboratory Accreditation Number: NV015/CA2990

Laboratory ID	Client Sample ID	Date/Time Sampled	Date Received
22030949-01	TP-3 0-5	03/14/2022 12:00	3/16/2022

Parameter	Method	Result	Units	PQL	Analyst	Date/Time Analyzed	Data Flag
Chloride	EPA 9056	80	mg/Kg	50	CTR	03/22/2022 18:40	
Oxidation-Reduction Potential	SM 2580B	111	mV		AC	03/22/2022 13:59	
pH	SW-846 9045D	7.74	pH Units		AC	03/24/2022 11:12	
pH Temperature	SW-846 9045D	22.0	°C		AC	03/24/2022 11:12	
Resistivity	AASHTO T288	470	Ohms-cm		SR	03/23/2022 9:17	
Sodium	ASTM D2791	< 0.01	%	0.01	AC	03/24/2022 8:50	
Sodium Sulfate as Na2SO4	Calculation	< 0.01	%	0.01	AC	03/24/2022 8:53	
Sulfate	SM4500 SO4E	0.11	%	0.01	AC	03/24/2022 8:52	
Sulfide	AWWA C105	Negative	POS/NEG		AC	03/25/2022 16:14	

Laboratory Accreditation Number: NV015/CA2990

Laboratory ID	Client Sample ID	Date/Time Sampled	Date Received
22030949-02	TP-4 0-2	03/14/2022 12:00	3/16/2022

Parameter	Method	Result	Units	PQL	Analyst	Date/Time Analyzed	Data Flag
Chloride	EPA 9056	<50	mg/Kg	50	CTR	03/27/2022 3:19	
Oxidation-Reduction Potential	SM 2580B	26.0	mV		AC	03/25/2022 9:10	
pH	SW-846 9045D	9.58	pH Units		AC	03/24/2022 11:12	
pH Temperature	SW-846 9045D	22.0	°C		AC	03/24/2022 11:12	
Resistivity	AASHTO T288	1300	Ohms-cm		SR	03/23/2022 9:17	
Sodium	ASTM D2791	< 0.01	%	0.01	AC	03/28/2022 8:46	
Sodium Sulfate as Na2SO4	Calculation	< 0.01	%	0.01	AC	03/28/2022 9:17	
Sulfate	SM4500 SO4E	< 0.01	%	0.01	AC	03/28/2022 9:16	
Sulfide	AWWA C105	Negative	POS/NEG		AC	03/25/2022 16:14	

Daniel B. Stephens & Associates, Inc.

Summary of Water Potential

Sample Number	Moisture Content (%, g/g)	Water Potential (-cm water)	Water Potential (pF)
TP-4 @ 2'-4' (5.2%)	5.15	174,182	5.24
TP-4 @ 2'-4' (15.6%)	15.58	15,195	4.18
TP-4 @ 2'-4' (25.3%)	25.28	8,260	3.92

WOOD RODGERS
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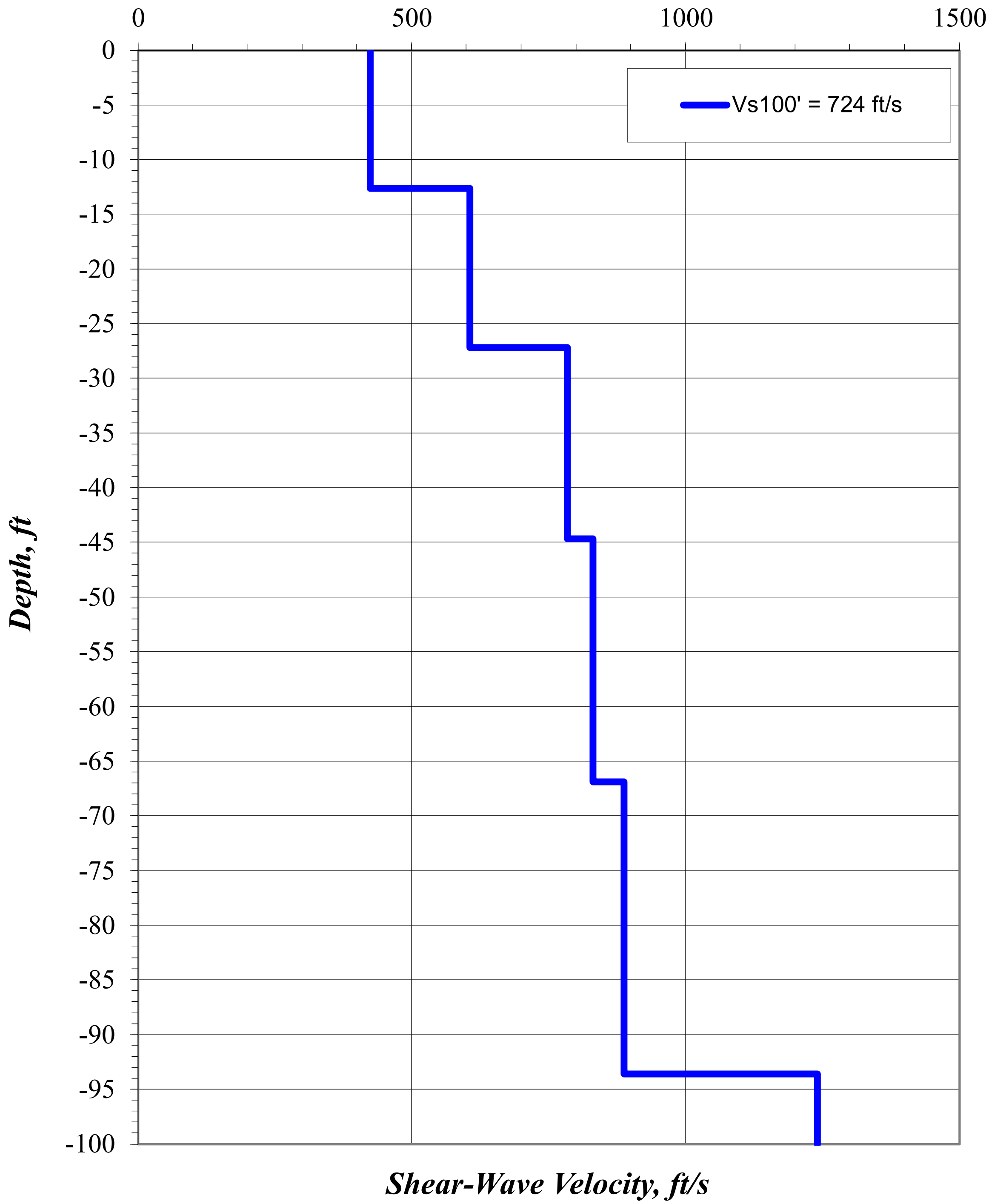
WATER POTENTIAL TESTING RESULTS

Geotechnical Investigation
Lompa Ranch East
Tanamera Construction, LLC
Carson City, Nevada

Project No.: 2702083
Date: 03/14/22

PLATE A-4d

Lompa Ranch East 300 S: Vs Model



WOOD RODGERS 1361 Corporate Boulevard, Reno, NV 89502 Phone 775.823.4068 Fax 775.823.4066	**ReMi RESULTS**	***Geotechnical Investigation*** ***Lompa Ranch East*** ***Tanamera Construction, LLC*** ***Carson City, Nevada*** Project No.: 2702083 Date: 03/14/22 **PLATE A-5**

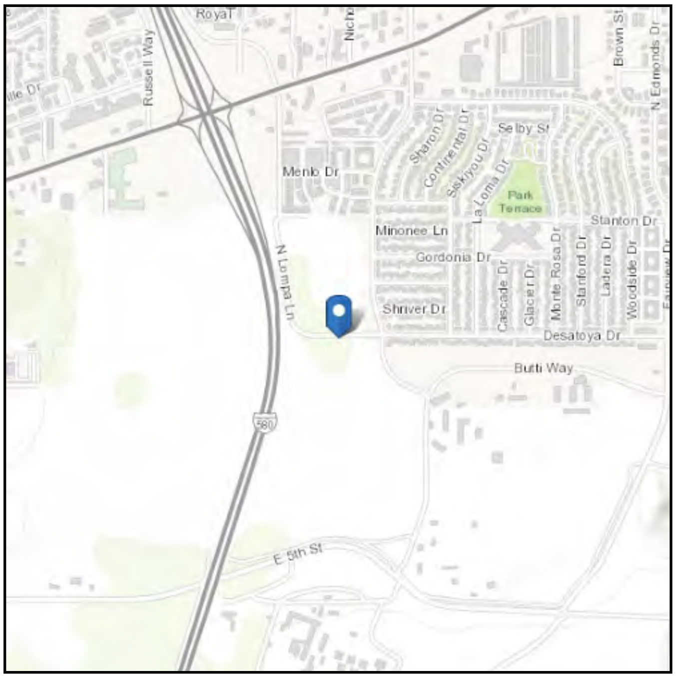
APPENDIX B
ASCE 7 HAZARDS REPORTS

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 4625.94 ft (NAVD 88)
Latitude: 39.1685
Longitude: -119.7358



ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Seismic

Site Soil Class: D - Stiff Soil

Results:

S_S :	2.046	S_{D1} :	N/A
S_1 :	0.738	T_L :	6
F_a :	1	PGA :	0.874
F_v :	N/A	PGA_M :	0.961
S_{MS} :	2.046	F_{PGA} :	1.1
S_{M1} :	N/A	I_e :	1
S_{DS} :	1.364	C_v :	1.5

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Mon Apr 18 2022

Date Source: USGS Seismic Design Maps

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided "as is" and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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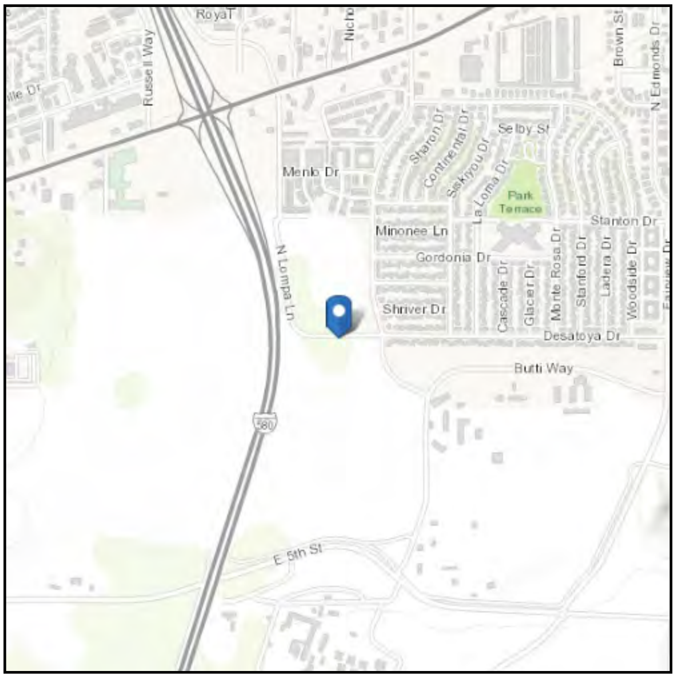
ASCE 7 Hazards Report

Address:
No Address at This Location

Standard:	ASCE/SEI 7-16	**Elevation:**	4625.94 ft (NAVD 88)
Risk Category:	III	**Latitude:**	39.1685
Soil Class:	D - Stiff Soil	**Longitude:**	-119.7358



Seismic

Site Soil Class: D - Stiff Soil

Results:

S_S :	2.046	S_{D1} :	N/A
S_1 :	0.738	T_L :	6
F_a :	1	PGA :	0.874
F_v :	N/A	PGA_M :	0.961
S_{MS} :	2.046	F_{PGA} :	1.1
S_{M1} :	N/A	I_e :	1.25
S_{DS} :	1.364	C_v :	1.5

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Mon Apr 18 2022

Date Source: USGS Seismic Design Maps

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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APPENDIX C
FAULT HAZARD LETTER

August 30, 2018

The Red Ltd.
Jaimee Yoshizawa, PE, CCIM
7272 S. El Capitan Way #2
Las Vegas, Nevada 89148

Subject: ***Lompa Ranch East Project***
Preliminary Geotechnical Investigation Addendum No. 1
Carson City, Nevada

Dear Ms. Yoshizawa:

This letter addendum No. 1 to our Lompa Ranch East Project Preliminary Geotechnical Investigation, dated December 17, 2017 is intended to revise and clarify our verbiage found in section 8.1 of the report and the related recommendation 9.1.4 in Section 9.0 of the Conclusions and Recommendations. These revisions are based on our field fault trenching study completed in addition to an update of Figure 2 the Site Exploration Plan, Figure 5, the Fault Map and our recently compledted Fault Trench Log, Figure 2A. The revised figures and trench log are attached for inclusion with the original report. This addendum should be included with the report in any further submittals or general use of the report by the client, engineers, contractors or the public.

REVISED SECTION 8.1

The following section is intended to take the place of the entire Section 8.1 found on page 5 of the original report. The amended section is based on a review of the USGS fault and fold data base and the New Empire Earthquake Hazards Map.

8.1 Active Faulting

Carson City is located near active faults which can produce significant ground motions due to seismic events. On Figure 5, the Fault Map for the site shows the distribution of active faults in the area of the site. Based on the U.S. Geological Survey (USGS), Quaternary fault and fold database for the United States (https://earthquake.usgs.gov/hazards/qfaults/map/#qfaults.), faults considered active for the type of development planned are located near the project site. The nearest active faults (Holocene age) to the site are located approximately one-half mile west of the site. Based on the USGS data and the New Empire Earthquake Hazards Map (Nevada Bureau of Mines and Geology, 1979) a single pre-Holocene fault has been mapped across the southeast portion the site as shown on Figure 5, the Fault Map. No evidence of any active fault scarp was observed in the field. The approximate location of the mapped fault is also shown on Figure 2 for reference. The fault mapped across the site was identified by Bell and Trexler as Mid to Late-Pleistocene (approximately 35,000 to

100,000 years). The fault location was only approximately located by the use of aerial photography due to the high degree of erosion of the slope. This pre- Holocene age is supported by the lack of a discernable fault rupture (scarp) on the subject site. On August 21, 2018 a fault trench was excavated near on the southerly portion of the subject site as shown on the revised Exploration Map, Figure 2. No evidence of fault rupture was identified in the fault trench. It is apparent that there are soil changes across the identified fault area that we interpret as alluvial deposition over the former fault scarp. Base on the depth of soil cover over the "fault area" it is our interpretation that the fault is older by Holocene which is consistent with the published maps.

The risk of fault ground rupture at the site is considered low.

Strong seismic shaking is considered likely during the life of the project. Ground shaking intensities for design considerations should be governed by seismic events occurring along the base of the Carson Range on the Kings Canyon fault zone and Southern Washoe Valley fault zone approximately three miles west of the site. Faulting along the Carson Range has been evaluated by the Nevada Bureau of Mines and Geology to be capable of producing earthquake Richter Magnitudes on the order of 7.0 with peak ground accelerations as high as 2.0 g. These values are equivalent to Modified Mercalli Intensities of X or greater.

The seismic risk due to shaking at the Site is not considered significantly greater than that of the surrounding developments and the Carson City area in general. We recommend that seismic design of the structures be performed in accordance with the latest version of the International Residential Code (IRC) or the International Building Code (IBC) as appropriate. Site-specific IRC and IBC geotechnical seismic design parameters are presented in Section 9.2 of this report.

REVISED 9.0 CONCLUSIONS AND RECOMMENDATIONS

SECTION 9.1 GENERAL

9.1.4 Potential seismic hazards at the site will likely be associated with possible moderate to strong ground shaking from an event along the regional active faults. Bell and Trexler identified a single pre-Holocene fault on southeastern portion of the site. Due to the lack of an identifiable scarp and assigned age of the fault and the results of our field trenching, no building offsets are recommended. No active Holocene age faults are known on the site and therefore the risk of fault rupture is considered low. Structures should be designed in accordance with 2015IBC Seismic requirements.

Should you have any questions or require additional services, please contact me at your convenience.

Sincerely,

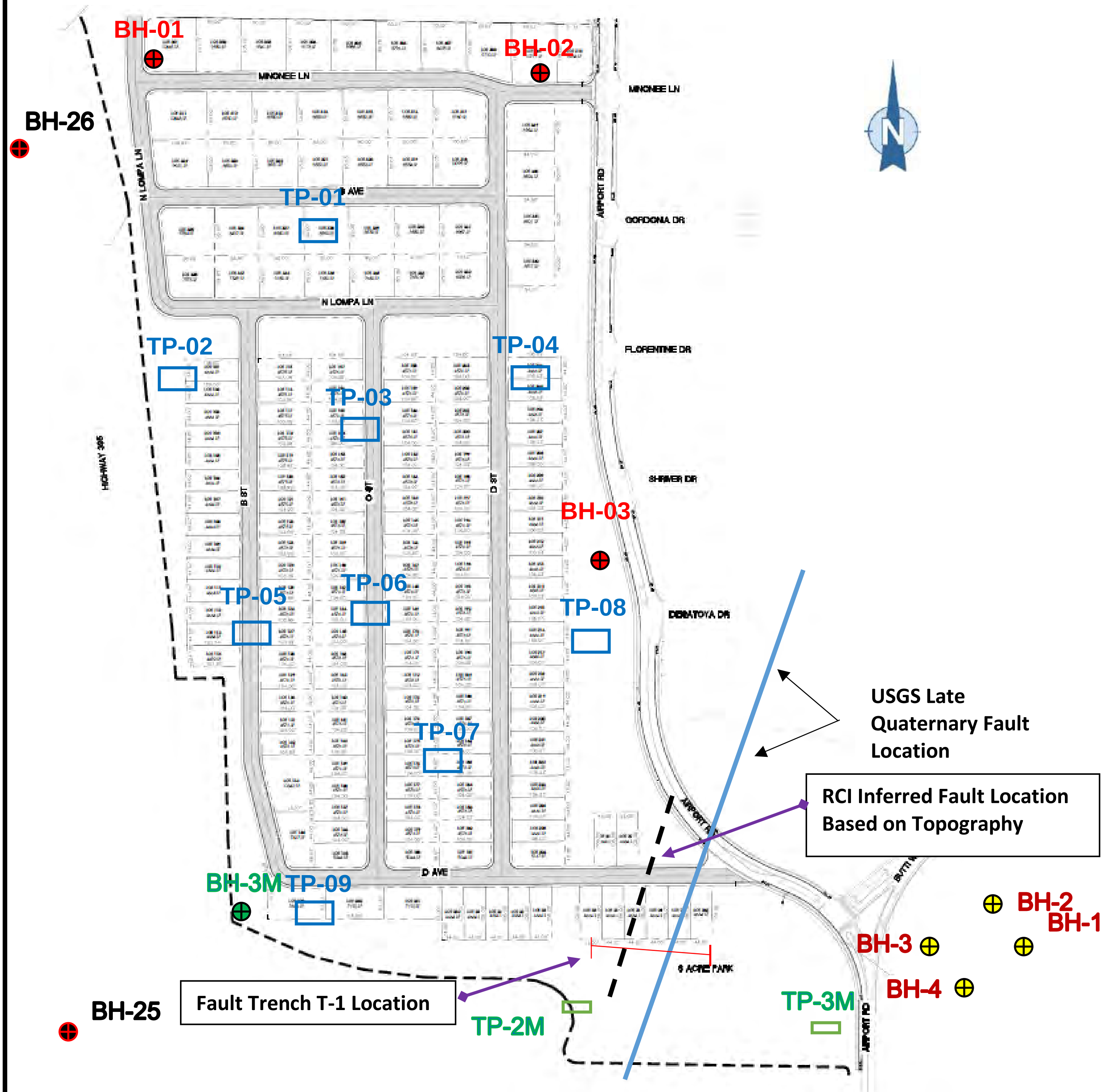
Resource Concepts, INC.

PROFESSIONAL ENGINEER STATE OF NEVADA
GARY C.
LUCE
EXP 12-31-19
CIVIL
No. 12001

8-30-2018

Gary Luce, PE
Senior Project Engineer/ Geologist

Enclosures: Revised Figure 2, Figure 2A and Figure 5



Reference: *Lompa Ranch East, The Red Ltd., November 11, 2017*

- TEST PIT LOCATION OBSERVED BY RESOURCE CONCEPTS, INC., NOVEMBER 30, 2017
- BORING LOCATION OBSERVED BY RESOURCE CONCEPTS, INC., NOVEMBER 29 AND 30, 2017
- BORING LOCATION GEOCON CONSULTANTS INC., SEPTEMBER 2010
- BORING LOCATION TERRACON, JANUARY 2014
- BORING LOCATION BLACK EAGLE CONSULTING, INC., JUNE 2004

RCI Resource Concepts Inc

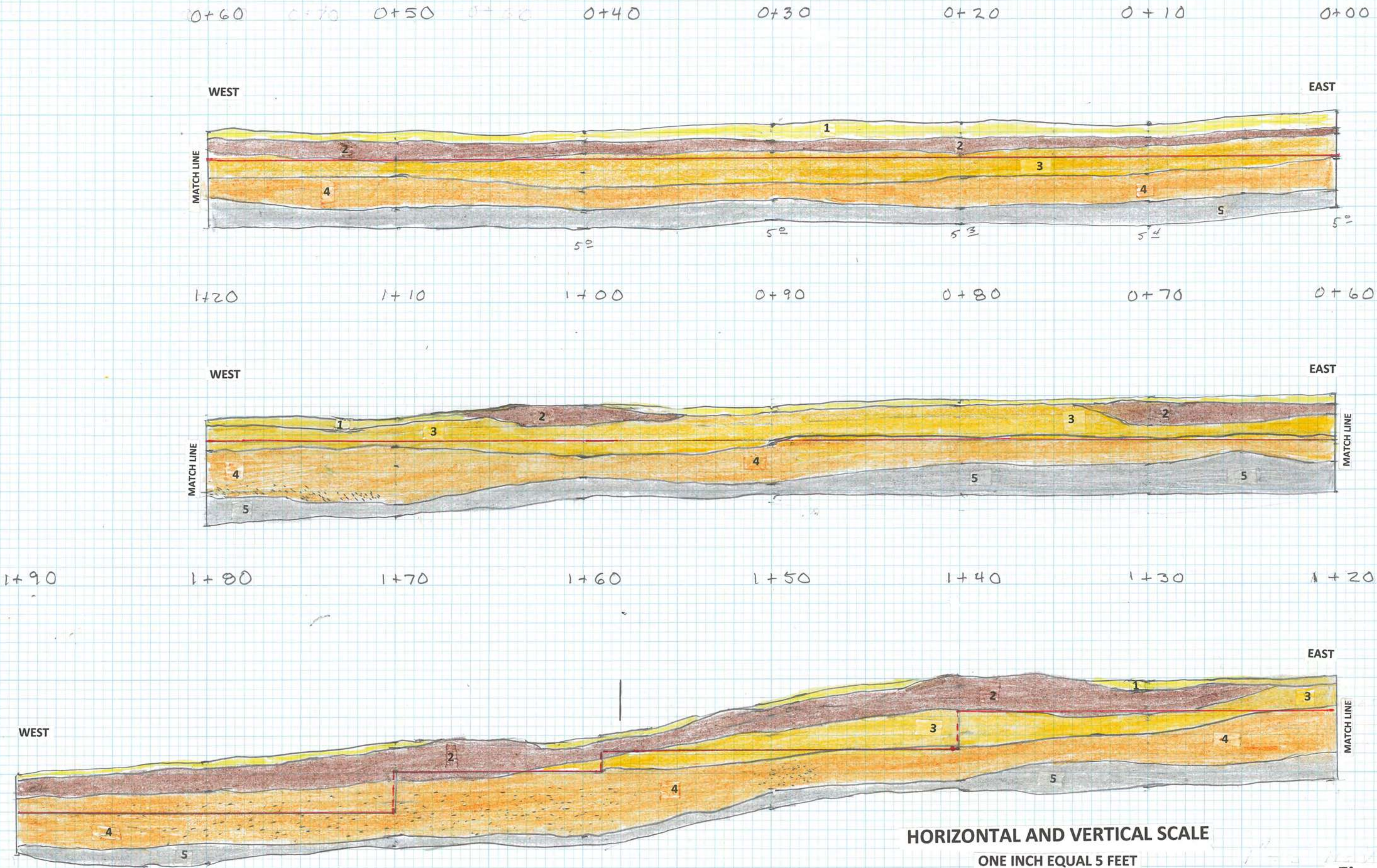
340 N. Minnesota St.
Carson City, NV 89703
775 883-1600

GL | REVISED AUGUST 2018

FIGURE 2 SITE EXPLORATION MAP

LOMPA RANCH EAST
CARSON CITY, NV

PROJECT NO. 17-285.2



HORIZONTAL AND VERTICAL SCALE

ONE INCH EQUAL 5 FEET

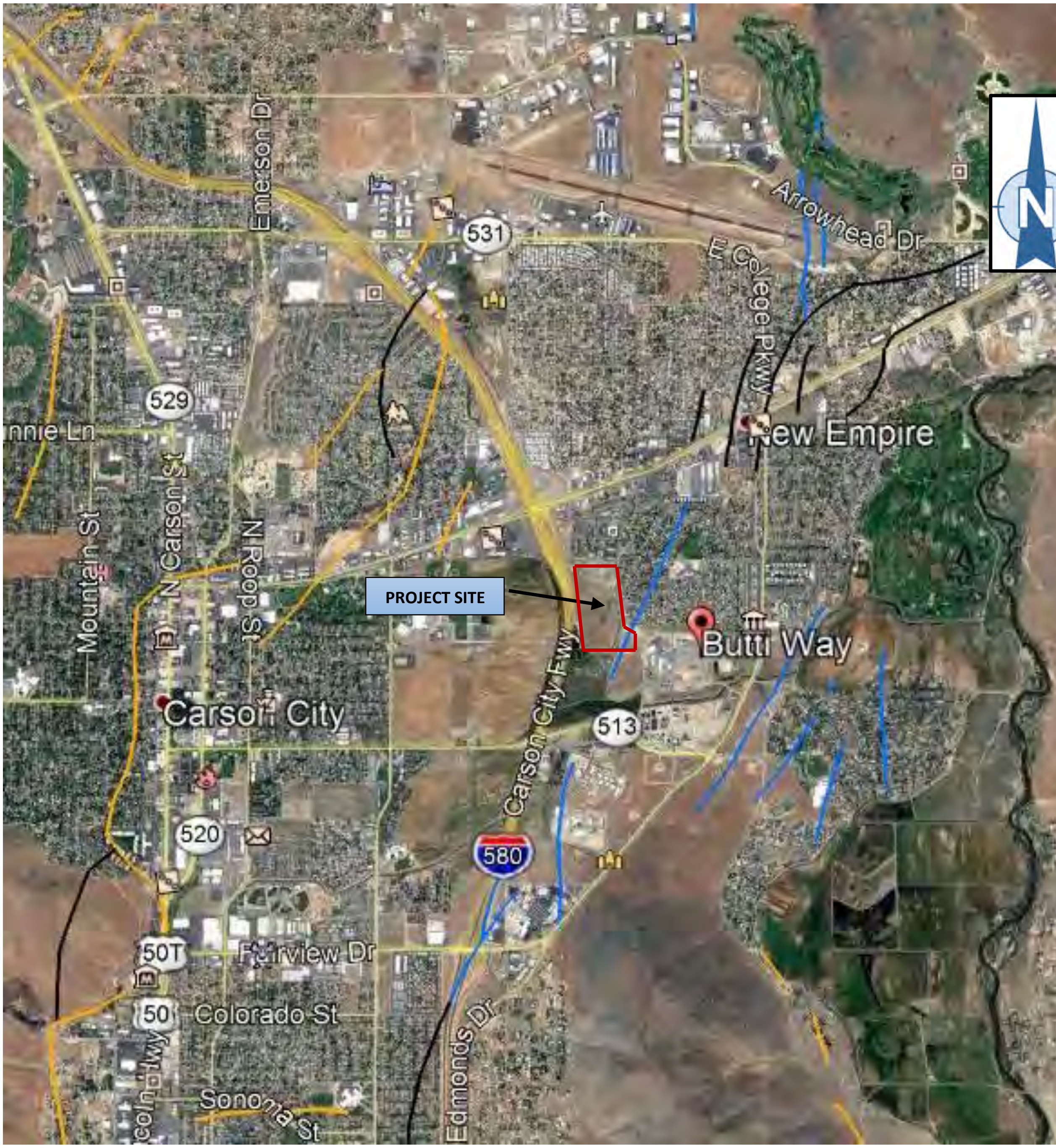
LOMPA RANCH EAST FAULT TRENCH LOG

Figure 2A

FAULT TRENCH GEOLOGIC LEGEND

Soil Unit	Description	Approximate Age
1	**Silty Sand (SM)**- Dark Yellowish Brown, Loose, Dry with rootlets	Holocene
2	**Lean Clay (CL)**- Dark, Brown, Hard, Dry,	Holocene to Late Quaternary
3	**Clayey Sand (SC)**- Dark Yellowish Brown, Medium Dense, Moist	Late Quaternary
4	**Clayey Sand (SC)** with Fine Gravel- Yellowish Brown to Grayish Brown, Medium Dense, Moist	Late Quaternary
5	**Silty Fine Sand (SM)**- Gray, Loose, Slightly Moist, with iron oxide mottling at interface with soil unit above.	Late to Middle Quaterary
	Horizontal Datum	
	Caliche Coating	

Logged By: Gary Luce, P.E., Senior Geologist **Job No.** 17-285.2



Holocene Fault (Active)

Inferred Fault Location

Early to Mid-Pleistocene

Map Reference: USGS Fault and Fold Data Base Google Earth 2018

RCI Resource Concepts Inc

340 N. Minnesota St.
Carson City, NV 89703
775 883-1600

FIGURE 5 FAULT MAP

LOMPA RANCH EAST
CARSON CITY, NV

DE GL | Revised August 2018

PROJECT NO. 17-285.2

APPENDIX D
LIQUEFACTION ASSESSMENT

T A B L E   O F   C O N T E N T S

Wood Rodgers, Inc.

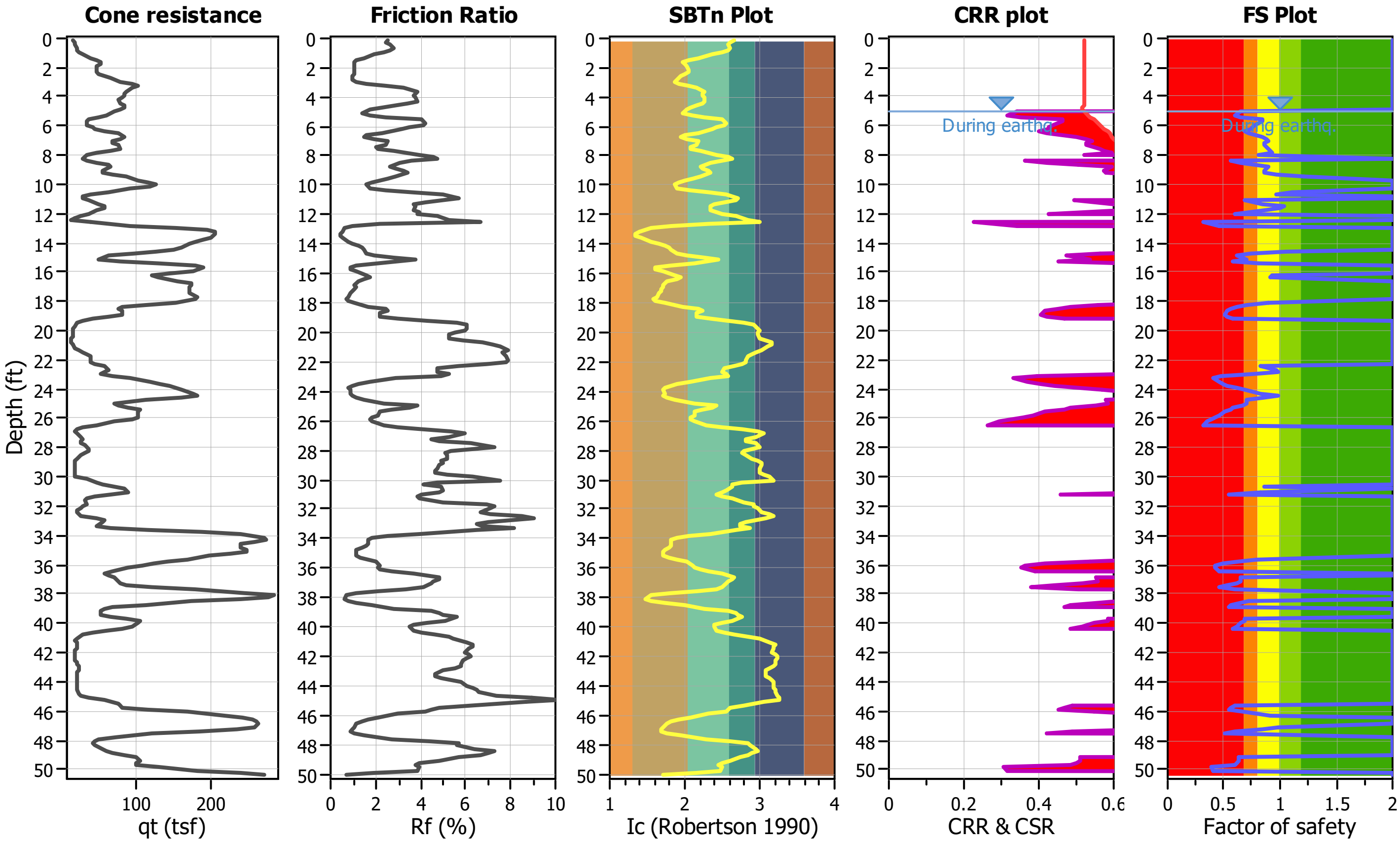
LIQUEFACTION ANALYSIS REPORT

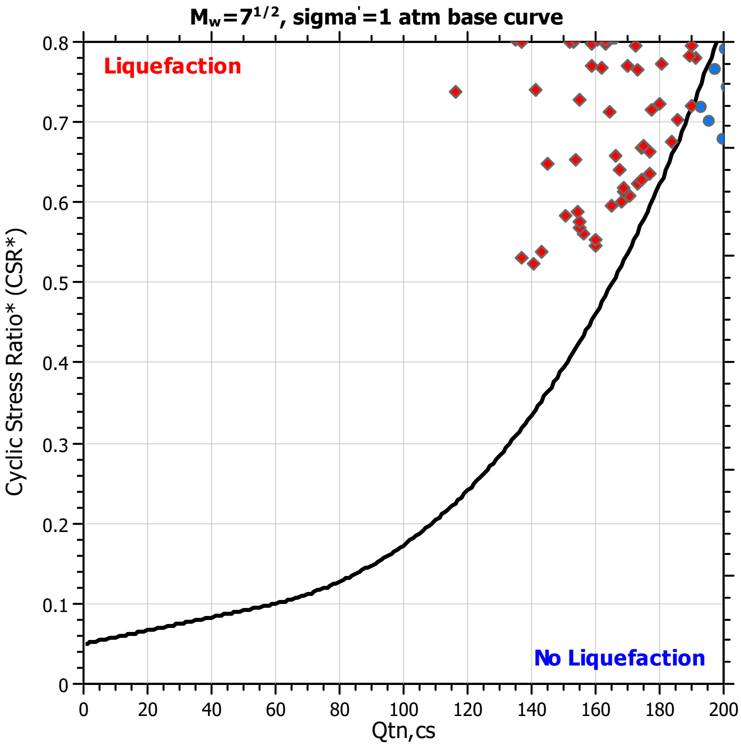
Project title : Lompa Ranch East **Location : Carson City, NV**

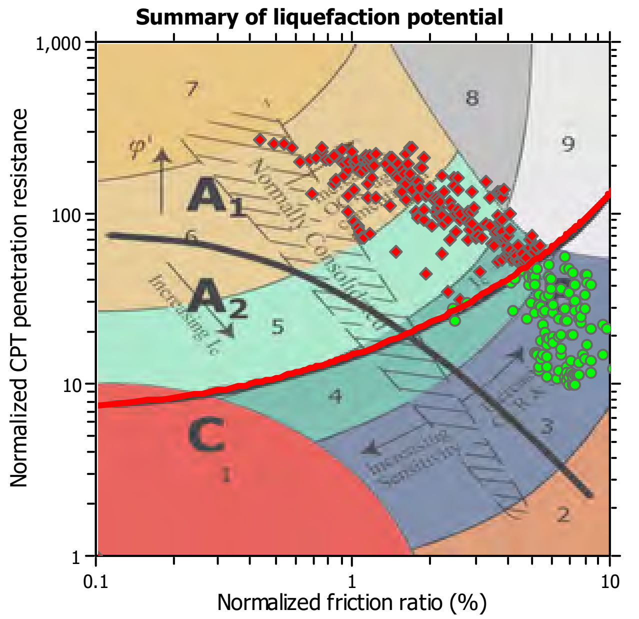
CPT file : CPT 1

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	5.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A		
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.96	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:	Method based

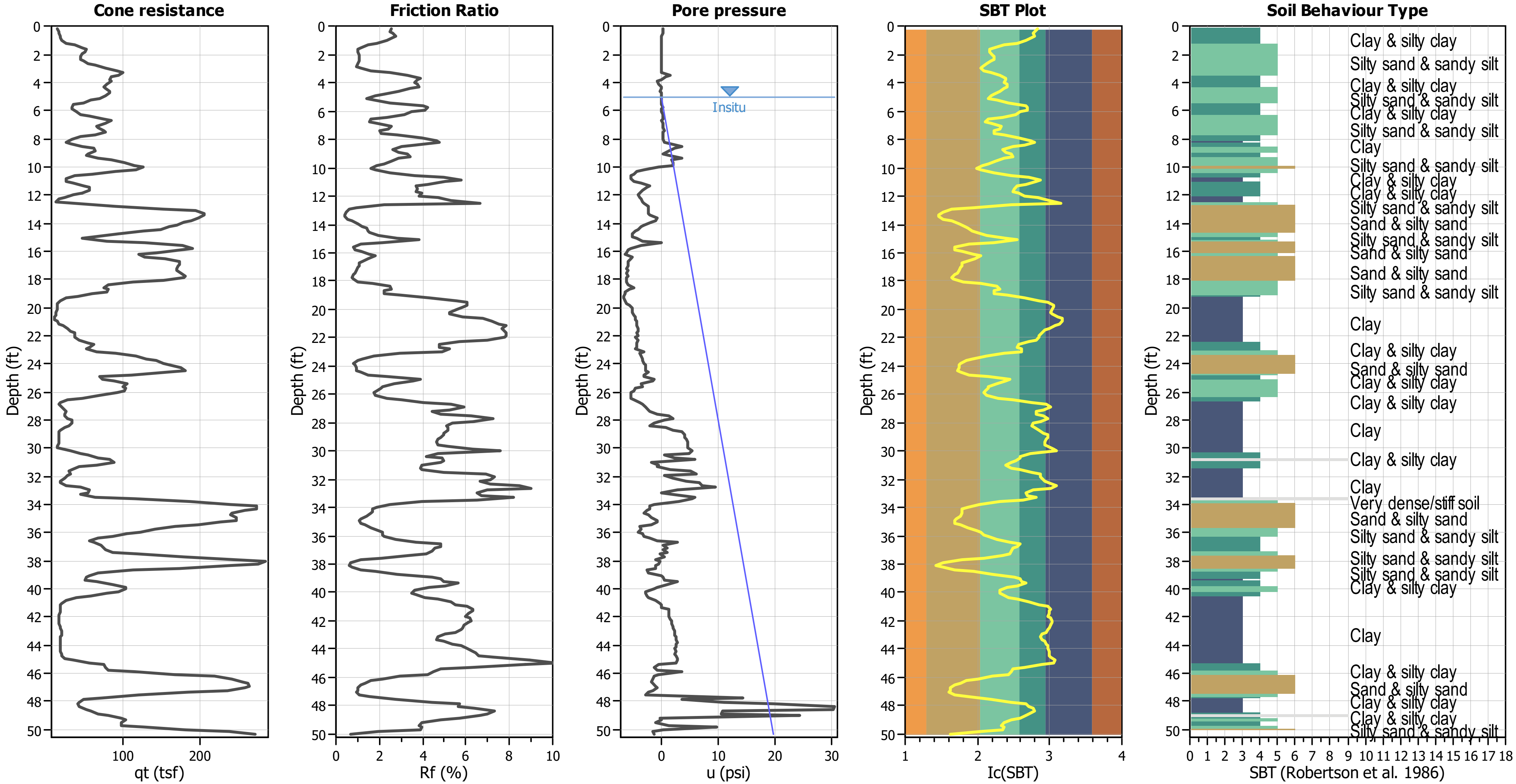






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



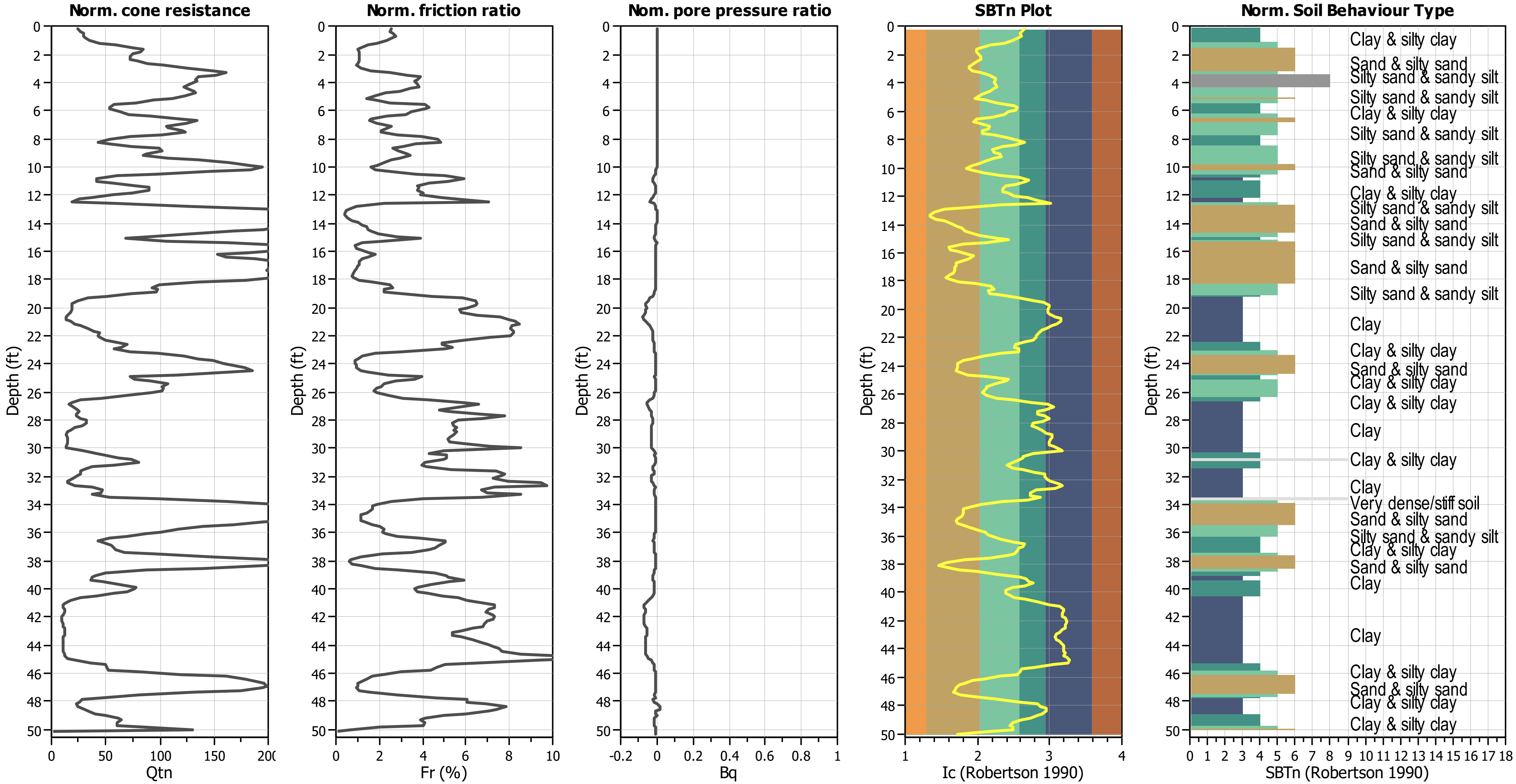
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



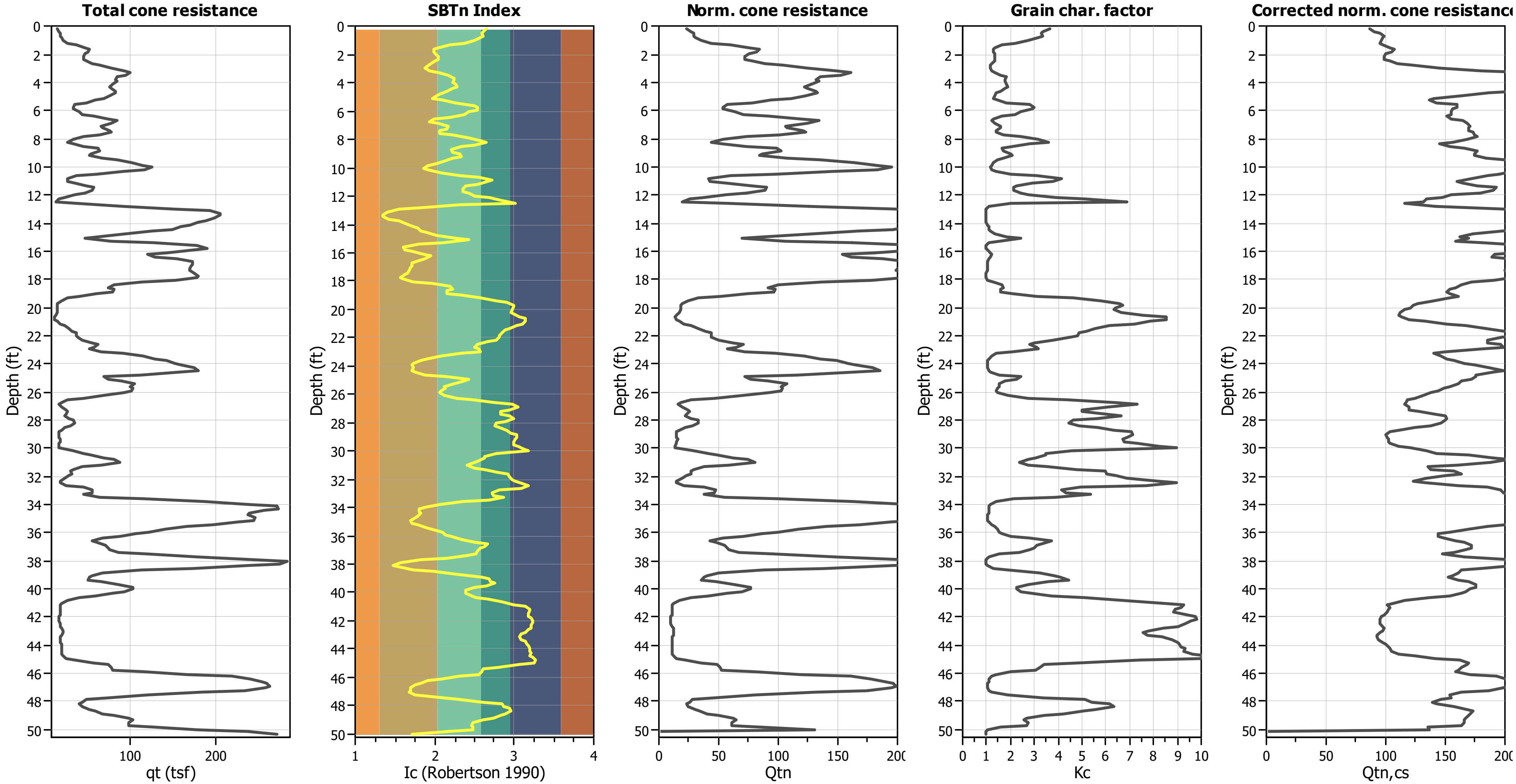
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

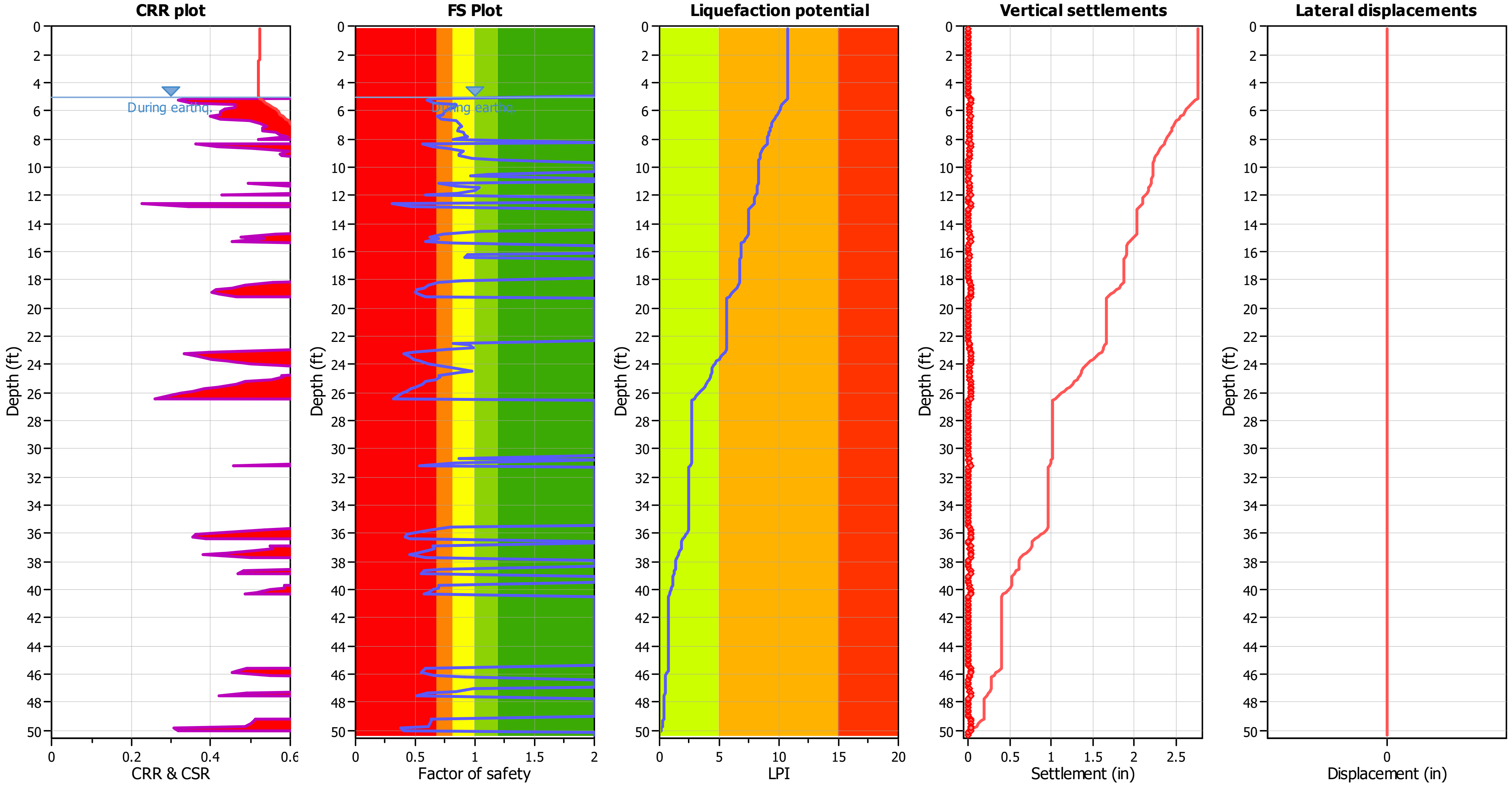
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



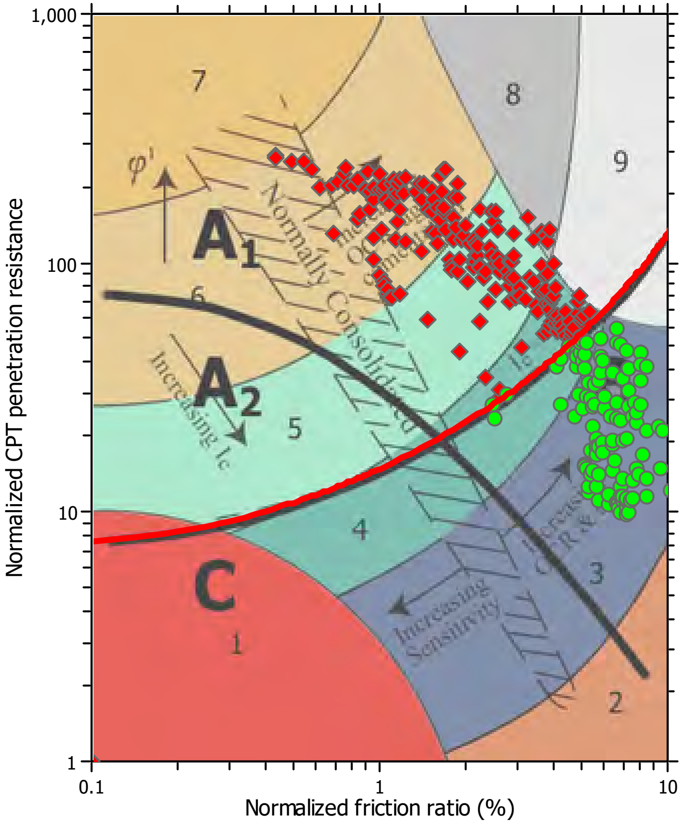
Input parameters and analysis data

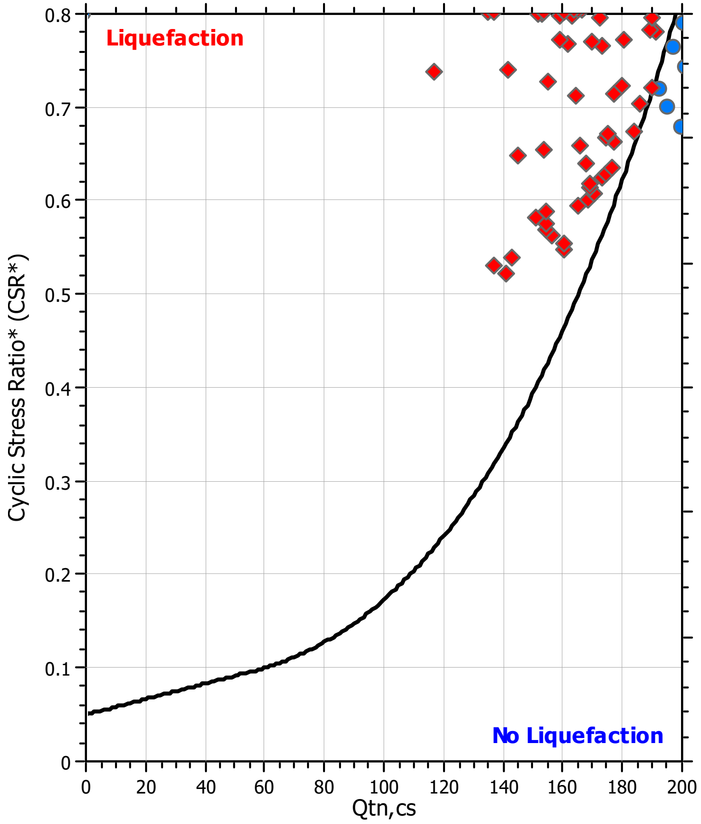
Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

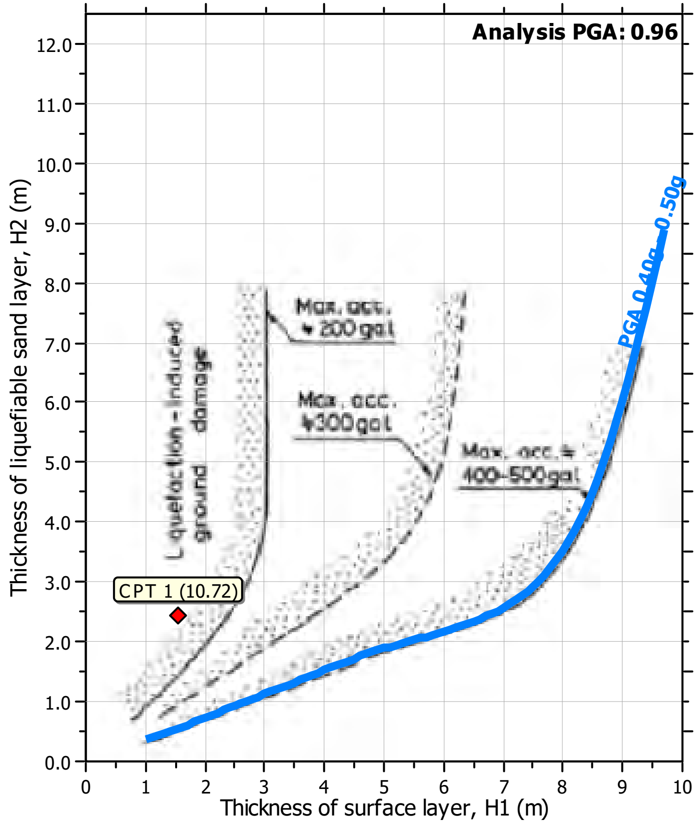
F.S. color scheme
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme
- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



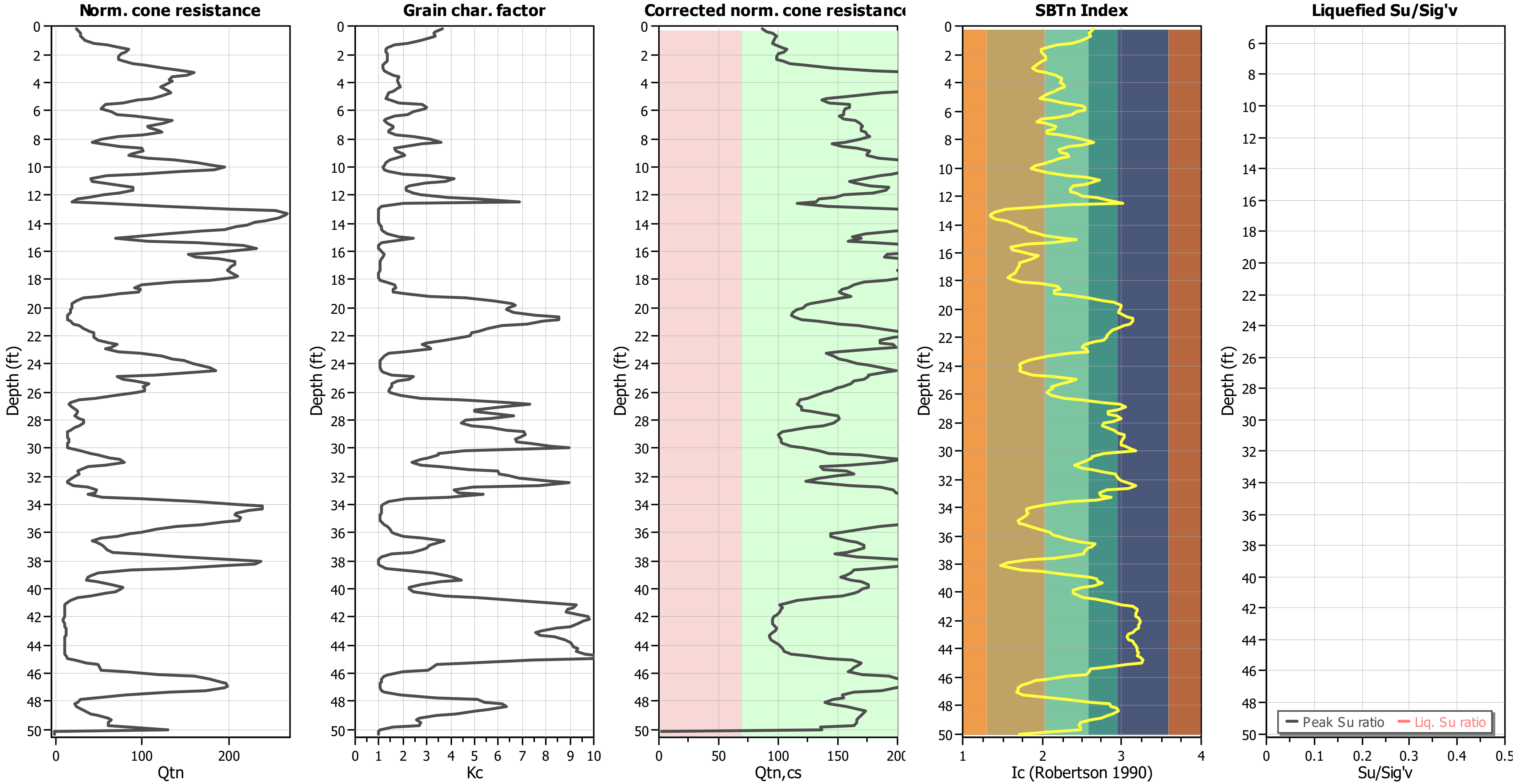




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

:: Field input data ::

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
1	0.16	13.09	0.35	0.33	38.04	109.56
2	0.33	17.72	0.41	0.36	35.47	110.74
3	0.49	19.49	0.49	0.43	34.85	111.82
4	0.66	17.05	0.51	0.16	35.53	112.40
5	0.82	18.36	0.52	0.15	33.86	112.51
6	0.98	22.63	0.49	0.08	30.61	112.89
7	1.15	24.49	0.53	0.10	24.96	113.60
8	1.31	35.22	0.55	0.20	18.75	114.65
9	1.48	51.38	0.56	0.09	14.26	115.34
10	1.64	55.13	0.55	0.07	12.41	115.46
11	1.80	50.50	0.52	0.05	12.71	115.15
12	1.97	46.45	0.51	0.07	13.51	114.60
13	2.13	44.74	0.47	0.06	14.12	114.38
14	2.30	44.62	0.49	0.07	14.19	114.42
15	2.46	46.26	0.52	0.09	13.23	115.02
16	2.63	56.16	0.56	0.17	11.65	115.74
17	2.79	63.89	0.59	0.15	10.12	116.89
18	2.95	73.06	0.71	0.17	9.86	120.00
19	3.12	95.88	1.37	0.17	11.06	124.22
20	3.28	109.53	2.39	0.20	14.31	128.12
21	3.44	95.06	3.65	1.70	17.76	129.67
22	3.61	79.74	3.29	0.91	20.75	129.79
23	3.77	78.87	2.91	0.12	20.53	129.29
24	3.94	89.03	3.07	-0.63	20.06	129.27
25	4.10	84.08	3.21	-0.41	20.92	129.03
26	4.26	66.73	2.76	0.21	21.56	128.63
27	4.43	77.10	2.73	0.06	19.98	128.02
28	4.59	89.30	2.46	-0.15	17.69	127.42
29	4.76	80.29	2.00	0.06	14.90	125.61
30	4.92	79.82	1.12	-0.01	13.49	123.21
31	5.08	70.61	1.01	0.12	12.19	120.37
32	5.25	58.46	0.77	0.09	15.78	120.54
33	5.41	47.56	1.36	0.14	21.09	121.24
34	5.58	41.00	1.54	0.18	30.91	121.74
35	5.74	19.53	1.45	0.47	32.58	121.47
36	5.91	40.60	1.30	0.18	32.07	121.16
37	6.07	40.71	1.37	0.19	27.55	121.70
38	6.23	38.73	1.51	0.24	25.03	122.08
39	6.40	54.31	1.37	0.33	18.62	122.27
40	6.56	79.76	1.12	0.32	12.67	122.10
41	6.73	91.39	1.09	0.21	11.39	122.81
42	6.89	80.65	1.59	0.25	13.92	123.80
43	7.05	62.26	1.78	0.26	18.23	124.32
44	7.22	56.06	1.69	0.44	17.56	124.17
45	7.38	84.47	1.45	0.67	14.89	124.00
46	7.55	85.95	1.49	0.26	14.91	124.41
47	7.71	61.54	1.92	0.23	19.64	124.64
48	7.87	44.02	1.94	0.27	27.58	123.89

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
49	8.04	31.65	1.54	0.23	33.97	122.03
50	8.20	25.07	1.16	0.47	37.58	120.34
51	8.37	25.70	1.24	1.70	30.81	120.08
52	8.53	47.88	1.18	3.65	24.06	122.13
53	8.69	65.57	1.80	2.35	19.10	123.85
54	8.86	73.17	1.86	1.31	19.92	124.84
55	9.02	53.09	1.83	0.47	23.16	124.32
56	9.19	37.97	1.69	1.34	23.98	124.24
57	9.35	67.66	1.87	3.69	19.62	125.45
58	9.51	95.99	2.31	1.97	16.08	126.80
59	9.68	91.49	2.35	2.18	13.17	127.54
60	9.84	119.76	2.13	2.21	10.79	127.44
61	10.01	136.15	1.95	-0.35	9.35	127.32
62	10.17	122.87	2.06	-2.93	10.57	127.38
63	10.34	93.96	2.33	-4.22	15.18	127.20
64	10.50	56.39	2.35	-4.75	23.28	126.11
65	10.66	32.84	1.95	-5.18	33.54	123.75
66	10.83	24.65	1.33	-5.24	41.38	121.36
67	10.99	22.43	1.29	-4.64	38.94	120.52
68	11.15	33.94	1.44	-3.40	31.94	122.02
69	11.32	51.20	1.81	-1.87	26.07	124.17
70	11.48	62.29	2.23	-2.54	24.59	125.73
71	11.65	57.35	2.42	-3.12	24.49	125.51
72	11.81	49.52	1.64	-3.69	27.66	124.15
73	11.97	32.96	1.51	-3.98	30.69	121.27
74	12.14	24.54	0.96	-3.82	39.70	118.99
75	12.30	15.37	0.95	-3.50	48.40	116.39
76	12.47	11.19	0.79	-3.27	59.29	115.19
77	12.63	11.54	0.78	-3.09	23.23	117.55
78	12.79	88.52	0.86	-2.24	8.56	120.19
79	12.96	173.86	0.94	-2.32	3.46	122.09
80	13.12	196.76	1.02	-2.21	1.57	122.72
81	13.29	208.77	0.89	-2.09	0.93	122.34
82	13.45	208.87	0.75	-1.95	0.96	122.37
83	13.62	197.09	1.03	-0.72	1.87	123.69
84	13.78	188.94	1.45	-0.84	3.52	125.69
85	13.94	180.10	1.83	-1.72	5.15	127.14
86	14.11	169.11	2.06	-3.06	6.61	128.07
87	14.27	158.84	2.29	-3.42	7.73	128.43
88	14.44	151.97	2.26	-3.88	8.73	128.35
89	14.60	136.23	2.14	-4.61	10.13	127.11
90	14.76	91.32	1.56	-5.04	13.82	125.82
91	14.93	57.76	1.80	-5.06	21.26	124.44
92	15.09	38.05	1.88	-4.37	27.84	124.04
93	15.26	47.52	1.75	-3.21	16.46	124.67
94	15.42	149.53	1.38	0.15	8.19	125.06
95	15.58	187.25	1.36	-3.47	4.53	125.82
96	15.75	196.46	1.72	-5.24	4.63	127.02

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
97	15.91	185.72	2.07	-5.67	6.45	128.11
98	16.08	144.44	2.35	-5.98	9.48	128.13
99	16.24	98.24	2.17	-6.19	11.78	127.54
100	16.40	118.30	1.91	-5.06	10.01	126.92
101	16.57	170.05	1.69	-5.37	7.48	127.08
102	16.73	173.26	1.96	-5.75	6.25	127.44
103	16.90	174.35	1.98	-5.87	6.32	127.52
104	17.06	170.53	1.75	-5.89	6.00	126.97
105	17.22	169.86	1.56	-5.94	5.67	126.27
106	17.39	167.65	1.52	-5.88	5.36	125.80
107	17.55	170.12	1.45	-5.94	4.69	125.42
108	17.72	188.03	1.28	-5.88	3.89	124.76
109	17.88	184.87	1.11	-5.93	4.43	125.26
110	18.05	161.01	1.75	-5.98	6.84	125.89
111	18.21	112.34	1.89	-5.98	12.24	126.55
112	18.37	66.05	2.10	-5.88	18.61	126.06
113	18.54	64.17	2.01	-4.81	19.83	125.56
114	18.70	93.85	1.64	-5.44	17.49	125.15
115	18.86	84.52	1.65	-6.20	17.66	125.02
116	19.03	60.99	1.94	-6.34	23.87	124.62
117	19.19	36.66	1.83	-6.49	33.72	123.56
118	19.36	26.19	1.56	-6.55	45.00	121.08
119	19.52	16.64	1.02	-6.37	52.65	118.58
120	19.68	15.33	0.90	-6.05	57.55	116.61
121	19.85	15.43	0.93	-5.49	58.17	116.14
122	20.01	15.05	0.87	-5.09	56.55	115.88
123	20.18	16.29	0.79	-5.00	56.05	115.24
124	20.34	14.49	0.73	-4.93	57.82	114.63
125	20.50	12.24	0.73	-4.74	63.41	114.21
126	20.67	11.30	0.75	-4.58	69.08	114.48
127	20.83	11.49	0.88	-4.43	68.93	115.42
128	21.00	14.14	1.00	-4.32	65.18	117.48
129	21.16	18.34	1.41	-4.28	61.04	119.83
130	21.32	21.50	1.82	-4.20	55.01	121.93
131	21.49	28.64	1.98	-4.06	51.06	124.08
132	21.65	34.46	2.71	-4.03	48.61	125.70
133	21.82	35.57	3.03	-4.15	46.56	126.97
134	21.98	41.95	3.06	-3.95	46.36	126.95
135	22.15	35.12	2.66	-4.61	44.13	126.28
136	22.31	37.40	2.22	-4.01	38.74	126.08
137	22.47	57.70	2.53	-4.17	32.37	127.16
138	22.64	71.72	3.16	-4.15	30.94	128.39
139	22.80	58.85	3.30	-4.31	33.56	128.18
140	22.97	41.50	2.53	-4.39	33.94	126.72
141	23.13	55.77	1.78	-3.06	23.96	125.37
142	23.29	102.24	1.52	-3.65	15.40	124.71
143	23.46	115.83	1.50	-3.55	10.50	124.39
144	23.62	130.49	1.22	-3.27	8.43	124.06

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
145	23.79	143.09	1.18	-3.36	6.71	123.67
146	23.95	156.24	1.17	-2.90	6.43	124.45
147	24.11	159.79	1.54	-2.85	6.62	125.46
148	24.28	163.98	1.69	-2.83	6.30	126.52
149	24.44	199.05	1.72	-2.61	7.10	128.08
150	24.61	178.26	2.65	-2.19	9.76	128.77
151	24.77	98.40	2.58	-3.10	16.78	128.88
152	24.93	57.79	2.70	-3.07	27.68	127.79
153	25.10	50.79	2.73	-1.24	25.58	127.85
154	25.26	114.92	2.45	-1.56	20.50	127.71
155	25.43	102.22	2.10	-3.38	16.53	127.64
156	25.59	98.62	2.27	-3.30	16.61	126.92
157	25.75	101.38	1.91	-4.41	15.45	126.33
158	25.92	108.29	1.57	-4.68	14.87	125.74
159	26.08	96.92	1.83	-5.17	16.39	125.23
160	26.25	72.67	1.72	-5.18	21.72	124.26
161	26.41	41.58	1.37	-5.36	30.25	122.03
162	26.57	25.04	1.08	-4.79	43.45	119.11
163	26.74	16.42	0.88	-3.70	56.44	117.66
164	26.90	16.55	1.12	-3.17	61.79	117.32
165	27.07	18.59	1.06	-2.74	54.45	118.29
166	27.23	27.49	1.09	-2.11	47.32	119.06
167	27.39	30.13	1.25	-1.96	47.40	120.29
168	27.56	23.77	1.59	-0.63	54.17	121.34
169	27.72	20.60	1.83	1.43	57.91	122.12
170	27.89	27.87	1.82	2.20	51.29	122.89
171	28.05	38.08	1.83	0.54	44.84	123.41
172	28.21	37.39	1.89	-1.25	43.77	123.16
173	28.38	29.37	1.62	-2.05	46.78	121.87
174	28.54	24.40	1.18	0.84	51.72	119.64
175	28.71	18.80	0.93	2.02	55.98	117.35
176	28.87	15.88	0.81	3.57	60.40	115.84
177	29.04	15.67	0.77	4.16	60.94	115.36
178	29.20	17.20	0.79	4.24	59.21	115.56
179	29.36	18.11	0.84	4.36	58.18	115.87
180	29.53	17.59	0.84	4.72	58.47	115.87
181	29.69	17.03	0.80	4.67	61.92	116.01
182	29.86	15.24	0.93	4.61	67.39	117.07
183	30.02	15.53	1.28	4.73	71.33	118.51
184	30.18	17.44	1.45	5.50	44.41	122.05
185	30.35	66.11	1.94	5.01	36.47	124.32
186	30.51	54.27	2.32	0.71	36.63	127.18
187	30.68	41.77	3.73	2.49	33.28	129.58
188	30.84	109.77	4.20	6.01	30.50	131.12
189	31.00	94.46	4.00	-1.61	26.82	130.45
190	31.17	61.47	2.41	-0.40	30.37	127.26
191	31.33	40.59	1.18	-0.69	37.08	123.54
192	31.50	29.48	1.63	1.70	45.65	122.75

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
193	31.66	31.86	2.29	5.20	53.66	124.29
194	31.82	32.01	2.56	6.11	54.04	125.00
195	31.99	32.74	2.21	0.49	56.30	123.64
196	32.15	21.02	1.33	2.17	59.38	121.41
197	32.32	17.94	1.23	4.48	67.33	119.56
198	32.48	17.39	1.45	6.66	71.54	120.84
199	32.64	20.80	2.10	7.12	64.21	124.39
200	32.81	39.12	3.43	9.60	47.05	127.94
201	32.97	74.49	3.90	2.99	41.74	129.50
202	33.14	54.00	3.53	0.16	42.69	129.64
203	33.30	37.06	3.68	1.75	49.73	129.37
204	33.47	47.76	4.14	6.08	39.59	131.00
205	33.63	109.81	4.85	5.42	24.39	132.99
206	33.79	187.81	4.75	3.04	14.54	134.31
207	33.96	260.81	4.43	-1.22	10.02	134.59
208	34.12	270.36	4.22	-1.89	8.35	134.97
209	34.28	284.63	4.90	-1.92	8.41	135.10
210	34.45	265.54	4.64	-2.38	8.44	134.16
211	34.61	221.09	2.81	-2.86	7.96	132.59
212	34.78	234.19	2.73	-2.31	6.64	131.01
213	34.94	259.63	2.69	-1.80	6.19	131.05
214	35.10	246.91	2.77	-0.73	6.41	131.21
215	35.27	230.27	2.93	-0.65	7.93	131.49
216	35.43	200.05	3.26	-1.64	10.49	131.78
217	35.60	162.39	3.56	-3.78	13.41	131.47
218	35.76	137.53	3.07	-3.54	15.78	130.46
219	35.92	121.80	2.48	-3.87	17.04	128.95
220	36.09	106.00	2.23	-3.16	18.94	127.98
221	36.25	91.58	2.41	-3.01	23.55	127.58
222	36.42	65.37	2.56	-1.96	30.97	127.23
223	36.58	46.49	2.51	-0.58	38.29	127.36
224	36.74	55.99	3.04	2.94	36.88	128.30
225	36.91	81.66	3.39	0.34	33.79	129.28
226	37.07	74.77	3.32	1.05	32.54	129.58
227	37.24	67.92	3.26	0.22	31.25	129.30
228	37.40	86.71	2.94	1.12	26.77	128.91
229	37.57	102.86	2.48	-0.06	17.32	128.61
230	37.73	168.61	2.05	0.71	8.70	128.08
231	37.89	263.92	1.55	-1.01	3.79	127.33
232	38.06	301.93	1.34	-0.21	2.41	127.59
233	38.22	285.80	1.98	-0.41	3.73	129.25
234	38.39	237.55	2.85	-0.81	6.83	130.88
235	38.55	191.76	3.26	-0.85	12.67	131.21
236	38.71	91.49	3.30	-2.45	21.57	130.33
237	38.88	55.54	3.07	-2.09	34.77	128.51
238	39.04	54.36	2.55	0.01	39.37	127.41
239	39.21	58.10	2.54	0.29	40.92	126.94
240	39.37	45.13	2.72	0.57	43.90	127.53

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
241	39.53	48.83	3.31	2.85	37.54	129.19
242	39.70	101.87	3.86	1.19	30.64	130.69
243	39.86	108.47	3.89	-0.79	26.04	131.32
244	40.03	100.47	3.59	-1.13	25.67	130.97
245	40.19	99.46	3.36	-2.64	27.48	130.40
246	40.35	81.78	3.39	-2.64	31.33	129.52
247	40.52	57.26	2.94	-2.49	38.40	127.64
248	40.68	37.98	1.95	-2.15	48.41	124.69
249	40.85	23.95	1.42	-1.06	58.35	121.18
250	41.01	19.24	1.07	-0.27	68.55	119.07
251	41.17	17.68	1.17	-0.01	73.07	118.34
252	41.34	17.73	1.19	0.20	72.29	118.65
253	41.50	20.84	1.19	1.35	71.13	118.62
254	41.67	18.74	1.13	1.39	70.71	118.40
255	41.83	17.59	1.09	1.33	74.12	117.92
256	41.99	16.68	1.05	1.45	75.81	117.56
257	42.16	16.59	1.02	1.63	76.04	117.28
258	42.32	16.82	0.98	1.83	74.75	117.23
259	42.49	17.67	1.02	1.88	73.39	117.45
260	42.65	18.31	1.08	2.08	71.75	117.91
261	42.81	19.49	1.13	2.25	68.37	118.22
262	42.98	21.80	1.08	2.40	64.85	118.14
263	43.14	21.90	0.98	2.50	63.19	117.71
264	43.31	20.14	0.93	2.38	64.42	117.25
265	43.47	19.19	0.93	2.61	67.85	117.10
266	43.63	18.07	0.98	2.74	70.50	117.43
267	43.80	18.62	1.09	2.93	71.83	118.02
268	43.96	19.65	1.18	2.61	71.98	118.62
269	44.13	19.65	1.22	2.54	72.57	119.07
270	44.29	19.44	1.30	2.50	73.46	119.23
271	44.45	19.37	1.27	2.65	73.27	119.54
272	44.62	20.80	1.36	2.45	75.21	120.54
273	44.78	20.64	1.85	2.54	78.37	122.45
274	44.95	22.38	2.52	2.90	76.98	124.78
275	45.11	30.59	3.13	2.85	62.67	127.45
276	45.28	55.65	3.84	2.60	45.73	129.38
277	45.44	84.41	3.65	-0.48	36.25	130.26
278	45.60	85.72	3.42	-1.13	34.54	130.00
279	45.77	62.85	3.35	-0.58	33.17	129.89
280	45.93	91.97	3.39	3.58	23.19	130.88
281	46.10	191.85	3.56	-0.50	15.39	132.07
282	46.26	220.42	3.74	-1.30	10.79	132.76
283	46.42	244.94	3.45	-1.49	8.72	132.39
284	46.59	257.26	2.72	-1.83	7.09	131.59
285	46.75	260.51	2.55	-1.49	6.19	130.97
286	46.92	264.39	2.68	-1.03	5.98	130.90
287	47.08	265.97	2.61	-0.79	5.63	130.08
288	47.24	243.41	1.77	-1.56	7.20	130.28

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
289	47.41	193.85	3.12	-2.12	11.71	130.57
290	47.57	115.60	3.56	-2.84	22.14	130.73
291	47.74	50.90	3.28	14.40	36.02	129.31
292	47.90	52.38	2.84	3.57	48.30	127.26
293	48.06	43.08	2.23	11.01	50.35	126.25
294	48.23	37.35	2.45	19.73	54.88	126.39
295	48.39	41.63	3.19	30.47	56.00	128.01
296	48.56	51.54	3.97	30.23	51.01	129.45
297	48.72	63.65	3.85	10.82	47.84	130.18
298	48.88	60.17	3.91	10.68	42.13	130.45
299	49.05	78.83	3.83	24.22	35.93	131.02
300	49.21	105.51	4.04	-0.08	30.15	131.46
301	49.38	110.26	3.90	0.07	28.75	131.61
302	49.54	94.63	3.87	-1.00	30.27	131.36
303	49.70	87.95	3.86	1.31	29.88	131.24
304	49.87	111.66	3.69	9.68	18.00	128.85
305	50.03	183.38	0.00	0.31	6.53	124.45
306	50.20	246.07	0.00	-1.54	N/A	87.36
307	50.36	283.79	0.00	-1.16	N/A	87.36

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	0.16	0.01	0.00	0.01	1.00	0.624	1.19	0.524	1.00	1.00	2.000	No
2	0.33	0.02	0.00	0.02	1.00	0.624	1.19	0.524	1.00	1.00	2.000	No
3	0.49	0.03	0.00	0.03	1.00	0.624	1.19	0.523	1.00	1.00	2.000	No
4	0.66	0.04	0.00	0.04	1.00	0.624	1.19	0.523	1.00	1.00	2.000	No
5	0.82	0.05	0.00	0.05	1.00	0.624	1.19	0.523	1.00	1.00	2.000	No
6	0.98	0.05	0.00	0.05	1.00	0.624	1.19	0.523	1.00	1.00	2.000	No
7	1.15	0.06	0.00	0.06	1.00	0.624	1.19	0.523	1.00	1.00	2.000	No
8	1.31	0.07	0.00	0.07	1.00	0.623	1.19	0.523	1.00	1.00	2.000	No
9	1.48	0.08	0.00	0.08	1.00	0.623	1.19	0.522	1.00	1.00	2.000	No
10	1.64	0.09	0.00	0.09	1.00	0.623	1.19	0.522	1.00	1.00	2.000	No
11	1.80	0.10	0.00	0.10	1.00	0.623	1.19	0.522	1.00	1.00	2.000	No
12	1.97	0.11	0.00	0.11	1.00	0.622	1.19	0.522	1.00	1.00	2.000	No
13	2.13	0.12	0.00	0.12	1.00	0.622	1.19	0.522	1.00	1.00	2.000	No
14	2.30	0.13	0.00	0.13	1.00	0.622	1.19	0.521	1.00	1.00	2.000	No
15	2.46	0.14	0.00	0.14	1.00	0.622	1.19	0.521	1.00	1.00	2.000	No
16	2.63	0.15	0.00	0.15	1.00	0.621	1.19	0.521	1.00	1.00	2.000	No
17	2.79	0.16	0.00	0.16	1.00	0.621	1.19	0.521	1.00	1.00	2.000	No
18	2.95	0.17	0.00	0.17	1.00	0.621	1.19	0.521	1.00	1.00	2.000	No
19	3.12	0.18	0.00	0.18	0.99	0.621	1.19	0.520	1.00	1.00	2.000	No
20	3.28	0.19	0.00	0.19	0.99	0.620	1.19	0.520	1.00	1.00	2.000	No
21	3.44	0.20	0.00	0.20	0.99	0.620	1.19	0.520	1.00	1.00	2.000	No
22	3.61	0.21	0.00	0.21	0.99	0.620	1.19	0.520	1.00	1.00	2.000	No
23	3.77	0.22	0.00	0.22	0.99	0.620	1.19	0.520	1.00	1.00	2.000	No
24	3.94	0.23	0.00	0.23	0.99	0.619	1.19	0.519	1.00	1.00	2.000	No
25	4.10	0.24	0.00	0.24	0.99	0.619	1.19	0.519	1.00	1.00	2.000	No
26	4.26	0.25	0.00	0.25	0.99	0.619	1.19	0.519	1.00	1.00	2.000	No
27	4.43	0.26	0.00	0.26	0.99	0.619	1.19	0.519	1.00	1.00	2.000	No
28	4.59	0.27	0.00	0.27	0.99	0.619	1.19	0.519	1.00	1.00	2.000	No
29	4.76	0.28	0.00	0.28	0.99	0.618	1.19	0.518	1.00	1.00	2.000	No
30	4.92	0.29	0.00	0.29	0.99	0.618	1.19	0.518	1.00	1.00	2.000	No
31	5.08	0.30	0.00	0.30	0.99	0.623	1.19	0.523	1.00	1.00	0.523	No
32	5.25	0.31	0.01	0.31	0.99	0.633	1.19	0.531	1.00	1.00	0.531	No
33	5.41	0.32	0.01	0.31	0.99	0.643	1.19	0.539	1.00	1.00	0.539	No
34	5.58	0.33	0.02	0.32	0.99	0.652	1.19	0.547	1.00	1.00	0.547	No
35	5.74	0.34	0.02	0.32	0.99	0.661	1.19	0.554	1.00	1.00	0.554	No
36	5.91	0.35	0.03	0.33	0.99	0.670	1.19	0.562	1.00	1.00	0.562	No
37	6.07	0.36	0.03	0.33	0.99	0.679	1.19	0.569	1.00	1.00	0.569	No
38	6.23	0.37	0.04	0.34	0.99	0.687	1.19	0.576	1.00	1.00	0.576	No
39	6.40	0.38	0.04	0.34	0.99	0.695	1.19	0.583	1.00	1.00	0.583	No
40	6.56	0.39	0.05	0.35	0.99	0.703	1.19	0.589	1.00	1.00	0.589	No
41	6.73	0.40	0.05	0.35	0.99	0.710	1.19	0.595	1.00	1.00	0.595	No
42	6.89	0.41	0.06	0.36	0.99	0.717	1.19	0.601	1.00	1.00	0.601	No
43	7.05	0.42	0.06	0.36	0.99	0.724	1.19	0.607	1.00	1.00	0.607	No
44	7.22	0.43	0.07	0.37	0.99	0.731	1.19	0.613	1.00	1.00	0.613	No
45	7.38	0.44	0.07	0.37	0.98	0.738	1.19	0.619	1.00	1.00	0.619	No
46	7.55	0.45	0.08	0.38	0.98	0.744	1.19	0.624	1.00	1.00	0.624	No
47	7.71	0.47	0.08	0.38	0.98	0.751	1.19	0.629	1.00	1.00	0.629	No
48	7.87	0.48	0.09	0.39	0.98	0.757	1.19	0.634	1.00	1.00	0.634	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	8.04	0.49	0.09	0.39	0.98	0.763	1.19	0.639	1.00	1.00	0.639	No
50	8.20	0.50	0.10	0.40	0.98	0.768	1.19	0.644	1.00	1.00	0.644	No
51	8.37	0.50	0.11	0.40	0.98	0.774	1.19	0.649	1.00	1.00	0.649	No
52	8.53	0.51	0.11	0.40	0.98	0.780	1.19	0.654	1.00	1.00	0.654	No
53	8.69	0.53	0.12	0.41	0.98	0.785	1.19	0.658	1.00	1.00	0.658	No
54	8.86	0.54	0.12	0.41	0.98	0.790	1.19	0.662	1.00	1.00	0.662	No
55	9.02	0.55	0.13	0.42	0.98	0.795	1.19	0.667	1.00	1.00	0.667	No
56	9.19	0.56	0.13	0.43	0.98	0.800	1.19	0.671	1.00	1.00	0.671	No
57	9.35	0.57	0.14	0.43	0.98	0.805	1.19	0.675	1.00	1.00	0.675	No
58	9.51	0.58	0.14	0.44	0.98	0.809	1.19	0.679	1.00	1.00	0.679	No
59	9.68	0.59	0.15	0.44	0.98	0.814	1.19	0.682	1.00	1.00	0.682	No
60	9.84	0.60	0.15	0.45	0.98	0.818	1.19	0.686	1.00	1.00	0.686	No
61	10.01	0.61	0.16	0.45	0.98	0.822	1.19	0.689	1.00	1.00	0.689	No
62	10.17	0.62	0.16	0.46	0.98	0.826	1.19	0.693	1.00	1.00	0.693	No
63	10.34	0.63	0.17	0.46	0.98	0.830	1.19	0.696	1.00	1.00	0.696	No
64	10.50	0.64	0.17	0.47	0.98	0.834	1.19	0.699	1.00	1.00	0.699	No
65	10.66	0.65	0.18	0.47	0.98	0.838	1.19	0.703	1.00	1.00	0.703	No
66	10.83	0.66	0.18	0.48	0.98	0.842	1.19	0.706	1.00	1.00	0.706	No
67	10.99	0.67	0.19	0.48	0.98	0.846	1.19	0.709	1.00	1.00	0.709	No
68	11.15	0.68	0.19	0.49	0.98	0.850	1.19	0.712	1.00	1.00	0.712	No
69	11.32	0.69	0.20	0.49	0.98	0.853	1.19	0.715	1.00	1.00	0.715	No
70	11.48	0.70	0.20	0.50	0.98	0.857	1.19	0.718	1.00	1.00	0.718	No
71	11.65	0.71	0.21	0.50	0.98	0.860	1.19	0.721	1.00	1.00	0.721	No
72	11.81	0.72	0.21	0.51	0.98	0.863	1.19	0.724	1.00	1.00	0.724	No
73	11.97	0.73	0.22	0.51	0.97	0.867	1.19	0.727	1.00	1.00	0.727	No
74	12.14	0.74	0.22	0.52	0.97	0.870	1.19	0.730	1.00	1.00	0.730	No
75	12.30	0.75	0.23	0.52	0.97	0.874	1.19	0.732	1.00	1.00	0.732	No
76	12.47	0.76	0.23	0.53	0.97	0.877	1.19	0.735	1.00	1.00	0.735	No
77	12.63	0.77	0.24	0.53	0.97	0.880	1.19	0.738	1.00	1.00	0.738	No
78	12.79	0.78	0.24	0.53	0.97	0.883	1.19	0.741	1.00	1.00	0.741	No
79	12.96	0.79	0.25	0.54	0.97	0.886	1.19	0.743	1.00	1.00	0.743	No
80	13.12	0.80	0.25	0.54	0.97	0.889	1.19	0.745	1.00	1.00	0.745	No
81	13.29	0.81	0.26	0.55	0.97	0.892	1.19	0.748	1.00	1.00	0.748	No
82	13.45	0.82	0.26	0.55	0.97	0.895	1.19	0.750	1.00	1.00	0.750	No
83	13.62	0.83	0.27	0.56	0.97	0.897	1.19	0.752	1.00	1.00	0.752	No
84	13.78	0.84	0.27	0.56	0.97	0.900	1.19	0.754	1.00	1.00	0.754	No
85	13.94	0.85	0.28	0.57	0.97	0.902	1.19	0.756	1.00	1.00	0.756	No
86	14.11	0.86	0.28	0.58	0.97	0.905	1.19	0.758	1.00	1.00	0.758	No
87	14.27	0.87	0.29	0.58	0.97	0.907	1.19	0.760	1.00	1.00	0.760	No
88	14.44	0.88	0.29	0.59	0.97	0.909	1.19	0.762	1.00	1.00	0.762	No
89	14.60	0.89	0.30	0.59	0.97	0.911	1.19	0.764	1.00	1.00	0.764	No
90	14.76	0.90	0.30	0.60	0.97	0.913	1.19	0.766	1.00	1.00	0.766	No
91	14.93	0.91	0.31	0.60	0.97	0.915	1.19	0.768	1.00	1.00	0.768	No
92	15.09	0.92	0.31	0.61	0.97	0.918	1.19	0.769	1.00	1.00	0.769	No
93	15.26	0.93	0.32	0.61	0.97	0.920	1.19	0.771	1.00	1.00	0.771	No
94	15.42	0.94	0.33	0.62	0.97	0.922	1.19	0.773	1.00	1.00	0.773	No
95	15.58	0.95	0.33	0.62	0.97	0.924	1.19	0.774	1.00	1.00	0.774	No
96	15.75	0.96	0.34	0.63	0.97	0.926	1.19	0.776	1.00	1.00	0.776	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	15.91	0.97	0.34	0.63	0.97	0.927	1.19	0.778	1.00	1.00	0.778	No
98	16.08	0.98	0.35	0.64	0.97	0.929	1.19	0.779	1.00	1.00	0.779	No
99	16.24	0.99	0.35	0.64	0.97	0.931	1.19	0.780	1.00	1.00	0.780	No
100	16.40	1.01	0.36	0.65	0.97	0.933	1.19	0.782	1.00	1.00	0.782	No
101	16.57	1.02	0.36	0.65	0.97	0.934	1.19	0.783	1.00	1.00	0.783	No
102	16.73	1.03	0.37	0.66	0.96	0.936	1.19	0.785	1.00	1.00	0.785	No
103	16.90	1.04	0.37	0.67	0.96	0.938	1.19	0.786	1.00	1.00	0.786	No
104	17.06	1.05	0.38	0.67	0.96	0.939	1.19	0.787	1.00	1.00	0.787	No
105	17.22	1.06	0.38	0.68	0.96	0.941	1.19	0.789	1.00	1.00	0.789	No
106	17.39	1.07	0.39	0.68	0.96	0.942	1.19	0.790	1.00	1.00	0.790	No
107	17.55	1.08	0.39	0.69	0.96	0.944	1.19	0.791	1.00	1.00	0.791	No
108	17.72	1.09	0.40	0.69	0.96	0.945	1.19	0.793	1.00	1.00	0.793	No
109	17.88	1.10	0.40	0.70	0.96	0.947	1.19	0.794	1.00	1.00	0.794	No
110	18.05	1.11	0.41	0.70	0.96	0.948	1.19	0.795	1.00	1.00	0.795	No
111	18.21	1.12	0.41	0.71	0.96	0.950	1.19	0.796	1.00	1.00	0.796	No
112	18.37	1.13	0.42	0.71	0.96	0.951	1.19	0.797	1.00	1.00	0.797	No
113	18.54	1.14	0.42	0.72	0.96	0.952	1.19	0.798	1.00	1.00	0.798	No
114	18.70	1.15	0.43	0.72	0.96	0.954	1.19	0.800	1.00	1.00	0.800	No
115	18.86	1.16	0.43	0.73	0.96	0.955	1.19	0.801	1.00	1.00	0.801	No
116	19.03	1.17	0.44	0.73	0.96	0.956	1.19	0.802	1.00	1.00	0.802	No
117	19.19	1.18	0.44	0.74	0.96	0.958	1.19	0.803	1.00	1.00	0.803	No
118	19.36	1.19	0.45	0.74	0.96	0.959	1.19	0.804	1.00	1.00	0.804	No
119	19.52	1.20	0.45	0.75	0.96	0.960	1.19	0.805	1.00	1.00	0.805	No
120	19.68	1.21	0.46	0.75	0.96	0.962	1.19	0.806	1.00	1.00	0.806	No
121	19.85	1.22	0.46	0.76	0.96	0.963	1.19	0.808	1.00	1.00	0.808	No
122	20.01	1.23	0.47	0.76	0.96	0.965	1.19	0.809	1.00	1.00	0.809	No
123	20.18	1.24	0.47	0.76	0.96	0.966	1.19	0.810	1.00	1.00	0.810	No
124	20.34	1.25	0.48	0.77	0.96	0.968	1.19	0.811	1.00	1.00	0.811	No
125	20.50	1.26	0.48	0.77	0.96	0.969	1.19	0.813	1.00	1.00	0.813	No
126	20.67	1.27	0.49	0.78	0.96	0.971	1.19	0.814	1.00	1.00	0.814	No
127	20.83	1.28	0.49	0.78	0.95	0.972	1.19	0.815	1.00	1.00	0.815	No
128	21.00	1.29	0.50	0.79	0.95	0.973	1.19	0.816	1.00	1.00	0.816	No
129	21.16	1.30	0.50	0.79	0.95	0.975	1.19	0.817	1.00	1.00	0.817	No
130	21.32	1.31	0.51	0.80	0.95	0.976	1.19	0.818	1.00	1.00	0.818	No
131	21.49	1.32	0.51	0.80	0.95	0.977	1.19	0.819	1.00	1.00	0.819	No
132	21.65	1.33	0.52	0.81	0.95	0.977	1.19	0.819	1.00	1.00	0.819	No
133	21.82	1.34	0.52	0.81	0.95	0.978	1.19	0.820	1.00	1.00	0.820	No
134	21.98	1.35	0.53	0.82	0.95	0.979	1.19	0.821	1.00	1.00	0.821	No
135	22.15	1.36	0.53	0.82	0.95	0.980	1.19	0.821	1.00	1.00	0.821	No
136	22.31	1.37	0.54	0.83	0.95	0.980	1.19	0.822	1.00	1.00	0.822	No
137	22.47	1.38	0.55	0.83	0.95	0.981	1.19	0.822	1.00	1.00	0.822	No
138	22.64	1.39	0.55	0.84	0.95	0.982	1.19	0.823	1.00	1.00	0.823	No
139	22.80	1.40	0.56	0.84	0.95	0.982	1.19	0.823	1.00	1.00	0.823	No
140	22.97	1.41	0.56	0.85	0.95	0.983	1.19	0.824	1.00	1.00	0.824	No
141	23.13	1.42	0.57	0.85	0.95	0.984	1.19	0.825	1.00	1.00	0.825	No
142	23.29	1.43	0.57	0.86	0.95	0.984	1.19	0.825	1.00	1.00	0.825	No
143	23.46	1.44	0.58	0.86	0.95	0.985	1.19	0.826	1.00	1.00	0.826	No
144	23.62	1.45	0.58	0.87	0.95	0.985	1.19	0.826	1.00	1.00	0.826	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	23.79	1.46	0.59	0.87	0.95	0.986	1.19	0.827	1.00	1.00	0.827	No
146	23.95	1.47	0.59	0.88	0.95	0.987	1.19	0.827	1.00	1.00	0.827	No
147	24.11	1.48	0.60	0.88	0.94	0.987	1.19	0.828	1.00	1.00	0.828	No
148	24.28	1.49	0.60	0.89	0.94	0.988	1.19	0.828	1.00	1.00	0.828	No
149	24.44	1.50	0.61	0.89	0.94	0.988	1.19	0.828	1.00	1.00	0.828	No
150	24.61	1.51	0.61	0.90	0.94	0.988	1.19	0.829	1.00	1.00	0.829	No
151	24.77	1.52	0.62	0.91	0.94	0.989	1.19	0.829	1.00	1.00	0.829	No
152	24.93	1.53	0.62	0.91	0.94	0.989	1.19	0.829	1.00	1.00	0.829	No
153	25.10	1.54	0.63	0.92	0.94	0.989	1.19	0.830	1.00	1.00	0.830	No
154	25.26	1.55	0.63	0.92	0.94	0.990	1.19	0.830	1.00	1.00	0.830	No
155	25.43	1.56	0.64	0.93	0.94	0.990	1.19	0.830	1.00	1.00	0.830	No
156	25.59	1.58	0.64	0.93	0.94	0.990	1.19	0.830	1.00	1.00	0.830	No
157	25.75	1.59	0.65	0.94	0.94	0.991	1.19	0.831	1.00	1.00	0.831	No
158	25.92	1.60	0.65	0.94	0.94	0.991	1.19	0.831	1.00	1.00	0.831	No
159	26.08	1.61	0.66	0.95	0.94	0.991	1.19	0.831	1.00	1.00	0.831	No
160	26.25	1.62	0.66	0.95	0.94	0.992	1.19	0.831	1.00	1.00	0.831	No
161	26.41	1.63	0.67	0.96	0.94	0.992	1.19	0.832	1.00	1.00	0.832	No
162	26.57	1.64	0.67	0.96	0.94	0.992	1.19	0.832	1.00	1.00	0.832	No
163	26.74	1.65	0.68	0.97	0.94	0.993	1.19	0.832	1.00	1.00	0.832	No
164	26.90	1.66	0.68	0.97	0.93	0.993	1.19	0.833	1.00	1.00	0.833	No
165	27.07	1.66	0.69	0.98	0.93	0.994	1.19	0.833	1.00	1.00	0.833	No
166	27.23	1.67	0.69	0.98	0.93	0.994	1.19	0.833	1.00	1.00	0.833	No
167	27.39	1.68	0.70	0.99	0.93	0.994	1.19	0.834	1.00	1.00	0.834	No
168	27.56	1.69	0.70	0.99	0.93	0.995	1.19	0.834	1.00	1.00	0.834	No
169	27.72	1.70	0.71	1.00	0.93	0.995	1.19	0.834	1.00	1.00	0.834	No
170	27.89	1.71	0.71	1.00	0.93	0.995	1.19	0.834	1.00	1.00	0.834	No
171	28.05	1.72	0.72	1.01	0.93	0.995	1.19	0.834	1.00	1.00	0.834	No
172	28.21	1.73	0.72	1.01	0.93	0.995	1.19	0.834	1.00	1.00	0.834	No
173	28.38	1.74	0.73	1.02	0.93	0.995	1.19	0.835	1.00	1.00	0.835	No
174	28.54	1.75	0.73	1.02	0.93	0.996	1.19	0.835	1.00	1.00	0.835	No
175	28.71	1.76	0.74	1.02	0.93	0.996	1.19	0.835	1.00	1.00	0.835	No
176	28.87	1.77	0.74	1.03	0.93	0.996	1.19	0.835	1.00	1.00	0.835	No
177	29.04	1.78	0.75	1.03	0.93	0.996	1.19	0.835	1.00	1.00	0.835	No
178	29.20	1.79	0.76	1.04	0.92	0.997	1.19	0.836	1.00	1.00	0.836	No
179	29.36	1.80	0.76	1.04	0.92	0.997	1.19	0.836	1.00	1.00	0.836	No
180	29.53	1.81	0.77	1.05	0.92	0.997	1.19	0.836	1.00	1.00	0.836	No
181	29.69	1.82	0.77	1.05	0.92	0.997	1.19	0.836	1.00	1.00	0.836	No
182	29.86	1.83	0.78	1.06	0.92	0.997	1.19	0.836	1.00	1.00	0.836	No
183	30.02	1.84	0.78	1.06	0.92	0.997	1.19	0.836	1.00	1.00	0.837	No
184	30.18	1.85	0.79	1.06	0.92	0.997	1.19	0.836	1.00	1.00	0.837	No
185	30.35	1.86	0.79	1.07	0.92	0.997	1.19	0.836	1.00	1.00	0.838	No
186	30.51	1.87	0.80	1.08	0.92	0.997	1.19	0.836	1.00	1.00	0.839	No
187	30.68	1.88	0.80	1.08	0.92	0.996	1.19	0.835	1.00	1.00	0.839	No
188	30.84	1.89	0.81	1.09	0.92	0.996	1.19	0.835	0.99	1.00	0.840	No
189	31.00	1.90	0.81	1.09	0.92	0.996	1.19	0.835	0.99	1.00	0.841	No
190	31.17	1.91	0.82	1.10	0.91	0.995	1.19	0.834	0.99	1.00	0.841	No
191	31.33	1.92	0.82	1.10	0.91	0.995	1.19	0.834	0.99	1.00	0.842	No
192	31.50	1.93	0.83	1.11	0.91	0.995	1.19	0.834	0.99	1.00	0.843	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
193	31.66	1.94	0.83	1.11	0.91	0.994	1.19	0.834	0.99	1.00	0.843	No
194	31.82	1.95	0.84	1.12	0.91	0.994	1.19	0.833	0.99	1.00	0.844	No
195	31.99	1.96	0.84	1.12	0.91	0.994	1.19	0.833	0.99	1.00	0.844	No
196	32.15	1.97	0.85	1.13	0.91	0.993	1.19	0.833	0.99	1.00	0.845	No
197	32.32	1.98	0.85	1.13	0.91	0.993	1.19	0.833	0.98	1.00	0.846	No
198	32.48	1.99	0.86	1.14	0.91	0.993	1.19	0.832	0.98	1.00	0.846	No
199	32.64	2.00	0.86	1.14	0.91	0.992	1.19	0.832	0.98	1.00	0.847	No
200	32.81	2.01	0.87	1.15	0.90	0.992	1.19	0.831	0.98	1.00	0.847	No
201	32.97	2.03	0.87	1.15	0.90	0.991	1.19	0.831	0.98	1.00	0.847	No
202	33.14	2.04	0.88	1.16	0.90	0.990	1.19	0.830	0.98	1.00	0.848	No
203	33.30	2.05	0.88	1.16	0.90	0.990	1.19	0.830	0.98	1.00	0.848	No
204	33.47	2.06	0.89	1.17	0.90	0.989	1.19	0.829	0.98	1.00	0.849	No
205	33.63	2.07	0.89	1.18	0.90	0.988	1.19	0.829	0.98	1.00	0.849	No
206	33.79	2.08	0.90	1.18	0.90	0.987	1.19	0.828	0.98	1.00	0.849	No
207	33.96	2.09	0.90	1.19	0.90	0.986	1.19	0.827	0.97	1.00	0.849	No
208	34.12	2.10	0.91	1.19	0.90	0.986	1.19	0.826	0.97	1.00	0.849	No
209	34.28	2.11	0.91	1.20	0.90	0.985	1.19	0.826	0.97	1.00	0.850	No
210	34.45	2.12	0.92	1.20	0.89	0.984	1.19	0.825	0.97	1.00	0.850	No
211	34.61	2.13	0.92	1.21	0.89	0.983	1.19	0.824	0.97	1.00	0.850	No
212	34.78	2.15	0.93	1.22	0.89	0.982	1.19	0.823	0.97	1.00	0.850	No
213	34.94	2.16	0.93	1.22	0.89	0.981	1.19	0.823	0.97	1.00	0.850	No
214	35.10	2.17	0.94	1.23	0.89	0.980	1.19	0.822	0.97	1.00	0.850	No
215	35.27	2.18	0.94	1.23	0.89	0.979	1.19	0.821	0.97	1.00	0.850	No
216	35.43	2.19	0.95	1.24	0.89	0.978	1.19	0.820	0.96	1.00	0.851	No
217	35.60	2.20	0.95	1.24	0.89	0.977	1.19	0.819	0.96	1.00	0.851	No
218	35.76	2.21	0.96	1.25	0.89	0.976	1.19	0.819	0.96	1.00	0.851	No
219	35.92	2.22	0.96	1.26	0.88	0.976	1.19	0.818	0.96	1.00	0.851	No
220	36.09	2.23	0.97	1.26	0.88	0.975	1.19	0.817	0.96	1.00	0.851	No
221	36.25	2.24	0.98	1.27	0.88	0.974	1.19	0.816	0.96	1.00	0.851	No
222	36.42	2.25	0.98	1.27	0.88	0.973	1.19	0.816	0.96	1.00	0.851	No
223	36.58	2.26	0.99	1.28	0.88	0.972	1.19	0.815	0.96	1.00	0.851	No
224	36.74	2.27	0.99	1.28	0.88	0.971	1.19	0.814	0.96	1.00	0.851	No
225	36.91	2.28	1.00	1.29	0.88	0.970	1.19	0.813	0.96	1.00	0.851	No
226	37.07	2.29	1.00	1.29	0.88	0.969	1.19	0.812	0.95	1.00	0.851	No
227	37.24	2.30	1.01	1.30	0.87	0.968	1.19	0.811	0.95	1.00	0.851	No
228	37.40	2.32	1.01	1.30	0.87	0.967	1.19	0.811	0.95	1.00	0.850	No
229	37.57	2.33	1.02	1.31	0.87	0.966	1.19	0.810	0.95	1.00	0.850	No
230	37.73	2.34	1.02	1.32	0.87	0.965	1.19	0.809	0.95	1.00	0.850	No
231	37.89	2.35	1.03	1.32	0.87	0.964	1.19	0.808	0.95	1.00	0.850	No
232	38.06	2.36	1.03	1.33	0.87	0.962	1.19	0.807	0.95	1.00	0.850	No
233	38.22	2.37	1.04	1.33	0.87	0.961	1.19	0.806	0.95	1.00	0.850	No
234	38.39	2.38	1.04	1.34	0.86	0.960	1.19	0.805	0.95	1.00	0.849	No
235	38.55	2.39	1.05	1.34	0.86	0.959	1.19	0.804	0.95	1.00	0.849	No
236	38.71	2.40	1.05	1.35	0.86	0.958	1.19	0.803	0.95	1.00	0.849	No
237	38.88	2.41	1.06	1.35	0.86	0.957	1.19	0.802	0.94	1.00	0.849	No
238	39.04	2.42	1.06	1.36	0.86	0.955	1.19	0.801	0.94	1.00	0.848	No
239	39.21	2.43	1.07	1.36	0.86	0.954	1.19	0.800	0.94	1.00	0.848	No
240	39.37	2.44	1.07	1.37	0.86	0.953	1.19	0.799	0.94	1.00	0.848	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	39.53	2.45	1.08	1.37	0.86	0.952	1.19	0.798	0.94	1.00	0.847	No
242	39.70	2.46	1.08	1.38	0.85	0.950	1.19	0.797	0.94	1.00	0.847	No
243	39.86	2.47	1.09	1.39	0.85	0.949	1.19	0.796	0.94	1.00	0.847	No
244	40.03	2.48	1.09	1.39	0.85	0.948	1.19	0.795	0.94	1.00	0.846	No
245	40.19	2.50	1.10	1.40	0.85	0.946	1.19	0.793	0.94	1.00	0.846	No
246	40.35	2.51	1.10	1.40	0.85	0.945	1.19	0.792	0.94	1.00	0.845	No
247	40.52	2.52	1.11	1.41	0.85	0.944	1.19	0.791	0.94	1.00	0.845	No
248	40.68	2.53	1.11	1.41	0.84	0.943	1.19	0.790	0.94	1.00	0.845	No
249	40.85	2.54	1.12	1.42	0.84	0.941	1.19	0.789	0.93	1.00	0.844	No
250	41.01	2.55	1.12	1.42	0.84	0.940	1.19	0.788	0.93	1.00	0.844	No
251	41.17	2.56	1.13	1.43	0.84	0.939	1.19	0.787	0.93	1.00	0.844	No
252	41.34	2.57	1.13	1.43	0.84	0.938	1.19	0.786	0.93	1.00	0.843	No
253	41.50	2.58	1.14	1.44	0.84	0.937	1.19	0.785	0.93	1.00	0.843	No
254	41.67	2.59	1.14	1.44	0.84	0.936	1.19	0.784	0.93	1.00	0.842	No
255	41.83	2.59	1.15	1.45	0.83	0.934	1.19	0.783	0.93	1.00	0.842	No
256	41.99	2.60	1.15	1.45	0.83	0.933	1.19	0.782	0.93	1.00	0.841	No
257	42.16	2.61	1.16	1.45	0.83	0.932	1.19	0.782	0.93	1.00	0.841	No
258	42.32	2.62	1.16	1.46	0.83	0.931	1.19	0.781	0.93	1.00	0.840	No
259	42.49	2.63	1.17	1.46	0.83	0.930	1.19	0.779	0.93	1.00	0.840	No
260	42.65	2.64	1.17	1.47	0.83	0.928	1.19	0.778	0.93	1.00	0.839	No
261	42.81	2.65	1.18	1.47	0.83	0.927	1.19	0.777	0.93	1.00	0.839	No
262	42.98	2.66	1.18	1.48	0.82	0.926	1.19	0.776	0.93	1.00	0.838	No
263	43.14	2.67	1.19	1.48	0.82	0.925	1.19	0.775	0.93	1.00	0.838	No
264	43.31	2.68	1.20	1.49	0.82	0.923	1.19	0.774	0.92	1.00	0.837	No
265	43.47	2.69	1.20	1.49	0.82	0.922	1.19	0.773	0.92	1.00	0.837	No
266	43.63	2.70	1.21	1.50	0.82	0.921	1.19	0.772	0.92	1.00	0.836	No
267	43.80	2.71	1.21	1.50	0.82	0.920	1.19	0.771	0.92	1.00	0.835	No
268	43.96	2.72	1.22	1.50	0.81	0.918	1.19	0.770	0.92	1.00	0.835	No
269	44.13	2.73	1.22	1.51	0.81	0.917	1.19	0.769	0.92	1.00	0.834	No
270	44.29	2.74	1.23	1.51	0.81	0.915	1.19	0.768	0.92	1.00	0.833	No
271	44.45	2.75	1.23	1.52	0.81	0.914	1.19	0.766	0.92	1.00	0.833	No
272	44.62	2.76	1.24	1.52	0.81	0.913	1.19	0.765	0.92	1.00	0.832	No
273	44.78	2.77	1.24	1.53	0.81	0.911	1.19	0.764	0.92	1.00	0.831	No
274	44.95	2.78	1.25	1.53	0.80	0.910	1.19	0.763	0.92	1.00	0.831	No
275	45.11	2.79	1.25	1.54	0.80	0.908	1.19	0.761	0.92	1.00	0.830	No
276	45.28	2.80	1.26	1.54	0.80	0.906	1.19	0.760	0.92	1.00	0.829	No
277	45.44	2.81	1.26	1.55	0.80	0.905	1.19	0.758	0.92	1.00	0.828	No
278	45.60	2.82	1.27	1.56	0.80	0.903	1.19	0.757	0.92	1.00	0.827	No
279	45.77	2.83	1.27	1.56	0.80	0.901	1.19	0.756	0.91	1.00	0.826	No
280	45.93	2.84	1.28	1.57	0.79	0.900	1.19	0.754	0.91	1.00	0.825	No
281	46.10	2.85	1.28	1.57	0.79	0.898	1.19	0.753	0.91	1.00	0.825	No
282	46.26	2.87	1.29	1.58	0.79	0.896	1.19	0.751	0.91	1.00	0.824	No
283	46.42	2.88	1.29	1.58	0.79	0.894	1.19	0.750	0.91	1.00	0.823	No
284	46.59	2.89	1.30	1.59	0.79	0.893	1.19	0.748	0.91	1.00	0.822	No
285	46.75	2.90	1.30	1.60	0.79	0.891	1.19	0.747	0.91	1.00	0.821	No
286	46.92	2.91	1.31	1.60	0.78	0.889	1.19	0.745	0.91	1.00	0.820	No
287	47.08	2.92	1.31	1.61	0.78	0.887	1.19	0.744	0.91	1.00	0.819	No
288	47.24	2.93	1.32	1.61	0.78	0.886	1.19	0.743	0.91	1.00	0.818	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	47.41	2.94	1.32	1.62	0.78	0.884	1.19	0.741	0.91	1.00	0.817	No
290	47.57	2.95	1.33	1.62	0.78	0.882	1.19	0.740	0.91	1.00	0.816	No
291	47.74	2.96	1.33	1.63	0.78	0.881	1.19	0.738	0.91	1.00	0.815	No
292	47.90	2.97	1.34	1.63	0.77	0.879	1.19	0.737	0.90	1.00	0.814	No
293	48.06	2.98	1.34	1.64	0.77	0.877	1.19	0.735	0.90	1.00	0.813	No
294	48.23	2.99	1.35	1.64	0.77	0.876	1.19	0.734	0.90	1.00	0.812	No
295	48.39	3.00	1.35	1.65	0.77	0.874	1.19	0.733	0.90	1.00	0.811	No
296	48.56	3.01	1.36	1.66	0.77	0.872	1.19	0.731	0.90	1.00	0.810	No
297	48.72	3.02	1.36	1.66	0.77	0.870	1.19	0.730	0.90	1.00	0.809	No
298	48.88	3.04	1.37	1.67	0.76	0.869	1.19	0.728	0.90	1.00	0.808	No
299	49.05	3.05	1.37	1.67	0.76	0.867	1.19	0.727	0.90	1.00	0.807	No
300	49.21	3.06	1.38	1.68	0.76	0.865	1.19	0.725	0.90	1.00	0.806	No
301	49.38	3.07	1.38	1.68	0.76	0.863	1.19	0.724	0.90	1.00	0.805	No
302	49.54	3.08	1.39	1.69	0.76	0.861	1.19	0.722	0.90	1.00	0.804	No
303	49.70	3.09	1.39	1.69	0.76	0.860	1.19	0.721	0.90	1.00	0.803	No
304	49.87	3.10	1.40	1.70	0.75	0.858	1.19	0.719	0.90	1.00	0.802	No
305	50.03	3.11	1.41	1.71	0.75	0.856	1.19	0.718	0.90	1.00	0.801	No
306	50.20	3.12	1.41	1.71	0.75	0.855	1.19	0.717	0.90	1.00	0.801	No
307	50.36	3.12	1.42	1.71	0.75	0.854	1.19	0.716	0.90	1.00	0.800	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	0.16	14.64	2.65	2.53	0.89	23.50	3.67	86.30	4.000	No	Yes	2.00
2	0.33	16.77	2.60	2.49	0.87	26.92	3.34	89.93	4.000	No	Yes	2.00
3	0.49	18.09	2.59	2.61	0.86	29.02	3.26	94.72	4.000	No	No	2.00
4	0.66	18.30	2.60	2.78	0.87	29.35	3.35	98.27	4.000	No	Yes	2.00
5	0.82	19.35	2.57	2.62	0.85	31.01	3.14	97.44	4.000	No	No	2.00
6	0.98	21.83	2.50	2.35	0.83	34.98	2.76	96.58	4.000	No	No	2.00
7	1.15	27.45	2.36	1.91	0.78	44.00	2.17	95.49	4.000	No	No	2.00
8	1.31	37.03	2.19	1.48	0.71	59.38	1.65	97.91	4.000	No	No	2.00
9	1.48	47.25	2.05	1.17	0.66	75.77	1.37	103.58	4.000	No	No	2.00
10	1.64	52.34	1.98	1.04	0.63	83.94	1.27	106.99	4.000	No	No	2.00
11	1.80	50.69	1.99	1.04	0.63	81.28	1.29	104.74	4.000	No	No	2.00
12	1.97	47.23	2.02	1.06	0.64	75.70	1.33	100.52	4.000	No	No	2.00
13	2.13	45.27	2.04	1.09	0.65	72.54	1.36	98.59	4.000	No	No	2.00
14	2.30	45.21	2.04	1.10	0.65	72.42	1.36	98.73	4.000	No	No	2.00
15	2.46	49.01	2.01	1.07	0.64	78.52	1.31	103.16	4.000	No	No	2.00
16	2.63	55.44	1.95	1.00	0.62	88.83	1.24	110.19	4.000	No	No	2.00
17	2.79	64.37	1.89	0.96	0.59	103.17	1.18	121.57	4.000	No	No	2.00
18	2.95	77.61	1.88	1.14	0.59	124.42	1.17	145.40	4.000	No	No	2.00
19	3.12	92.83	1.93	1.60	0.61	148.85	1.22	180.94	4.000	No	No	2.00
20	3.28	100.17	2.05	2.47	0.66	160.63	1.37	219.94	4.000	No	No	2.00
21	3.44	94.79	2.16	3.29	0.70	151.97	1.58	240.05	4.000	No	No	2.00
22	3.61	84.57	2.25	3.89	0.73	135.53	1.80	244.08	4.000	No	No	2.00
23	3.77	82.55	2.24	3.75	0.73	132.27	1.78	235.89	4.000	No	No	2.00
24	3.94	83.99	2.23	3.66	0.73	134.57	1.75	235.05	4.000	No	No	2.00
25	4.10	79.94	2.26	3.78	0.73	128.05	1.82	232.42	4.000	No	No	2.00
26	4.26	75.97	2.27	3.83	0.74	121.65	1.87	227.15	4.000	No	No	2.00
27	4.43	77.71	2.23	3.42	0.72	124.43	1.74	216.63	4.000	No	No	2.00
28	4.59	82.23	2.16	2.92	0.70	131.67	1.57	207.37	4.000	No	No	2.00
29	4.76	83.14	2.07	2.25	0.66	133.11	1.40	186.60	4.000	No	No	2.00
30	4.92	76.91	2.02	1.80	0.64	123.09	1.33	163.30	4.000	No	No	2.00
31	5.08	69.63	1.97	1.39	0.63	111.38	1.26	140.82	0.340	No	No	0.65
32	5.25	58.88	2.10	1.79	0.67	94.09	1.45	136.71	0.318	No	No	0.60
33	5.41	49.01	2.26	2.51	0.74	78.22	1.83	143.04	0.352	No	No	0.65
34	5.58	36.03	2.51	4.07	0.83	57.36	2.79	160.25	0.463	No	No	0.85
35	5.74	33.71	2.54	4.29	0.84	53.61	2.99	160.21	0.462	No	No	0.83
36	5.91	33.62	2.53	4.13	0.84	53.44	2.93	156.47	0.436	No	No	0.78
37	6.07	40.02	2.43	3.51	0.80	63.71	2.43	154.70	0.424	No	No	0.75
38	6.23	44.59	2.37	3.20	0.78	71.03	2.18	154.69	0.424	No	No	0.74
39	6.40	57.60	2.19	2.33	0.71	91.93	1.64	150.73	0.398	No	No	0.68
40	6.56	75.16	1.99	1.60	0.63	120.12	1.29	154.53	0.423	No	No	0.72
41	6.73	83.94	1.94	1.52	0.61	134.21	1.23	165.00	0.498	No	No	0.84
42	6.89	78.10	2.04	1.91	0.65	124.82	1.35	168.35	0.524	No	No	0.87
43	7.05	66.33	2.18	2.56	0.70	105.88	1.61	170.68	0.542	No	No	0.89
44	7.22	67.60	2.16	2.44	0.70	107.92	1.57	168.99	0.529	No	No	0.86
45	7.38	75.50	2.07	2.06	0.66	120.59	1.40	168.97	0.529	No	No	0.85
46	7.55	77.33	2.07	2.11	0.66	123.50	1.40	173.24	0.564	No	No	0.90
47	7.71	63.84	2.22	2.81	0.72	101.82	1.72	174.64	0.575	No	No	0.91
48	7.87	45.74	2.43	3.97	0.80	72.72	2.43	176.81	0.594	No	No	0.94

:: 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	8.04	33.58	2.57	4.67	0.85	53.18	3.16	167.81	0.519	No	No	0.81
50	8.20	27.48	2.64	4.86	0.88	43.36	3.61	156.61	4.000	No	Yes	2.00
51	8.37	32.91	2.50	3.68	0.83	52.07	2.78	144.90	0.363	No	No	0.56
52	8.53	46.42	2.34	3.06	0.77	73.75	2.09	153.86	0.419	No	No	0.64
53	8.69	62.24	2.20	2.62	0.71	99.16	1.67	166.02	0.506	No	No	0.77
54	8.86	63.96	2.23	2.89	0.72	101.91	1.74	176.95	0.595	No	No	0.90
55	9.02	54.76	2.32	3.31	0.76	87.10	2.00	174.60	0.575	No	No	0.86
56	9.19	52.93	2.34	3.43	0.77	84.15	2.08	174.95	0.578	No	No	0.86
57	9.35	67.24	2.22	2.94	0.72	107.12	1.71	183.56	0.655	No	No	0.97
58	9.51	85.08	2.11	2.57	0.68	135.77	1.47	199.73	0.821	No	No	1.21
59	9.68	102.44	2.01	2.22	0.64	163.65	1.31	214.49	4.000	No	No	2.00
60	9.84	115.82	1.92	1.86	0.61	183.64	1.20	221.24	4.000	No	No	2.00
61	10.01	126.25	1.86	1.63	0.58	194.99	1.15	224.18	4.000	No	No	2.00
62	10.17	117.62	1.91	1.81	0.60	183.33	1.20	219.24	4.000	No	No	2.00
63	10.34	91.02	2.08	2.49	0.67	145.22	1.42	205.90	4.000	No	No	2.00
64	10.50	61.00	2.32	3.66	0.76	96.97	2.02	195.42	0.774	No	No	1.11
65	10.66	37.89	2.56	5.05	0.85	59.83	3.10	185.63	0.675	No	No	0.96
66	10.83	26.57	2.72	5.89	0.91	41.63	4.12	171.68	4.000	No	Yes	2.00
67	10.99	26.94	2.67	5.15	0.89	42.21	3.79	160.04	4.000	No	Yes	2.00
68	11.15	35.81	2.53	4.30	0.84	56.44	2.91	164.41	0.493	No	No	0.69
69	11.32	49.11	2.39	3.77	0.79	77.79	2.28	177.27	0.598	No	No	0.84
70	11.48	56.91	2.35	3.83	0.77	90.31	2.14	192.87	0.747	No	No	1.04
71	11.65	56.34	2.35	3.76	0.77	89.38	2.13	190.04	0.718	No	No	1.00
72	11.81	46.56	2.43	4.04	0.80	73.65	2.44	179.70	0.620	No	No	0.86
73	11.97	35.62	2.50	3.92	0.83	56.05	2.77	155.20	0.428	No	No	0.59
74	12.14	24.24	2.69	4.84	0.90	37.75	3.89	146.98	4.000	No	Yes	2.00
75	12.30	16.98	2.84	5.53	0.96	26.08	5.14	134.14	4.000	No	Yes	2.00
76	12.47	12.65	3.01	7.06	1.00	19.11	6.88	131.42	4.000	No	Yes	2.00
77	12.63	37.04	2.32	2.24	0.76	57.91	2.01	116.45	0.227	No	No	0.31
78	12.79	91.27	1.82	0.95	0.57	126.02	1.12	141.34	0.343	No	No	0.46
79	12.96	153.01	1.54	0.62	0.50	201.41	1.00	201.41	4.000	No	No	2.00
80	13.12	193.10	1.40	0.49	0.50	253.27	1.00	253.27	4.000	No	No	2.00
81	13.29	204.77	1.35	0.43	0.50	267.42	1.00	267.42	4.000	No	No	2.00
82	13.45	204.89	1.35	0.43	0.50	266.38	1.00	266.38	4.000	No	No	2.00
83	13.62	198.28	1.43	0.54	0.50	256.58	1.00	256.58	4.000	No	No	2.00
84	13.78	188.69	1.55	0.76	0.50	242.98	1.00	242.98	4.000	No	No	2.00
85	13.94	179.36	1.65	1.00	0.50	230.19	1.00	230.40	4.000	No	No	2.00
86	14.11	169.31	1.73	1.22	0.53	220.17	1.06	232.34	4.000	No	No	2.00
87	14.27	159.92	1.78	1.39	0.55	209.50	1.09	229.07	4.000	No	No	2.00
88	14.44	148.96	1.83	1.51	0.57	196.09	1.13	221.12	4.000	No	No	2.00
89	14.60	126.44	1.89	1.58	0.59	167.65	1.18	197.59	0.797	No	No	1.04
90	14.76	95.03	2.03	1.95	0.65	129.00	1.34	173.33	0.564	No	No	0.74
91	14.93	62.31	2.27	2.85	0.74	87.98	1.84	162.07	0.476	No	No	0.62
92	15.09	47.72	2.43	3.87	0.80	69.10	2.46	169.86	0.536	No	No	0.70
93	15.26	78.33	2.12	2.16	0.68	106.31	1.49	158.88	0.453	No	No	0.59
94	15.42	128.07	1.80	1.18	0.56	162.64	1.11	180.36	0.626	No	No	0.81
95	15.58	177.71	1.61	0.84	0.50	217.78	1.00	217.78	4.000	No	No	2.00
96	15.75	189.74	1.62	0.91	0.50	231.62	1.00	231.62	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
97	15.91	175.46	1.72	1.17	0.53	216.41	1.05	227.14	4.000	No	No	2.00
98	16.08	142.71	1.86	1.55	0.58	179.91	1.15	207.72	4.000	No	No	2.00
99	16.24	120.24	1.96	1.80	0.62	153.36	1.25	191.14	0.729	No	No	0.93
100	16.40	128.78	1.88	1.51	0.59	161.32	1.17	189.38	0.712	No	No	0.91
101	16.57	153.79	1.77	1.21	0.55	187.98	1.09	203.97	4.000	No	No	2.00
102	16.73	172.47	1.71	1.09	0.53	207.67	1.04	216.53	4.000	No	No	2.00
103	16.90	172.63	1.71	1.10	0.53	207.10	1.05	216.46	4.000	No	No	2.00
104	17.06	171.50	1.69	1.03	0.52	204.26	1.03	211.14	4.000	No	No	2.00
105	17.22	169.26	1.68	0.96	0.51	200.13	1.02	204.39	4.000	No	No	2.00
106	17.39	169.12	1.66	0.90	0.51	198.64	1.01	200.52	4.000	No	No	2.00
107	17.55	175.18	1.62	0.81	0.50	204.34	1.00	204.34	4.000	No	No	2.00
108	17.72	180.92	1.57	0.71	0.50	210.27	1.00	210.27	4.000	No	No	2.00
109	17.88	177.88	1.60	0.78	0.50	205.95	1.00	205.95	4.000	No	No	2.00
110	18.05	152.65	1.74	1.04	0.54	178.58	1.06	189.84	0.716	No	No	0.90
111	18.21	113.05	1.97	1.71	0.63	136.22	1.27	172.56	0.558	No	No	0.70
112	18.37	80.77	2.19	2.51	0.71	99.67	1.64	163.36	0.485	No	No	0.61
113	18.54	74.61	2.22	2.61	0.72	91.96	1.73	159.01	0.454	No	No	0.57
114	18.70	80.77	2.15	2.22	0.70	98.13	1.56	153.20	0.414	No	No	0.52
115	18.86	79.70	2.16	2.22	0.70	96.40	1.57	151.62	0.404	No	No	0.50
116	19.03	60.63	2.34	3.04	0.77	74.44	2.07	153.99	0.420	No	No	0.52
117	19.19	41.19	2.57	4.45	0.85	51.43	3.12	160.68	0.466	No	No	0.58
118	19.36	26.40	2.78	5.83	0.94	33.19	4.64	153.93	4.000	No	Yes	2.00
119	19.52	19.30	2.91	6.42	0.98	24.09	5.80	139.72	4.000	No	Yes	2.00
120	19.68	15.71	2.99	6.54	1.00	19.30	6.59	127.17	4.000	No	Yes	2.00
121	19.85	15.19	3.00	6.45	1.00	18.48	6.69	123.69	4.000	No	Yes	2.00
122	20.01	15.52	2.97	6.04	1.00	18.79	6.43	120.75	4.000	No	Yes	2.00
123	20.18	15.20	2.96	5.70	1.00	18.26	6.34	115.89	4.000	No	Yes	2.00
124	20.34	14.27	2.99	5.75	1.00	16.93	6.64	112.37	4.000	No	Yes	2.00
125	20.50	12.61	3.07	6.48	1.00	14.68	7.57	111.16	4.000	No	Yes	2.00
126	20.67	11.61	3.15	7.59	1.00	13.31	8.55	113.83	4.000	No	Yes	2.00
127	20.83	12.25	3.15	7.99	1.00	14.03	8.53	119.66	4.000	No	Yes	2.00
128	21.00	14.59	3.10	8.23	1.00	16.93	7.88	133.29	4.000	No	Yes	2.00
129	21.16	17.93	3.04	8.48	1.00	21.03	7.17	150.78	4.000	No	Yes	2.00
130	21.32	22.77	2.95	8.09	1.00	26.95	6.18	166.48	4.000	No	Yes	2.00
131	21.49	28.14	2.88	8.08	0.97	33.25	5.55	184.60	4.000	No	Yes	2.00
132	21.65	32.83	2.84	8.17	0.96	38.65	5.17	199.98	4.000	No	Yes	2.00
133	21.82	37.27	2.81	8.17	0.95	43.65	4.87	212.44	4.000	No	Yes	2.00
134	21.98	37.49	2.81	8.08	0.94	43.61	4.84	211.02	4.000	No	Yes	2.00
135	22.15	38.10	2.77	7.21	0.93	43.91	4.51	198.12	4.000	No	Yes	2.00
136	22.31	43.35	2.67	5.89	0.89	49.41	3.76	185.96	4.000	No	Yes	2.00
137	22.47	55.55	2.54	4.87	0.84	62.65	2.96	185.65	0.675	No	No	0.82
138	22.64	62.70	2.51	4.89	0.83	70.32	2.80	196.69	0.788	No	No	0.96
139	22.80	57.29	2.56	5.36	0.85	64.08	3.11	199.01	0.813	No	No	0.99
140	22.97	51.98	2.57	5.02	0.85	57.71	3.15	181.91	0.640	No	No	0.78
141	23.13	66.45	2.34	2.99	0.77	72.44	2.08	150.43	0.397	No	No	0.48
142	23.29	91.23	2.09	1.78	0.67	97.60	1.43	139.65	0.333	No	No	0.40
143	23.46	116.14	1.90	1.23	0.60	122.44	1.19	146.09	0.370	No	No	0.45
144	23.62	129.75	1.81	1.01	0.57	135.56	1.12	151.47	0.403	No	No	0.49

:: 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	23.79	143.23	1.73	0.84	0.53	148.40	1.06	157.13	0.441	No	No	0.53
146	23.95	153.00	1.72	0.86	0.53	157.95	1.05	165.69	0.503	No	No	0.61
147	24.11	159.96	1.73	0.93	0.53	164.80	1.06	173.94	0.569	No	No	0.69
148	24.28	174.23	1.71	0.95	0.53	178.87	1.04	186.78	0.686	No	No	0.83
149	24.44	180.39	1.75	1.13	0.54	185.14	1.07	198.46	0.807	No	No	0.97
150	24.61	158.53	1.87	1.47	0.59	163.20	1.16	190.07	0.719	No	No	0.87
151	24.77	111.44	2.13	2.41	0.69	115.59	1.52	175.12	0.579	No	No	0.70
152	24.93	68.96	2.43	3.96	0.80	71.83	2.44	175.44	0.582	No	No	0.70
153	25.10	74.47	2.38	3.60	0.78	77.11	2.23	171.99	0.553	No	No	0.67
154	25.26	89.28	2.24	2.77	0.73	91.68	1.78	163.29	0.485	No	No	0.58
155	25.43	105.21	2.12	2.19	0.68	107.21	1.50	160.74	0.466	No	No	0.56
156	25.59	100.69	2.13	2.11	0.69	102.13	1.50	153.59	0.417	No	No	0.50
157	25.75	102.70	2.09	1.90	0.67	103.62	1.43	148.50	0.385	No	No	0.46
158	25.92	102.13	2.07	1.76	0.66	102.55	1.40	143.60	0.355	No	No	0.43
159	26.08	92.55	2.12	1.88	0.68	92.63	1.49	138.07	0.325	No	No	0.39
160	26.25	70.31	2.28	2.39	0.74	70.16	1.88	131.92	0.293	No	No	0.35
161	26.41	46.36	2.49	3.10	0.82	45.87	2.72	124.76	0.261	No	No	0.31
162	26.57	27.61	2.76	4.26	0.92	26.79	4.42	118.29	4.000	No	Yes	2.00
163	26.74	19.28	2.97	5.81	1.00	18.23	6.41	116.83	4.000	No	Yes	2.00
164	26.90	17.14	3.05	6.56	1.00	15.93	7.30	116.25	4.000	No	Yes	2.00
165	27.07	20.84	2.94	5.67	0.99	19.63	6.09	119.47	4.000	No	Yes	2.00
166	27.23	25.37	2.82	4.77	0.95	24.06	4.98	119.85	4.000	No	Yes	2.00
167	27.39	27.11	2.82	5.15	0.95	25.70	4.99	128.32	4.000	No	Yes	2.00
168	27.56	24.83	2.93	6.72	0.99	23.34	6.04	141.03	4.000	No	Yes	2.00
169	27.72	24.09	2.99	7.81	1.00	22.49	6.65	149.53	4.000	No	Yes	2.00
170	27.89	28.87	2.89	6.73	0.98	27.10	5.59	151.47	4.000	No	Yes	2.00
171	28.05	34.45	2.78	5.65	0.93	32.44	4.61	149.71	4.000	No	Yes	2.00
172	28.21	34.93	2.76	5.37	0.93	32.74	4.46	146.08	4.000	No	Yes	2.00
173	28.38	30.37	2.81	5.47	0.95	28.13	4.90	137.87	4.000	No	Yes	2.00
174	28.54	24.19	2.90	5.54	0.98	21.98	5.66	124.30	4.000	No	Yes	2.00
175	28.71	19.72	2.96	5.42	1.00	17.53	6.33	111.03	4.000	No	Yes	2.00
176	28.87	16.83	3.03	5.55	1.00	14.63	7.06	103.35	4.000	No	Yes	2.00
177	29.04	16.31	3.04	5.44	1.00	14.06	7.15	100.55	4.000	No	Yes	2.00
178	29.20	17.05	3.01	5.25	1.00	14.71	6.86	100.96	4.000	No	Yes	2.00
179	29.36	17.70	3.00	5.19	1.00	15.25	6.69	102.09	4.000	No	Yes	2.00
180	29.53	17.64	3.00	5.22	1.00	15.13	6.74	101.98	4.000	No	Yes	2.00
181	29.69	16.69	3.05	5.77	1.00	14.15	7.32	103.54	4.000	No	Yes	2.00
182	29.86	16.00	3.13	7.09	1.00	13.43	8.26	110.88	4.000	No	Yes	2.00
183	30.02	16.14	3.18	8.53	1.00	13.49	8.95	120.79	4.000	No	Yes	2.00
184	30.18	33.10	2.77	4.98	0.93	29.36	4.55	133.69	4.000	No	Yes	2.00
185	30.35	45.99	2.62	4.31	0.87	41.31	3.47	143.23	4.000	No	Yes	2.00
186	30.51	54.09	2.63	5.10	0.88	48.66	3.49	169.76	4.000	No	Yes	2.00
187	30.68	68.65	2.56	5.12	0.85	61.98	3.07	190.39	0.722	No	No	0.86
188	30.84	82.03	2.50	4.96	0.83	74.11	2.75	203.67	4.000	No	No	2.00
189	31.00	88.59	2.41	4.08	0.79	79.90	2.35	188.09	0.699	No	No	0.83
190	31.17	65.49	2.49	3.98	0.82	58.31	2.73	159.38	0.457	No	No	0.54
191	31.33	43.85	2.63	4.15	0.88	38.22	3.55	135.54	4.000	No	Yes	2.00
192	31.50	34.01	2.79	5.30	0.94	29.05	4.73	137.49	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
193	31.66	31.18	2.93	7.38	0.99	26.30	5.96	156.75	4.000	No	Yes	2.00
194	31.82	32.26	2.93	7.76	0.99	27.13	6.02	163.40	4.000	No	Yes	2.00
195	31.99	28.63	2.97	7.62	1.00	23.76	6.39	151.70	4.000	No	Yes	2.00
196	32.15	23.93	3.01	7.24	1.00	19.48	6.89	134.25	4.000	No	Yes	2.00
197	32.32	18.85	3.13	7.93	1.00	14.90	8.25	122.86	4.000	No	Yes	2.00
198	32.48	18.80	3.18	9.49	1.00	14.78	8.99	132.87	4.000	No	Yes	2.00
199	32.64	25.88	3.08	9.76	1.00	20.91	7.71	161.20	4.000	No	Yes	2.00
200	32.81	44.90	2.82	7.34	0.95	37.53	4.94	185.48	4.000	No	Yes	2.00
201	32.97	55.93	2.72	6.72	0.91	47.11	4.17	196.67	4.000	No	Yes	2.00
202	33.14	55.21	2.74	6.97	0.92	46.24	4.31	199.17	4.000	No	Yes	2.00
203	33.30	46.31	2.86	8.55	0.97	38.16	5.35	203.99	4.000	No	Yes	2.00
204	33.47	64.94	2.68	6.72	0.90	54.33	3.88	210.72	4.000	No	Yes	2.00
205	33.63	115.20	2.35	4.05	0.77	98.61	2.12	208.71	4.000	No	No	2.00
206	33.79	186.18	2.06	2.54	0.66	161.83	1.38	223.64	4.000	No	No	2.00
207	33.96	239.66	1.88	1.88	0.59	209.72	1.17	246.35	4.000	No	No	2.00
208	34.12	271.91	1.81	1.67	0.57	238.28	1.11	265.57	4.000	No	No	2.00
209	34.28	273.48	1.81	1.69	0.57	238.95	1.12	266.78	4.000	No	No	2.00
210	34.45	257.05	1.81	1.61	0.57	223.84	1.12	250.19	4.000	No	No	2.00
211	34.61	240.24	1.79	1.43	0.56	208.74	1.10	229.83	4.000	No	No	2.00
212	34.78	238.27	1.73	1.16	0.53	207.19	1.06	218.81	4.000	No	No	2.00
213	34.94	246.89	1.70	1.12	0.52	214.49	1.04	223.14	4.000	No	No	2.00
214	35.10	245.59	1.72	1.15	0.53	212.68	1.05	222.94	4.000	No	No	2.00
215	35.27	225.73	1.79	1.33	0.56	193.99	1.10	213.41	4.000	No	No	2.00
216	35.43	197.54	1.90	1.66	0.60	167.94	1.19	200.29	4.000	No	No	2.00
217	35.60	166.61	2.02	2.00	0.64	139.98	1.32	185.17	0.671	No	No	0.79
218	35.76	140.52	2.10	2.19	0.67	116.80	1.45	169.68	0.534	No	No	0.63
219	35.92	121.73	2.14	2.17	0.69	100.36	1.53	153.70	0.418	No	No	0.49
220	36.09	106.41	2.20	2.28	0.71	86.89	1.66	144.49	0.361	No	No	0.42
221	36.25	87.61	2.33	2.81	0.76	70.36	2.04	143.55	0.355	No	No	0.42
222	36.42	67.79	2.51	3.80	0.83	53.17	2.80	148.94	0.387	No	No	0.46
223	36.58	55.95	2.66	5.03	0.89	42.94	3.70	159.07	4.000	No	Yes	2.00
224	36.74	61.39	2.63	5.04	0.88	47.20	3.52	166.16	4.000	No	Yes	2.00
225	36.91	70.83	2.57	4.74	0.85	54.78	3.13	171.62	0.550	No	No	0.65
226	37.07	74.79	2.54	4.58	0.84	57.85	2.98	172.56	0.558	No	No	0.66
227	37.24	76.48	2.51	4.28	0.83	59.10	2.83	167.42	0.516	No	No	0.61
228	37.40	85.84	2.41	3.47	0.79	66.87	2.35	157.04	0.440	No	No	0.52
229	37.57	119.40	2.15	2.13	0.69	95.42	1.55	147.92	0.381	No	No	0.45
230	37.73	178.46	1.83	1.15	0.57	147.02	1.13	165.64	0.503	No	No	0.59
231	37.89	244.82	1.56	0.68	0.50	205.14	1.00	205.14	4.000	No	No	2.00
232	38.06	283.88	1.47	0.58	0.50	237.69	1.00	237.69	4.000	No	No	2.00
233	38.22	275.09	1.56	0.75	0.50	229.79	1.00	229.79	4.000	No	No	2.00
234	38.39	238.36	1.74	1.14	0.54	196.71	1.06	209.05	4.000	No	No	2.00
235	38.55	173.58	1.99	1.83	0.63	139.14	1.29	179.06	0.614	No	No	0.72
236	38.71	112.90	2.27	2.90	0.74	87.26	1.87	163.02	0.483	No	No	0.57
237	38.88	67.11	2.59	4.60	0.86	49.46	3.25	160.91	0.467	No	No	0.55
238	39.04	55.99	2.68	5.08	0.90	40.46	3.85	155.74	4.000	No	Yes	2.00
239	39.21	52.53	2.71	5.20	0.91	37.61	4.06	152.68	4.000	No	Yes	2.00
240	39.37	50.70	2.76	5.92	0.93	35.90	4.48	160.85	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	39.53	65.30	2.64	5.24	0.88	47.14	3.61	170.00	4.000	No	Yes	2.00
242	39.70	86.41	2.50	4.39	0.83	63.66	2.76	175.96	0.587	No	No	0.69
243	39.86	103.60	2.39	3.74	0.79	77.29	2.28	175.87	0.586	No	No	0.69
244	40.03	102.78	2.38	3.60	0.78	76.48	2.24	171.28	0.547	No	No	0.65
245	40.19	93.87	2.43	3.77	0.80	69.14	2.42	167.38	0.516	No	No	0.61
246	40.35	79.46	2.51	4.20	0.83	57.50	2.84	163.39	0.486	No	No	0.57
247	40.52	58.97	2.66	4.89	0.89	41.38	3.72	153.92	4.000	No	Yes	2.00
248	40.68	39.70	2.84	5.66	0.96	26.63	5.14	137.00	4.000	No	Yes	2.00
249	40.85	27.04	3.00	6.04	1.00	17.28	6.72	116.15	4.000	No	Yes	2.00
250	41.01	20.28	3.14	6.88	1.00	12.47	8.46	105.49	4.000	No	Yes	2.00
251	41.17	18.22	3.20	7.31	1.00	10.97	9.26	101.61	4.000	No	Yes	2.00
252	41.34	18.76	3.19	7.30	1.00	11.31	9.12	103.15	4.000	No	Yes	2.00
253	41.50	19.12	3.18	7.08	1.00	11.51	8.92	102.67	4.000	No	Yes	2.00
254	41.67	19.08	3.17	6.89	1.00	11.44	8.84	101.18	4.000	No	Yes	2.00
255	41.83	17.69	3.21	7.23	1.00	10.44	9.45	98.68	4.000	No	Yes	2.00
256	41.99	16.97	3.24	7.33	1.00	9.91	9.76	96.66	4.000	No	Yes	2.00
257	42.16	16.72	3.24	7.22	1.00	9.70	9.80	95.01	4.000	No	Yes	2.00
258	42.32	17.05	3.22	6.97	1.00	9.89	9.56	94.56	4.000	No	Yes	2.00
259	42.49	17.63	3.21	6.84	1.00	10.24	9.32	95.47	4.000	No	Yes	2.00
260	42.65	18.52	3.18	6.76	1.00	10.81	9.03	97.60	4.000	No	Yes	2.00
261	42.81	19.90	3.14	6.34	1.00	11.71	8.43	98.70	4.000	No	Yes	2.00
262	42.98	21.10	3.09	5.76	1.00	12.48	7.82	97.55	4.000	No	Yes	2.00
263	43.14	21.31	3.07	5.34	1.00	12.58	7.53	94.77	4.000	No	Yes	2.00
264	43.31	20.45	3.09	5.34	1.00	11.95	7.74	92.54	4.000	No	Yes	2.00
265	43.47	19.17	3.13	5.76	1.00	11.05	8.34	92.16	4.000	No	Yes	2.00
266	43.63	18.67	3.17	6.28	1.00	10.68	8.80	93.99	4.000	No	Yes	2.00
267	43.80	18.82	3.18	6.73	1.00	10.74	9.04	97.09	4.000	No	Yes	2.00
268	43.96	19.35	3.19	7.01	1.00	11.05	9.07	100.19	4.000	No	Yes	2.00
269	44.13	19.62	3.19	7.31	1.00	11.19	9.17	102.63	4.000	No	Yes	2.00
270	44.29	19.52	3.21	7.53	1.00	11.09	9.33	103.46	4.000	No	Yes	2.00
271	44.45	19.91	3.20	7.63	1.00	11.30	9.30	105.04	4.000	No	Yes	2.00
272	44.62	20.31	3.23	8.50	1.00	11.52	9.65	111.12	4.000	No	Yes	2.00
273	44.78	21.31	3.27	10.28	1.00	12.13	10.22	124.01	4.000	No	Yes	2.00
274	44.95	24.58	3.25	11.46	1.00	14.21	9.97	141.67	4.000	No	Yes	2.00
275	45.11	36.25	3.06	9.45	1.00	21.74	7.45	161.89	4.000	No	Yes	2.00
276	45.28	56.91	2.80	6.54	0.94	35.83	4.75	170.04	4.000	No	Yes	2.00
277	45.44	75.26	2.62	5.02	0.87	49.07	3.44	168.77	4.000	No	Yes	2.00
278	45.60	77.65	2.58	4.64	0.86	50.78	3.22	163.76	0.488	No	No	0.59
279	45.77	80.19	2.55	4.38	0.85	52.56	3.06	160.75	0.466	No	No	0.56
280	45.93	115.57	2.32	3.05	0.76	79.11	2.01	158.83	0.453	No	No	0.55
281	46.10	168.09	2.09	2.16	0.67	119.77	1.43	171.25	0.547	No	No	0.66
282	46.26	219.05	1.92	1.66	0.61	160.40	1.20	193.23	0.751	No	No	0.91
283	46.42	240.85	1.83	1.39	0.57	178.60	1.13	201.35	4.000	No	No	2.00
284	46.59	254.21	1.75	1.16	0.54	190.51	1.07	204.18	4.000	No	No	2.00
285	46.75	260.70	1.70	1.03	0.52	196.46	1.04	204.40	4.000	No	No	2.00
286	46.92	263.61	1.69	1.00	0.52	198.66	1.03	205.17	4.000	No	No	2.00
287	47.08	257.91	1.67	0.92	0.51	194.55	1.02	198.38	0.806	No	No	0.98
288	47.24	234.39	1.76	1.08	0.54	173.97	1.08	187.11	0.689	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
289	47.41	184.26	1.95	1.55	0.62	131.75	1.24	163.81	0.489	No	No	0.60
290	47.57	120.16	2.29	2.83	0.75	80.45	1.92	154.16	0.421	No	No	0.52
291	47.74	73.03	2.61	4.60	0.87	45.48	3.41	155.10	4.000	No	Yes	2.00
292	47.90	48.93	2.84	6.06	0.96	28.66	5.13	146.95	4.000	No	Yes	2.00
293	48.06	44.43	2.87	6.05	0.97	25.62	5.44	139.44	4.000	No	Yes	2.00
294	48.23	40.98	2.95	6.91	1.00	23.13	6.16	142.38	4.000	No	Yes	2.00
295	48.39	43.89	2.96	7.83	1.00	24.79	6.34	157.07	4.000	No	Yes	2.00
296	48.56	52.62	2.88	7.40	0.97	30.32	5.54	168.10	4.000	No	Yes	2.00
297	48.72	58.70	2.83	7.03	0.95	34.22	5.06	173.16	4.000	No	Yes	2.00
298	48.88	67.77	2.73	5.97	0.92	40.36	4.23	170.65	4.000	No	Yes	2.00
299	49.05	81.67	2.61	5.00	0.87	49.89	3.40	169.59	4.000	No	Yes	2.00
300	49.21	98.32	2.49	4.12	0.82	61.59	2.71	166.80	0.512	No	No	0.63
301	49.38	103.46	2.46	3.92	0.81	65.10	2.56	166.37	0.508	No	No	0.63
302	49.54	97.62	2.49	4.10	0.82	60.76	2.72	165.35	0.500	No	No	0.62
303	49.70	98.13	2.48	4.01	0.82	61.01	2.68	163.43	0.486	No	No	0.60
304	49.87	127.72	2.17	2.02	0.70	84.43	1.60	134.77	0.308	No	No	0.38
305	50.03	180.41	1.72	0.69	0.53	130.04	1.05	136.86	0.318	No	No	0.40
306	50.20	237.74	N/A	0.00	1.00	-1.00	1.00	N/A	4.000	No	No	2.00
307	50.36	271.20	N/A	0.00	1.00	-1.00	1.00	N/A	4.000	No	No	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
0.16	2.00	0.00	0.00	0.16	0.00	0.33	2.00	0.00	0.00	0.16	0.00
0.49	2.00	0.00	0.00	0.16	0.00	0.66	2.00	0.00	0.00	0.16	0.00
0.82	2.00	0.00	0.00	0.16	0.00	0.98	2.00	0.00	0.00	0.16	0.00
1.15	2.00	0.00	0.00	0.16	0.00	1.31	2.00	0.00	0.00	0.16	0.00
1.48	2.00	0.00	0.00	0.16	0.00	1.64	2.00	0.00	0.00	0.16	0.00
1.80	2.00	0.00	0.00	0.16	0.00	1.97	2.00	0.00	0.00	0.17	0.00
2.13	2.00	0.00	0.00	0.16	0.00	2.30	2.00	0.00	0.00	0.16	0.00
2.46	2.00	0.00	0.00	0.16	0.00	2.63	2.00	0.00	0.00	0.16	0.00
2.79	2.00	0.00	0.00	0.16	0.00	2.95	2.00	0.00	0.00	0.16	0.00
3.12	2.00	0.00	0.00	0.16	0.00	3.28	2.00	0.00	0.00	0.16	0.00
3.44	2.00	0.00	0.00	0.16	0.00	3.61	2.00	0.00	0.00	0.16	0.00
3.77	2.00	0.00	0.00	0.16	0.00	3.94	2.00	0.00	0.00	0.16	0.00
4.10	2.00	0.00	0.00	0.16	0.00	4.26	2.00	0.00	0.00	0.16	0.00
4.43	2.00	0.00	0.00	0.16	0.00	4.59	2.00	0.00	0.00	0.16	0.00
4.76	2.00	0.00	0.00	0.16	0.00	4.92	2.00	0.00	0.00	0.16	0.00
5.08	0.65	0.35	0.75	0.16	0.16	5.25	0.60	0.40	0.63	0.16	0.18
5.41	0.65	0.35	0.76	0.16	0.16	5.58	0.85	0.00	0.00	0.16	0.07
5.74	0.83	0.00	0.00	0.16	0.08	5.91	0.78	0.22	1.40	0.17	0.10
6.07	0.75	0.25	1.16	0.16	0.12	6.23	0.74	0.26	1.10	0.16	0.12
6.40	0.68	0.32	0.86	0.16	0.14	6.56	0.72	0.28	1.00	0.16	0.13
6.73	0.84	0.00	0.00	0.16	0.07	6.89	0.87	0.00	0.00	0.16	0.06
7.05	0.89	0.00	0.00	0.16	0.05	7.22	0.86	0.00	0.00	0.16	0.06
7.38	0.85	0.00	0.00	0.16	0.06	7.55	0.90	0.00	0.00	0.16	0.04
7.71	0.91	0.00	0.00	0.16	0.04	7.87	0.94	0.00	0.00	0.16	0.03
8.04	0.81	0.19	1.84	0.16	0.08	8.20	2.00	0.00	0.00	0.16	0.00
8.37	0.56	0.44	0.56	0.16	0.19	8.53	0.64	0.36	0.72	0.16	0.16
8.69	0.77	0.23	1.32	0.16	0.10	8.86	0.90	0.00	0.00	0.16	0.04
9.02	0.86	0.00	0.00	0.16	0.06	9.19	0.86	0.00	0.00	0.16	0.06
9.35	0.97	0.00	0.00	0.16	0.01	9.51	1.21	0.00	0.00	0.16	0.00
9.68	2.00	0.00	0.00	0.16	0.00	9.84	2.00	0.00	0.00	0.16	0.00
10.01	2.00	0.00	0.00	0.16	0.00	10.17	2.00	0.00	0.00	0.16	0.00
10.34	2.00	0.00	0.00	0.16	0.00	10.50	1.11	0.00	0.00	0.16	0.00
10.66	0.96	0.00	0.00	0.16	0.02	10.83	2.00	0.00	0.00	0.16	0.00
10.99	2.00	0.00	0.00	0.16	0.00	11.15	0.69	0.31	0.89	0.16	0.13
11.32	0.84	0.00	0.00	0.16	0.07	11.48	1.04	0.00	0.00	0.16	0.00
11.65	1.00	0.00	0.00	0.16	0.00	11.81	0.86	0.00	0.00	0.16	0.06
11.97	0.59	0.41	0.61	0.16	0.17	12.14	2.00	0.00	0.00	0.16	0.00
12.30	2.00	0.00	0.00	0.16	0.00	12.47	2.00	0.00	0.00	0.16	0.00
12.63	0.31	0.69	0.33	0.16	0.28	12.79	0.46	0.54	0.44	0.16	0.22
12.96	2.00	0.00	0.00	0.16	0.00	13.12	2.00	0.00	0.00	0.16	0.00
13.29	2.00	0.00	0.00	0.16	0.00	13.45	2.00	0.00	0.00	0.16	0.00
13.62	2.00	0.00	0.00	0.16	0.00	13.78	2.00	0.00	0.00	0.16	0.00
13.94	2.00	0.00	0.00	0.16	0.00	14.11	2.00	0.00	0.00	0.16	0.00
14.27	2.00	0.00	0.00	0.16	0.00	14.44	2.00	0.00	0.00	0.16	0.00
14.60	1.04	0.00	0.00	0.16	0.00	14.76	0.74	0.26	1.10	0.16	0.10
14.93	0.62	0.38	0.67	0.16	0.15	15.09	0.70	0.30	0.90	0.16	0.12
15.26	0.59	0.41	0.61	0.16	0.16	15.42	0.81	0.19	1.79	0.16	0.07
15.58	2.00	0.00	0.00	0.16	0.00	15.75	2.00	0.00	0.00	0.16	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI
15.91	2.00	0.00	0.00	0.16	0.00
16.24	0.93	0.00	0.00	0.16	0.02
16.57	2.00	0.00	0.00	0.16	0.00
16.90	2.00	0.00	0.00	0.16	0.00
17.22	2.00	0.00	0.00	0.16	0.00
17.55	2.00	0.00	0.00	0.16	0.00
17.88	2.00	0.00	0.00	0.16	0.00
18.21	0.70	0.30	0.92	0.16	0.11
18.54	0.57	0.43	0.57	0.16	0.15
18.86	0.50	0.50	0.48	0.16	0.18
19.19	0.58	0.42	0.59	0.16	0.15
19.52	2.00	0.00	0.00	0.16	0.00
19.85	2.00	0.00	0.00	0.16	0.00
20.18	2.00	0.00	0.00	0.16	0.00
20.50	2.00	0.00	0.00	0.16	0.00
20.83	2.00	0.00	0.00	0.16	0.00
21.16	2.00	0.00	0.00	0.16	0.00
21.49	2.00	0.00	0.00	0.16	0.00
21.82	2.00	0.00	0.00	0.16	0.00
22.15	2.00	0.00	0.00	0.16	0.00
22.47	0.82	0.00	0.00	0.16	0.06
22.80	0.99	0.00	0.00	0.16	0.00
23.13	0.48	0.52	0.46	0.16	0.17
23.46	0.45	0.55	0.43	0.16	0.18
23.79	0.53	0.47	0.52	0.16	0.15
24.11	0.69	0.31	0.87	0.16	0.10
24.44	0.97	0.00	0.00	0.16	0.01
24.77	0.70	0.30	0.92	0.16	0.09
25.10	0.67	0.33	0.80	0.16	0.10
25.43	0.56	0.44	0.56	0.16	0.14
25.75	0.46	0.54	0.44	0.16	0.16
26.08	0.39	0.61	0.38	0.16	0.18
26.41	0.31	0.69	0.33	0.16	0.21
26.74	2.00	0.00	0.00	0.16	0.00
27.07	2.00	0.00	0.00	0.16	0.00
27.39	2.00	0.00	0.00	0.16	0.00
27.72	2.00	0.00	0.00	0.16	0.00
28.05	2.00	0.00	0.00	0.16	0.00
28.38	2.00	0.00	0.00	0.16	0.00
28.71	2.00	0.00	0.00	0.16	0.00
29.04	2.00	0.00	0.00	0.16	0.00
29.36	2.00	0.00	0.00	0.16	0.00
29.69	2.00	0.00	0.00	0.16	0.00
30.02	2.00	0.00	0.00	0.16	0.00
30.35	2.00	0.00	0.00	0.16	0.00
30.68	0.86	0.00	0.00	0.16	0.04
31.00	0.83	0.00	0.00	0.16	0.04
31.33	2.00	0.00	0.00	0.16	0.00
16.08	2.00	0.00	0.00	0.16	0.00
16.40	0.91	0.00	0.00	0.16	0.03
16.73	2.00	0.00	0.00	0.16	0.00
17.06	2.00	0.00	0.00	0.16	0.00
17.39	2.00	0.00	0.00	0.16	0.00
17.72	2.00	0.00	0.00	0.16	0.00
18.05	0.90	0.00	0.00	0.16	0.04
18.37	0.61	0.39	0.65	0.16	0.14
18.70	0.52	0.48	0.50	0.16	0.17
19.03	0.52	0.48	0.51	0.16	0.17
19.36	2.00	0.00	0.00	0.16	0.00
19.68	2.00	0.00	0.00	0.16	0.00
20.01	2.00	0.00	0.00	0.16	0.00
20.34	2.00	0.00	0.00	0.16	0.00
20.67	2.00	0.00	0.00	0.16	0.00
21.00	2.00	0.00	0.00	0.16	0.00
21.32	2.00	0.00	0.00	0.16	0.00
21.65	2.00	0.00	0.00	0.16	0.00
21.98	2.00	0.00	0.00	0.16	0.00
22.31	2.00	0.00	0.00	0.16	0.00
22.64	0.96	0.00	0.00	0.16	0.01
22.97	0.78	0.22	1.40	0.16	0.07
23.29	0.40	0.60	0.39	0.16	0.19
23.62	0.49	0.51	0.47	0.16	0.16
23.95	0.61	0.39	0.65	0.16	0.12
24.28	0.83	0.00	0.00	0.16	0.05
24.61	0.87	0.00	0.00	0.16	0.04
24.93	0.70	0.30	0.93	0.16	0.09
25.26	0.58	0.42	0.60	0.16	0.13
25.59	0.50	0.50	0.48	0.16	0.15
25.92	0.43	0.57	0.41	0.16	0.17
26.25	0.35	0.65	0.35	0.16	0.19
26.57	2.00	0.00	0.00	0.16	0.00
26.90	2.00	0.00	0.00	0.16	0.00
27.23	2.00	0.00	0.00	0.16	0.00
27.56	2.00	0.00	0.00	0.16	0.00
27.89	2.00	0.00	0.00	0.16	0.00
28.21	2.00	0.00	0.00	0.16	0.00
28.54	2.00	0.00	0.00	0.16	0.00
28.87	2.00	0.00	0.00	0.16	0.00
29.20	2.00	0.00	0.00	0.16	0.00
29.53	2.00	0.00	0.00	0.16	0.00
29.86	2.00	0.00	0.00	0.16	0.00
30.18	2.00	0.00	0.00	0.16	0.00
30.51	2.00	0.00	0.00	0.16	0.00
30.84	2.00	0.00	0.00	0.16	0.00
31.17	0.54	0.46	0.53	0.16	0.12
31.50	2.00	0.00	0.00	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
31.66	2.00	0.00	0.00	0.16	0.00	31.82	2.00	0.00	0.00	0.16	0.00
31.99	2.00	0.00	0.00	0.16	0.00	32.15	2.00	0.00	0.00	0.16	0.00
32.32	2.00	0.00	0.00	0.16	0.00	32.48	2.00	0.00	0.00	0.16	0.00
32.64	2.00	0.00	0.00	0.16	0.00	32.81	2.00	0.00	0.00	0.16	0.00
32.97	2.00	0.00	0.00	0.16	0.00	33.14	2.00	0.00	0.00	0.16	0.00
33.30	2.00	0.00	0.00	0.16	0.00	33.47	2.00	0.00	0.00	0.16	0.00
33.63	2.00	0.00	0.00	0.16	0.00	33.79	2.00	0.00	0.00	0.16	0.00
33.96	2.00	0.00	0.00	0.16	0.00	34.12	2.00	0.00	0.00	0.16	0.00
34.28	2.00	0.00	0.00	0.16	0.00	34.45	2.00	0.00	0.00	0.16	0.00
34.61	2.00	0.00	0.00	0.16	0.00	34.78	2.00	0.00	0.00	0.16	0.00
34.94	2.00	0.00	0.00	0.16	0.00	35.10	2.00	0.00	0.00	0.16	0.00
35.27	2.00	0.00	0.00	0.16	0.00	35.43	2.00	0.00	0.00	0.16	0.00
35.60	0.79	0.21	1.52	0.16	0.05	35.76	0.63	0.37	0.69	0.16	0.08
35.92	0.49	0.51	0.47	0.16	0.12	36.09	0.42	0.58	0.40	0.16	0.13
36.25	0.42	0.58	0.40	0.16	0.13	36.42	0.46	0.54	0.43	0.16	0.12
36.58	2.00	0.00	0.00	0.16	0.00	36.74	2.00	0.00	0.00	0.16	0.00
36.91	0.65	0.35	0.74	0.16	0.08	37.07	0.66	0.34	0.77	0.16	0.07
37.24	0.61	0.39	0.65	0.16	0.09	37.40	0.52	0.48	0.50	0.16	0.10
37.57	0.45	0.55	0.43	0.16	0.12	37.73	0.59	0.41	0.61	0.16	0.09
37.89	2.00	0.00	0.00	0.16	0.00	38.06	2.00	0.00	0.00	0.16	0.00
38.22	2.00	0.00	0.00	0.16	0.00	38.39	2.00	0.00	0.00	0.16	0.00
38.55	0.72	0.28	1.03	0.16	0.06	38.71	0.57	0.43	0.57	0.16	0.09
38.88	0.55	0.45	0.55	0.16	0.09	39.04	2.00	0.00	0.00	0.16	0.00
39.21	2.00	0.00	0.00	0.16	0.00	39.37	2.00	0.00	0.00	0.16	0.00
39.53	2.00	0.00	0.00	0.16	0.00	39.70	0.69	0.31	0.89	0.16	0.06
39.86	0.69	0.31	0.89	0.16	0.06	40.03	0.65	0.35	0.74	0.16	0.07
40.19	0.61	0.39	0.65	0.16	0.08	40.35	0.57	0.43	0.58	0.16	0.08
40.52	2.00	0.00	0.00	0.16	0.00	40.68	2.00	0.00	0.00	0.16	0.00
40.85	2.00	0.00	0.00	0.16	0.00	41.01	2.00	0.00	0.00	0.17	0.00
41.17	2.00	0.00	0.00	0.16	0.00	41.34	2.00	0.00	0.00	0.16	0.00
41.50	2.00	0.00	0.00	0.16	0.00	41.67	2.00	0.00	0.00	0.16	0.00
41.83	2.00	0.00	0.00	0.16	0.00	41.99	2.00	0.00	0.00	0.16	0.00
42.16	2.00	0.00	0.00	0.16	0.00	42.32	2.00	0.00	0.00	0.16	0.00
42.49	2.00	0.00	0.00	0.16	0.00	42.65	2.00	0.00	0.00	0.16	0.00
42.81	2.00	0.00	0.00	0.16	0.00	42.98	2.00	0.00	0.00	0.16	0.00
43.14	2.00	0.00	0.00	0.16	0.00	43.31	2.00	0.00	0.00	0.16	0.00
43.47	2.00	0.00	0.00	0.16	0.00	43.63	2.00	0.00	0.00	0.16	0.00
43.80	2.00	0.00	0.00	0.16	0.00	43.96	2.00	0.00	0.00	0.16	0.00
44.13	2.00	0.00	0.00	0.16	0.00	44.29	2.00	0.00	0.00	0.16	0.00
44.45	2.00	0.00	0.00	0.16	0.00	44.62	2.00	0.00	0.00	0.16	0.00
44.78	2.00	0.00	0.00	0.16	0.00	44.95	2.00	0.00	0.00	0.16	0.00
45.11	2.00	0.00	0.00	0.16	0.00	45.28	2.00	0.00	0.00	0.16	0.00
45.44	2.00	0.00	0.00	0.16	0.00	45.60	0.59	0.41	0.61	0.16	0.06
45.77	0.56	0.44	0.57	0.16	0.07	45.93	0.55	0.45	0.54	0.16	0.07
46.10	0.66	0.34	0.79	0.16	0.05	46.26	0.91	0.00	0.00	0.16	0.01
46.42	2.00	0.00	0.00	0.16	0.00	46.59	2.00	0.00	0.00	0.16	0.00
46.75	2.00	0.00	0.00	0.16	0.00	46.92	2.00	0.00	0.00	0.16	0.00
47.08	0.98	0.00	0.00	0.16	0.00	47.24	0.84	0.00	0.00	0.16	0.02

:: 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
47.41	0.60	0.40	0.63	0.16	0.06	47.57	0.52	0.48	0.50	0.16	0.07
47.74	2.00	0.00	0.00	0.16	0.00	47.90	2.00	0.00	0.00	0.16	0.00
48.06	2.00	0.00	0.00	0.16	0.00	48.23	2.00	0.00	0.00	0.16	0.00
48.39	2.00	0.00	0.00	0.16	0.00	48.56	2.00	0.00	0.00	0.16	0.00
48.72	2.00	0.00	0.00	0.16	0.00	48.88	2.00	0.00	0.00	0.16	0.00
49.05	2.00	0.00	0.00	0.16	0.00	49.21	0.63	0.37	0.71	0.16	0.05
49.38	0.63	0.37	0.70	0.16	0.05	49.54	0.62	0.38	0.68	0.16	0.05
49.70	0.60	0.40	0.64	0.16	0.05	49.87	0.38	0.62	0.37	0.16	0.07
50.03	0.40	0.60	0.38	0.16	0.07	50.20	2.00	0.00	0.00	0.16	0.00
50.36	2.00	0.00	0.00	0.16	0.00						

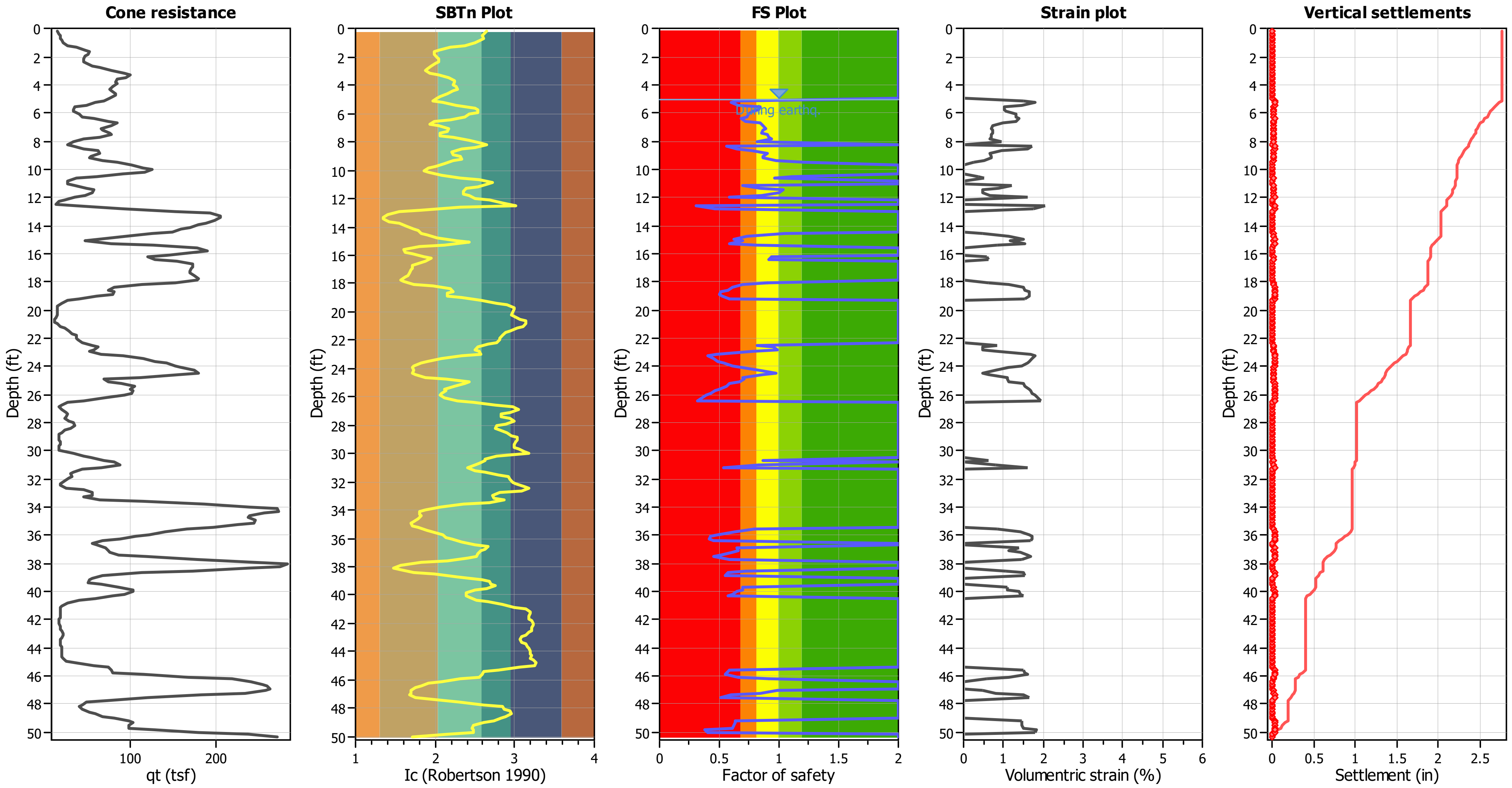
Overall liquefaction potential: 10.72

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)
5.08	140.82	0.65	1.51	1.00	0.03	5.25	136.71	0.60	1.81	1.00	0.04
5.41	143.04	0.65	1.48	1.00	0.03	5.58	160.25	0.85	1.02	1.00	0.02
5.74	160.21	0.83	1.02	1.00	0.02	5.91	156.47	0.78	1.06	1.00	0.02
6.07	154.70	0.75	1.32	1.00	0.03	6.23	154.69	0.74	1.32	1.00	0.03
6.40	150.73	0.68	1.37	1.00	0.03	6.56	154.53	0.72	1.33	1.00	0.03
6.73	165.00	0.84	0.98	1.00	0.02	6.89	168.35	0.87	0.73	1.00	0.01
7.05	170.68	0.89	0.71	1.00	0.01	7.22	168.99	0.86	0.72	1.00	0.01
7.38	168.97	0.85	0.72	1.00	0.01	7.55	173.24	0.90	0.70	1.00	0.01
7.71	174.64	0.91	0.69	1.00	0.01	7.87	176.81	0.94	0.67	1.00	0.01
8.04	167.81	0.81	0.95	1.00	0.02	8.20	156.61	2.00	0.00	1.00	0.00
8.37	144.90	0.56	1.72	1.00	0.03	8.53	153.86	0.64	1.63	1.00	0.03
8.69	166.02	0.77	0.97	1.00	0.02	8.86	176.95	0.90	0.67	1.00	0.01
9.02	174.60	0.86	0.69	1.00	0.01	9.19	174.95	0.86	0.69	1.00	0.01
9.35	183.56	0.97	0.50	1.00	0.01	9.51	199.73	1.21	0.25	1.00	0.00
9.68	214.49	2.00	0.00	1.00	0.00	9.84	221.24	2.00	0.00	1.00	0.00
10.01	224.18	2.00	0.00	1.00	0.00	10.17	219.24	2.00	0.00	1.00	0.00
10.34	205.90	2.00	0.00	1.00	0.00	10.50	195.42	1.11	0.36	1.00	0.01
10.66	185.63	0.96	0.50	1.00	0.01	10.83	171.68	2.00	0.00	1.00	0.00
10.99	160.04	2.00	0.00	1.00	0.00	11.15	164.41	0.69	1.21	1.00	0.02
11.32	177.27	0.84	0.88	1.00	0.02	11.48	192.87	1.04	0.48	1.00	0.01
11.65	190.04	1.00	0.49	1.00	0.01	11.81	179.70	0.86	0.66	1.00	0.01
11.97	155.20	0.59	1.60	1.00	0.03	12.14	146.98	2.00	0.00	1.00	0.00
12.30	134.14	2.00	0.00	1.00	0.00	12.47	131.42	2.00	0.00	1.00	0.00
12.63	116.45	0.31	2.06	1.00	0.04	12.79	141.34	0.46	1.76	1.00	0.03
12.96	201.41	2.00	0.00	1.00	0.00	13.12	253.27	2.00	0.00	1.00	0.00
13.29	267.42	2.00	0.00	1.00	0.00	13.45	266.38	2.00	0.00	1.00	0.00
13.62	256.58	2.00	0.00	1.00	0.00	13.78	242.98	2.00	0.00	1.00	0.00
13.94	230.40	2.00	0.00	1.00	0.00	14.11	232.34	2.00	0.00	1.00	0.00
14.27	229.07	2.00	0.00	1.00	0.00	14.44	221.12	2.00	0.00	1.00	0.00
14.60	197.59	1.04	0.47	1.00	0.01	14.76	173.33	0.74	1.13	1.00	0.02
14.93	162.07	0.62	1.51	1.00	0.03	15.09	169.86	0.70	1.16	1.00	0.02
15.26	158.88	0.59	1.55	1.00	0.03	15.42	180.36	0.81	0.86	1.00	0.02
15.58	217.78	2.00	0.00	1.00	0.00	15.75	231.62	2.00	0.00	1.00	0.00
15.91	227.14	2.00	0.00	1.00	0.00	16.08	207.72	2.00	0.00	1.00	0.00
16.24	191.14	0.93	0.60	1.00	0.01	16.40	189.38	0.91	0.61	1.00	0.01
16.57	203.97	2.00	0.00	1.00	0.00	16.73	216.53	2.00	0.00	1.00	0.00
16.90	216.46	2.00	0.00	1.00	0.00	17.06	211.14	2.00	0.00	1.00	0.00
17.22	204.39	2.00	0.00	1.00	0.00	17.39	200.52	2.00	0.00	1.00	0.00
17.55	204.34	2.00	0.00	1.00	0.00	17.72	210.27	2.00	0.00	1.00	0.00
17.88	205.95	2.00	0.00	1.00	0.00	18.05	189.84	0.90	0.61	1.00	0.01
18.21	172.56	0.70	1.13	1.00	0.02	18.37	163.36	0.61	1.49	1.00	0.03
18.54	159.01	0.57	1.55	1.00	0.03	18.70	153.20	0.52	1.65	1.00	0.03
18.86	151.62	0.50	1.66	1.00	0.03	19.03	153.99	0.52	1.64	1.00	0.03
19.19	160.68	0.58	1.53	1.00	0.03	19.36	153.93	2.00	0.00	1.00	0.00
19.52	139.72	2.00	0.00	1.00	0.00	19.68	127.17	2.00	0.00	1.00	0.00
19.85	123.69	2.00	0.00	1.00	0.00	20.01	120.75	2.00	0.00	1.00	0.00
20.18	115.89	2.00	0.00	1.00	0.00	20.34	112.37	2.00	0.00	1.00	0.00
20.50	111.16	2.00	0.00	1.00	0.00	20.67	113.83	2.00	0.00	1.00	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)
20.83	119.66	2.00	0.00	1.00	0.00	21.00	133.29	2.00	0.00	1.00	0.00
21.16	150.78	2.00	0.00	1.00	0.00	21.32	166.48	2.00	0.00	1.00	0.00
21.49	184.60	2.00	0.00	1.00	0.00	21.65	199.98	2.00	0.00	1.00	0.00
21.82	212.44	2.00	0.00	1.00	0.00	21.98	211.02	2.00	0.00	1.00	0.00
22.15	198.12	2.00	0.00	1.00	0.00	22.31	185.96	2.00	0.00	1.00	0.00
22.47	185.65	0.82	0.82	1.00	0.02	22.64	196.69	0.96	0.47	1.00	0.01
22.80	199.01	0.99	0.47	1.00	0.01	22.97	181.91	0.78	0.85	1.00	0.02
23.13	150.43	0.48	1.67	1.00	0.03	23.29	139.65	0.40	1.78	1.00	0.03
23.46	146.09	0.45	1.71	1.00	0.03	23.62	151.47	0.49	1.66	1.00	0.03
23.79	157.13	0.53	1.61	1.00	0.03	23.95	165.69	0.61	1.46	1.00	0.03
24.11	173.94	0.69	1.12	1.00	0.02	24.28	186.78	0.83	0.82	1.00	0.02
24.44	198.46	0.97	0.47	1.00	0.01	24.61	190.07	0.87	0.61	1.00	0.01
24.77	175.12	0.70	1.11	1.00	0.02	24.93	175.44	0.70	1.11	1.00	0.02
25.10	171.99	0.67	1.14	1.00	0.02	25.26	163.29	0.58	1.49	1.00	0.03
25.43	160.74	0.56	1.53	1.00	0.03	25.59	153.59	0.50	1.64	1.00	0.03
25.75	148.50	0.46	1.69	1.00	0.03	25.92	143.60	0.43	1.74	1.00	0.03
26.08	138.07	0.39	1.79	1.00	0.04	26.25	131.92	0.35	1.86	1.00	0.04
26.41	124.76	0.31	1.95	1.00	0.04	26.57	118.29	2.00	0.00	1.00	0.00
26.74	116.83	2.00	0.00	1.00	0.00	26.90	116.25	2.00	0.00	1.00	0.00
27.07	119.47	2.00	0.00	1.00	0.00	27.23	119.85	2.00	0.00	1.00	0.00
27.39	128.32	2.00	0.00	1.00	0.00	27.56	141.03	2.00	0.00	1.00	0.00
27.72	149.53	2.00	0.00	1.00	0.00	27.89	151.47	2.00	0.00	1.00	0.00
28.05	149.71	2.00	0.00	1.00	0.00	28.21	146.08	2.00	0.00	1.00	0.00
28.38	137.87	2.00	0.00	1.00	0.00	28.54	124.30	2.00	0.00	1.00	0.00
28.71	111.03	2.00	0.00	1.00	0.00	28.87	103.35	2.00	0.00	1.00	0.00
29.04	100.55	2.00	0.00	1.00	0.00	29.20	100.96	2.00	0.00	1.00	0.00
29.36	102.09	2.00	0.00	1.00	0.00	29.53	101.98	2.00	0.00	1.00	0.00
29.69	103.54	2.00	0.00	1.00	0.00	29.86	110.88	2.00	0.00	1.00	0.00
30.02	120.79	2.00	0.00	1.00	0.00	30.18	133.69	2.00	0.00	1.00	0.00
30.35	143.23	2.00	0.00	1.00	0.00	30.51	169.76	2.00	0.00	1.00	0.00
30.68	190.39	0.86	0.60	1.00	0.01	30.84	203.67	2.00	0.00	1.00	0.00
31.00	188.09	0.83	0.81	1.00	0.02	31.17	159.38	0.54	1.59	1.00	0.03
31.33	135.54	2.00	0.00	1.00	0.00	31.50	137.49	2.00	0.00	1.00	0.00
31.66	156.75	2.00	0.00	1.00	0.00	31.82	163.40	2.00	0.00	1.00	0.00
31.99	151.70	2.00	0.00	1.00	0.00	32.15	134.25	2.00	0.00	1.00	0.00
32.32	122.86	2.00	0.00	1.00	0.00	32.48	132.87	2.00	0.00	1.00	0.00
32.64	161.20	2.00	0.00	1.00	0.00	32.81	185.48	2.00	0.00	1.00	0.00
32.97	196.67	2.00	0.00	1.00	0.00	33.14	199.17	2.00	0.00	1.00	0.00
33.30	203.99	2.00	0.00	1.00	0.00	33.47	210.72	2.00	0.00	1.00	0.00
33.63	208.71	2.00	0.00	1.00	0.00	33.79	223.64	2.00	0.00	1.00	0.00
33.96	246.35	2.00	0.00	1.00	0.00	34.12	265.57	2.00	0.00	1.00	0.00
34.28	266.78	2.00	0.00	1.00	0.00	34.45	250.19	2.00	0.00	1.00	0.00
34.61	229.83	2.00	0.00	1.00	0.00	34.78	218.81	2.00	0.00	1.00	0.00
34.94	223.14	2.00	0.00	1.00	0.00	35.10	222.94	2.00	0.00	1.00	0.00
35.27	213.41	2.00	0.00	1.00	0.00	35.43	200.29	2.00	0.00	1.00	0.00
35.60	185.17	0.79	0.83	1.00	0.02	35.76	169.68	0.63	1.41	1.00	0.03
35.92	153.70	0.49	1.64	1.00	0.03	36.09	144.49	0.42	1.73	1.00	0.03
36.25	143.55	0.42	1.74	1.00	0.03	36.42	148.94	0.46	1.69	1.00	0.03

:: 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)
36.58	159.07	2.00	0.00	1.00	0.00	36.74	166.16	2.00	0.00	1.00	0.00
36.91	171.62	0.65	1.39	1.00	0.03	37.07	172.56	0.66	1.13	1.00	0.02
37.24	167.42	0.61	1.44	1.00	0.03	37.40	157.04	0.52	1.61	1.00	0.03
37.57	147.92	0.45	1.69	1.00	0.03	37.73	165.64	0.59	1.46	1.00	0.03
37.89	205.14	2.00	0.00	1.00	0.00	38.06	237.69	2.00	0.00	1.00	0.00
38.22	229.79	2.00	0.00	1.00	0.00	38.39	209.05	2.00	0.00	1.00	0.00
38.55	179.06	0.72	1.08	1.00	0.02	38.71	163.02	0.57	1.49	1.00	0.03
38.88	160.91	0.55	1.52	1.00	0.03	39.04	155.74	2.00	0.00	1.00	0.00
39.21	152.68	2.00	0.00	1.00	0.00	39.37	160.85	2.00	0.00	1.00	0.00
39.53	170.00	2.00	0.00	1.00	0.00	39.70	175.96	0.69	1.10	1.00	0.02
39.86	175.87	0.69	1.10	1.00	0.02	40.03	171.28	0.65	1.39	1.00	0.03
40.19	167.38	0.61	1.44	1.00	0.03	40.35	163.39	0.57	1.49	1.00	0.03
40.52	153.92	2.00	0.00	1.00	0.00	40.68	137.00	2.00	0.00	1.00	0.00
40.85	116.15	2.00	0.00	1.00	0.00	41.01	105.49	2.00	0.00	1.00	0.00
41.17	101.61	2.00	0.00	1.00	0.00	41.34	103.15	2.00	0.00	1.00	0.00
41.50	102.67	2.00	0.00	1.00	0.00	41.67	101.18	2.00	0.00	1.00	0.00
41.83	98.68	2.00	0.00	1.00	0.00	41.99	96.66	2.00	0.00	1.00	0.00
42.16	95.01	2.00	0.00	1.00	0.00	42.32	94.56	2.00	0.00	1.00	0.00
42.49	95.47	2.00	0.00	1.00	0.00	42.65	97.60	2.00	0.00	1.00	0.00
42.81	98.70	2.00	0.00	1.00	0.00	42.98	97.55	2.00	0.00	1.00	0.00
43.14	94.77	2.00	0.00	1.00	0.00	43.31	92.54	2.00	0.00	1.00	0.00
43.47	92.16	2.00	0.00	1.00	0.00	43.63	93.99	2.00	0.00	1.00	0.00
43.80	97.09	2.00	0.00	1.00	0.00	43.96	100.19	2.00	0.00	1.00	0.00
44.13	102.63	2.00	0.00	1.00	0.00	44.29	103.46	2.00	0.00	1.00	0.00
44.45	105.04	2.00	0.00	1.00	0.00	44.62	111.12	2.00	0.00	1.00	0.00
44.78	124.01	2.00	0.00	1.00	0.00	44.95	141.67	2.00	0.00	1.00	0.00
45.11	161.89	2.00	0.00	1.00	0.00	45.28	170.04	2.00	0.00	1.00	0.00
45.44	168.77	2.00	0.00	1.00	0.00	45.60	163.76	0.59	1.48	1.00	0.03
45.77	160.75	0.56	1.52	1.00	0.03	45.93	158.83	0.55	1.60	1.00	0.03
46.10	171.25	0.66	1.15	1.00	0.02	46.26	193.23	0.91	0.59	1.00	0.01
46.42	201.35	2.00	0.00	1.00	0.00	46.59	204.18	2.00	0.00	1.00	0.00
46.75	204.40	2.00	0.00	1.00	0.00	46.92	205.17	2.00	0.00	1.00	0.00
47.08	198.38	0.98	0.47	1.00	0.01	47.24	187.11	0.84	0.81	1.00	0.02
47.41	163.81	0.60	1.48	1.00	0.03	47.57	154.16	0.52	1.64	1.00	0.03
47.74	155.10	2.00	0.00	1.00	0.00	47.90	146.95	2.00	0.00	1.00	0.00
48.06	139.44	2.00	0.00	1.00	0.00	48.23	142.38	2.00	0.00	1.00	0.00
48.39	157.07	2.00	0.00	1.00	0.00	48.56	168.10	2.00	0.00	1.00	0.00
48.72	173.16	2.00	0.00	1.00	0.00	48.88	170.65	2.00	0.00	1.00	0.00
49.05	169.59	2.00	0.00	1.00	0.00	49.21	166.80	0.63	1.45	1.00	0.03
49.38	166.37	0.63	1.45	1.00	0.03	49.54	165.35	0.62	1.46	1.00	0.03
49.70	163.43	0.60	1.49	1.00	0.03	49.87	134.77	0.38	1.83	1.00	0.04
50.03	136.86	0.40	1.81	1.00	0.04	50.20	-1.00	2.00	0.00	1.00	0.00
50.36	-1.00	2.00	0.00	1.00	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)

Total estimated settlement: 2.77

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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.16	14.64	23.50	3.67	86.30	2.65	N/A	N/A
0.33	16.77	26.92	3.34	89.93	2.60	N/A	N/A
0.49	18.09	29.02	3.26	94.72	2.59	N/A	N/A
0.66	18.30	29.35	3.35	98.27	2.60	N/A	N/A
0.82	19.35	31.01	3.14	97.44	2.57	N/A	N/A
0.98	21.83	34.98	2.76	96.58	2.50	N/A	N/A
1.15	27.45	44.00	2.17	95.49	2.36	N/A	N/A
1.31	37.03	59.38	1.65	97.91	2.19	N/A	N/A
1.48	47.25	75.77	1.37	103.58	2.05	N/A	N/A
1.64	52.34	83.94	1.27	106.99	1.98	N/A	N/A
1.80	50.69	81.28	1.29	104.74	1.99	N/A	N/A
1.97	47.23	75.70	1.33	100.52	2.02	N/A	N/A
2.13	45.27	72.54	1.36	98.59	2.04	N/A	N/A
2.30	45.21	72.42	1.36	98.73	2.04	N/A	N/A
2.46	49.01	78.52	1.31	103.16	2.01	N/A	N/A
2.63	55.44	88.83	1.24	110.19	1.95	N/A	N/A
2.79	64.37	103.17	1.18	121.57	1.89	N/A	N/A
2.95	77.61	124.42	1.17	145.40	1.88	N/A	N/A
3.12	92.83	148.85	1.22	180.94	1.93	N/A	N/A
3.28	100.17	160.63	1.37	219.94	2.05	N/A	N/A
3.44	94.79	151.97	1.58	240.05	2.16	N/A	N/A
3.61	84.57	135.53	1.80	244.08	2.25	N/A	N/A
3.77	82.55	132.27	1.78	235.89	2.24	N/A	N/A
3.94	83.99	134.57	1.75	235.05	2.23	N/A	N/A
4.10	79.94	128.05	1.82	232.42	2.26	N/A	N/A
4.26	75.97	121.65	1.87	227.15	2.27	N/A	N/A
4.43	77.71	124.43	1.74	216.63	2.23	N/A	N/A
4.59	82.23	131.67	1.57	207.37	2.16	N/A	N/A
4.76	83.14	133.11	1.40	186.60	2.07	N/A	N/A
4.92	76.91	123.09	1.33	163.30	2.02	N/A	N/A
5.08	69.63	111.38	1.26	140.82	1.97	0.84	0.84
5.25	58.88	94.09	1.45	136.71	2.10	0.82	0.82
5.41	49.01	78.22	1.83	143.04	2.26	0.79	0.79
5.58	36.03	57.36	2.79	160.25	2.51	0.75	0.75
5.74	33.71	53.61	2.99	160.21	2.54	0.74	0.74
5.91	33.62	53.44	2.93	156.47	2.53	0.74	0.74
6.07	40.02	63.71	2.43	154.70	2.43	0.77	0.77
6.23	44.59	71.03	2.18	154.69	2.37	0.78	0.78
6.40	57.60	91.93	1.64	150.73	2.19	0.82	0.82
6.56	75.16	120.12	1.29	154.53	1.99	0.85	0.85
6.73	83.94	134.21	1.23	165.00	1.94	0.87	0.87
6.89	78.10	124.82	1.35	168.35	2.04	0.86	0.86
7.05	66.33	105.88	1.61	170.68	2.18	0.84	0.84
7.22	67.60	107.92	1.57	168.99	2.16	0.84	0.84
7.38	75.50	120.59	1.40	168.97	2.07	0.85	0.85
7.55	77.33	123.50	1.40	173.24	2.07	0.86	0.86
7.71	63.84	101.82	1.72	174.64	2.22	0.83	0.83
7.87	45.74	72.72	2.43	176.81	2.43	0.78	0.78

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.04	33.58	53.18	3.16	167.81	2.57	0.74	0.74
8.20	27.48	43.36	3.61	156.61	2.64	4.88	4.88
8.37	32.91	52.07	2.78	144.90	2.50	0.74	0.74
8.53	46.42	73.75	2.09	153.86	2.34	0.79	0.79
8.69	62.24	99.16	1.67	166.02	2.20	0.83	0.83
8.86	63.96	101.91	1.74	176.95	2.23	0.83	0.83
9.02	54.76	87.10	2.00	174.60	2.32	0.81	0.81
9.19	52.93	84.15	2.08	174.95	2.34	0.80	0.80
9.35	67.24	107.12	1.71	183.56	2.22	0.84	0.84
9.51	85.08	135.77	1.47	199.73	2.11	0.87	0.87
9.68	102.44	163.65	1.31	214.49	2.01	0.90	0.90
9.84	115.82	183.64	1.20	221.24	1.92	0.92	0.92
10.01	126.25	194.99	1.15	224.18	1.86	0.93	0.93
10.17	117.62	183.33	1.20	219.24	1.91	0.92	0.92
10.34	91.02	145.22	1.42	205.90	2.08	0.88	0.88
10.50	61.00	96.97	2.02	195.42	2.32	0.82	0.82
10.66	37.89	59.83	3.10	185.63	2.56	0.76	0.76
10.83	26.57	41.63	4.12	171.68	2.72	3.88	3.88
10.99	26.94	42.21	3.79	160.04	2.67	3.89	3.89
11.15	35.81	56.44	2.91	164.41	2.53	0.75	0.75
11.32	49.11	77.79	2.28	177.27	2.39	0.79	0.79
11.48	56.91	90.31	2.14	192.87	2.35	0.81	0.81
11.65	56.34	89.38	2.13	190.04	2.35	0.81	0.81
11.81	46.56	73.65	2.44	179.70	2.43	0.79	0.79
11.97	35.62	56.05	2.77	155.20	2.50	0.75	0.75
12.14	24.24	37.75	3.89	146.98	2.69	3.25	3.25
12.30	16.98	26.08	5.14	134.14	2.84	2.22	2.22
12.47	12.65	19.11	6.88	131.42	3.01	1.62	1.62
12.63	37.04	57.91	2.01	116.45	2.32	0.75	0.75
12.79	91.27	126.02	1.12	141.34	1.82	0.86	0.86
12.96	153.01	201.41	1.00	201.41	1.54	0.93	0.93
13.12	193.10	253.27	1.00	253.27	1.40	0.97	0.97
13.29	204.77	267.42	1.00	267.42	1.35	0.98	0.98
13.45	204.89	266.38	1.00	266.38	1.35	0.98	0.98
13.62	198.28	256.58	1.00	256.58	1.43	0.97	0.97
13.78	188.69	242.98	1.00	242.98	1.55	0.96	0.96
13.94	179.36	230.19	1.00	230.40	1.65	0.95	0.95
14.11	169.31	220.17	1.06	232.34	1.73	0.94	0.94
14.27	159.92	209.50	1.09	229.07	1.78	0.94	0.94
14.44	148.96	196.09	1.13	221.12	1.83	0.93	0.93
14.60	126.44	167.65	1.18	197.59	1.89	0.90	0.90
14.76	95.03	129.00	1.34	173.33	2.03	0.86	0.86
14.93	62.31	87.98	1.84	162.07	2.27	0.81	0.81
15.09	47.72	69.10	2.46	169.86	2.43	0.78	0.78
15.26	78.33	106.31	1.49	158.88	2.12	0.84	0.84
15.42	128.07	162.64	1.11	180.36	1.80	0.90	0.90
15.58	177.71	217.78	1.00	217.78	1.61	0.94	0.94
15.75	189.74	231.62	1.00	231.62	1.62	0.95	0.95

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
15.91	175.46	216.41	1.05	227.14	1.72	0.94	0.94
16.08	142.71	179.91	1.15	207.72	1.86	0.91	0.91
16.24	120.24	153.36	1.25	191.14	1.96	0.89	0.89
16.40	128.78	161.32	1.17	189.38	1.88	0.90	0.90
16.57	153.79	187.98	1.09	203.97	1.77	0.92	0.92
16.73	172.47	207.67	1.04	216.53	1.71	0.94	0.94
16.90	172.63	207.10	1.05	216.46	1.71	0.94	0.94
17.06	171.50	204.26	1.03	211.14	1.69	0.93	0.93
17.22	169.26	200.13	1.02	204.39	1.68	0.93	0.93
17.39	169.12	198.64	1.01	200.52	1.66	0.93	0.93
17.55	175.18	204.34	1.00	204.34	1.62	0.93	0.93
17.72	180.92	210.27	1.00	210.27	1.57	0.94	0.94
17.88	177.88	205.95	1.00	205.95	1.60	0.93	0.93
18.05	152.65	178.58	1.06	189.84	1.74	0.91	0.91
18.21	113.05	136.22	1.27	172.56	1.97	0.87	0.87
18.37	80.77	99.67	1.64	163.36	2.19	0.83	0.83
18.54	74.61	91.96	1.73	159.01	2.22	0.82	0.82
18.70	80.77	98.13	1.56	153.20	2.15	0.82	0.82
18.86	79.70	96.40	1.57	151.62	2.16	0.82	0.82
19.03	60.63	74.44	2.07	153.99	2.34	0.79	0.79
19.19	41.19	51.43	3.12	160.68	2.57	0.74	0.74
19.36	26.40	33.19	4.64	153.93	2.78	2.43	2.43
19.52	19.30	24.09	5.80	139.72	2.91	1.73	1.73
19.68	15.71	19.30	6.59	127.17	2.99	1.38	1.38
19.85	15.19	18.48	6.69	123.69	3.00	1.32	1.32
20.01	15.52	18.79	6.43	120.75	2.97	1.34	1.34
20.18	15.20	18.26	6.34	115.89	2.96	1.30	1.30
20.34	14.27	16.93	6.64	112.37	2.99	1.21	1.21
20.50	12.61	14.68	7.57	111.16	3.07	1.05	1.05
20.67	11.61	13.31	8.55	113.83	3.15	0.95	0.95
20.83	12.25	14.03	8.53	119.66	3.15	1.00	1.00
21.00	14.59	16.93	7.88	133.29	3.10	1.21	1.21
21.16	17.93	21.03	7.17	150.78	3.04	1.50	1.50
21.32	22.77	26.95	6.18	166.48	2.95	1.93	1.93
21.49	28.14	33.25	5.55	184.60	2.88	2.39	2.39
21.65	32.83	38.65	5.17	199.98	2.84	2.79	2.79
21.82	37.27	43.65	4.87	212.44	2.81	3.16	3.16
21.98	37.49	43.61	4.84	211.02	2.81	3.16	3.16
22.15	38.10	43.91	4.51	198.12	2.77	3.19	3.19
22.31	43.35	49.41	3.76	185.96	2.67	3.62	3.62
22.47	55.55	62.65	2.96	185.65	2.54	0.76	0.76
22.64	62.70	70.32	2.80	196.69	2.51	0.78	0.78
22.80	57.29	64.08	3.11	199.01	2.56	0.77	0.77
22.97	51.98	57.71	3.15	181.91	2.57	0.75	0.75
23.13	66.45	72.44	2.08	150.43	2.34	0.78	0.78
23.29	91.23	97.60	1.43	139.65	2.09	0.82	0.82
23.46	116.14	122.44	1.19	146.09	1.90	0.86	0.86
23.62	129.75	135.56	1.12	151.47	1.81	0.87	0.87

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
23.79	143.23	148.40	1.06	157.13	1.73	0.88	0.88
23.95	153.00	157.95	1.05	165.69	1.72	0.89	0.89
24.11	159.96	164.80	1.06	173.94	1.73	0.90	0.90
24.28	174.23	178.87	1.04	186.78	1.71	0.91	0.91
24.44	180.39	185.14	1.07	198.46	1.75	0.92	0.92
24.61	158.53	163.20	1.16	190.07	1.87	0.90	0.90
24.77	111.44	115.59	1.52	175.12	2.13	0.85	0.85
24.93	68.96	71.83	2.44	175.44	2.43	0.78	0.78
25.10	74.47	77.11	2.23	171.99	2.38	0.79	0.79
25.26	89.28	91.68	1.78	163.29	2.24	0.82	0.82
25.43	105.21	107.21	1.50	160.74	2.12	0.84	0.84
25.59	100.69	102.13	1.50	153.59	2.13	0.83	0.83
25.75	102.70	103.62	1.43	148.50	2.09	0.83	0.83
25.92	102.13	102.55	1.40	143.60	2.07	0.83	0.83
26.08	92.55	92.63	1.49	138.07	2.12	0.82	0.82
26.25	70.31	70.16	1.88	131.92	2.28	0.78	0.78
26.41	46.36	45.87	2.72	124.76	2.49	0.72	0.72
26.57	27.61	26.79	4.42	118.29	2.76	1.93	1.93
26.74	19.28	18.23	6.41	116.83	2.97	1.30	1.30
26.90	17.14	15.93	7.30	116.25	3.05	1.14	1.14
27.07	20.84	19.63	6.09	119.47	2.94	1.40	1.40
27.23	25.37	24.06	4.98	119.85	2.82	1.73	1.73
27.39	27.11	25.70	4.99	128.32	2.82	1.84	1.84
27.56	24.83	23.34	6.04	141.03	2.93	1.67	1.67
27.72	24.09	22.49	6.65	149.53	2.99	1.61	1.61
27.89	28.87	27.10	5.59	151.47	2.89	1.94	1.94
28.05	34.45	32.44	4.61	149.71	2.78	2.32	2.32
28.21	34.93	32.74	4.46	146.08	2.76	2.35	2.35
28.38	30.37	28.13	4.90	137.87	2.81	2.01	2.01
28.54	24.19	21.98	5.66	124.30	2.90	1.57	1.57
28.71	19.72	17.53	6.33	111.03	2.96	1.25	1.25
28.87	16.83	14.63	7.06	103.35	3.03	1.05	1.05
29.04	16.31	14.06	7.15	100.55	3.04	1.00	1.00
29.20	17.05	14.71	6.86	100.96	3.01	1.05	1.05
29.36	17.70	15.25	6.69	102.09	3.00	1.09	1.09
29.53	17.64	15.13	6.74	101.98	3.00	1.08	1.08
29.69	16.69	14.15	7.32	103.54	3.05	1.01	1.01
29.86	16.00	13.43	8.26	110.88	3.13	0.96	0.96
30.02	16.14	13.49	8.95	120.79	3.18	0.96	0.96
30.18	33.10	29.36	4.55	133.69	2.77	2.10	2.10
30.35	45.99	41.31	3.47	143.23	2.62	2.95	2.95
30.51	54.09	48.66	3.49	169.76	2.63	3.47	3.47
30.68	68.65	61.98	3.07	190.39	2.56	0.76	0.76
30.84	82.03	74.11	2.75	203.67	2.50	0.79	0.79
31.00	88.59	79.90	2.35	188.09	2.41	0.80	0.80
31.17	65.49	58.31	2.73	159.38	2.49	0.75	0.75
31.33	43.85	38.22	3.55	135.54	2.63	2.72	2.72
31.50	34.01	29.05	4.73	137.49	2.79	2.07	2.07

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
31.66	31.18	26.30	5.96	156.75	2.93	1.88	1.88
31.82	32.26	27.13	6.02	163.40	2.93	1.94	1.94
31.99	28.63	23.76	6.39	151.70	2.97	1.70	1.70
32.15	23.93	19.48	6.89	134.25	3.01	1.39	1.39
32.32	18.85	14.90	8.25	122.86	3.13	1.06	1.06
32.48	18.80	14.78	8.99	132.87	3.18	1.06	1.06
32.64	25.88	20.91	7.71	161.20	3.08	1.49	1.49
32.81	44.90	37.53	4.94	185.48	2.82	2.67	2.67
32.97	55.93	47.11	4.17	196.67	2.72	3.34	3.34
33.14	55.21	46.24	4.31	199.17	2.74	3.28	3.28
33.30	46.31	38.16	5.35	203.99	2.86	2.72	2.72
33.47	64.94	54.33	3.88	210.72	2.68	3.84	3.84
33.63	115.20	98.61	2.12	208.71	2.35	0.83	0.83
33.79	186.18	161.83	1.38	223.64	2.06	0.90	0.90
33.96	239.66	209.72	1.17	246.35	1.88	0.94	0.94
34.12	271.91	238.28	1.11	265.57	1.81	0.96	0.96
34.28	273.48	238.95	1.12	266.78	1.81	0.96	0.96
34.45	257.05	223.84	1.12	250.19	1.81	0.95	0.95
34.61	240.24	208.74	1.10	229.83	1.79	0.94	0.94
34.78	238.27	207.19	1.06	218.81	1.73	0.94	0.94
34.94	246.89	214.49	1.04	223.14	1.70	0.94	0.94
35.10	245.59	212.68	1.05	222.94	1.72	0.94	0.94
35.27	225.73	193.99	1.10	213.41	1.79	0.92	0.92
35.43	197.54	167.94	1.19	200.29	1.90	0.90	0.90
35.60	166.61	139.98	1.32	185.17	2.02	0.88	0.88
35.76	140.52	116.80	1.45	169.68	2.10	0.85	0.85
35.92	121.73	100.36	1.53	153.70	2.14	0.83	0.83
36.09	106.41	86.89	1.66	144.49	2.20	0.81	0.81
36.25	87.61	70.36	2.04	143.55	2.33	0.78	0.78
36.42	67.79	53.17	2.80	148.94	2.51	0.74	0.74
36.58	55.95	42.94	3.70	159.07	2.66	3.00	3.00
36.74	61.39	47.20	3.52	166.16	2.63	3.29	3.29
36.91	70.83	54.78	3.13	171.62	2.57	0.75	0.75
37.07	74.79	57.85	2.98	172.56	2.54	0.75	0.75
37.24	76.48	59.10	2.83	167.42	2.51	0.76	0.76
37.40	85.84	66.87	2.35	157.04	2.41	0.77	0.77
37.57	119.40	95.42	1.55	147.92	2.15	0.82	0.82
37.73	178.46	147.02	1.13	165.64	1.83	0.88	0.88
37.89	244.82	205.14	1.00	205.14	1.56	0.93	0.93
38.06	283.88	237.69	1.00	237.69	1.47	0.96	0.96
38.22	275.09	229.79	1.00	229.79	1.56	0.95	0.95
38.39	238.36	196.71	1.06	209.05	1.74	0.93	0.93
38.55	173.58	139.14	1.29	179.06	1.99	0.87	0.87
38.71	112.90	87.26	1.87	163.02	2.27	0.81	0.81
38.88	67.11	49.46	3.25	160.91	2.59	0.73	0.73
39.04	55.99	40.46	3.85	155.74	2.68	2.82	2.82
39.21	52.53	37.61	4.06	152.68	2.71	2.62	2.62
39.37	50.70	35.90	4.48	160.85	2.76	2.52	2.52

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
39.53	65.30	47.14	3.61	170.00	2.64	3.26	3.26
39.70	86.41	63.66	2.76	175.96	2.50	0.77	0.77
39.86	103.60	77.29	2.28	175.87	2.39	0.79	0.79
40.03	102.78	76.48	2.24	171.28	2.38	0.79	0.79
40.19	93.87	69.14	2.42	167.38	2.43	0.78	0.78
40.35	79.46	57.50	2.84	163.39	2.51	0.75	0.75
40.52	58.97	41.38	3.72	153.92	2.66	2.86	2.86
40.68	39.70	26.63	5.14	137.00	2.84	1.88	1.88
40.85	27.04	17.28	6.72	116.15	3.00	1.23	1.23
41.01	20.28	12.47	8.46	105.49	3.14	0.89	0.89
41.17	18.22	10.97	9.26	101.61	3.20	0.78	0.78
41.34	18.76	11.31	9.12	103.15	3.19	0.81	0.81
41.50	19.12	11.51	8.92	102.67	3.18	0.82	0.82
41.67	19.08	11.44	8.84	101.18	3.17	0.82	0.82
41.83	17.69	10.44	9.45	98.68	3.21	0.75	0.75
41.99	16.97	9.91	9.76	96.66	3.24	0.71	0.71
42.16	16.72	9.70	9.80	95.01	3.24	0.69	0.69
42.32	17.05	9.89	9.56	94.56	3.22	0.71	0.71
42.49	17.63	10.24	9.32	95.47	3.21	0.73	0.73
42.65	18.52	10.81	9.03	97.60	3.18	0.77	0.77
42.81	19.90	11.71	8.43	98.70	3.14	0.84	0.84
42.98	21.10	12.48	7.82	97.55	3.09	0.89	0.89
43.14	21.31	12.58	7.53	94.77	3.07	0.90	0.90
43.31	20.45	11.95	7.74	92.54	3.09	0.85	0.85
43.47	19.17	11.05	8.34	92.16	3.13	0.79	0.79
43.63	18.67	10.68	8.80	93.99	3.17	0.76	0.76
43.80	18.82	10.74	9.04	97.09	3.18	0.77	0.77
43.96	19.35	11.05	9.07	100.19	3.19	0.79	0.79
44.13	19.62	11.19	9.17	102.63	3.19	0.80	0.80
44.29	19.52	11.09	9.33	103.46	3.21	0.79	0.79
44.45	19.91	11.30	9.30	105.04	3.20	0.81	0.81
44.62	20.31	11.52	9.65	111.12	3.23	0.82	0.82
44.78	21.31	12.13	10.22	124.01	3.27	0.87	0.87
44.95	24.58	14.21	9.97	141.67	3.25	1.02	1.02
45.11	36.25	21.74	7.45	161.89	3.06	1.55	1.55
45.28	56.91	35.83	4.75	170.04	2.80	2.50	2.50
45.44	75.26	49.07	3.44	168.77	2.62	3.34	3.34
45.60	77.65	50.78	3.22	163.76	2.58	0.74	0.74
45.77	80.19	52.56	3.06	160.75	2.55	0.74	0.74
45.93	115.57	79.11	2.01	158.83	2.32	0.79	0.79
46.10	168.09	119.77	1.43	171.25	2.09	0.85	0.85
46.26	219.05	160.40	1.20	193.23	1.92	0.90	0.90
46.42	240.85	178.60	1.13	201.35	1.83	0.91	0.91
46.59	254.21	190.51	1.07	204.18	1.75	0.92	0.92
46.75	260.70	196.46	1.04	204.40	1.70	0.93	0.93
46.92	263.61	198.66	1.03	205.17	1.69	0.93	0.93
47.08	257.91	194.55	1.02	198.38	1.67	0.93	0.93
47.24	234.39	173.97	1.08	187.11	1.76	0.91	0.91

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
47.41	184.26	131.75	1.24	163.81	1.95	0.87	0.87
47.57	120.16	80.45	1.92	154.16	2.29	0.80	0.80
47.74	73.03	45.48	3.41	155.10	2.61	3.07	3.07
47.90	48.93	28.66	5.13	146.95	2.84	2.01	2.01
48.06	44.43	25.62	5.44	139.44	2.87	1.81	1.81
48.23	40.98	23.13	6.16	142.38	2.95	1.65	1.65
48.39	43.89	24.79	6.34	157.07	2.96	1.77	1.77
48.56	52.62	30.32	5.54	168.10	2.88	2.14	2.14
48.72	58.70	34.22	5.06	173.16	2.83	2.39	2.39
48.88	67.77	40.36	4.23	170.65	2.73	2.77	2.77
49.05	81.67	49.89	3.40	169.59	2.61	3.36	3.36
49.21	98.32	61.59	2.71	166.80	2.49	0.76	0.76
49.38	103.46	65.10	2.56	166.37	2.46	0.77	0.77
49.54	97.62	60.76	2.72	165.35	2.49	0.76	0.76
49.70	98.13	61.01	2.68	163.43	2.48	0.76	0.76
49.87	127.72	84.43	1.60	134.77	2.17	0.80	0.80
50.03	180.41	130.04	1.05	136.86	1.72	0.86	0.86
50.20	237.74	-1.00	1.00	-1.00	-1.00	N/A	N/A
50.36	271.20	-1.00	1.00	-1.00	-1.00	N/A	N/A

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

Wood Rodgers, Inc.

GEOLOGISMIKI Geotechnical Software

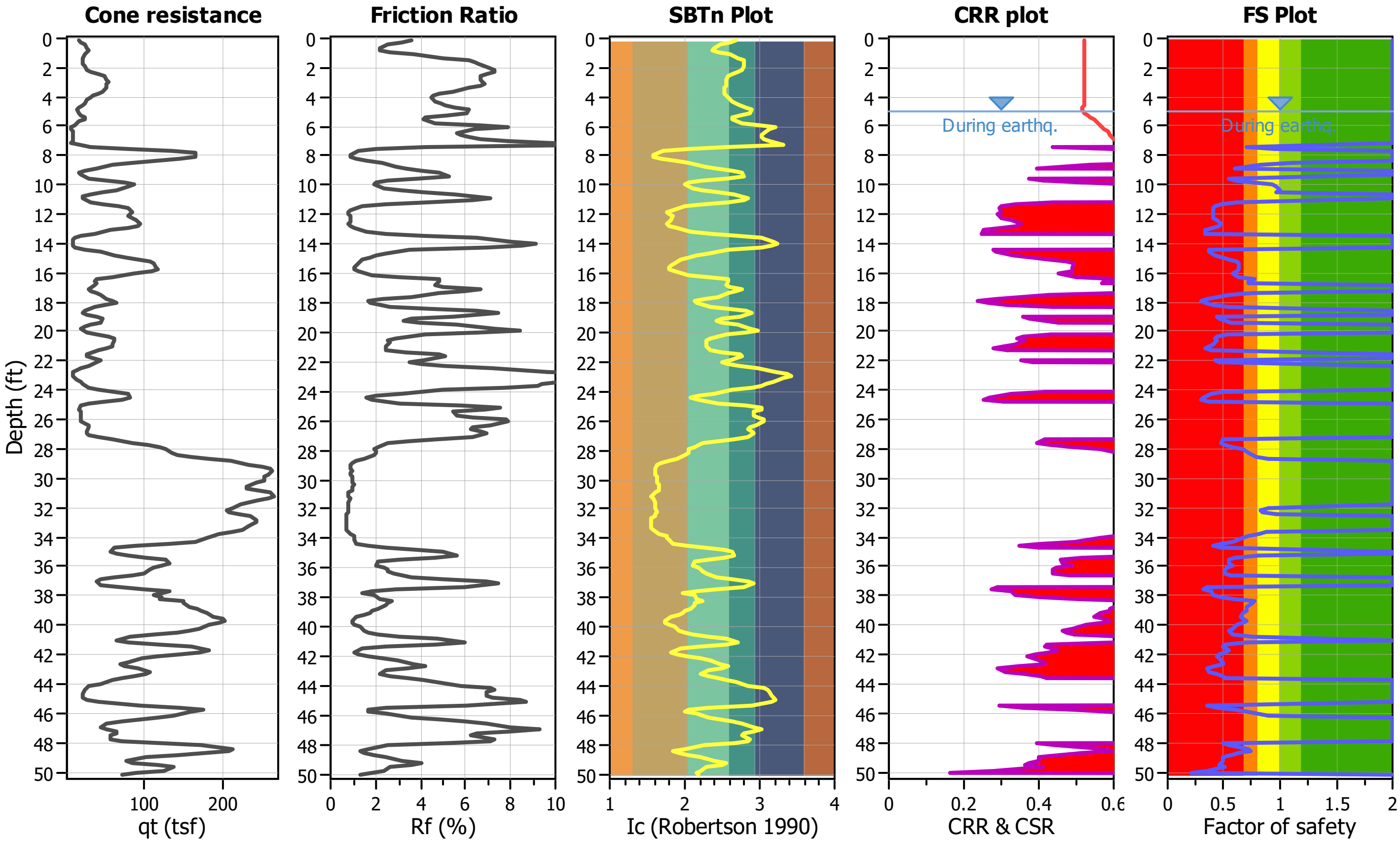
LIQUEFACTION ANALYSIS REPORT

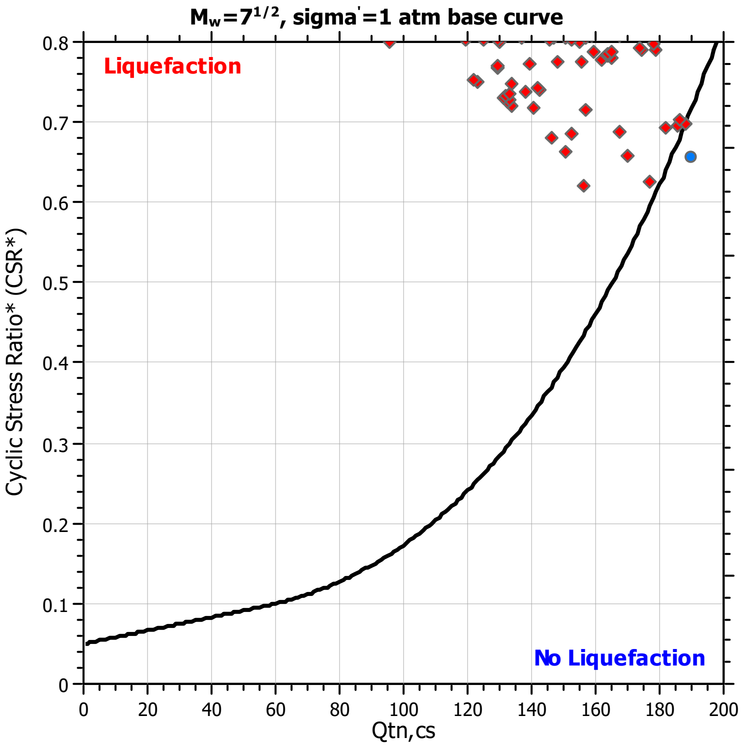
Project title : Lompa Ranch East **Location : Carson City, NV**

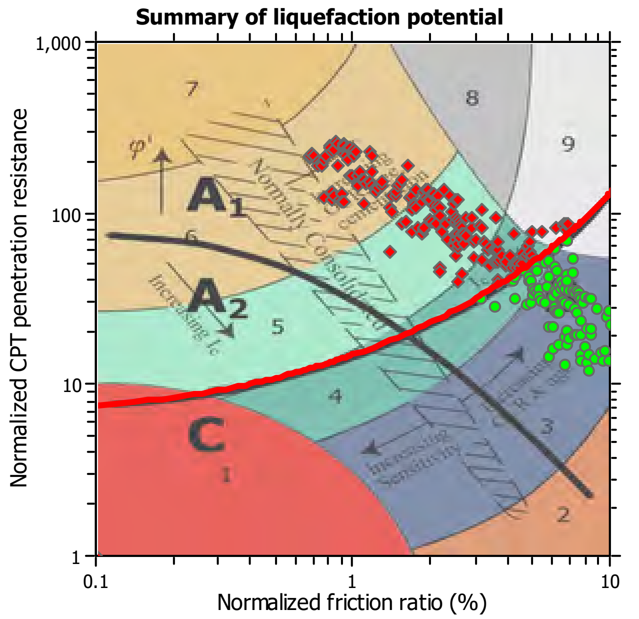
CPT file : CPT 2

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	5.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.96	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

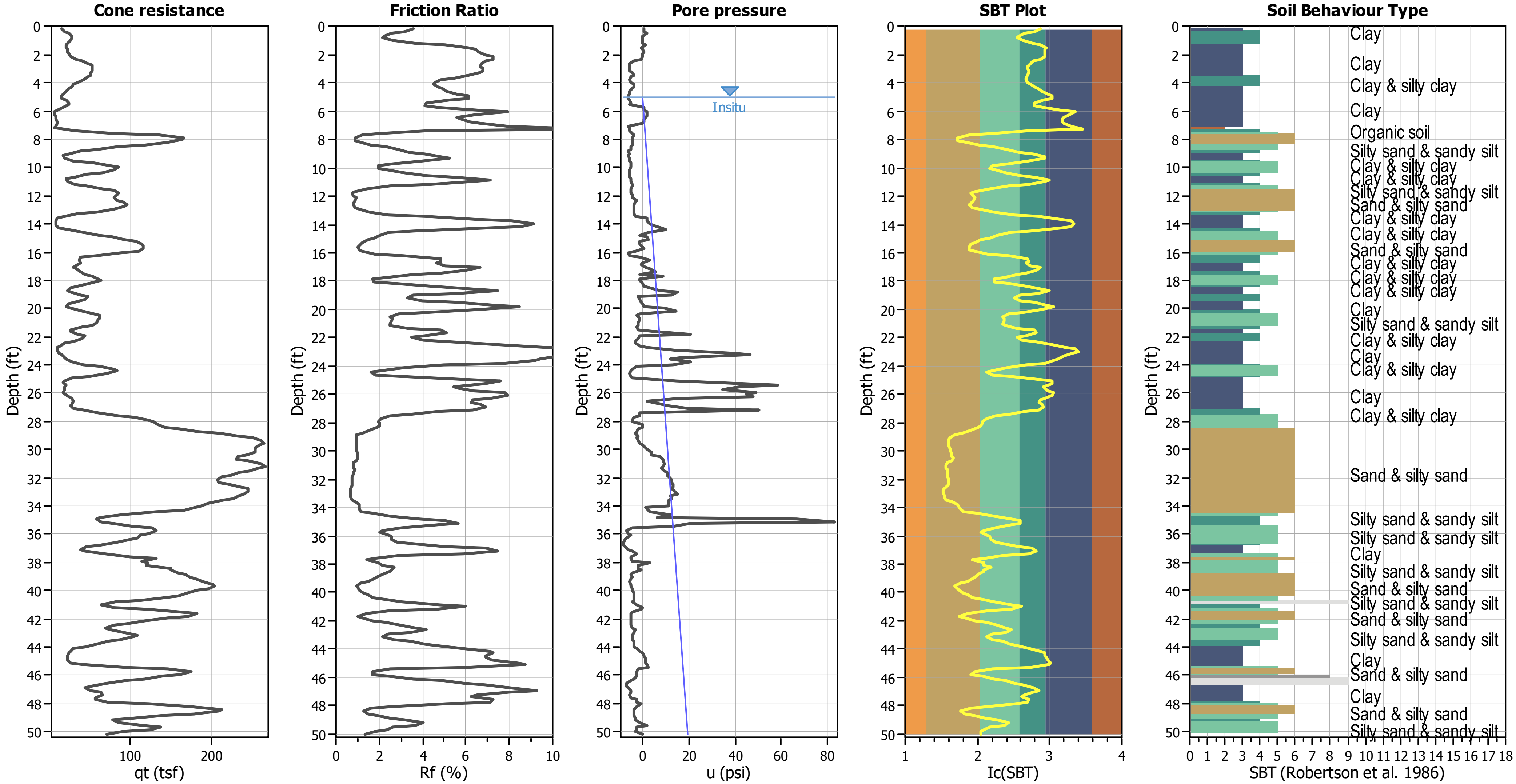






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



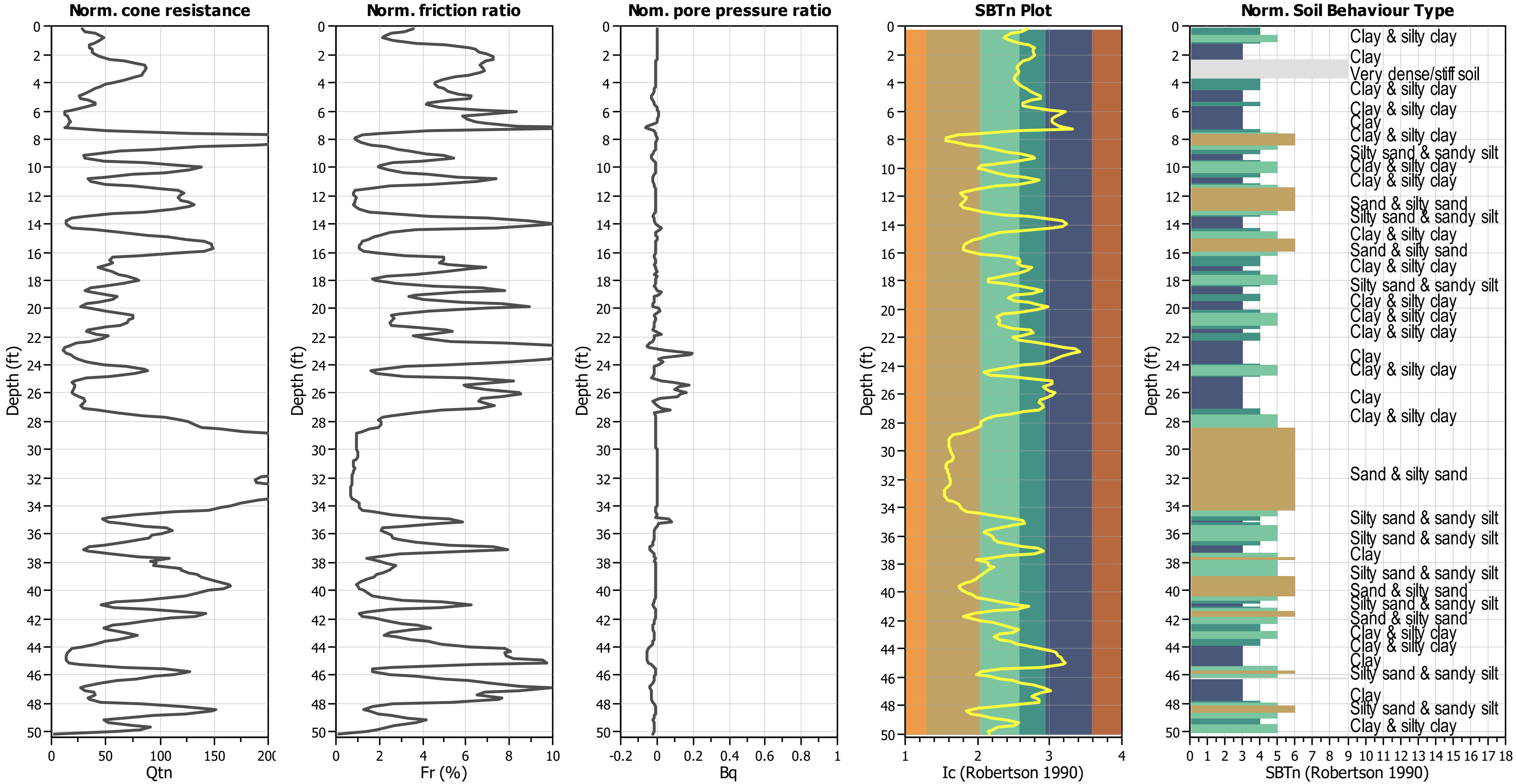
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



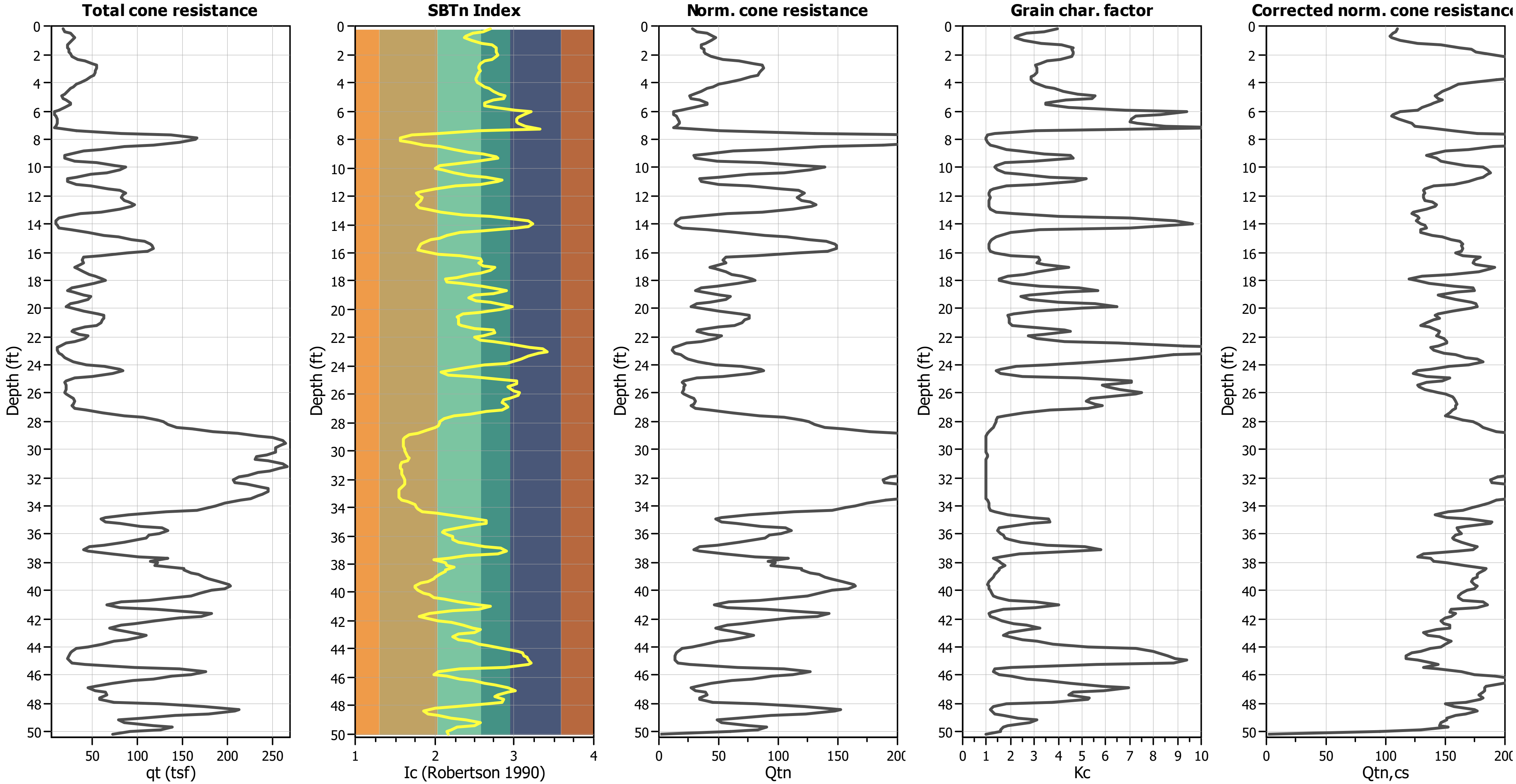
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to
- 9. Very stiff fine grained

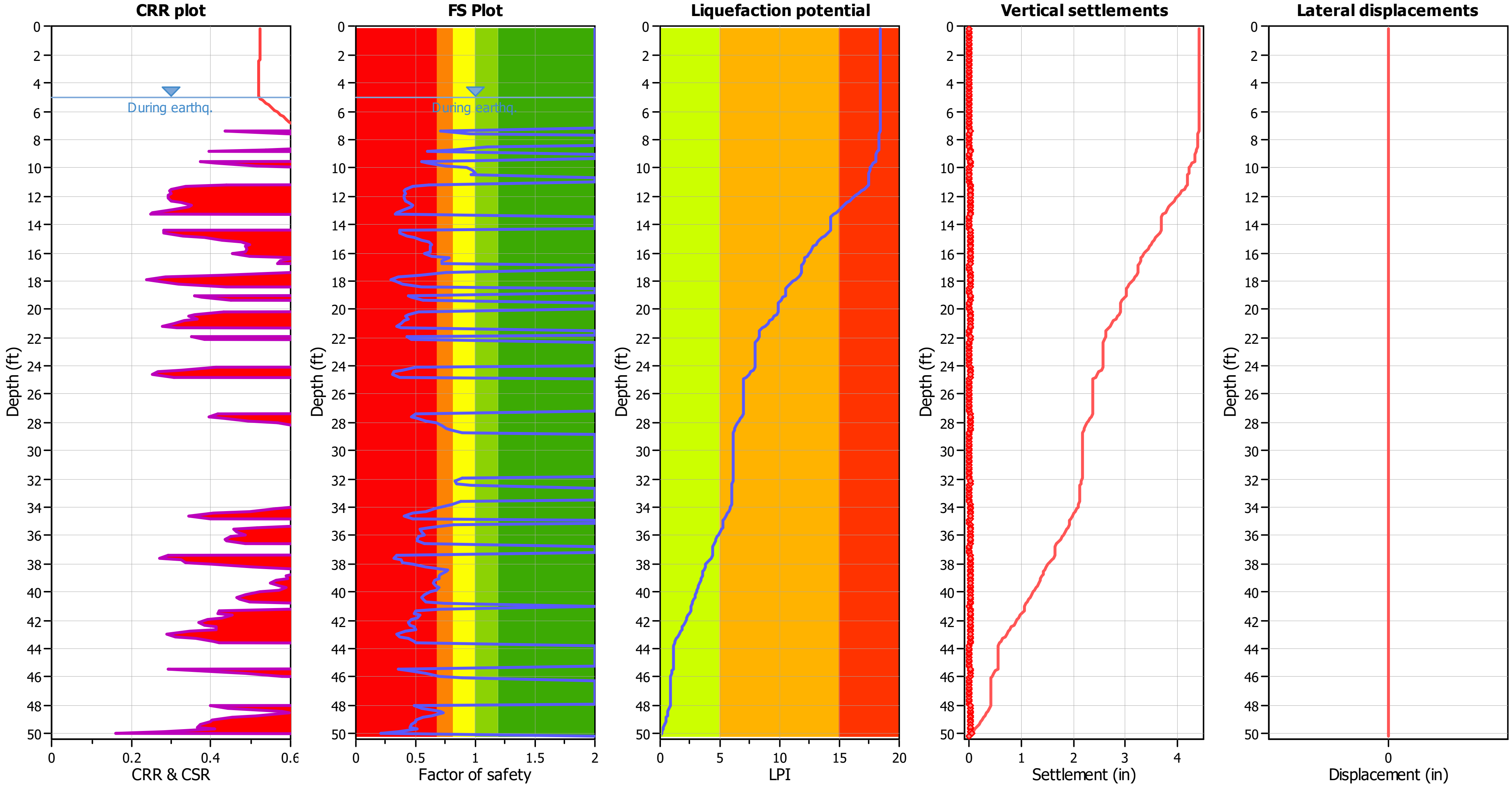
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

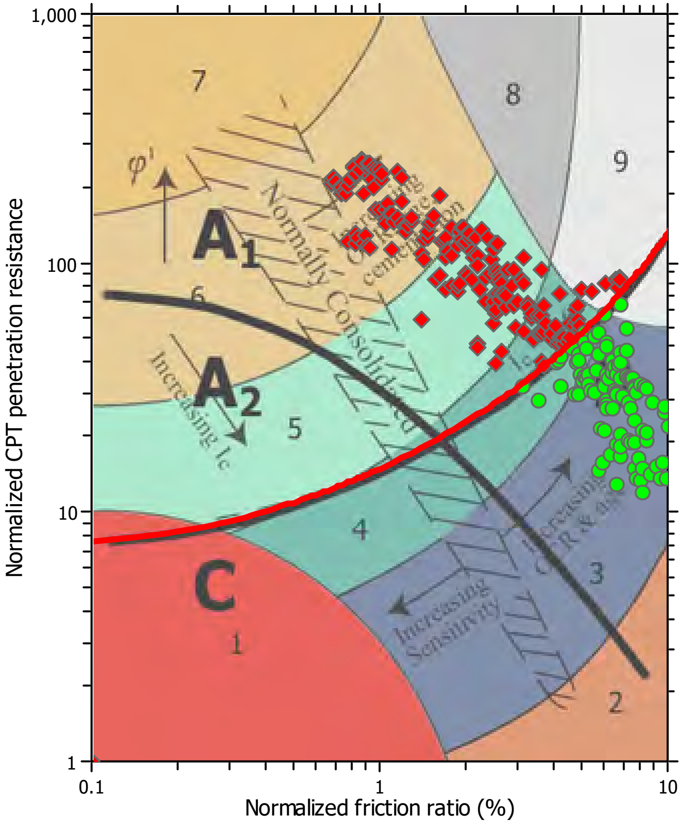
F.S. color scheme

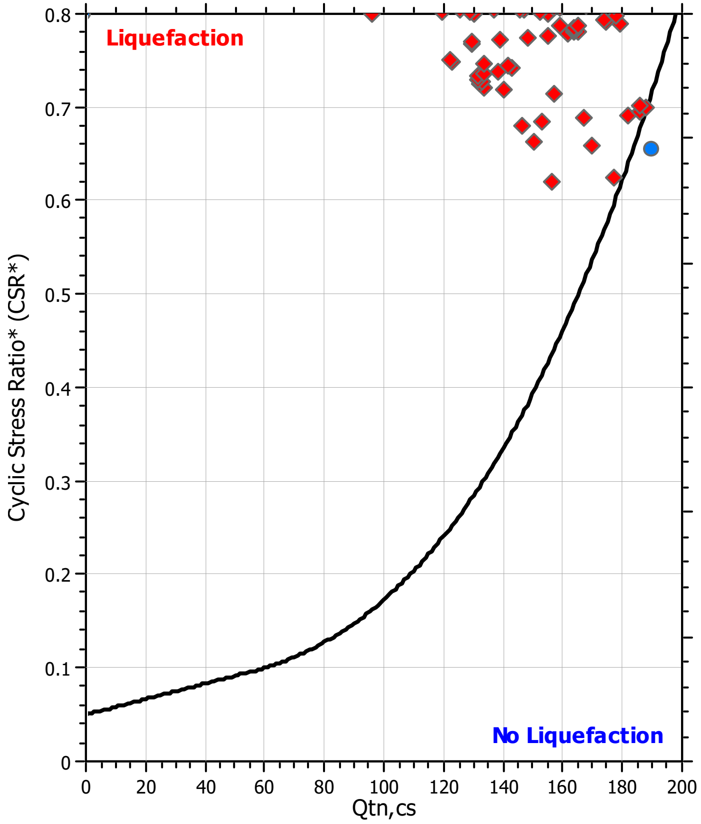
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

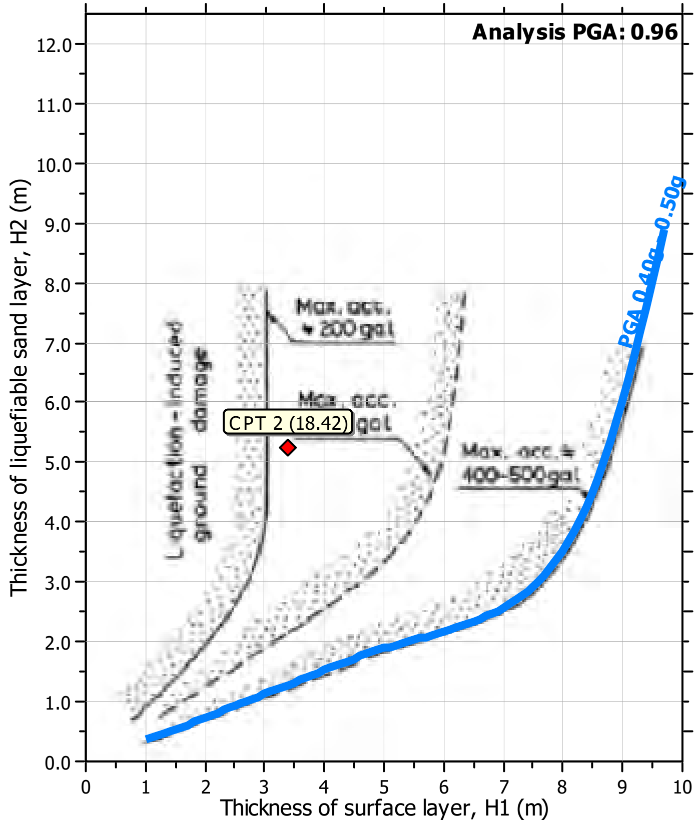
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



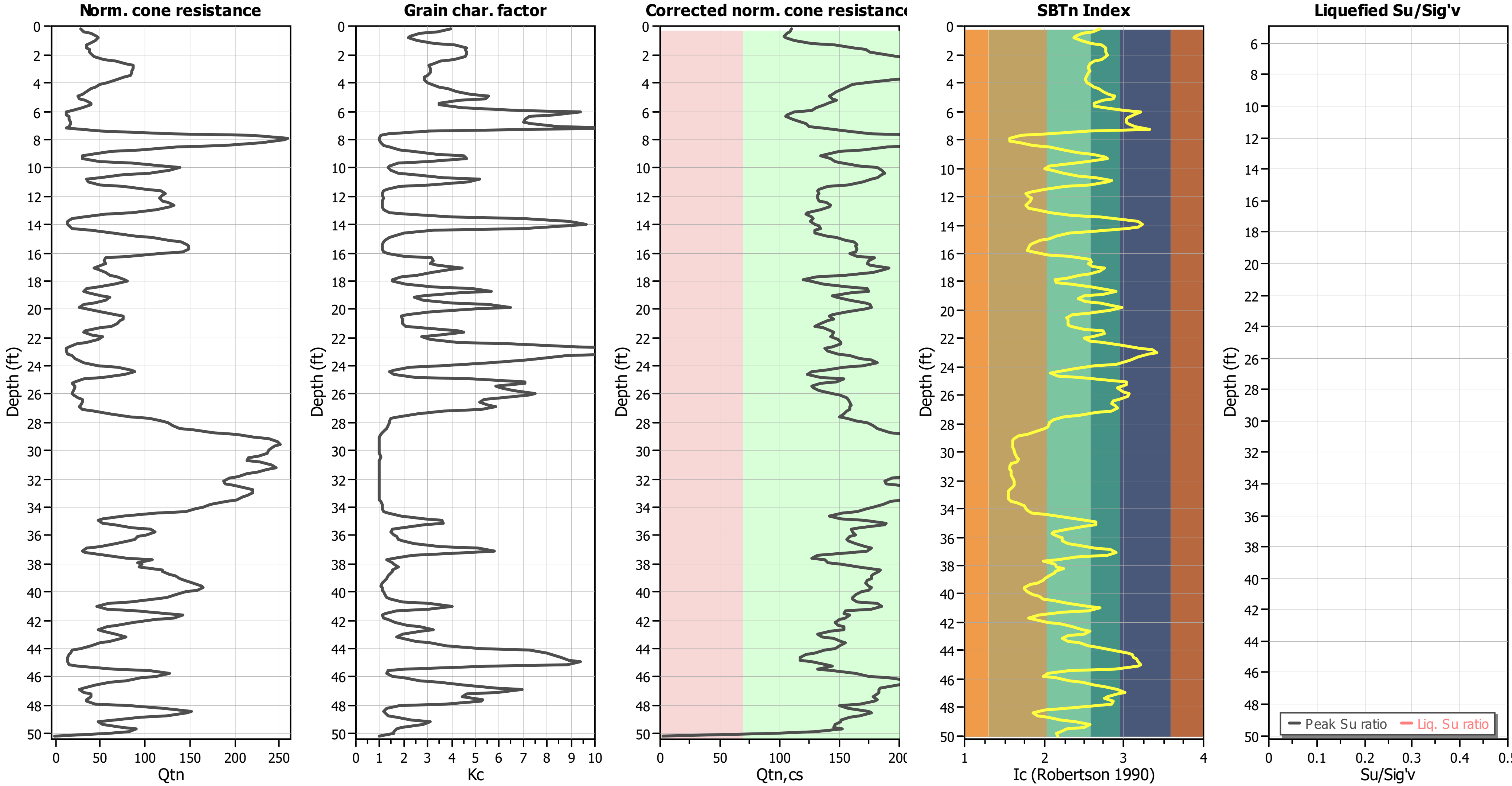




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

:: Field input data ::

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
1	0.16	16.35	0.60	0.31	40.06	113.70
2	0.33	19.20	0.66	0.25	36.21	114.08
3	0.49	23.36	0.61	1.83	29.71	114.73
4	0.66	31.79	0.62	0.11	26.01	114.98
5	0.82	30.23	0.64	0.04	25.32	115.36
6	0.98	27.37	0.68	-0.02	28.78	115.93
7	1.15	24.44	0.84	0.05	35.18	117.11
8	1.31	20.29	1.13	0.82	41.36	118.63
9	1.48	21.84	1.38	-0.72	44.97	119.97
10	1.64	23.69	1.52	0.03	44.73	120.93
11	1.80	24.63	1.60	0.44	44.82	121.27
12	1.97	23.15	1.57	-0.39	45.07	121.99
13	2.13	26.41	1.94	0.09	44.37	123.34
14	2.30	32.49	2.44	-0.93	41.08	125.39
15	2.46	42.37	2.96	-4.07	37.01	127.21
16	2.63	51.89	3.33	-5.99	34.43	128.58
17	2.79	54.55	3.68	-6.14	33.17	129.33
18	2.95	55.73	3.72	-5.97	33.38	129.60
19	3.12	53.77	3.69	-5.72	33.69	129.47
20	3.28	51.74	3.55	-4.38	33.50	129.12
21	3.44	53.03	3.28	-3.99	32.39	128.32
22	3.61	50.72	2.66	-5.04	31.48	126.82
23	3.77	41.48	1.97	-5.61	31.34	124.70
24	3.94	35.44	1.54	-5.05	32.63	122.62
25	4.10	31.25	1.40	-3.98	34.33	121.24
26	4.26	28.09	1.31	-3.94	36.58	120.45
27	4.43	25.55	1.25	-4.79	39.24	119.71
28	4.59	22.02	1.15	-5.57	42.06	118.69
29	4.76	18.79	0.98	-6.15	46.31	117.71
30	4.92	15.78	0.99	-6.53	50.90	117.00
31	5.08	14.39	1.01	-6.19	50.08	117.38
32	5.25	20.78	1.09	-5.97	42.93	118.55
33	5.41	29.35	1.25	-5.50	36.60	118.58
34	5.58	26.18	0.84	-5.69	36.51	118.35
35	5.74	19.89	1.00	0.46	43.79	116.30
36	5.91	9.40	0.75	0.25	59.08	114.45
37	6.07	6.26	0.58	1.63	73.93	111.67
38	6.23	7.52	0.51	1.96	67.59	110.86
39	6.40	11.07	0.51	1.82	61.54	111.02
40	6.56	9.56	0.55	0.75	60.38	112.07
41	6.73	9.88	0.71	0.69	60.11	113.20
42	6.89	13.21	0.76	0.11	61.88	113.59
43	7.05	9.24	0.67	-6.37	68.50	113.81
44	7.22	6.58	0.85	-6.12	82.55	114.90
45	7.38	8.63	1.29	-5.65	33.18	120.99
46	7.55	81.84	1.93	-4.41	14.14	124.65
47	7.71	154.00	1.72	-3.99	6.49	125.78
48	7.87	173.54	1.20	-4.80	3.82	125.32

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
49	8.04	168.70	1.35	-4.69	3.92	125.30
50	8.20	150.75	1.72	-4.55	6.03	126.26
51	8.37	119.03	1.99	-4.54	9.59	126.59
52	8.53	82.37	1.99	-4.91	14.76	125.90
53	8.69	55.18	1.78	-5.38	20.79	124.14
54	8.86	40.28	1.35	-6.32	27.23	121.29
55	9.02	23.65	0.84	-5.86	36.27	118.48
56	9.19	13.20	0.94	-6.44	44.31	116.79
57	9.35	20.16	0.97	-5.64	45.08	117.78
58	9.51	25.84	1.20	-5.70	32.69	119.98
59	9.68	47.13	1.44	-4.99	20.56	122.39
60	9.84	88.60	1.53	-5.17	14.54	123.79
61	10.01	92.29	1.53	-5.50	13.22	124.94
62	10.17	79.90	1.97	-5.62	15.86	125.62
63	10.34	67.65	2.18	-5.69	20.65	125.77
64	10.50	50.38	2.03	-5.73	27.87	124.67
65	10.66	25.15	1.71	-5.79	37.78	122.81
66	10.83	20.14	1.52	-5.33	48.81	121.04
67	10.99	20.47	1.45	-4.92	45.56	120.65
68	11.15	28.67	1.39	-4.74	33.77	120.96
69	11.32	46.69	1.24	-4.68	21.45	120.92
70	11.48	68.08	0.92	-5.11	13.07	120.07
71	11.65	85.91	0.67	-4.93	8.76	118.64
72	11.81	89.09	0.59	-5.06	7.55	118.16
73	11.97	84.30	0.73	-4.86	8.09	118.30
74	12.14	78.20	0.73	-4.75	8.91	118.80
75	12.30	82.13	0.76	-2.99	8.52	118.89
76	12.47	92.85	0.74	-3.32	7.79	119.23
77	12.63	97.33	0.78	-4.01	7.34	119.60
78	12.79	97.69	0.83	-3.98	8.09	119.91
79	12.96	82.69	0.87	-4.08	10.34	119.92
80	13.12	59.21	0.91	-4.03	15.41	119.43
81	13.29	33.91	0.93	-3.82	24.77	118.24
82	13.45	16.72	0.85	-3.50	40.78	116.39
83	13.62	10.74	0.76	1.85	60.09	114.63
84	13.78	8.95	0.76	1.98	71.19	113.90
85	13.94	8.91	0.80	3.07	75.19	114.44
86	14.11	9.66	0.96	4.11	70.54	114.97
87	14.27	11.97	0.86	8.32	60.13	115.58
88	14.44	16.46	0.83	9.90	34.38	117.62
89	14.60	49.42	1.08	2.31	23.13	120.04
90	14.76	66.18	1.32	-1.20	17.53	122.07
91	14.93	73.25	1.38	1.71	14.47	123.16
92	15.09	94.72	1.38	2.42	11.59	123.55
93	15.26	112.94	1.29	-1.52	9.44	123.60
94	15.42	114.16	1.23	-1.55	8.51	123.54
95	15.58	114.91	1.27	-0.81	8.04	123.22
96	15.75	118.36	1.11	0.17	8.02	123.30

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
97	15.91	117.01	1.26	-3.53	9.52	123.99
98	16.08	95.26	1.71	-6.30	14.25	124.72
99	16.24	51.86	1.89	-5.55	23.21	124.73
100	16.40	31.45	1.94	-1.12	34.10	123.97
101	16.57	34.95	1.90	3.24	34.74	123.49
102	16.73	46.63	1.61	-0.37	33.45	123.72
103	16.90	37.90	2.02	-0.99	35.93	123.52
104	17.06	25.50	1.90	1.40	43.59	123.72
105	17.22	27.29	2.14	2.99	40.12	124.03
106	17.39	48.60	2.05	5.56	34.22	124.23
107	17.55	45.71	1.69	-1.30	28.58	123.16
108	17.72	42.42	1.15	8.58	21.56	121.48
109	17.88	72.78	0.84	-1.36	17.13	120.47
110	18.05	69.16	1.08	-1.64	17.24	121.33
111	18.21	51.02	1.48	0.14	24.00	122.12
112	18.37	32.88	1.53	0.45	34.72	122.43
113	18.54	25.70	1.76	3.15	46.43	122.20
114	18.70	20.70	1.85	7.17	51.76	121.79
115	18.86	21.97	1.49	14.85	42.87	121.52
116	19.03	40.74	1.26	12.19	30.87	121.98
117	19.19	58.36	1.58	-2.08	27.65	123.00
118	19.36	44.25	1.86	-1.57	31.13	123.65
119	19.52	30.79	1.82	-0.52	40.82	123.29
120	19.68	24.15	1.86	-0.30	50.85	122.42
121	19.85	19.13	1.74	0.67	56.80	122.06
122	20.01	20.62	1.82	9.60	47.55	122.58
123	20.18	41.03	1.81	14.47	33.51	123.19
124	20.34	60.21	1.46	-1.48	24.50	123.60
125	20.50	67.35	1.56	-2.55	21.73	123.78
126	20.67	62.29	1.74	-1.29	22.36	124.16
127	20.83	60.25	1.72	-1.59	22.58	123.54
128	21.00	59.46	1.22	-2.13	22.35	122.99
129	21.16	58.54	1.43	-2.35	23.71	122.09
130	21.32	43.22	1.35	-2.98	30.54	121.86
131	21.49	24.51	1.43	-2.35	42.53	120.68
132	21.65	16.72	1.32	4.14	43.95	120.74
133	21.82	40.41	1.42	20.46	36.19	121.83
134	21.98	49.78	1.68	-1.27	30.46	122.86
135	22.15	44.73	1.60	-1.88	33.83	122.95
136	22.31	28.54	1.64	-3.13	42.32	121.90
137	22.47	18.94	1.45	-3.14	57.12	120.41
138	22.64	13.44	1.31	-1.42	73.15	119.00
139	22.80	9.98	1.33	1.58	85.82	118.18
140	22.97	9.85	1.32	13.61	90.64	118.62
141	23.13	11.48	1.61	38.79	81.63	119.62
142	23.29	15.86	1.66	46.31	70.82	120.92
143	23.46	20.54	1.78	16.48	64.16	122.05
144	23.62	21.73	2.11	11.80	60.83	123.18

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
145	23.79	24.33	2.32	20.60	51.59	124.41
146	23.95	40.74	2.30	13.07	36.99	125.21
147	24.11	65.81	1.94	-2.55	25.69	125.47
148	24.28	82.72	1.78	-4.46	18.20	124.64
149	24.44	92.77	1.24	-4.95	15.44	123.13
150	24.61	75.81	0.96	-6.05	18.23	122.75
151	24.77	48.79	1.77	-5.20	28.50	122.98
152	24.93	26.01	1.89	-4.46	46.56	122.54
153	25.10	14.75	1.51	14.58	60.32	120.76
154	25.26	19.52	1.21	29.29	60.55	119.14
155	25.43	19.94	1.09	58.33	53.17	118.75
156	25.59	22.00	1.16	42.01	54.12	118.81
157	25.75	18.53	1.25	34.51	57.51	119.34
158	25.92	17.78	1.41	49.04	62.96	120.37
159	26.08	19.30	1.81	44.52	61.42	121.27
160	26.25	23.09	1.70	47.98	54.62	122.43
161	26.41	32.03	1.88	15.37	49.70	122.97
162	26.57	31.22	1.96	1.54	48.48	123.29
163	26.74	27.93	1.85	7.95	50.97	123.22
164	26.90	27.05	1.94	10.61	52.99	122.96
165	27.07	26.29	1.86	19.56	49.18	123.36
166	27.23	36.60	1.95	50.16	38.09	124.58
167	27.39	64.33	2.25	-1.24	28.53	125.87
168	27.56	81.44	2.23	-1.47	20.52	126.67
169	27.72	109.67	1.94	-3.76	16.43	127.42
170	27.89	126.43	2.44	-4.87	14.50	128.19
171	28.05	128.20	2.64	-4.42	14.50	129.10
172	28.21	130.66	2.71	-0.16	14.18	129.55
173	28.38	143.80	2.81	-0.27	13.12	129.66
174	28.54	153.59	2.60	-2.00	10.50	129.24
175	28.71	183.37	1.96	-2.83	7.77	128.65
176	28.87	212.94	1.94	-3.14	5.61	128.40
177	29.04	236.29	2.10	-1.91	4.88	129.06
178	29.20	248.77	2.32	-2.38	4.54	129.76
179	29.36	263.30	2.41	-2.16	4.39	130.27
180	29.53	270.61	2.49	-1.22	4.28	130.27
181	29.69	257.57	2.30	-0.27	4.44	130.15
182	29.86	247.37	2.34	0.82	4.71	130.15
183	30.02	254.33	2.54	1.81	4.81	130.26
184	30.18	257.31	2.41	3.45	5.05	130.52
185	30.35	245.12	2.61	3.88	5.35	130.22
186	30.51	224.09	2.33	7.23	5.57	129.69
187	30.68	223.55	2.00	8.48	5.21	129.10
188	30.84	240.85	2.09	8.83	4.24	128.83
189	31.00	270.11	1.96	9.31	3.86	129.27
190	31.17	268.92	2.25	8.57	3.76	129.46
191	31.33	257.33	2.22	8.21	4.13	129.43
192	31.50	244.09	2.00	9.12	4.24	128.80

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
193	31.66	234.76	1.81	10.47	4.27	127.93
194	31.82	220.27	1.63	10.30	4.41	127.33
195	31.99	212.75	1.66	11.01	4.60	126.73
196	32.15	203.22	1.48	12.22	4.77	126.49
197	32.32	203.54	1.52	12.39	4.60	126.35
198	32.48	217.07	1.55	13.34	4.31	126.89
199	32.64	239.17	1.74	13.27	3.74	127.21
200	32.81	250.80	1.63	12.46	3.56	127.52
201	32.97	242.12	1.71	13.69	3.53	127.42
202	33.14	238.40	1.67	14.87	3.61	127.14
203	33.30	234.37	1.47	12.11	3.67	126.87
204	33.47	228.09	1.56	12.50	4.18	127.04
205	33.63	214.93	1.84	11.34	5.44	127.88
206	33.79	198.74	2.17	11.47	7.11	128.46
207	33.96	175.51	2.19	11.02	7.40	127.91
208	34.12	185.69	1.48	1.04	7.85	127.73
209	34.28	177.48	2.10	2.43	9.04	127.62
210	34.45	134.69	2.27	3.00	13.76	128.03
211	34.61	83.23	2.32	11.86	21.59	127.18
212	34.78	52.55	2.16	6.37	31.77	126.91
213	34.94	54.13	2.82	66.92	37.33	128.16
214	35.10	67.64	3.91	83.15	37.79	129.86
215	35.27	69.09	4.16	20.43	31.68	130.57
216	35.43	100.69	3.10	13.19	22.65	129.97
217	35.60	139.15	2.18	-4.79	16.51	129.40
218	35.76	141.76	2.87	-6.87	15.67	129.47
219	35.92	117.42	3.06	-6.31	18.07	129.96
220	36.09	111.28	2.96	-5.27	19.60	129.41
221	36.25	109.00	2.48	-6.84	20.09	129.20
222	36.42	107.34	2.90	-7.72	22.22	129.14
223	36.58	85.55	3.12	-8.37	27.52	129.21
224	36.74	60.83	3.08	-8.21	36.87	128.80
225	36.91	43.07	3.29	-7.50	48.23	128.09
226	37.07	34.83	3.18	-6.25	52.61	127.38
227	37.24	43.65	2.58	-4.62	45.86	126.84
228	37.40	57.97	2.33	-2.39	27.10	125.81
229	37.57	110.96	1.15	-5.40	17.74	126.02
230	37.73	133.65	2.07	-4.92	12.46	126.63
231	37.89	154.67	2.28	-4.55	17.14	127.71
232	38.06	54.06	2.36	2.94	17.45	129.03
233	38.22	156.73	3.23	-2.13	20.23	130.52
234	38.39	147.08	4.12	-2.33	17.11	132.25
235	38.55	147.37	4.02	-0.90	16.92	132.15
236	38.71	158.01	3.06	-4.46	14.90	131.54
237	38.88	171.72	3.05	-5.30	13.27	131.13
238	39.04	173.46	3.30	-4.62	12.41	130.92
239	39.21	173.94	2.71	-5.25	10.71	130.02
240	39.37	190.89	1.90	-5.96	8.48	128.71

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
241	39.53	202.84	1.89	-5.31	6.94	128.00
242	39.70	208.62	1.99	-5.09	7.01	128.27
243	39.86	198.10	2.10	-4.82	7.95	128.70
244	40.03	181.47	2.32	-4.54	9.59	129.13
245	40.19	167.05	2.55	-4.25	11.20	129.42
246	40.35	160.63	2.55	-3.84	12.80	129.66
247	40.52	148.67	2.74	-4.26	16.21	130.43
248	40.68	117.01	3.74	-4.01	22.79	130.70
249	40.85	70.15	3.67	-4.42	33.29	130.97
250	41.01	59.12	4.28	-2.71	40.86	130.47
251	41.17	67.40	3.82	0.11	33.25	130.68
252	41.34	116.38	3.19	-0.59	19.62	129.93
253	41.50	178.36	1.90	-4.53	11.39	128.60
254	41.67	190.11	1.66	-4.94	8.33	127.61
255	41.83	177.40	2.11	-5.10	9.96	128.18
256	41.99	145.12	2.49	-5.03	13.98	129.03
257	42.16	116.02	2.80	-4.98	19.05	129.15
258	42.32	94.81	2.78	-4.93	24.58	129.08
259	42.49	79.74	2.96	-5.00	30.00	128.97
260	42.65	69.22	3.18	-4.38	34.37	128.44
261	42.81	60.31	2.58	-3.52	30.34	127.74
262	42.98	95.96	1.97	-3.97	22.79	127.28
263	43.14	123.78	2.21	-4.68	19.64	127.98
264	43.31	107.71	2.88	-4.67	22.70	129.05
265	43.47	80.12	3.22	-4.57	28.14	129.23
266	43.63	75.98	2.90	-4.22	33.36	128.86
267	43.80	66.12	2.95	-4.17	38.99	127.78
268	43.96	38.54	2.53	-3.92	49.07	126.46
269	44.13	28.91	2.26	-3.00	61.49	124.60
270	44.29	27.19	1.94	-1.52	65.73	123.35
271	44.45	26.07	1.75	-0.10	66.89	122.30
272	44.62	23.07	1.59	0.41	69.17	121.57
273	44.78	21.74	1.56	0.81	70.97	121.59
274	44.95	24.11	1.80	1.13	73.82	123.00
275	45.11	24.94	2.59	1.25	70.74	124.57
276	45.28	31.87	2.67	1.95	51.53	126.22
277	45.44	69.74	2.35	2.24	23.24	127.71
278	45.60	185.63	2.08	-2.10	14.30	128.97
279	45.77	184.55	2.89	-2.48	12.67	130.69
280	45.93	156.20	3.76	-2.79	17.33	132.61
281	46.10	139.27	5.06	-2.91	23.39	133.98
282	46.26	121.23	5.98	-3.98	29.98	134.71
283	46.42	93.65	6.22	-5.39	36.36	134.04
284	46.59	70.57	4.73	-6.91	43.97	132.41
285	46.75	51.15	3.94	-7.13	52.91	130.50
286	46.92	37.57	4.00	-6.31	59.76	130.06
287	47.08	47.23	4.65	-4.90	53.27	130.48
288	47.24	73.63	4.01	-5.15	45.10	130.90

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
289	47.41	72.18	3.90	-5.81	43.81	130.80
290	47.57	52.06	4.38	-5.41	49.52	130.69
291	47.74	49.58	4.35	-2.85	48.97	130.57
292	47.90	73.20	3.68	-2.45	38.29	130.41
293	48.06	98.43	3.19	-1.07	21.18	130.49
294	48.23	198.09	2.69	-2.68	12.88	130.43
295	48.39	224.10	2.57	-3.65	9.32	130.66
296	48.56	214.54	2.90	-3.73	10.72	131.61
297	48.72	185.03	3.88	-3.71	14.05	131.85
298	48.88	137.85	3.37	-3.79	19.20	131.53
299	49.05	102.72	3.25	-3.26	26.16	130.31
300	49.21	70.66	3.24	-3.35	33.71	129.40
301	49.38	63.91	3.05	-1.31	30.76	129.34
302	49.54	122.36	2.93	1.65	22.10	130.08
303	49.70	166.34	3.19	-2.99	19.18	130.96
304	49.87	125.15	3.69	-2.88	17.57	128.12
305	50.03	83.13	0.00	-3.40	18.19	122.80
306	50.20	66.24	0.00	-0.01	N/A	87.36

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	0.16	0.01	0.00	0.01	1.00	0.624	1.19	0.524	1.00	1.00	2.000	No
2	0.33	0.02	0.00	0.02	1.00	0.624	1.19	0.524	1.00	1.00	2.000	No
3	0.49	0.03	0.00	0.03	1.00	0.624	1.19	0.523	1.00	1.00	2.000	No
4	0.66	0.04	0.00	0.04	1.00	0.624	1.19	0.523	1.00	1.00	2.000	No
5	0.82	0.05	0.00	0.05	1.00	0.624	1.19	0.523	1.00	1.00	2.000	No
6	0.98	0.06	0.00	0.06	1.00	0.624	1.19	0.523	1.00	1.00	2.000	No
7	1.15	0.07	0.00	0.07	1.00	0.624	1.19	0.523	1.00	1.00	2.000	No
8	1.31	0.08	0.00	0.08	1.00	0.623	1.19	0.523	1.00	1.00	2.000	No
9	1.48	0.09	0.00	0.09	1.00	0.623	1.19	0.522	1.00	1.00	2.000	No
10	1.64	0.10	0.00	0.10	1.00	0.623	1.19	0.522	1.00	1.00	2.000	No
11	1.80	0.11	0.00	0.11	1.00	0.623	1.19	0.522	1.00	1.00	2.000	No
12	1.97	0.12	0.00	0.12	1.00	0.622	1.19	0.522	1.00	1.00	2.000	No
13	2.13	0.13	0.00	0.13	1.00	0.622	1.19	0.522	1.00	1.00	2.000	No
14	2.30	0.14	0.00	0.14	1.00	0.622	1.19	0.521	1.00	1.00	2.000	No
15	2.46	0.15	0.00	0.15	1.00	0.622	1.19	0.521	1.00	1.00	2.000	No
16	2.63	0.16	0.00	0.16	1.00	0.621	1.19	0.521	1.00	1.00	2.000	No
17	2.79	0.17	0.00	0.17	1.00	0.621	1.19	0.521	1.00	1.00	2.000	No
18	2.95	0.18	0.00	0.18	1.00	0.621	1.19	0.521	1.00	1.00	2.000	No
19	3.12	0.19	0.00	0.19	0.99	0.621	1.19	0.520	1.00	1.00	2.000	No
20	3.28	0.20	0.00	0.20	0.99	0.620	1.19	0.520	1.00	1.00	2.000	No
21	3.44	0.21	0.00	0.21	0.99	0.620	1.19	0.520	1.00	1.00	2.000	No
22	3.61	0.22	0.00	0.22	0.99	0.620	1.19	0.520	1.00	1.00	2.000	No
23	3.77	0.23	0.00	0.23	0.99	0.620	1.19	0.520	1.00	1.00	2.000	No
24	3.94	0.24	0.00	0.24	0.99	0.619	1.19	0.519	1.00	1.00	2.000	No
25	4.10	0.25	0.00	0.25	0.99	0.619	1.19	0.519	1.00	1.00	2.000	No
26	4.26	0.26	0.00	0.26	0.99	0.619	1.19	0.519	1.00	1.00	2.000	No
27	4.43	0.27	0.00	0.27	0.99	0.619	1.19	0.519	1.00	1.00	2.000	No
28	4.59	0.28	0.00	0.28	0.99	0.619	1.19	0.519	1.00	1.00	2.000	No
29	4.76	0.29	0.00	0.29	0.99	0.618	1.19	0.518	1.00	1.00	2.000	No
30	4.92	0.30	0.00	0.30	0.99	0.618	1.19	0.518	1.00	1.00	2.000	No
31	5.08	0.31	0.00	0.31	0.99	0.623	1.19	0.522	1.00	1.00	0.522	No
32	5.25	0.32	0.01	0.31	0.99	0.633	1.19	0.531	1.00	1.00	0.531	No
33	5.41	0.33	0.01	0.32	0.99	0.643	1.19	0.539	1.00	1.00	0.539	No
34	5.58	0.34	0.02	0.32	0.99	0.652	1.19	0.546	1.00	1.00	0.546	No
35	5.74	0.35	0.02	0.32	0.99	0.661	1.19	0.554	1.00	1.00	0.554	No
36	5.91	0.36	0.03	0.33	0.99	0.670	1.19	0.561	1.00	1.00	0.561	No
37	6.07	0.37	0.03	0.33	0.99	0.678	1.19	0.569	1.00	1.00	0.569	No
38	6.23	0.38	0.04	0.34	0.99	0.687	1.19	0.576	1.00	1.00	0.576	No
39	6.40	0.38	0.04	0.34	0.99	0.695	1.19	0.582	1.00	1.00	0.582	No
40	6.56	0.39	0.05	0.34	0.99	0.703	1.19	0.589	1.00	1.00	0.589	No
41	6.73	0.40	0.05	0.35	0.99	0.710	1.19	0.596	1.00	1.00	0.596	No
42	6.89	0.41	0.06	0.35	0.99	0.718	1.19	0.602	1.00	1.00	0.602	No
43	7.05	0.42	0.06	0.36	0.99	0.725	1.19	0.608	1.00	1.00	0.608	No
44	7.22	0.43	0.07	0.36	0.99	0.732	1.19	0.614	1.00	1.00	0.614	No
45	7.38	0.44	0.07	0.37	0.98	0.739	1.19	0.620	1.00	1.00	0.620	No
46	7.55	0.45	0.08	0.37	0.98	0.746	1.19	0.625	1.00	1.00	0.625	No
47	7.71	0.46	0.08	0.38	0.98	0.752	1.19	0.630	1.00	1.00	0.630	No
48	7.87	0.47	0.09	0.38	0.98	0.758	1.19	0.635	1.00	1.00	0.635	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	8.04	0.48	0.09	0.39	0.98	0.764	1.19	0.640	1.00	1.00	0.640	No
50	8.20	0.49	0.10	0.39	0.98	0.770	1.19	0.645	1.00	1.00	0.645	No
51	8.37	0.50	0.11	0.40	0.98	0.775	1.19	0.650	1.00	1.00	0.650	No
52	8.53	0.51	0.11	0.40	0.98	0.781	1.19	0.654	1.00	1.00	0.654	No
53	8.69	0.52	0.12	0.41	0.98	0.786	1.19	0.659	1.00	1.00	0.659	No
54	8.86	0.53	0.12	0.41	0.98	0.791	1.19	0.663	1.00	1.00	0.663	No
55	9.02	0.54	0.13	0.42	0.98	0.796	1.19	0.668	1.00	1.00	0.668	No
56	9.19	0.55	0.13	0.42	0.98	0.802	1.19	0.672	1.00	1.00	0.672	No
57	9.35	0.56	0.14	0.43	0.98	0.807	1.19	0.676	1.00	1.00	0.676	No
58	9.51	0.57	0.14	0.43	0.98	0.812	1.19	0.680	1.00	1.00	0.680	No
59	9.68	0.58	0.15	0.44	0.98	0.816	1.19	0.684	1.00	1.00	0.684	No
60	9.84	0.59	0.15	0.44	0.98	0.821	1.19	0.688	1.00	1.00	0.688	No
61	10.01	0.60	0.16	0.45	0.98	0.825	1.19	0.692	1.00	1.00	0.692	No
62	10.17	0.61	0.16	0.45	0.98	0.829	1.19	0.695	1.00	1.00	0.695	No
63	10.34	0.62	0.17	0.46	0.98	0.833	1.19	0.699	1.00	1.00	0.699	No
64	10.50	0.63	0.17	0.46	0.98	0.837	1.19	0.702	1.00	1.00	0.702	No
65	10.66	0.64	0.18	0.47	0.98	0.841	1.19	0.705	1.00	1.00	0.705	No
66	10.83	0.65	0.18	0.47	0.98	0.845	1.19	0.709	1.00	1.00	0.709	No
67	10.99	0.66	0.19	0.48	0.98	0.849	1.19	0.712	1.00	1.00	0.712	No
68	11.15	0.67	0.19	0.48	0.98	0.853	1.19	0.715	1.00	1.00	0.715	No
69	11.32	0.68	0.20	0.49	0.98	0.857	1.19	0.718	1.00	1.00	0.718	No
70	11.48	0.69	0.20	0.49	0.98	0.860	1.19	0.721	1.00	1.00	0.721	No
71	11.65	0.70	0.21	0.50	0.98	0.864	1.19	0.724	1.00	1.00	0.724	No
72	11.81	0.71	0.21	0.50	0.98	0.867	1.19	0.727	1.00	1.00	0.727	No
73	11.97	0.72	0.22	0.50	0.97	0.871	1.19	0.730	1.00	1.00	0.730	No
74	12.14	0.73	0.22	0.51	0.97	0.874	1.19	0.733	1.00	1.00	0.733	No
75	12.30	0.74	0.23	0.51	0.97	0.878	1.19	0.736	1.00	1.00	0.736	No
76	12.47	0.75	0.23	0.52	0.97	0.881	1.19	0.739	1.00	1.00	0.739	No
77	12.63	0.76	0.24	0.52	0.97	0.884	1.19	0.741	1.00	1.00	0.741	No
78	12.79	0.77	0.24	0.53	0.97	0.887	1.19	0.744	1.00	1.00	0.744	No
79	12.96	0.78	0.25	0.53	0.97	0.890	1.19	0.746	1.00	1.00	0.746	No
80	13.12	0.79	0.25	0.54	0.97	0.893	1.19	0.749	1.00	1.00	0.749	No
81	13.29	0.80	0.26	0.54	0.97	0.896	1.19	0.751	1.00	1.00	0.751	No
82	13.45	0.81	0.26	0.55	0.97	0.899	1.19	0.754	1.00	1.00	0.754	No
83	13.62	0.82	0.27	0.55	0.97	0.902	1.19	0.757	1.00	1.00	0.757	No
84	13.78	0.83	0.27	0.55	0.97	0.905	1.19	0.759	1.00	1.00	0.759	No
85	13.94	0.84	0.28	0.56	0.97	0.908	1.19	0.762	1.00	1.00	0.762	No
86	14.11	0.85	0.28	0.56	0.97	0.911	1.19	0.764	1.00	1.00	0.764	No
87	14.27	0.86	0.29	0.57	0.97	0.914	1.19	0.766	1.00	1.00	0.766	No
88	14.44	0.87	0.29	0.57	0.97	0.917	1.19	0.768	1.00	1.00	0.768	No
89	14.60	0.88	0.30	0.58	0.97	0.919	1.19	0.771	1.00	1.00	0.771	No
90	14.76	0.89	0.30	0.58	0.97	0.921	1.19	0.773	1.00	1.00	0.773	No
91	14.93	0.90	0.31	0.59	0.97	0.924	1.19	0.774	1.00	1.00	0.774	No
92	15.09	0.91	0.31	0.59	0.97	0.926	1.19	0.776	1.00	1.00	0.776	No
93	15.26	0.92	0.32	0.60	0.97	0.928	1.19	0.778	1.00	1.00	0.778	No
94	15.42	0.93	0.33	0.60	0.97	0.930	1.19	0.780	1.00	1.00	0.780	No
95	15.58	0.94	0.33	0.61	0.97	0.932	1.19	0.782	1.00	1.00	0.782	No
96	15.75	0.95	0.34	0.61	0.97	0.934	1.19	0.783	1.00	1.00	0.783	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	15.91	0.96	0.34	0.62	0.97	0.936	1.19	0.785	1.00	1.00	0.785	No
98	16.08	0.97	0.35	0.62	0.97	0.938	1.19	0.786	1.00	1.00	0.786	No
99	16.24	0.98	0.35	0.63	0.97	0.940	1.19	0.788	1.00	1.00	0.788	No
100	16.40	0.99	0.36	0.63	0.97	0.942	1.19	0.790	1.00	1.00	0.790	No
101	16.57	1.00	0.36	0.64	0.97	0.944	1.19	0.791	1.00	1.00	0.791	No
102	16.73	1.01	0.37	0.64	0.96	0.945	1.19	0.793	1.00	1.00	0.793	No
103	16.90	1.02	0.37	0.65	0.96	0.947	1.19	0.794	1.00	1.00	0.794	No
104	17.06	1.03	0.38	0.65	0.96	0.949	1.19	0.795	1.00	1.00	0.795	No
105	17.22	1.04	0.38	0.66	0.96	0.950	1.19	0.797	1.00	1.00	0.797	No
106	17.39	1.05	0.39	0.66	0.96	0.952	1.19	0.798	1.00	1.00	0.798	No
107	17.55	1.06	0.39	0.67	0.96	0.954	1.19	0.799	1.00	1.00	0.799	No
108	17.72	1.07	0.40	0.67	0.96	0.955	1.19	0.801	1.00	1.00	0.801	No
109	17.88	1.08	0.40	0.68	0.96	0.957	1.19	0.802	1.00	1.00	0.802	No
110	18.05	1.09	0.41	0.68	0.96	0.958	1.19	0.804	1.00	1.00	0.804	No
111	18.21	1.10	0.41	0.69	0.96	0.960	1.19	0.805	1.00	1.00	0.805	No
112	18.37	1.11	0.42	0.69	0.96	0.962	1.19	0.806	1.00	1.00	0.806	No
113	18.54	1.12	0.42	0.70	0.96	0.963	1.19	0.807	1.00	1.00	0.807	No
114	18.70	1.13	0.43	0.70	0.96	0.964	1.19	0.809	1.00	1.00	0.809	No
115	18.86	1.14	0.43	0.71	0.96	0.966	1.19	0.810	1.00	1.00	0.810	No
116	19.03	1.15	0.44	0.71	0.96	0.967	1.19	0.811	1.00	1.00	0.811	No
117	19.19	1.16	0.44	0.72	0.96	0.969	1.19	0.812	1.00	1.00	0.812	No
118	19.36	1.17	0.45	0.72	0.96	0.970	1.19	0.813	1.00	1.00	0.813	No
119	19.52	1.18	0.45	0.73	0.96	0.971	1.19	0.814	1.00	1.00	0.814	No
120	19.68	1.19	0.46	0.73	0.96	0.972	1.19	0.815	1.00	1.00	0.815	No
121	19.85	1.20	0.46	0.74	0.96	0.974	1.19	0.816	1.00	1.00	0.816	No
122	20.01	1.21	0.47	0.74	0.96	0.975	1.19	0.817	1.00	1.00	0.817	No
123	20.18	1.22	0.47	0.75	0.96	0.976	1.19	0.818	1.00	1.00	0.818	No
124	20.34	1.23	0.48	0.75	0.96	0.977	1.19	0.819	1.00	1.00	0.819	No
125	20.50	1.24	0.48	0.76	0.96	0.978	1.19	0.820	1.00	1.00	0.820	No
126	20.67	1.25	0.49	0.76	0.96	0.979	1.19	0.821	1.00	1.00	0.821	No
127	20.83	1.26	0.49	0.77	0.95	0.980	1.19	0.822	1.00	1.00	0.822	No
128	21.00	1.27	0.50	0.77	0.95	0.981	1.19	0.823	1.00	1.00	0.823	No
129	21.16	1.28	0.50	0.78	0.95	0.982	1.19	0.823	1.00	1.00	0.823	No
130	21.32	1.29	0.51	0.78	0.95	0.983	1.19	0.824	1.00	1.00	0.824	No
131	21.49	1.30	0.51	0.79	0.95	0.984	1.19	0.825	1.00	1.00	0.825	No
132	21.65	1.31	0.52	0.79	0.95	0.985	1.19	0.826	1.00	1.00	0.826	No
133	21.82	1.32	0.52	0.79	0.95	0.986	1.19	0.827	1.00	1.00	0.827	No
134	21.98	1.33	0.53	0.80	0.95	0.987	1.19	0.828	1.00	1.00	0.828	No
135	22.15	1.34	0.53	0.80	0.95	0.988	1.19	0.828	1.00	1.00	0.828	No
136	22.31	1.35	0.54	0.81	0.95	0.989	1.19	0.829	1.00	1.00	0.829	No
137	22.47	1.36	0.55	0.81	0.95	0.990	1.19	0.830	1.00	1.00	0.830	No
138	22.64	1.37	0.55	0.82	0.95	0.991	1.19	0.831	1.00	1.00	0.831	No
139	22.80	1.38	0.56	0.82	0.95	0.992	1.19	0.831	1.00	1.00	0.831	No
140	22.97	1.39	0.56	0.83	0.95	0.992	1.19	0.832	1.00	1.00	0.832	No
141	23.13	1.40	0.57	0.83	0.95	0.993	1.19	0.833	1.00	1.00	0.833	No
142	23.29	1.41	0.57	0.84	0.95	0.994	1.19	0.833	1.00	1.00	0.833	No
143	23.46	1.42	0.58	0.84	0.95	0.995	1.19	0.834	1.00	1.00	0.834	No
144	23.62	1.43	0.58	0.85	0.95	0.995	1.19	0.835	1.00	1.00	0.835	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	23.79	1.44	0.59	0.85	0.95	0.996	1.19	0.835	1.00	1.00	0.835	No
146	23.95	1.45	0.59	0.86	0.95	0.997	1.19	0.835	1.00	1.00	0.835	No
147	24.11	1.46	0.60	0.86	0.94	0.997	1.19	0.836	1.00	1.00	0.836	No
148	24.28	1.47	0.60	0.87	0.94	0.997	1.19	0.836	1.00	1.00	0.836	No
149	24.44	1.48	0.61	0.87	0.94	0.998	1.19	0.837	1.00	1.00	0.837	No
150	24.61	1.49	0.61	0.88	0.94	0.999	1.19	0.837	1.00	1.00	0.837	No
151	24.77	1.50	0.62	0.88	0.94	0.999	1.19	0.838	1.00	1.00	0.838	No
152	24.93	1.51	0.62	0.89	0.94	1.000	1.19	0.838	1.00	1.00	0.838	No
153	25.10	1.52	0.63	0.89	0.94	1.000	1.19	0.838	1.00	1.00	0.838	No
154	25.26	1.53	0.63	0.90	0.94	1.001	1.19	0.839	1.00	1.00	0.839	No
155	25.43	1.54	0.64	0.90	0.94	1.001	1.19	0.839	1.00	1.00	0.839	No
156	25.59	1.55	0.64	0.91	0.94	1.002	1.19	0.840	1.00	1.00	0.840	No
157	25.75	1.56	0.65	0.91	0.94	1.002	1.19	0.840	1.00	1.00	0.840	No
158	25.92	1.57	0.65	0.92	0.94	1.003	1.19	0.841	1.00	1.00	0.841	No
159	26.08	1.58	0.66	0.92	0.94	1.003	1.19	0.841	1.00	1.00	0.841	No
160	26.25	1.59	0.66	0.93	0.94	1.004	1.19	0.841	1.00	1.00	0.841	No
161	26.41	1.60	0.67	0.93	0.94	1.004	1.19	0.842	1.00	1.00	0.842	No
162	26.57	1.61	0.67	0.94	0.94	1.004	1.19	0.842	1.00	1.00	0.842	No
163	26.74	1.62	0.68	0.94	0.94	1.004	1.19	0.842	1.00	1.00	0.842	No
164	26.90	1.63	0.68	0.95	0.93	1.005	1.19	0.842	1.00	1.00	0.842	No
165	27.07	1.64	0.69	0.95	0.93	1.005	1.19	0.842	1.00	1.00	0.842	No
166	27.23	1.65	0.69	0.96	0.93	1.005	1.19	0.843	1.00	1.00	0.843	No
167	27.39	1.66	0.70	0.96	0.93	1.005	1.19	0.843	1.00	1.00	0.843	No
168	27.56	1.67	0.70	0.97	0.93	1.005	1.19	0.843	1.00	1.00	0.843	No
169	27.72	1.68	0.71	0.97	0.93	1.005	1.19	0.843	1.00	1.00	0.843	No
170	27.89	1.69	0.71	0.98	0.93	1.005	1.19	0.843	1.00	1.00	0.843	No
171	28.05	1.70	0.72	0.98	0.93	1.005	1.19	0.842	1.00	1.00	0.842	No
172	28.21	1.71	0.72	0.99	0.93	1.005	1.19	0.842	1.00	1.00	0.842	No
173	28.38	1.72	0.73	0.99	0.93	1.005	1.19	0.842	1.00	1.00	0.842	No
174	28.54	1.73	0.73	1.00	0.93	1.004	1.19	0.842	1.00	1.00	0.842	No
175	28.71	1.74	0.74	1.00	0.93	1.004	1.19	0.842	1.00	1.00	0.842	No
176	28.87	1.75	0.74	1.01	0.93	1.004	1.19	0.842	1.00	1.00	0.842	No
177	29.04	1.77	0.75	1.02	0.93	1.004	1.19	0.842	1.00	1.00	0.842	No
178	29.20	1.78	0.76	1.02	0.92	1.004	1.19	0.841	1.00	1.00	0.841	No
179	29.36	1.79	0.76	1.03	0.92	1.003	1.19	0.841	1.00	1.00	0.841	No
180	29.53	1.80	0.77	1.03	0.92	1.003	1.19	0.841	1.00	1.00	0.841	No
181	29.69	1.81	0.77	1.04	0.92	1.003	1.19	0.841	1.00	1.00	0.841	No
182	29.86	1.82	0.78	1.04	0.92	1.002	1.19	0.840	1.00	1.00	0.840	No
183	30.02	1.83	0.78	1.05	0.92	1.002	1.19	0.840	1.00	1.00	0.840	No
184	30.18	1.84	0.79	1.05	0.92	1.002	1.19	0.840	1.00	1.00	0.840	No
185	30.35	1.85	0.79	1.06	0.92	1.001	1.19	0.839	1.00	1.00	0.840	No
186	30.51	1.86	0.80	1.07	0.92	1.001	1.19	0.839	1.00	1.00	0.840	No
187	30.68	1.87	0.80	1.07	0.92	1.000	1.19	0.839	1.00	1.00	0.841	No
188	30.84	1.88	0.81	1.08	0.92	1.000	1.19	0.838	1.00	1.00	0.842	No
189	31.00	1.89	0.81	1.08	0.92	1.000	1.19	0.838	0.99	1.00	0.842	No
190	31.17	1.90	0.82	1.09	0.91	0.999	1.19	0.838	0.99	1.00	0.843	No
191	31.33	1.91	0.82	1.09	0.91	0.999	1.19	0.837	0.99	1.00	0.843	No
192	31.50	1.92	0.83	1.10	0.91	0.998	1.19	0.837	0.99	1.00	0.844	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
193	31.66	1.94	0.83	1.10	0.91	0.998	1.19	0.836	0.99	1.00	0.845	No
194	31.82	1.95	0.84	1.11	0.91	0.997	1.19	0.836	0.99	1.00	0.845	No
195	31.99	1.96	0.84	1.11	0.91	0.997	1.19	0.836	0.99	1.00	0.846	No
196	32.15	1.97	0.85	1.12	0.91	0.996	1.19	0.835	0.99	1.00	0.846	No
197	32.32	1.98	0.85	1.12	0.91	0.996	1.19	0.835	0.99	1.00	0.847	No
198	32.48	1.99	0.86	1.13	0.91	0.995	1.19	0.834	0.98	1.00	0.847	No
199	32.64	2.00	0.86	1.14	0.91	0.995	1.19	0.834	0.98	1.00	0.848	No
200	32.81	2.01	0.87	1.14	0.90	0.994	1.19	0.834	0.98	1.00	0.848	No
201	32.97	2.02	0.87	1.15	0.90	0.994	1.19	0.833	0.98	1.00	0.848	No
202	33.14	2.03	0.88	1.15	0.90	0.993	1.19	0.833	0.98	1.00	0.849	No
203	33.30	2.04	0.88	1.16	0.90	0.992	1.19	0.832	0.98	1.00	0.849	No
204	33.47	2.05	0.89	1.16	0.90	0.992	1.19	0.832	0.98	1.00	0.850	No
205	33.63	2.06	0.89	1.17	0.90	0.991	1.19	0.831	0.98	1.00	0.850	No
206	33.79	2.07	0.90	1.17	0.90	0.990	1.19	0.830	0.98	1.00	0.850	No
207	33.96	2.08	0.90	1.18	0.90	0.990	1.19	0.830	0.98	1.00	0.851	No
208	34.12	2.09	0.91	1.18	0.90	0.989	1.19	0.829	0.97	1.00	0.851	No
209	34.28	2.10	0.91	1.19	0.90	0.988	1.19	0.829	0.97	1.00	0.851	No
210	34.45	2.11	0.92	1.19	0.89	0.988	1.19	0.828	0.97	1.00	0.851	No
211	34.61	2.12	0.92	1.20	0.89	0.987	1.19	0.827	0.97	1.00	0.852	No
212	34.78	2.13	0.93	1.20	0.89	0.986	1.19	0.827	0.97	1.00	0.852	No
213	34.94	2.14	0.93	1.21	0.89	0.985	1.19	0.826	0.97	1.00	0.852	No
214	35.10	2.15	0.94	1.22	0.89	0.984	1.19	0.825	0.97	1.00	0.852	No
215	35.27	2.17	0.94	1.22	0.89	0.983	1.19	0.824	0.97	1.00	0.852	No
216	35.43	2.18	0.95	1.23	0.89	0.982	1.19	0.824	0.97	1.00	0.852	No
217	35.60	2.19	0.95	1.23	0.89	0.982	1.19	0.823	0.97	1.00	0.852	No
218	35.76	2.20	0.96	1.24	0.89	0.981	1.19	0.822	0.96	1.00	0.852	No
219	35.92	2.21	0.96	1.24	0.88	0.980	1.19	0.821	0.96	1.00	0.852	No
220	36.09	2.22	0.97	1.25	0.88	0.979	1.19	0.821	0.96	1.00	0.852	No
221	36.25	2.23	0.98	1.25	0.88	0.978	1.19	0.820	0.96	1.00	0.852	No
222	36.42	2.24	0.98	1.26	0.88	0.977	1.19	0.819	0.96	1.00	0.852	No
223	36.58	2.25	0.99	1.27	0.88	0.976	1.19	0.818	0.96	1.00	0.852	No
224	36.74	2.26	0.99	1.27	0.88	0.975	1.19	0.817	0.96	1.00	0.852	No
225	36.91	2.27	1.00	1.28	0.88	0.974	1.19	0.816	0.96	1.00	0.852	No
226	37.07	2.28	1.00	1.28	0.88	0.973	1.19	0.816	0.96	1.00	0.852	No
227	37.24	2.29	1.01	1.29	0.87	0.972	1.19	0.815	0.96	1.00	0.852	No
228	37.40	2.30	1.01	1.29	0.87	0.971	1.19	0.814	0.96	1.00	0.852	No
229	37.57	2.31	1.02	1.30	0.87	0.970	1.19	0.813	0.95	1.00	0.852	No
230	37.73	2.32	1.02	1.30	0.87	0.969	1.19	0.812	0.95	1.00	0.852	No
231	37.89	2.33	1.03	1.31	0.87	0.968	1.19	0.811	0.95	1.00	0.852	No
232	38.06	2.34	1.03	1.31	0.87	0.966	1.19	0.810	0.95	1.00	0.852	No
233	38.22	2.36	1.04	1.32	0.87	0.965	1.19	0.809	0.95	1.00	0.851	No
234	38.39	2.37	1.04	1.32	0.86	0.964	1.19	0.808	0.95	1.00	0.851	No
235	38.55	2.38	1.05	1.33	0.86	0.963	1.19	0.807	0.95	1.00	0.851	No
236	38.71	2.39	1.05	1.34	0.86	0.961	1.19	0.806	0.95	1.00	0.851	No
237	38.88	2.40	1.06	1.34	0.86	0.960	1.19	0.805	0.95	1.00	0.850	No
238	39.04	2.41	1.06	1.35	0.86	0.959	1.19	0.804	0.95	1.00	0.850	No
239	39.21	2.42	1.07	1.35	0.86	0.958	1.19	0.803	0.95	1.00	0.850	No
240	39.37	2.43	1.07	1.36	0.86	0.956	1.19	0.802	0.94	1.00	0.849	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	39.53	2.44	1.08	1.36	0.86	0.955	1.19	0.801	0.94	1.00	0.849	No
242	39.70	2.45	1.08	1.37	0.85	0.954	1.19	0.800	0.94	1.00	0.849	No
243	39.86	2.46	1.09	1.37	0.85	0.953	1.19	0.799	0.94	1.00	0.848	No
244	40.03	2.47	1.09	1.38	0.85	0.951	1.19	0.798	0.94	1.00	0.848	No
245	40.19	2.48	1.10	1.39	0.85	0.950	1.19	0.797	0.94	1.00	0.847	No
246	40.35	2.49	1.10	1.39	0.85	0.949	1.19	0.795	0.94	1.00	0.847	No
247	40.52	2.50	1.11	1.40	0.85	0.947	1.19	0.794	0.94	1.00	0.847	No
248	40.68	2.52	1.11	1.40	0.84	0.946	1.19	0.793	0.94	1.00	0.846	No
249	40.85	2.53	1.12	1.41	0.84	0.944	1.19	0.792	0.94	1.00	0.846	No
250	41.01	2.54	1.12	1.41	0.84	0.943	1.19	0.791	0.94	1.00	0.845	No
251	41.17	2.55	1.13	1.42	0.84	0.942	1.19	0.789	0.93	1.00	0.845	No
252	41.34	2.56	1.13	1.42	0.84	0.940	1.19	0.788	0.93	1.00	0.844	No
253	41.50	2.57	1.14	1.43	0.84	0.939	1.19	0.787	0.93	1.00	0.844	No
254	41.67	2.58	1.14	1.44	0.84	0.937	1.19	0.786	0.93	1.00	0.843	No
255	41.83	2.59	1.15	1.44	0.83	0.936	1.19	0.785	0.93	1.00	0.842	No
256	41.99	2.60	1.15	1.45	0.83	0.935	1.19	0.784	0.93	1.00	0.842	No
257	42.16	2.61	1.16	1.45	0.83	0.933	1.19	0.782	0.93	1.00	0.841	No
258	42.32	2.62	1.16	1.46	0.83	0.932	1.19	0.781	0.93	1.00	0.841	No
259	42.49	2.63	1.17	1.46	0.83	0.930	1.19	0.780	0.93	1.00	0.840	No
260	42.65	2.64	1.17	1.47	0.83	0.929	1.19	0.779	0.93	1.00	0.839	No
261	42.81	2.65	1.18	1.47	0.83	0.927	1.19	0.777	0.93	1.00	0.839	No
262	42.98	2.66	1.18	1.48	0.82	0.926	1.19	0.776	0.93	1.00	0.838	No
263	43.14	2.67	1.19	1.48	0.82	0.924	1.19	0.775	0.93	1.00	0.838	No
264	43.31	2.68	1.20	1.49	0.82	0.923	1.19	0.774	0.92	1.00	0.837	No
265	43.47	2.70	1.20	1.49	0.82	0.921	1.19	0.772	0.92	1.00	0.836	No
266	43.63	2.71	1.21	1.50	0.82	0.920	1.19	0.771	0.92	1.00	0.835	No
267	43.80	2.72	1.21	1.51	0.82	0.918	1.19	0.770	0.92	1.00	0.835	No
268	43.96	2.73	1.22	1.51	0.81	0.917	1.19	0.768	0.92	1.00	0.834	No
269	44.13	2.74	1.22	1.52	0.81	0.915	1.19	0.767	0.92	1.00	0.833	No
270	44.29	2.75	1.23	1.52	0.81	0.914	1.19	0.766	0.92	1.00	0.833	No
271	44.45	2.76	1.23	1.53	0.81	0.912	1.19	0.765	0.92	1.00	0.832	No
272	44.62	2.77	1.24	1.53	0.81	0.911	1.19	0.764	0.92	1.00	0.831	No
273	44.78	2.78	1.24	1.54	0.81	0.909	1.19	0.762	0.92	1.00	0.830	No
274	44.95	2.79	1.25	1.54	0.80	0.908	1.19	0.761	0.92	1.00	0.830	No
275	45.11	2.80	1.25	1.55	0.80	0.906	1.19	0.760	0.92	1.00	0.829	No
276	45.28	2.81	1.26	1.55	0.80	0.905	1.19	0.758	0.92	1.00	0.828	No
277	45.44	2.82	1.26	1.56	0.80	0.903	1.19	0.757	0.92	1.00	0.827	No
278	45.60	2.83	1.27	1.56	0.80	0.901	1.19	0.756	0.91	1.00	0.827	No
279	45.77	2.84	1.27	1.57	0.80	0.900	1.19	0.754	0.91	1.00	0.826	No
280	45.93	2.85	1.28	1.57	0.79	0.898	1.19	0.753	0.91	1.00	0.825	No
281	46.10	2.86	1.28	1.58	0.79	0.896	1.19	0.751	0.91	1.00	0.824	No
282	46.26	2.87	1.29	1.58	0.79	0.894	1.19	0.750	0.91	1.00	0.823	No
283	46.42	2.88	1.29	1.59	0.79	0.893	1.19	0.748	0.91	1.00	0.822	No
284	46.59	2.89	1.30	1.60	0.79	0.891	1.19	0.747	0.91	1.00	0.821	No
285	46.75	2.90	1.30	1.60	0.79	0.889	1.19	0.745	0.91	1.00	0.820	No
286	46.92	2.92	1.31	1.61	0.78	0.887	1.19	0.744	0.91	1.00	0.819	No
287	47.08	2.93	1.31	1.61	0.78	0.886	1.19	0.743	0.91	1.00	0.818	No
288	47.24	2.94	1.32	1.62	0.78	0.884	1.19	0.741	0.91	1.00	0.817	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	47.41	2.95	1.32	1.62	0.78	0.882	1.19	0.740	0.91	1.00	0.816	No
290	47.57	2.96	1.33	1.63	0.78	0.881	1.19	0.738	0.91	1.00	0.815	No
291	47.74	2.97	1.33	1.64	0.78	0.879	1.19	0.737	0.90	1.00	0.814	No
292	47.90	2.98	1.34	1.64	0.77	0.877	1.19	0.735	0.90	1.00	0.813	No
293	48.06	2.99	1.34	1.65	0.77	0.875	1.19	0.734	0.90	1.00	0.812	No
294	48.23	3.00	1.35	1.65	0.77	0.874	1.19	0.732	0.90	1.00	0.811	No
295	48.39	3.01	1.35	1.66	0.77	0.872	1.19	0.731	0.90	1.00	0.811	No
296	48.56	3.02	1.36	1.66	0.77	0.870	1.19	0.729	0.90	1.00	0.809	No
297	48.72	3.03	1.36	1.67	0.77	0.868	1.19	0.728	0.90	1.00	0.808	No
298	48.88	3.04	1.37	1.68	0.76	0.867	1.19	0.726	0.90	1.00	0.807	No
299	49.05	3.06	1.37	1.68	0.76	0.865	1.19	0.725	0.90	1.00	0.806	No
300	49.21	3.07	1.38	1.69	0.76	0.863	1.19	0.724	0.90	1.00	0.805	No
301	49.38	3.08	1.38	1.69	0.76	0.861	1.19	0.722	0.90	1.00	0.804	No
302	49.54	3.09	1.39	1.70	0.76	0.860	1.19	0.721	0.90	1.00	0.803	No
303	49.70	3.10	1.39	1.70	0.76	0.858	1.19	0.719	0.90	1.00	0.802	No
304	49.87	3.11	1.40	1.71	0.75	0.856	1.19	0.718	0.90	1.00	0.801	No
305	50.03	3.12	1.41	1.71	0.75	0.855	1.19	0.716	0.90	1.00	0.800	No
306	50.20	3.13	1.41	1.72	0.75	0.854	1.19	0.716	0.89	1.00	0.800	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	0.16	17.30	2.69	3.57	0.90	27.79	3.94	109.53	4.000	No	Yes	2.00
2	0.33	19.65	2.62	3.18	0.87	31.54	3.44	108.34	4.000	No	Yes	2.00
3	0.49	24.79	2.48	2.55	0.82	39.79	2.66	105.85	4.000	No	No	2.00
4	0.66	28.47	2.39	2.19	0.79	45.68	2.27	103.83	4.000	No	No	2.00
5	0.82	29.80	2.37	2.17	0.78	47.80	2.21	105.40	4.000	No	No	2.00
6	0.98	27.35	2.46	2.64	0.81	43.85	2.56	112.18	4.000	No	No	2.00
7	1.15	24.04	2.60	3.68	0.86	38.51	3.30	127.27	4.000	No	No	2.00
8	1.31	22.19	2.72	5.05	0.91	35.53	4.12	146.42	4.000	No	Yes	2.00
9	1.48	21.94	2.78	6.15	0.94	35.11	4.63	162.75	4.000	No	Yes	2.00
10	1.64	23.39	2.78	6.45	0.93	37.42	4.60	172.08	4.000	No	Yes	2.00
11	1.80	23.82	2.78	6.59	0.93	38.11	4.61	175.77	4.000	No	Yes	2.00
12	1.97	24.73	2.78	6.91	0.94	39.55	4.65	183.84	4.000	No	Yes	2.00
13	2.13	27.34	2.77	7.28	0.93	43.73	4.55	198.86	4.000	No	Yes	2.00
14	2.30	33.73	2.71	7.27	0.91	53.98	4.08	220.37	4.000	No	Yes	2.00
15	2.46	42.20	2.63	6.92	0.88	67.56	3.54	238.94	4.000	No	Yes	2.00
16	2.63	49.53	2.58	6.73	0.86	79.32	3.21	254.77	4.000	No	No	2.00
17	2.79	53.97	2.55	6.65	0.85	86.44	3.06	264.35	4.000	No	No	2.00
18	2.95	54.60	2.56	6.79	0.85	87.43	3.08	269.58	4.000	No	No	2.00
19	3.12	53.67	2.57	6.83	0.85	85.92	3.12	268.13	4.000	No	No	2.00
20	3.28	52.78	2.56	6.67	0.85	84.48	3.10	261.67	4.000	No	No	2.00
21	3.44	51.77	2.54	6.13	0.84	82.83	2.97	245.61	4.000	No	No	2.00
22	3.61	48.34	2.52	5.48	0.83	77.31	2.86	221.05	4.000	No	No	2.00
23	3.77	42.47	2.51	4.87	0.83	67.87	2.84	192.99	4.000	No	No	2.00
24	3.94	35.99	2.54	4.58	0.84	57.43	2.99	171.98	4.000	No	No	2.00
25	4.10	31.53	2.58	4.53	0.86	50.26	3.20	160.75	4.000	No	No	2.00
26	4.26	28.24	2.62	4.72	0.88	44.95	3.48	156.50	4.000	No	Yes	2.00
27	4.43	25.15	2.68	4.98	0.90	39.98	3.83	153.16	4.000	No	Yes	2.00
28	4.59	22.04	2.73	5.18	0.92	34.96	4.22	147.50	4.000	No	Yes	2.00
29	4.76	18.78	2.81	5.63	0.94	29.70	4.83	143.49	4.000	No	Yes	2.00
30	4.92	16.23	2.88	6.22	0.97	25.59	5.53	141.44	4.000	No	Yes	2.00
31	5.08	16.89	2.87	6.21	0.97	26.65	5.40	143.89	4.000	No	Yes	2.00
32	5.25	21.42	2.75	5.29	0.92	33.91	4.34	147.18	4.000	No	Yes	2.00
33	5.41	25.35	2.63	4.23	0.88	40.21	3.48	140.10	4.000	No	Yes	2.00
34	5.58	25.09	2.62	4.16	0.87	39.77	3.47	138.11	4.000	No	Yes	2.00
35	5.74	18.47	2.76	4.76	0.93	29.11	4.46	129.96	4.000	No	Yes	2.00
36	5.91	11.86	3.01	6.75	1.00	18.48	6.84	126.49	4.000	No	Yes	2.00
37	6.07	7.75	3.21	8.30	1.00	11.86	9.42	111.64	4.000	No	Yes	2.00
38	6.23	8.31	3.13	6.74	1.00	12.75	8.29	105.71	4.000	No	Yes	2.00
39	6.40	9.41	3.04	5.82	1.00	14.49	7.25	105.14	4.000	No	Yes	2.00
40	6.56	10.19	3.03	6.03	1.00	15.73	7.06	111.06	4.000	No	Yes	2.00
41	6.73	10.89	3.02	6.42	1.00	16.85	7.01	118.19	4.000	No	Yes	2.00
42	6.89	10.75	3.05	6.90	1.00	16.61	7.31	121.45	4.000	No	Yes	2.00
43	7.05	9.62	3.14	8.29	1.00	14.77	8.45	124.88	4.000	No	Yes	2.00
44	7.22	8.06	3.32	12.30	1.00	12.26	10.99	134.77	4.000	No	Yes	2.00
45	7.38	32.27	2.55	4.27	0.85	51.14	3.06	156.47	0.436	No	No	0.70
46	7.55	81.42	2.04	2.03	0.65	130.09	1.36	176.96	0.595	No	No	0.95
47	7.71	136.40	1.72	1.19	0.53	218.40	1.05	229.52	4.000	No	No	2.00
48	7.87	165.35	1.57	0.86	0.50	259.37	1.00	259.37	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	8.04	164.26	1.57	0.87	0.50	255.92	1.00	255.92	4.000	No	No	2.00
50	8.20	146.09	1.70	1.16	0.52	230.80	1.03	238.79	4.000	No	No	2.00
51	8.37	117.32	1.87	1.63	0.59	187.68	1.16	217.38	4.000	No	No	2.00
52	8.53	85.46	2.06	2.26	0.66	136.47	1.39	190.22	0.720	No	No	1.10
53	8.69	59.20	2.25	2.91	0.73	94.27	1.80	170.10	0.538	No	No	0.82
54	8.86	39.62	2.42	3.38	0.80	62.80	2.40	150.43	0.397	No	No	0.60
55	9.02	25.62	2.62	4.15	0.87	40.29	3.44	138.70	4.000	No	Yes	2.00
56	9.19	18.92	2.77	4.98	0.93	29.51	4.54	133.91	4.000	No	Yes	2.00
57	9.35	19.65	2.78	5.42	0.94	30.66	4.65	142.58	4.000	No	Yes	2.00
58	9.51	30.96	2.54	3.95	0.84	48.83	3.00	146.54	0.373	No	No	0.55
59	9.68	53.78	2.25	2.61	0.73	85.47	1.79	152.69	0.411	No	No	0.60
60	9.84	75.93	2.06	1.99	0.66	121.04	1.38	167.25	0.515	No	No	0.75
61	10.01	86.85	2.01	1.94	0.64	138.57	1.31	181.98	0.640	No	No	0.93
62	10.17	79.87	2.10	2.39	0.68	127.33	1.46	185.62	0.675	No	No	0.97
63	10.34	65.89	2.25	3.15	0.73	104.87	1.79	188.05	0.698	No	No	1.00
64	10.50	47.64	2.44	4.20	0.80	75.53	2.46	185.96	0.678	No	No	0.97
65	10.66	31.81	2.65	5.62	0.88	50.07	3.64	182.13	4.000	No	Yes	2.00
66	10.83	21.84	2.85	7.36	0.96	34.04	5.21	177.21	4.000	No	Yes	2.00
67	10.99	23.02	2.79	6.50	0.94	35.92	4.72	169.58	4.000	No	Yes	2.00
68	11.15	31.87	2.57	4.36	0.85	50.13	3.13	156.92	0.439	No	No	0.61
69	11.32	47.74	2.27	2.51	0.74	75.61	1.86	140.51	0.338	No	No	0.47
70	11.48	66.82	2.00	1.42	0.64	102.18	1.31	133.46	0.301	No	No	0.42
71	11.65	80.95	1.83	0.90	0.57	117.12	1.13	132.20	0.295	No	No	0.41
72	11.81	86.36	1.77	0.78	0.55	122.35	1.09	133.04	0.299	No	No	0.41
73	11.97	83.79	1.80	0.82	0.56	118.93	1.11	131.51	0.292	No	No	0.40
74	12.14	81.48	1.84	0.92	0.57	116.22	1.13	131.79	0.293	No	No	0.40
75	12.30	84.34	1.82	0.89	0.57	119.11	1.12	133.43	0.301	No	No	0.41
76	12.47	90.72	1.78	0.84	0.55	126.36	1.10	138.43	0.327	No	No	0.44
77	12.63	95.90	1.76	0.82	0.55	132.18	1.08	142.79	0.351	No	No	0.47
78	12.79	92.51	1.80	0.90	0.56	128.05	1.11	141.57	0.344	No	No	0.46
79	12.96	79.81	1.90	1.10	0.60	112.64	1.19	133.66	0.302	No	No	0.40
80	13.12	58.55	2.09	1.56	0.67	86.05	1.43	123.13	0.254	No	No	0.34
81	13.29	36.56	2.36	2.50	0.77	56.76	2.15	122.17	0.250	No	No	0.33
82	13.45	20.43	2.71	4.30	0.91	31.52	4.04	127.37	4.000	No	Yes	2.00
83	13.62	12.14	3.02	6.97	1.00	18.19	7.01	127.49	4.000	No	Yes	2.00
84	13.78	9.57	3.18	8.85	1.00	14.04	8.93	125.34	4.000	No	Yes	2.00
85	13.94	9.22	3.23	10.06	1.00	13.46	9.64	129.82	4.000	No	Yes	2.00
86	14.11	10.25	3.17	9.30	1.00	15.11	8.81	133.20	4.000	No	Yes	2.00
87	14.27	12.80	3.02	7.40	1.00	19.19	7.02	134.71	4.000	No	Yes	2.00
88	14.44	26.05	2.58	3.66	0.86	40.35	3.20	129.31	0.281	No	No	0.37
89	14.60	44.07	2.32	2.49	0.76	64.69	2.00	129.50	0.282	No	No	0.37
90	14.76	62.96	2.16	2.03	0.70	89.00	1.56	139.20	0.331	No	No	0.43
91	14.93	78.06	2.05	1.77	0.66	107.51	1.38	148.15	0.382	No	No	0.49
92	15.09	93.65	1.95	1.46	0.62	125.50	1.24	155.36	0.429	No	No	0.55
93	15.26	107.27	1.86	1.22	0.58	140.43	1.15	161.91	0.475	No	No	0.61
94	15.42	113.98	1.82	1.12	0.57	147.22	1.12	164.87	0.497	No	No	0.64
95	15.58	115.80	1.80	1.05	0.56	148.19	1.10	163.58	0.487	No	No	0.62
96	15.75	116.74	1.80	1.05	0.56	148.68	1.10	164.05	0.491	No	No	0.63

:: 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	15.91	110.16	1.86	1.25	0.58	141.54	1.16	163.59	0.487	No	No	0.62
98	16.08	87.97	2.05	1.86	0.65	116.48	1.37	159.14	0.455	No	No	0.58
99	16.24	59.46	2.32	3.16	0.76	82.22	2.01	165.20	0.499	No	No	0.63
100	16.40	39.40	2.57	4.97	0.86	56.46	3.17	179.04	0.614	No	No	0.78
101	16.57	37.69	2.59	4.95	0.86	53.69	3.25	174.47	0.574	No	No	0.73
102	16.73	39.84	2.56	4.74	0.85	56.15	3.09	173.61	0.567	No	No	0.72
103	16.90	36.68	2.61	5.16	0.87	51.72	3.40	175.77	4.000	No	Yes	2.00
104	17.06	30.25	2.76	6.91	0.93	43.24	4.44	191.78	4.000	No	Yes	2.00
105	17.22	33.84	2.69	6.18	0.90	47.65	3.95	188.20	4.000	No	Yes	2.00
106	17.39	40.57	2.58	4.96	0.86	55.82	3.19	177.83	0.603	No	No	0.76
107	17.55	45.64	2.45	3.65	0.81	61.20	2.54	155.25	0.428	No	No	0.54
108	17.72	53.67	2.27	2.33	0.74	69.60	1.87	129.95	0.284	No	No	0.35
109	17.88	61.48	2.14	1.69	0.69	77.76	1.54	119.54	0.239	No	No	0.30
110	18.05	64.31	2.15	1.79	0.69	81.03	1.54	125.19	0.262	No	No	0.33
111	18.21	51.01	2.34	2.73	0.77	65.73	2.08	136.75	0.318	No	No	0.39
112	18.37	36.55	2.59	4.48	0.86	48.32	3.25	156.89	0.439	No	No	0.54
113	18.54	26.48	2.81	6.76	0.94	35.59	4.85	172.59	4.000	No	Yes	2.00
114	18.70	22.91	2.90	7.80	0.98	30.80	5.66	174.33	4.000	No	Yes	2.00
115	18.86	27.97	2.74	5.71	0.92	36.81	4.33	159.46	4.000	No	Yes	2.00
116	19.03	40.48	2.50	3.67	0.83	51.70	2.79	144.22	0.359	No	No	0.44
117	19.19	47.82	2.43	3.36	0.80	60.32	2.44	147.11	0.376	No	No	0.46
118	19.36	44.45	2.51	4.06	0.83	56.28	2.82	158.69	0.452	No	No	0.56
119	19.52	33.05	2.71	5.79	0.91	42.39	4.05	171.56	4.000	No	Yes	2.00
120	19.68	24.69	2.88	7.68	0.97	31.84	5.52	175.71	4.000	No	Yes	2.00
121	19.85	21.35	2.97	8.96	1.00	27.39	6.47	177.14	4.000	No	Yes	2.00
122	20.01	27.05	2.83	6.93	0.95	34.30	5.02	172.00	4.000	No	Yes	2.00
123	20.18	40.73	2.56	4.30	0.85	50.30	3.10	155.91	0.432	No	No	0.53
124	20.34	56.25	2.35	2.93	0.77	67.77	2.13	144.19	0.359	No	No	0.44
125	20.50	63.26	2.28	2.56	0.74	75.28	1.88	141.63	0.344	No	No	0.42
126	20.67	63.27	2.30	2.70	0.75	75.08	1.93	145.28	0.365	No	No	0.44
127	20.83	60.64	2.30	2.63	0.75	71.59	1.95	139.89	0.335	No	No	0.41
128	21.00	59.39	2.30	2.51	0.75	69.67	1.93	134.73	0.307	No	No	0.37
129	21.16	53.70	2.33	2.54	0.76	62.81	2.05	129.04	0.280	No	No	0.34
130	21.32	42.05	2.50	3.44	0.83	49.55	2.75	136.38	0.316	No	No	0.38
131	21.49	28.14	2.74	5.08	0.92	33.37	4.28	142.97	4.000	No	Yes	2.00
132	21.65	27.32	2.76	5.34	0.93	32.24	4.49	144.66	4.000	No	Yes	2.00
133	21.82	35.75	2.62	4.28	0.87	41.76	3.43	143.31	4.000	No	Yes	2.00
134	21.98	45.06	2.49	3.59	0.83	52.07	2.74	142.83	0.351	No	No	0.42
135	22.15	40.99	2.57	4.14	0.85	47.33	3.14	148.53	0.385	No	No	0.46
136	22.31	30.70	2.73	5.33	0.92	35.45	4.25	150.82	4.000	No	Yes	2.00
137	22.47	20.27	2.98	7.75	1.00	23.22	6.52	151.37	4.000	No	Yes	2.00
138	22.64	14.11	3.20	10.71	1.00	15.55	9.28	144.23	4.000	No	Yes	2.00
139	22.80	11.16	3.36	13.49	1.00	11.87	11.60	137.67	4.000	No	Yes	2.00
140	22.97	10.70	3.41	15.27	1.00	11.24	12.51	140.53	4.000	No	Yes	2.00
141	23.13	12.87	3.31	13.35	1.00	13.77	10.82	149.03	4.000	No	Yes	2.00
142	23.29	16.45	3.17	11.20	1.00	17.95	8.86	159.06	4.000	No	Yes	2.00
143	23.46	19.73	3.08	10.10	1.00	21.74	7.70	167.34	4.000	No	Yes	2.00
144	23.62	22.43	3.03	9.85	1.00	24.78	7.14	176.82	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	23.79	29.15	2.89	8.09	0.98	32.34	5.63	182.21	4.000	No	Yes	2.00
146	23.95	43.78	2.63	5.16	0.88	48.10	3.54	170.02	4.000	No	Yes	2.00
147	24.11	63.12	2.38	3.25	0.78	68.35	2.24	153.19	0.414	No	No	0.50
148	24.28	80.38	2.18	2.09	0.70	85.72	1.61	138.03	0.325	No	No	0.39
149	24.44	83.69	2.09	1.61	0.67	88.38	1.43	126.63	0.269	No	No	0.32
150	24.61	72.38	2.18	1.86	0.70	76.40	1.61	123.17	0.254	No	No	0.30
151	24.77	50.13	2.45	3.17	0.81	53.19	2.53	134.48	0.306	No	No	0.37
152	24.93	29.87	2.81	6.08	0.95	31.64	4.87	154.02	4.000	No	Yes	2.00
153	25.10	20.28	3.03	8.19	1.00	21.02	7.05	148.15	4.000	No	Yes	2.00
154	25.26	18.56	3.03	7.46	1.00	18.98	7.09	134.50	4.000	No	Yes	2.00
155	25.43	21.11	2.92	5.89	0.99	21.65	5.88	127.35	4.000	No	Yes	2.00
156	25.59	20.80	2.93	6.07	0.99	21.21	6.03	128.00	4.000	No	Yes	2.00
157	25.75	20.04	2.99	6.88	1.00	20.28	6.58	133.50	4.000	No	Yes	2.00
158	25.92	19.15	3.06	8.46	1.00	19.19	7.49	143.83	4.000	No	Yes	2.00
159	26.08	20.74	3.04	8.54	1.00	20.80	7.23	150.46	4.000	No	Yes	2.00
160	26.25	25.32	2.94	7.55	1.00	25.62	6.12	156.67	4.000	No	Yes	2.00
161	26.41	29.09	2.86	6.71	0.97	29.41	5.34	157.10	4.000	No	Yes	2.00
162	26.57	30.51	2.84	6.56	0.96	30.73	5.16	158.40	4.000	No	Yes	2.00
163	26.74	28.83	2.88	7.04	0.97	28.83	5.54	159.68	4.000	No	Yes	2.00
164	26.90	27.27	2.92	7.34	0.99	27.07	5.85	158.50	4.000	No	Yes	2.00
165	27.07	30.37	2.85	6.67	0.96	30.09	5.26	158.33	4.000	No	Yes	2.00
166	27.23	42.74	2.65	4.92	0.89	42.49	3.68	156.27	4.000	No	Yes	2.00
167	27.39	61.02	2.45	3.61	0.81	60.64	2.53	153.50	0.416	No	No	0.49
168	27.56	85.12	2.24	2.56	0.73	84.26	1.78	150.22	0.395	No	No	0.47
169	27.72	105.80	2.12	2.12	0.68	104.30	1.49	155.70	0.431	No	No	0.51
170	27.89	121.37	2.06	1.95	0.66	119.20	1.38	164.48	0.494	No	No	0.59
171	28.05	128.38	2.06	2.05	0.66	125.71	1.38	173.45	0.565	No	No	0.67
172	28.21	134.20	2.04	2.05	0.65	130.94	1.36	178.40	0.608	No	No	0.72
173	28.38	142.67	2.01	1.92	0.64	138.68	1.31	181.42	0.635	No	No	0.75
174	28.54	160.23	1.90	1.55	0.60	155.05	1.19	185.00	0.669	No	No	0.79
175	28.71	183.26	1.78	1.20	0.55	176.57	1.09	193.26	0.751	No	No	0.89
176	28.87	210.83	1.67	0.96	0.51	202.37	1.02	206.24	4.000	No	No	2.00
177	29.04	232.63	1.63	0.92	0.50	222.73	1.00	222.73	4.000	No	No	2.00
178	29.20	249.42	1.61	0.92	0.50	238.27	1.00	238.27	4.000	No	No	2.00
179	29.36	260.87	1.60	0.93	0.50	248.59	1.00	248.59	4.000	No	No	2.00
180	29.53	263.81	1.59	0.92	0.50	250.73	1.00	250.73	4.000	No	No	2.00
181	29.69	258.51	1.60	0.93	0.50	244.99	1.00	244.99	4.000	No	No	2.00
182	29.86	253.10	1.62	0.95	0.50	239.18	1.00	239.18	4.000	No	No	2.00
183	30.02	253.03	1.63	0.97	0.50	238.46	1.00	238.46	4.000	No	No	2.00
184	30.18	252.30	1.64	1.01	0.50	237.13	1.00	236.40	4.000	No	No	2.00
185	30.35	242.24	1.66	1.02	0.51	227.00	1.01	229.06	4.000	No	No	2.00
186	30.51	231.01	1.67	1.01	0.51	215.81	1.02	219.58	4.000	No	No	2.00
187	30.68	229.61	1.65	0.94	0.50	213.94	1.00	214.68	4.000	No	No	2.00
188	30.84	244.96	1.59	0.83	0.50	227.78	1.00	227.78	4.000	No	No	2.00
189	31.00	260.09	1.57	0.81	0.50	241.33	1.00	241.33	4.000	No	No	2.00
190	31.17	265.58	1.56	0.81	0.50	245.83	1.00	245.83	4.000	No	No	2.00
191	31.33	256.90	1.59	0.85	0.50	237.13	1.00	237.13	4.000	No	No	2.00
192	31.50	245.53	1.59	0.82	0.50	225.98	1.00	225.98	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
193	31.66	233.18	1.59	0.78	0.50	213.99	1.00	213.99	4.000	No	No	2.00
194	31.82	222.75	1.60	0.77	0.50	203.83	1.00	203.83	4.000	No	No	2.00
195	31.99	212.24	1.61	0.76	0.50	193.67	1.00	193.67	0.756	No	No	0.89
196	32.15	206.67	1.62	0.76	0.50	188.09	1.00	188.09	0.699	No	No	0.83
197	32.32	208.13	1.61	0.74	0.50	188.97	1.00	188.97	0.708	No	No	0.84
198	32.48	220.11	1.60	0.74	0.50	199.48	1.00	199.48	0.818	No	No	0.97
199	32.64	235.87	1.56	0.70	0.50	213.38	1.00	213.38	4.000	No	No	2.00
200	32.81	244.22	1.55	0.70	0.50	220.47	1.00	220.47	4.000	No	No	2.00
201	32.97	243.97	1.55	0.69	0.50	219.72	1.00	219.72	4.000	No	No	2.00
202	33.14	238.49	1.55	0.68	0.50	214.24	1.00	214.24	4.000	No	No	2.00
203	33.30	233.81	1.56	0.68	0.50	209.51	1.00	209.51	4.000	No	No	2.00
204	33.47	225.97	1.59	0.73	0.50	201.95	1.00	201.95	4.000	No	No	2.00
205	33.63	214.09	1.66	0.87	0.51	190.62	1.01	193.02	0.749	No	No	0.88
206	33.79	196.56	1.75	1.06	0.54	173.83	1.07	186.39	0.682	No	No	0.80
207	33.96	186.76	1.77	1.05	0.55	164.56	1.08	178.10	0.605	No	No	0.71
208	34.12	179.63	1.79	1.08	0.56	157.66	1.10	173.03	0.562	No	No	0.66
209	34.28	165.98	1.84	1.19	0.58	144.82	1.14	164.86	0.497	No	No	0.58
210	34.45	131.88	2.03	1.72	0.65	113.39	1.34	152.00	0.407	No	No	0.48
211	34.61	90.26	2.27	2.55	0.74	75.90	1.87	141.88	0.346	No	No	0.41
212	34.78	63.71	2.52	3.95	0.84	52.21	2.89	151.05	0.401	No	No	0.47
213	34.94	58.86	2.64	5.23	0.88	47.62	3.58	170.43	4.000	No	Yes	2.00
214	35.10	64.44	2.65	5.83	0.88	52.06	3.64	189.46	4.000	No	Yes	2.00
215	35.27	79.70	2.52	4.80	0.84	65.00	2.88	187.34	0.691	No	No	0.81
216	35.43	103.12	2.30	3.12	0.75	85.34	1.96	167.23	0.515	No	No	0.60
217	35.60	127.21	2.12	2.17	0.68	106.46	1.50	159.43	0.457	No	No	0.54
218	35.76	132.69	2.10	2.07	0.67	110.96	1.45	160.48	0.464	No	No	0.54
219	35.92	123.40	2.17	2.44	0.70	102.26	1.60	163.73	0.488	No	No	0.57
220	36.09	112.48	2.22	2.57	0.72	92.48	1.71	158.27	0.449	No	No	0.53
221	36.25	109.11	2.23	2.60	0.73	89.28	1.75	156.20	0.434	No	No	0.51
222	36.42	100.52	2.29	2.89	0.75	81.51	1.92	156.74	0.438	No	No	0.51
223	36.58	84.46	2.43	3.69	0.80	67.34	2.43	163.32	0.485	No	No	0.57
224	36.74	63.03	2.63	5.20	0.88	48.91	3.52	172.13	4.000	No	Yes	2.00
225	36.91	46.14	2.84	7.26	0.96	34.66	5.12	177.39	4.000	No	Yes	2.00
226	37.07	40.43	2.91	7.91	0.98	29.86	5.79	173.02	4.000	No	Yes	2.00
227	37.24	45.42	2.80	6.25	0.94	33.90	4.76	161.55	4.000	No	Yes	2.00
228	37.40	70.80	2.42	2.95	0.80	55.22	2.38	131.56	0.292	No	No	0.34
229	37.57	100.80	2.16	1.88	0.70	80.72	1.58	127.39	0.272	No	No	0.32
230	37.73	133.02	1.98	1.40	0.63	108.36	1.28	138.38	0.326	No	No	0.38
231	37.89	114.10	2.14	2.00	0.69	91.22	1.54	140.32	0.337	No	No	0.40
232	38.06	121.80	2.15	2.19	0.70	97.14	1.56	151.45	0.403	No	No	0.47
233	38.22	119.28	2.24	2.77	0.73	94.15	1.76	165.70	0.503	No	No	0.59
234	38.39	150.37	2.14	2.56	0.69	119.75	1.54	183.96	0.659	No	No	0.77
235	38.55	150.78	2.14	2.52	0.69	119.78	1.52	182.58	0.646	No	No	0.76
236	38.71	158.98	2.07	2.16	0.66	126.77	1.40	177.73	0.602	No	No	0.71
237	38.88	167.66	2.01	1.90	0.64	134.11	1.32	176.44	0.591	No	No	0.69
238	39.04	172.97	1.98	1.77	0.63	138.44	1.27	176.48	0.591	No	No	0.70
239	39.21	179.35	1.91	1.49	0.60	144.16	1.20	173.19	0.563	No	No	0.66
240	39.37	189.14	1.82	1.16	0.57	153.16	1.12	171.37	0.548	No	No	0.65

:: 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	39.53	200.70	1.74	0.97	0.54	163.43	1.07	174.31	0.573	No	No	0.67
242	39.70	203.11	1.75	0.99	0.54	165.00	1.07	176.39	0.590	No	No	0.70
243	39.86	195.99	1.79	1.10	0.56	158.07	1.10	173.99	0.570	No	No	0.67
244	40.03	182.14	1.87	1.29	0.59	145.33	1.16	168.36	0.524	No	No	0.62
245	40.19	169.66	1.93	1.48	0.61	133.99	1.22	163.65	0.488	No	No	0.58
246	40.35	158.72	1.99	1.67	0.64	124.11	1.29	160.46	0.464	No	No	0.55
247	40.52	142.05	2.11	2.16	0.68	109.18	1.48	161.51	0.472	No	No	0.56
248	40.68	111.88	2.31	3.10	0.75	83.59	1.97	164.81	0.496	No	No	0.59
249	40.85	82.04	2.56	4.90	0.85	58.97	3.07	181.18	0.633	No	No	0.75
250	41.01	65.52	2.71	6.23	0.91	45.78	4.05	185.52	4.000	No	Yes	2.00
251	41.17	80.95	2.56	4.80	0.85	57.76	3.07	177.20	0.597	No	No	0.71
252	41.34	120.69	2.22	2.51	0.72	90.11	1.71	154.38	0.422	No	No	0.50
253	41.50	161.57	1.94	1.41	0.61	124.89	1.23	153.53	0.417	No	No	0.49
254	41.67	181.89	1.81	1.05	0.56	142.66	1.11	158.89	0.453	No	No	0.54
255	41.83	170.80	1.88	1.24	0.59	132.43	1.17	155.23	0.428	No	No	0.51
256	41.99	146.11	2.04	1.72	0.65	110.65	1.35	149.60	0.391	No	No	0.46
257	42.16	118.58	2.20	2.32	0.71	87.45	1.67	146.14	0.370	No	No	0.44
258	42.32	96.79	2.35	3.02	0.77	69.51	2.13	148.36	0.384	No	No	0.46
259	42.49	81.19	2.48	3.78	0.82	56.90	2.69	153.18	0.414	No	No	0.49
260	42.65	69.69	2.58	4.34	0.86	47.85	3.20	153.30	0.415	No	No	0.49
261	42.81	75.11	2.49	3.56	0.82	52.11	2.73	142.23	0.348	No	No	0.41
262	42.98	93.29	2.31	2.49	0.75	66.54	1.97	131.20	0.290	No	No	0.35
263	43.14	109.09	2.22	2.21	0.72	78.81	1.71	135.16	0.310	No	No	0.37
264	43.31	103.80	2.30	2.74	0.75	73.86	1.96	145.08	0.364	No	No	0.43
265	43.47	87.87	2.44	3.52	0.81	60.94	2.49	151.74	0.405	No	No	0.48
266	43.63	74.01	2.56	4.24	0.85	50.08	3.08	154.32	0.422	No	No	0.50
267	43.80	60.15	2.67	4.86	0.89	39.61	3.80	150.44	4.000	No	Yes	2.00
268	43.96	44.47	2.85	6.18	0.96	28.00	5.25	146.91	4.000	No	Yes	2.00
269	44.13	31.51	3.04	7.80	1.00	18.98	7.25	137.49	4.000	No	Yes	2.00
270	44.29	27.37	3.10	8.05	1.00	16.19	7.97	129.00	4.000	No	Yes	2.00
271	44.45	25.44	3.12	7.75	1.00	14.86	8.17	121.45	4.000	No	Yes	2.00
272	44.62	23.63	3.15	7.83	1.00	13.63	8.57	116.80	4.000	No	Yes	2.00
273	44.78	22.98	3.17	8.17	1.00	13.16	8.89	116.97	4.000	No	Yes	2.00
274	44.95	23.61	3.21	9.53	1.00	13.52	9.40	127.02	4.000	No	Yes	2.00
275	45.11	26.99	3.17	9.73	1.00	15.65	8.85	138.48	4.000	No	Yes	2.00
276	45.28	42.21	2.89	6.44	0.98	25.63	5.62	144.14	4.000	No	Yes	2.00
277	45.44	95.76	2.32	2.55	0.76	65.54	2.01	131.85	0.293	No	No	0.35
278	45.60	146.63	2.05	1.70	0.66	105.28	1.37	144.14	0.359	No	No	0.43
279	45.77	175.42	1.99	1.69	0.63	127.18	1.29	163.62	0.487	No	No	0.59
280	45.93	159.97	2.15	2.48	0.69	112.76	1.55	174.90	0.578	No	No	0.70
281	46.10	138.85	2.32	3.63	0.76	94.78	2.03	191.95	0.738	No	No	0.90
282	46.26	117.99	2.48	5.00	0.82	78.05	2.69	209.93	4.000	No	No	2.00
283	46.42	95.07	2.62	6.12	0.87	61.01	3.45	210.69	4.000	No	Yes	2.00
284	46.59	71.70	2.76	7.21	0.93	44.38	4.49	199.22	4.000	No	Yes	2.00
285	46.75	53.00	2.91	8.43	0.99	31.45	5.84	183.76	4.000	No	Yes	2.00
286	46.92	45.23	3.02	9.92	1.00	26.32	6.96	183.08	4.000	No	Yes	2.00
287	47.08	52.73	2.92	8.47	0.99	31.03	5.90	183.03	4.000	No	Yes	2.00
288	47.24	64.27	2.78	6.83	0.94	38.93	4.65	181.15	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
289	47.41	65.88	2.76	6.51	0.93	39.96	4.47	178.49	4.000	No	Yes	2.00
290	47.57	57.87	2.86	7.67	0.96	34.20	5.31	181.75	4.000	No	Yes	2.00
291	47.74	58.23	2.85	7.48	0.96	34.36	5.23	179.70	4.000	No	Yes	2.00
292	47.90	73.71	2.66	5.29	0.89	45.26	3.70	167.65	4.000	No	Yes	2.00
293	48.06	123.21	2.26	2.65	0.74	81.99	1.84	150.52	0.397	No	No	0.49
294	48.23	173.50	2.00	1.65	0.64	121.35	1.30	157.33	0.442	No	No	0.54
295	48.39	212.20	1.85	1.30	0.58	152.24	1.15	174.84	0.577	No	No	0.71
296	48.56	207.84	1.91	1.52	0.60	147.25	1.20	176.99	0.596	No	No	0.74
297	48.72	179.09	2.04	1.92	0.65	123.57	1.36	167.51	0.517	No	No	0.64
298	48.88	141.81	2.21	2.52	0.72	94.40	1.68	158.74	0.452	No	No	0.56
299	49.05	103.69	2.39	3.27	0.79	66.07	2.29	151.15	0.401	No	No	0.50
300	49.21	79.06	2.57	4.19	0.85	48.26	3.12	150.74	0.399	No	No	0.49
301	49.38	85.63	2.50	3.72	0.83	52.88	2.78	146.87	0.375	No	No	0.47
302	49.54	117.52	2.29	2.67	0.75	75.98	1.91	145.34	0.366	No	No	0.45
303	49.70	137.93	2.21	2.43	0.72	90.66	1.68	152.32	0.409	No	No	0.51
304	49.87	124.83	2.16	1.88	0.70	82.39	1.57	129.09	0.280	No	No	0.35
305	50.03	91.48	2.18	1.39	0.70	59.48	1.61	95.73	0.162	No	No	0.20
306	50.20	71.85	N/A	0.00	1.00	-1.00	1.00	N/A	4.000	No	No	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
0.16	2.00	0.00	0.00	0.16	0.00	0.33	2.00	0.00	0.00	0.16	0.00
0.49	2.00	0.00	0.00	0.16	0.00	0.66	2.00	0.00	0.00	0.16	0.00
0.82	2.00	0.00	0.00	0.16	0.00	0.98	2.00	0.00	0.00	0.16	0.00
1.15	2.00	0.00	0.00	0.16	0.00	1.31	2.00	0.00	0.00	0.16	0.00
1.48	2.00	0.00	0.00	0.16	0.00	1.64	2.00	0.00	0.00	0.16	0.00
1.80	2.00	0.00	0.00	0.16	0.00	1.97	2.00	0.00	0.00	0.17	0.00
2.13	2.00	0.00	0.00	0.16	0.00	2.30	2.00	0.00	0.00	0.16	0.00
2.46	2.00	0.00	0.00	0.16	0.00	2.63	2.00	0.00	0.00	0.16	0.00
2.79	2.00	0.00	0.00	0.16	0.00	2.95	2.00	0.00	0.00	0.16	0.00
3.12	2.00	0.00	0.00	0.16	0.00	3.28	2.00	0.00	0.00	0.16	0.00
3.44	2.00	0.00	0.00	0.16	0.00	3.61	2.00	0.00	0.00	0.16	0.00
3.77	2.00	0.00	0.00	0.16	0.00	3.94	2.00	0.00	0.00	0.16	0.00
4.10	2.00	0.00	0.00	0.16	0.00	4.26	2.00	0.00	0.00	0.16	0.00
4.43	2.00	0.00	0.00	0.16	0.00	4.59	2.00	0.00	0.00	0.16	0.00
4.76	2.00	0.00	0.00	0.16	0.00	4.92	2.00	0.00	0.00	0.16	0.00
5.08	2.00	0.00	0.00	0.16	0.00	5.25	2.00	0.00	0.00	0.16	0.00
5.41	2.00	0.00	0.00	0.16	0.00	5.58	2.00	0.00	0.00	0.16	0.00
5.74	2.00	0.00	0.00	0.16	0.00	5.91	2.00	0.00	0.00	0.17	0.00
6.07	2.00	0.00	0.00	0.16	0.00	6.23	2.00	0.00	0.00	0.16	0.00
6.40	2.00	0.00	0.00	0.16	0.00	6.56	2.00	0.00	0.00	0.16	0.00
6.73	2.00	0.00	0.00	0.16	0.00	6.89	2.00	0.00	0.00	0.16	0.00
7.05	2.00	0.00	0.00	0.16	0.00	7.22	2.00	0.00	0.00	0.16	0.00
7.38	0.70	0.00	0.00	0.16	0.13	7.55	0.95	0.00	0.00	0.16	0.02
7.71	2.00	0.00	0.00	0.16	0.00	7.87	2.00	0.00	0.00	0.16	0.00
8.04	2.00	0.00	0.00	0.16	0.00	8.20	2.00	0.00	0.00	0.16	0.00
8.37	2.00	0.00	0.00	0.16	0.00	8.53	1.10	0.00	0.00	0.16	0.00
8.69	0.82	0.00	0.00	0.16	0.08	8.86	0.60	0.00	0.00	0.16	0.17
9.02	2.00	0.00	0.00	0.16	0.00	9.19	2.00	0.00	0.00	0.16	0.00
9.35	2.00	0.00	0.00	0.16	0.00	9.51	0.55	0.00	0.00	0.16	0.19
9.68	0.60	0.00	0.00	0.16	0.17	9.84	0.75	0.00	0.00	0.16	0.11
10.01	0.93	0.00	0.00	0.16	0.03	10.17	0.97	0.00	0.00	0.16	0.01
10.34	1.00	0.00	0.00	0.16	0.00	10.50	0.97	0.00	0.00	0.16	0.01
10.66	2.00	0.00	0.00	0.16	0.00	10.83	2.00	0.00	0.00	0.16	0.00
10.99	2.00	0.00	0.00	0.16	0.00	11.15	0.61	0.39	0.66	0.16	0.16
11.32	0.47	0.53	0.45	0.16	0.22	11.48	0.42	0.58	0.40	0.16	0.24
11.65	0.41	0.59	0.39	0.16	0.24	11.81	0.41	0.59	0.39	0.16	0.24
11.97	0.40	0.60	0.38	0.16	0.25	12.14	0.40	0.60	0.39	0.16	0.24
12.30	0.41	0.59	0.39	0.16	0.24	12.47	0.44	0.56	0.42	0.16	0.23
12.63	0.47	0.53	0.45	0.16	0.21	12.79	0.46	0.54	0.44	0.16	0.22
12.96	0.40	0.60	0.39	0.16	0.24	13.12	0.34	0.66	0.34	0.16	0.26
13.29	0.33	0.67	0.34	0.16	0.27	13.45	2.00	0.00	0.00	0.16	0.00
13.62	2.00	0.00	0.00	0.16	0.00	13.78	2.00	0.00	0.00	0.16	0.00
13.94	2.00	0.00	0.00	0.16	0.00	14.11	2.00	0.00	0.00	0.16	0.00
14.27	2.00	0.00	0.00	0.16	0.00	14.44	0.37	0.63	0.36	0.16	0.25
14.60	0.37	0.63	0.36	0.16	0.25	14.76	0.43	0.57	0.41	0.16	0.22
14.93	0.49	0.51	0.47	0.16	0.20	15.09	0.55	0.45	0.55	0.16	0.17
15.26	0.61	0.39	0.65	0.16	0.15	15.42	0.64	0.36	0.71	0.16	0.14
15.58	0.62	0.38	0.68	0.16	0.14	15.75	0.63	0.37	0.69	0.16	0.14

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI
15.91	0.62	0.38	0.67	0.16	0.14
16.24	0.63	0.37	0.71	0.16	0.14
16.57	0.73	0.00	0.00	0.16	0.10
16.90	2.00	0.00	0.00	0.16	0.00
17.22	2.00	0.00	0.00	0.16	0.00
17.55	0.54	0.46	0.52	0.16	0.17
17.88	0.30	0.70	0.32	0.16	0.26
18.21	0.39	0.61	0.38	0.16	0.22
18.54	2.00	0.00	0.00	0.16	0.00
18.86	2.00	0.00	0.00	0.16	0.00
19.19	0.46	0.54	0.44	0.16	0.19
19.52	2.00	0.00	0.00	0.16	0.00
19.85	2.00	0.00	0.00	0.16	0.00
20.18	0.53	0.47	0.51	0.16	0.16
20.50	0.42	0.58	0.40	0.16	0.20
20.83	0.41	0.59	0.39	0.16	0.20
21.16	0.34	0.66	0.34	0.16	0.22
21.49	2.00	0.00	0.00	0.16	0.00
21.82	2.00	0.00	0.00	0.16	0.00
22.15	0.46	0.54	0.44	0.16	0.18
22.47	2.00	0.00	0.00	0.16	0.00
22.80	2.00	0.00	0.00	0.16	0.00
23.13	2.00	0.00	0.00	0.16	0.00
23.46	2.00	0.00	0.00	0.16	0.00
23.79	2.00	0.00	0.00	0.16	0.00
24.11	0.50	0.50	0.47	0.16	0.16
24.44	0.32	0.68	0.33	0.16	0.21
24.77	0.37	0.63	0.36	0.16	0.20
25.10	2.00	0.00	0.00	0.16	0.00
25.43	2.00	0.00	0.00	0.16	0.00
25.75	2.00	0.00	0.00	0.16	0.00
26.08	2.00	0.00	0.00	0.16	0.00
26.41	2.00	0.00	0.00	0.16	0.00
26.74	2.00	0.00	0.00	0.16	0.00
27.07	2.00	0.00	0.00	0.16	0.00
27.39	0.49	0.51	0.47	0.16	0.15
27.72	0.51	0.49	0.49	0.16	0.14
28.05	0.67	0.33	0.81	0.16	0.09
28.38	0.75	0.00	0.00	0.16	0.07
28.71	0.89	0.00	0.00	0.16	0.03
29.04	2.00	0.00	0.00	0.16	0.00
29.36	2.00	0.00	0.00	0.16	0.00
29.69	2.00	0.00	0.00	0.16	0.00
30.02	2.00	0.00	0.00	0.16	0.00
30.35	2.00	0.00	0.00	0.16	0.00
30.68	2.00	0.00	0.00	0.16	0.00
31.00	2.00	0.00	0.00	0.16	0.00
31.33	2.00	0.00	0.00	0.16	0.00

Depth (ft)	FS	F_L	w_z	d_z	LPI
16.08	0.58	0.42	0.59	0.16	0.16
16.40	0.78	0.00	0.00	0.16	0.08
16.73	0.72	0.00	0.00	0.16	0.11
17.06	2.00	0.00	0.00	0.16	0.00
17.39	0.76	0.00	0.00	0.16	0.09
17.72	0.35	0.65	0.35	0.16	0.24
18.05	0.33	0.67	0.34	0.16	0.24
18.37	0.54	0.46	0.54	0.16	0.16
18.70	2.00	0.00	0.00	0.16	0.00
19.03	0.44	0.56	0.42	0.16	0.20
19.36	0.56	0.44	0.55	0.16	0.16
19.68	2.00	0.00	0.00	0.16	0.00
20.01	2.00	0.00	0.00	0.16	0.00
20.34	0.44	0.56	0.42	0.16	0.19
20.67	0.44	0.56	0.42	0.16	0.19
21.00	0.37	0.63	0.37	0.16	0.21
21.32	0.38	0.62	0.37	0.16	0.21
21.65	2.00	0.00	0.00	0.16	0.00
21.98	0.42	0.58	0.40	0.16	0.19
22.31	2.00	0.00	0.00	0.16	0.00
22.64	2.00	0.00	0.00	0.16	0.00
22.97	2.00	0.00	0.00	0.16	0.00
23.29	2.00	0.00	0.00	0.16	0.00
23.62	2.00	0.00	0.00	0.16	0.00
23.95	2.00	0.00	0.00	0.16	0.00
24.28	0.39	0.61	0.38	0.16	0.19
24.61	0.30	0.70	0.32	0.16	0.22
24.93	2.00	0.00	0.00	0.16	0.00
25.26	2.00	0.00	0.00	0.16	0.00
25.59	2.00	0.00	0.00	0.16	0.00
25.92	2.00	0.00	0.00	0.16	0.00
26.25	2.00	0.00	0.00	0.16	0.00
26.57	2.00	0.00	0.00	0.16	0.00
26.90	2.00	0.00	0.00	0.16	0.00
27.23	2.00	0.00	0.00	0.16	0.00
27.56	0.47	0.53	0.45	0.16	0.15
27.89	0.59	0.41	0.60	0.16	0.12
28.21	0.72	0.00	0.00	0.16	0.08
28.54	0.79	0.00	0.00	0.16	0.06
28.87	2.00	0.00	0.00	0.16	0.00
29.20	2.00	0.00	0.00	0.16	0.00
29.53	2.00	0.00	0.00	0.16	0.00
29.86	2.00	0.00	0.00	0.16	0.00
30.18	2.00	0.00	0.00	0.16	0.00
30.51	2.00	0.00	0.00	0.16	0.00
30.84	2.00	0.00	0.00	0.16	0.00
31.17	2.00	0.00	0.00	0.16	0.00
31.50	2.00	0.00	0.00	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
31.66	2.00	0.00	0.00	0.16	0.00	31.82	2.00	0.00	0.00	0.16	0.00
31.99	0.89	0.00	0.00	0.16	0.03	32.15	0.83	0.00	0.00	0.16	0.04
32.32	0.84	0.00	0.00	0.16	0.04	32.48	0.97	0.00	0.00	0.16	0.01
32.64	2.00	0.00	0.00	0.16	0.00	32.81	2.00	0.00	0.00	0.16	0.00
32.97	2.00	0.00	0.00	0.16	0.00	33.14	2.00	0.00	0.00	0.16	0.00
33.30	2.00	0.00	0.00	0.16	0.00	33.47	2.00	0.00	0.00	0.16	0.00
33.63	0.88	0.00	0.00	0.16	0.03	33.79	0.80	0.00	0.00	0.16	0.05
33.96	0.71	0.00	0.00	0.16	0.07	34.12	0.66	0.34	0.78	0.16	0.08
34.28	0.58	0.42	0.60	0.16	0.10	34.45	0.48	0.52	0.45	0.16	0.12
34.61	0.41	0.59	0.39	0.16	0.14	34.78	0.47	0.53	0.45	0.16	0.12
34.94	2.00	0.00	0.00	0.16	0.00	35.10	2.00	0.00	0.00	0.16	0.00
35.27	0.81	0.00	0.00	0.16	0.04	35.43	0.60	0.40	0.64	0.16	0.09
35.60	0.54	0.46	0.52	0.16	0.11	35.76	0.54	0.46	0.54	0.16	0.10
35.92	0.57	0.43	0.58	0.16	0.10	36.09	0.53	0.47	0.51	0.16	0.11
36.25	0.51	0.49	0.49	0.16	0.11	36.42	0.51	0.49	0.50	0.16	0.11
36.58	0.57	0.43	0.57	0.16	0.10	36.74	2.00	0.00	0.00	0.16	0.00
36.91	2.00	0.00	0.00	0.16	0.00	37.07	2.00	0.00	0.00	0.16	0.00
37.24	2.00	0.00	0.00	0.16	0.00	37.40	0.34	0.66	0.35	0.16	0.14
37.57	0.32	0.68	0.33	0.16	0.15	37.73	0.38	0.62	0.37	0.16	0.13
37.89	0.40	0.60	0.38	0.16	0.13	38.06	0.47	0.53	0.45	0.16	0.11
38.22	0.59	0.41	0.61	0.16	0.09	38.39	0.77	0.00	0.00	0.16	0.05
38.55	0.76	0.00	0.00	0.16	0.05	38.71	0.71	0.00	0.00	0.16	0.06
38.88	0.69	0.00	0.00	0.16	0.06	39.04	0.70	0.00	0.00	0.16	0.06
39.21	0.66	0.34	0.79	0.16	0.07	39.37	0.65	0.35	0.74	0.16	0.07
39.53	0.67	0.33	0.82	0.16	0.06	39.70	0.70	0.00	0.00	0.16	0.06
39.86	0.67	0.33	0.81	0.16	0.06	40.03	0.62	0.38	0.67	0.16	0.07
40.19	0.58	0.42	0.59	0.16	0.08	40.35	0.55	0.45	0.54	0.16	0.09
40.52	0.56	0.44	0.56	0.16	0.08	40.68	0.59	0.41	0.61	0.16	0.08
40.85	0.75	0.00	0.00	0.16	0.05	41.01	2.00	0.00	0.00	0.17	0.00
41.17	0.71	0.00	0.00	0.16	0.05	41.34	0.50	0.50	0.48	0.16	0.09
41.50	0.49	0.51	0.47	0.16	0.09	41.67	0.54	0.46	0.53	0.16	0.08
41.83	0.51	0.49	0.49	0.16	0.09	41.99	0.46	0.54	0.44	0.16	0.10
42.16	0.44	0.56	0.42	0.16	0.10	42.32	0.46	0.54	0.43	0.16	0.10
42.49	0.49	0.51	0.47	0.16	0.09	42.65	0.49	0.51	0.47	0.16	0.09
42.81	0.41	0.59	0.40	0.16	0.10	42.98	0.35	0.65	0.35	0.16	0.11
43.14	0.37	0.63	0.36	0.16	0.11	43.31	0.43	0.57	0.41	0.16	0.10
43.47	0.48	0.52	0.46	0.16	0.09	43.63	0.50	0.50	0.48	0.16	0.08
43.80	2.00	0.00	0.00	0.16	0.00	43.96	2.00	0.00	0.00	0.16	0.00
44.13	2.00	0.00	0.00	0.16	0.00	44.29	2.00	0.00	0.00	0.16	0.00
44.45	2.00	0.00	0.00	0.16	0.00	44.62	2.00	0.00	0.00	0.16	0.00
44.78	2.00	0.00	0.00	0.16	0.00	44.95	2.00	0.00	0.00	0.16	0.00
45.11	2.00	0.00	0.00	0.16	0.00	45.28	2.00	0.00	0.00	0.16	0.00
45.44	0.35	0.65	0.35	0.16	0.10	45.60	0.43	0.57	0.41	0.16	0.09
45.77	0.59	0.41	0.61	0.16	0.06	45.93	0.70	0.00	0.00	0.16	0.04
46.10	0.90	0.00	0.00	0.16	0.02	46.26	2.00	0.00	0.00	0.16	0.00
46.42	2.00	0.00	0.00	0.16	0.00	46.59	2.00	0.00	0.00	0.16	0.00
46.75	2.00	0.00	0.00	0.16	0.00	46.92	2.00	0.00	0.00	0.16	0.00
47.08	2.00	0.00	0.00	0.16	0.00	47.24	2.00	0.00	0.00	0.16	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (ft)	FS	F_L	w_z	d_z	LPI
47.41	2.00	0.00	0.00	0.16	0.00
47.74	2.00	0.00	0.00	0.16	0.00
48.06	0.49	0.51	0.47	0.16	0.07
48.39	0.71	0.00	0.00	0.16	0.04
48.72	0.64	0.36	0.72	0.16	0.05
49.05	0.50	0.50	0.48	0.16	0.06
49.38	0.47	0.53	0.44	0.16	0.07
49.70	0.51	0.49	0.49	0.16	0.06
50.03	0.20	0.80	0.28	0.16	0.09
47.57	2.00	0.00	0.00	0.16	0.00
47.90	2.00	0.00	0.00	0.16	0.00
48.23	0.54	0.46	0.54	0.16	0.06
48.56	0.74	0.00	0.00	0.16	0.03
48.88	0.56	0.44	0.56	0.16	0.06
49.21	0.49	0.51	0.47	0.16	0.06
49.54	0.45	0.55	0.43	0.16	0.07
49.87	0.35	0.65	0.35	0.16	0.08
50.20	2.00	0.00	0.00	0.16	0.00

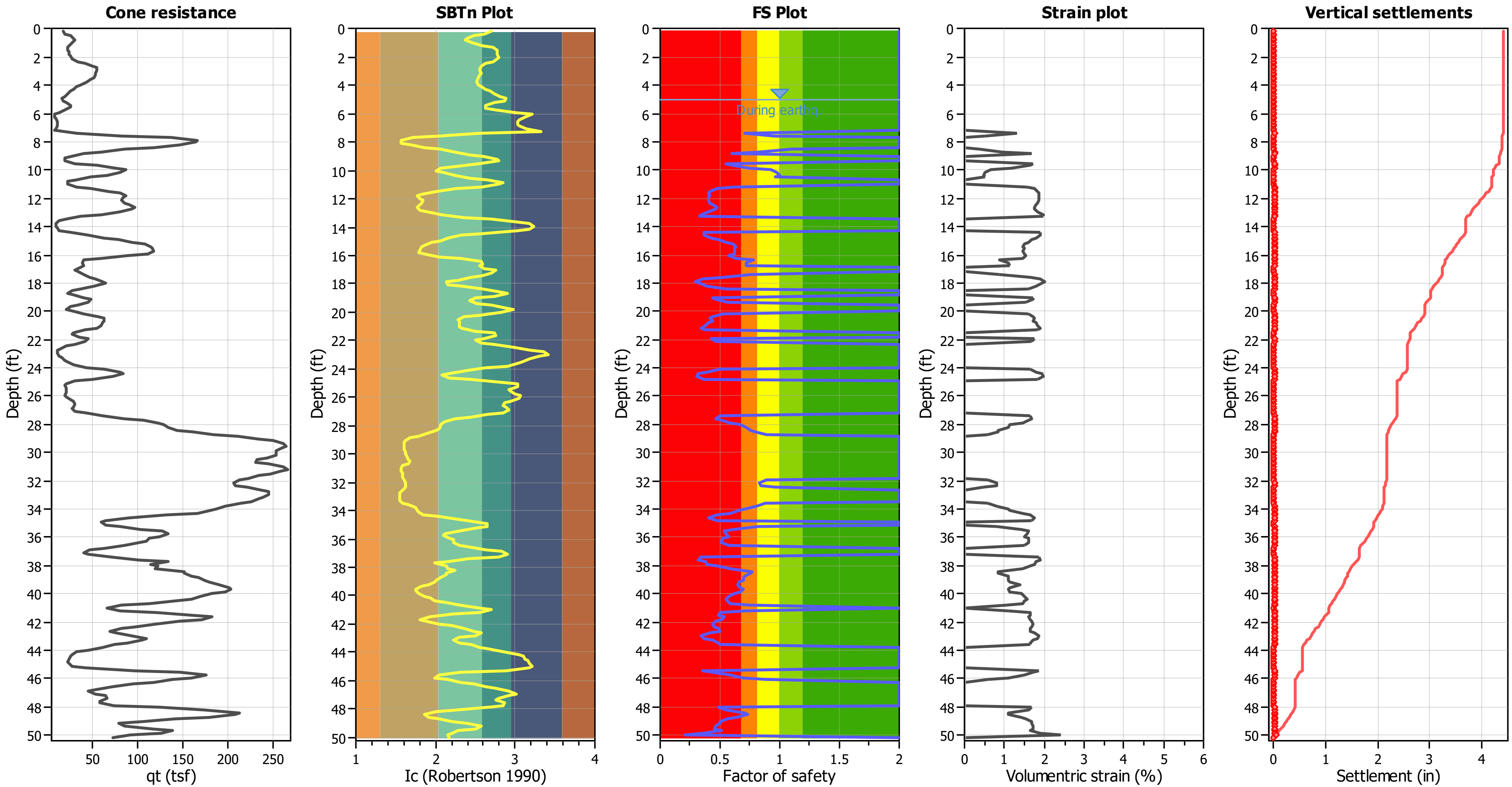
Overall liquefaction potential: 18.42

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)
5.08	143.89	2.00	0.00	1.00	0.00	5.25	147.18	2.00	0.00	1.00	0.00
5.41	140.10	2.00	0.00	1.00	0.00	5.58	138.11	2.00	0.00	1.00	0.00
5.74	129.96	2.00	0.00	1.00	0.00	5.91	126.49	2.00	0.00	1.00	0.00
6.07	111.64	2.00	0.00	1.00	0.00	6.23	105.71	2.00	0.00	1.00	0.00
6.40	105.14	2.00	0.00	1.00	0.00	6.56	111.06	2.00	0.00	1.00	0.00
6.73	118.19	2.00	0.00	1.00	0.00	6.89	121.45	2.00	0.00	1.00	0.00
7.05	124.88	2.00	0.00	1.00	0.00	7.22	134.77	2.00	0.00	1.00	0.00
7.38	156.47	0.70	1.30	1.00	0.03	7.55	176.96	0.95	0.52	1.00	0.01
7.71	229.52	2.00	0.00	1.00	0.00	7.87	259.37	2.00	0.00	1.00	0.00
8.04	255.92	2.00	0.00	1.00	0.00	8.20	238.79	2.00	0.00	1.00	0.00
8.37	217.38	2.00	0.00	1.00	0.00	8.53	190.22	1.10	0.36	1.00	0.01
8.69	170.10	0.82	0.94	1.00	0.02	8.86	150.43	0.60	1.68	1.00	0.03
9.02	138.70	2.00	0.00	1.00	0.00	9.19	133.91	2.00	0.00	1.00	0.00
9.35	142.58	2.00	0.00	1.00	0.00	9.51	146.54	0.55	1.71	1.00	0.03
9.68	152.69	0.60	1.64	1.00	0.03	9.84	167.25	0.75	1.18	1.00	0.02
10.01	181.98	0.93	0.65	1.00	0.01	10.17	185.62	0.97	0.50	1.00	0.01
10.34	188.05	1.00	0.49	1.00	0.01	10.50	185.96	0.97	0.50	1.00	0.01
10.66	182.13	2.00	0.00	1.00	0.00	10.83	177.21	2.00	0.00	1.00	0.00
10.99	169.58	2.00	0.00	1.00	0.00	11.15	156.92	0.61	1.58	1.00	0.03
11.32	140.51	0.47	1.77	1.00	0.03	11.48	133.46	0.42	1.84	1.00	0.04
11.65	132.20	0.41	1.86	1.00	0.04	11.81	133.04	0.41	1.85	1.00	0.04
11.97	131.51	0.40	1.87	1.00	0.04	12.14	131.79	0.40	1.86	1.00	0.04
12.30	133.43	0.41	1.84	1.00	0.04	12.47	138.43	0.44	1.79	1.00	0.04
12.63	142.79	0.47	1.74	1.00	0.03	12.79	141.57	0.46	1.76	1.00	0.03
12.96	133.66	0.40	1.84	1.00	0.04	13.12	123.13	0.34	1.97	1.00	0.04
13.29	122.17	0.33	1.98	1.00	0.04	13.45	127.37	2.00	0.00	1.00	0.00
13.62	127.49	2.00	0.00	1.00	0.00	13.78	125.34	2.00	0.00	1.00	0.00
13.94	129.82	2.00	0.00	1.00	0.00	14.11	133.20	2.00	0.00	1.00	0.00
14.27	134.71	2.00	0.00	1.00	0.00	14.44	129.31	0.37	1.89	1.00	0.04
14.60	129.50	0.37	1.89	1.00	0.04	14.76	139.20	0.43	1.78	1.00	0.04
14.93	148.15	0.49	1.69	1.00	0.03	15.09	155.36	0.55	1.60	1.00	0.03
15.26	161.91	0.61	1.51	1.00	0.03	15.42	164.87	0.64	1.47	1.00	0.03
15.58	163.58	0.62	1.49	1.00	0.03	15.75	164.05	0.63	1.48	1.00	0.03
15.91	163.59	0.62	1.49	1.00	0.03	16.08	159.14	0.58	1.55	1.00	0.03
16.24	165.20	0.63	1.47	1.00	0.03	16.40	179.04	0.78	0.87	1.00	0.02
16.57	174.47	0.73	1.12	1.00	0.02	16.73	173.61	0.72	1.12	1.00	0.02
16.90	175.77	2.00	0.00	1.00	0.00	17.06	191.78	2.00	0.00	1.00	0.00
17.22	188.20	2.00	0.00	1.00	0.00	17.39	177.83	0.76	0.88	1.00	0.02
17.55	155.25	0.54	1.63	1.00	0.03	17.72	129.95	0.35	1.88	1.00	0.04
17.88	119.54	0.30	2.02	1.00	0.04	18.05	125.19	0.33	1.94	1.00	0.04
18.21	136.75	0.39	1.81	1.00	0.04	18.37	156.89	0.54	1.62	1.00	0.03
18.54	172.59	2.00	0.00	1.00	0.00	18.70	174.33	2.00	0.00	1.00	0.00
18.86	159.46	2.00	0.00	1.00	0.00	19.03	144.22	0.44	1.73	1.00	0.03
19.19	147.11	0.46	1.70	1.00	0.03	19.36	158.69	0.56	1.55	1.00	0.03
19.52	171.56	2.00	0.00	1.00	0.00	19.68	175.71	2.00	0.00	1.00	0.00
19.85	177.14	2.00	0.00	1.00	0.00	20.01	172.00	2.00	0.00	1.00	0.00
20.18	155.91	0.53	1.62	1.00	0.03	20.34	144.19	0.44	1.73	1.00	0.03
20.50	141.63	0.42	1.76	1.00	0.03	20.67	145.28	0.44	1.72	1.00	0.03

:: 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)
20.83	139.89	0.41	1.77	1.00	0.03	21.00	134.73	0.37	1.83	1.00	0.04
21.16	129.04	0.34	1.90	1.00	0.04	21.32	136.38	0.38	1.81	1.00	0.04
21.49	142.97	2.00	0.00	1.00	0.00	21.65	144.66	2.00	0.00	1.00	0.00
21.82	143.31	2.00	0.00	1.00	0.00	21.98	142.83	0.42	1.74	1.00	0.03
22.15	148.53	0.46	1.69	1.00	0.03	22.31	150.82	2.00	0.00	1.00	0.00
22.47	151.37	2.00	0.00	1.00	0.00	22.64	144.23	2.00	0.00	1.00	0.00
22.80	137.67	2.00	0.00	1.00	0.00	22.97	140.53	2.00	0.00	1.00	0.00
23.13	149.03	2.00	0.00	1.00	0.00	23.29	159.06	2.00	0.00	1.00	0.00
23.46	167.34	2.00	0.00	1.00	0.00	23.62	176.82	2.00	0.00	1.00	0.00
23.79	182.21	2.00	0.00	1.00	0.00	23.95	170.02	2.00	0.00	1.00	0.00
24.11	153.19	0.50	1.65	1.00	0.03	24.28	138.03	0.39	1.79	1.00	0.04
24.44	126.63	0.32	1.93	1.00	0.04	24.61	123.17	0.30	1.97	1.00	0.04
24.77	134.48	0.37	1.83	1.00	0.04	24.93	154.02	2.00	0.00	1.00	0.00
25.10	148.15	2.00	0.00	1.00	0.00	25.26	134.50	2.00	0.00	1.00	0.00
25.43	127.35	2.00	0.00	1.00	0.00	25.59	128.00	2.00	0.00	1.00	0.00
25.75	133.50	2.00	0.00	1.00	0.00	25.92	143.83	2.00	0.00	1.00	0.00
26.08	150.46	2.00	0.00	1.00	0.00	26.25	156.67	2.00	0.00	1.00	0.00
26.41	157.10	2.00	0.00	1.00	0.00	26.57	158.40	2.00	0.00	1.00	0.00
26.74	159.68	2.00	0.00	1.00	0.00	26.90	158.50	2.00	0.00	1.00	0.00
27.07	158.33	2.00	0.00	1.00	0.00	27.23	156.27	2.00	0.00	1.00	0.00
27.39	153.50	0.49	1.64	1.00	0.03	27.56	150.22	0.47	1.67	1.00	0.03
27.72	155.70	0.51	1.63	1.00	0.03	27.89	164.48	0.59	1.48	1.00	0.03
28.05	173.45	0.67	1.12	1.00	0.02	28.21	178.40	0.72	1.08	1.00	0.02
28.38	181.42	0.75	0.85	1.00	0.02	28.54	185.00	0.79	0.83	1.00	0.02
28.71	193.26	0.89	0.59	1.00	0.01	28.87	206.24	2.00	0.00	1.00	0.00
29.04	222.73	2.00	0.00	1.00	0.00	29.20	238.27	2.00	0.00	1.00	0.00
29.36	248.59	2.00	0.00	1.00	0.00	29.53	250.73	2.00	0.00	1.00	0.00
29.69	244.99	2.00	0.00	1.00	0.00	29.86	239.18	2.00	0.00	1.00	0.00
30.02	238.46	2.00	0.00	1.00	0.00	30.18	236.40	2.00	0.00	1.00	0.00
30.35	229.06	2.00	0.00	1.00	0.00	30.51	219.58	2.00	0.00	1.00	0.00
30.68	214.68	2.00	0.00	1.00	0.00	30.84	227.78	2.00	0.00	1.00	0.00
31.00	241.33	2.00	0.00	1.00	0.00	31.17	245.83	2.00	0.00	1.00	0.00
31.33	237.13	2.00	0.00	1.00	0.00	31.50	225.98	2.00	0.00	1.00	0.00
31.66	213.99	2.00	0.00	1.00	0.00	31.82	203.83	2.00	0.00	1.00	0.00
31.99	193.67	0.89	0.59	1.00	0.01	32.15	188.09	0.83	0.81	1.00	0.02
32.32	188.97	0.84	0.80	1.00	0.02	32.48	199.48	0.97	0.46	1.00	0.01
32.64	213.38	2.00	0.00	1.00	0.00	32.81	220.47	2.00	0.00	1.00	0.00
32.97	219.72	2.00	0.00	1.00	0.00	33.14	214.24	2.00	0.00	1.00	0.00
33.30	209.51	2.00	0.00	1.00	0.00	33.47	201.95	2.00	0.00	1.00	0.00
33.63	193.02	0.88	0.59	1.00	0.01	33.79	186.39	0.80	0.82	1.00	0.02
33.96	178.10	0.71	1.08	1.00	0.02	34.12	173.03	0.66	1.13	1.00	0.02
34.28	164.86	0.58	1.47	1.00	0.03	34.45	152.00	0.48	1.66	1.00	0.03
34.61	141.88	0.41	1.75	1.00	0.03	34.78	151.05	0.47	1.67	1.00	0.03
34.94	170.43	2.00	0.00	1.00	0.00	35.10	189.46	2.00	0.00	1.00	0.00
35.27	187.34	0.81	0.81	1.00	0.02	35.43	167.23	0.60	1.44	1.00	0.03
35.60	159.43	0.54	1.59	1.00	0.03	35.76	160.48	0.54	1.59	1.00	0.03
35.92	163.73	0.57	1.48	1.00	0.03	36.09	158.27	0.53	1.60	1.00	0.03
36.25	156.20	0.51	1.62	1.00	0.03	36.42	156.74	0.51	1.62	1.00	0.03

:: 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)
36.58	163.32	0.57	1.49	1.00	0.03	36.74	172.13	2.00	0.00	1.00	0.00
36.91	177.39	2.00	0.00	1.00	0.00	37.07	173.02	2.00	0.00	1.00	0.00
37.24	161.55	2.00	0.00	1.00	0.00	37.40	131.56	0.34	1.87	1.00	0.04
37.57	127.39	0.32	1.92	1.00	0.04	37.73	138.38	0.38	1.79	1.00	0.04
37.89	140.32	0.40	1.77	1.00	0.03	38.06	151.45	0.47	1.66	1.00	0.03
38.22	165.70	0.59	1.46	1.00	0.03	38.39	183.96	0.77	0.83	1.00	0.02
38.55	182.58	0.76	0.84	1.00	0.02	38.71	177.73	0.71	1.09	1.00	0.02
38.88	176.44	0.69	1.10	1.00	0.02	39.04	176.48	0.70	1.10	1.00	0.02
39.21	173.19	0.66	1.13	1.00	0.02	39.37	171.37	0.65	1.39	1.00	0.03
39.53	174.31	0.67	1.12	1.00	0.02	39.70	176.39	0.70	1.10	1.00	0.02
39.86	173.99	0.67	1.12	1.00	0.02	40.03	168.36	0.62	1.43	1.00	0.03
40.19	163.65	0.58	1.49	1.00	0.03	40.35	160.46	0.55	1.59	1.00	0.03
40.52	161.51	0.56	1.51	1.00	0.03	40.68	164.81	0.59	1.47	1.00	0.03
40.85	181.18	0.75	1.06	1.00	0.02	41.01	185.52	2.00	0.00	1.00	0.00
41.17	177.20	0.71	1.09	1.00	0.02	41.34	154.38	0.50	1.64	1.00	0.03
41.50	153.53	0.49	1.64	1.00	0.03	41.67	158.89	0.54	1.60	1.00	0.03
41.83	155.23	0.51	1.63	1.00	0.03	41.99	149.60	0.46	1.68	1.00	0.03
42.16	146.14	0.44	1.71	1.00	0.03	42.32	148.36	0.46	1.69	1.00	0.03
42.49	153.18	0.49	1.65	1.00	0.03	42.65	153.30	0.49	1.65	1.00	0.03
42.81	142.23	0.41	1.75	1.00	0.03	42.98	131.20	0.35	1.87	1.00	0.04
43.14	135.16	0.37	1.83	1.00	0.04	43.31	145.08	0.43	1.72	1.00	0.03
43.47	151.74	0.48	1.66	1.00	0.03	43.63	154.32	0.50	1.64	1.00	0.03
43.80	150.44	2.00	0.00	1.00	0.00	43.96	146.91	2.00	0.00	1.00	0.00
44.13	137.49	2.00	0.00	1.00	0.00	44.29	129.00	2.00	0.00	1.00	0.00
44.45	121.45	2.00	0.00	1.00	0.00	44.62	116.80	2.00	0.00	1.00	0.00
44.78	116.97	2.00	0.00	1.00	0.00	44.95	127.02	2.00	0.00	1.00	0.00
45.11	138.48	2.00	0.00	1.00	0.00	45.28	144.14	2.00	0.00	1.00	0.00
45.44	131.85	0.35	1.86	1.00	0.04	45.60	144.14	0.43	1.73	1.00	0.03
45.77	163.62	0.59	1.49	1.00	0.03	45.93	174.90	0.70	1.11	1.00	0.02
46.10	191.95	0.90	0.60	1.00	0.01	46.26	209.93	2.00	0.00	1.00	0.00
46.42	210.69	2.00	0.00	1.00	0.00	46.59	199.22	2.00	0.00	1.00	0.00
46.75	183.76	2.00	0.00	1.00	0.00	46.92	183.08	2.00	0.00	1.00	0.00
47.08	183.03	2.00	0.00	1.00	0.00	47.24	181.15	2.00	0.00	1.00	0.00
47.41	178.49	2.00	0.00	1.00	0.00	47.57	181.75	2.00	0.00	1.00	0.00
47.74	179.70	2.00	0.00	1.00	0.00	47.90	167.65	2.00	0.00	1.00	0.00
48.06	150.52	0.49	1.67	1.00	0.03	48.23	157.33	0.54	1.61	1.00	0.03
48.39	174.84	0.71	1.11	1.00	0.02	48.56	176.99	0.74	1.09	1.00	0.02
48.72	167.51	0.64	1.44	1.00	0.03	48.88	158.74	0.56	1.55	1.00	0.03
49.05	151.15	0.50	1.67	1.00	0.03	49.21	150.74	0.49	1.67	1.00	0.03
49.38	146.87	0.47	1.70	1.00	0.03	49.54	145.34	0.45	1.72	1.00	0.03
49.70	152.32	0.51	1.65	1.00	0.03	49.87	129.09	0.35	1.90	1.00	0.04
50.03	95.73	0.20	2.42	1.00	0.05	50.20	-1.00	2.00	0.00	1.00	0.00

Total estimated settlement: 4.41

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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.16	17.30	27.79	3.94	109.53	2.69	N/A	N/A
0.33	19.65	31.54	3.44	108.34	2.62	N/A	N/A
0.49	24.79	39.79	2.66	105.85	2.48	N/A	N/A
0.66	28.47	45.68	2.27	103.83	2.39	N/A	N/A
0.82	29.80	47.80	2.21	105.40	2.37	N/A	N/A
0.98	27.35	43.85	2.56	112.18	2.46	N/A	N/A
1.15	24.04	38.51	3.30	127.27	2.60	N/A	N/A
1.31	22.19	35.53	4.12	146.42	2.72	N/A	N/A
1.48	21.94	35.11	4.63	162.75	2.78	N/A	N/A
1.64	23.39	37.42	4.60	172.08	2.78	N/A	N/A
1.80	23.82	38.11	4.61	175.77	2.78	N/A	N/A
1.97	24.73	39.55	4.65	183.84	2.78	N/A	N/A
2.13	27.34	43.73	4.55	198.86	2.77	N/A	N/A
2.30	33.73	53.98	4.08	220.37	2.71	N/A	N/A
2.46	42.20	67.56	3.54	238.94	2.63	N/A	N/A
2.63	49.53	79.32	3.21	254.77	2.58	N/A	N/A
2.79	53.97	86.44	3.06	264.35	2.55	N/A	N/A
2.95	54.60	87.43	3.08	269.58	2.56	N/A	N/A
3.12	53.67	85.92	3.12	268.13	2.57	N/A	N/A
3.28	52.78	84.48	3.10	261.67	2.56	N/A	N/A
3.44	51.77	82.83	2.97	245.61	2.54	N/A	N/A
3.61	48.34	77.31	2.86	221.05	2.52	N/A	N/A
3.77	42.47	67.87	2.84	192.99	2.51	N/A	N/A
3.94	35.99	57.43	2.99	171.98	2.54	N/A	N/A
4.10	31.53	50.26	3.20	160.75	2.58	N/A	N/A
4.26	28.24	44.95	3.48	156.50	2.62	N/A	N/A
4.43	25.15	39.98	3.83	153.16	2.68	N/A	N/A
4.59	22.04	34.96	4.22	147.50	2.73	N/A	N/A
4.76	18.78	29.70	4.83	143.49	2.81	N/A	N/A
4.92	16.23	25.59	5.53	141.44	2.88	N/A	N/A
5.08	16.89	26.65	5.40	143.89	2.87	3.87	3.87
5.25	21.42	33.91	4.34	147.18	2.75	4.85	4.85
5.41	25.35	40.21	3.48	140.10	2.63	5.67	5.67
5.58	25.09	39.77	3.47	138.11	2.62	5.53	5.53
5.74	18.47	29.11	4.46	129.96	2.76	3.99	3.99
5.91	11.86	18.48	6.84	126.49	3.01	2.50	2.50
6.07	7.75	11.86	9.42	111.64	3.21	1.58	1.58
6.23	8.31	12.75	8.29	105.71	3.13	1.68	1.68
6.40	9.41	14.49	7.25	105.14	3.04	1.89	1.89
6.56	10.19	15.73	7.06	111.06	3.03	2.03	2.03
6.73	10.89	16.85	7.01	118.19	3.02	2.15	2.15
6.89	10.75	16.61	7.31	121.45	3.05	2.09	2.09
7.05	9.62	14.77	8.45	124.88	3.14	1.84	1.84
7.22	8.06	12.26	10.99	134.77	3.32	1.51	1.51
7.38	32.27	51.14	3.06	156.47	2.55	0.74	0.74
7.55	81.42	130.09	1.36	176.96	2.04	0.86	0.86
7.71	136.40	218.40	1.05	229.52	1.72	0.94	0.94
7.87	165.35	259.37	1.00	259.37	1.57	0.97	0.97

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.04	164.26	255.92	1.00	255.92	1.57	0.97	0.97
8.20	146.09	230.80	1.03	238.79	1.70	0.95	0.95
8.37	117.32	187.68	1.16	217.38	1.87	0.92	0.92
8.53	85.46	136.47	1.39	190.22	2.06	0.87	0.87
8.69	59.20	94.27	1.80	170.10	2.25	0.82	0.82
8.86	39.62	62.80	2.40	150.43	2.42	0.76	0.76
9.02	25.62	40.29	3.44	138.70	2.62	4.29	4.29
9.19	18.92	29.51	4.54	133.91	2.77	3.11	3.11
9.35	19.65	30.66	4.65	142.58	2.78	3.20	3.20
9.51	30.96	48.83	3.00	146.54	2.54	0.73	0.73
9.68	53.78	85.47	1.79	152.69	2.25	0.81	0.81
9.84	75.93	121.04	1.38	167.25	2.06	0.85	0.85
10.01	86.85	138.57	1.31	181.98	2.01	0.87	0.87
10.17	79.87	127.33	1.46	185.62	2.10	0.86	0.86
10.34	65.89	104.87	1.79	188.05	2.25	0.83	0.83
10.50	47.64	75.53	2.46	185.96	2.44	0.79	0.79
10.66	31.81	50.07	3.64	182.13	2.65	4.77	4.77
10.83	21.84	34.04	5.21	177.21	2.85	3.21	3.21
10.99	23.02	35.92	4.72	169.58	2.79	3.35	3.35
11.15	31.87	50.13	3.13	156.92	2.57	0.73	0.73
11.32	47.74	75.61	1.86	140.51	2.27	0.79	0.79
11.48	66.82	102.18	1.31	133.46	2.00	0.83	0.83
11.65	80.95	117.12	1.13	132.20	1.83	0.85	0.85
11.81	86.36	122.35	1.09	133.04	1.77	0.86	0.86
11.97	83.79	118.93	1.11	131.51	1.80	0.85	0.85
12.14	81.48	116.22	1.13	131.79	1.84	0.85	0.85
12.30	84.34	119.11	1.12	133.43	1.82	0.85	0.85
12.47	90.72	126.36	1.10	138.43	1.78	0.86	0.86
12.63	95.90	132.18	1.08	142.79	1.76	0.87	0.87
12.79	92.51	128.05	1.11	141.57	1.80	0.86	0.86
12.96	79.81	112.64	1.19	133.66	1.90	0.84	0.84
13.12	58.55	86.05	1.43	123.13	2.09	0.81	0.81
13.29	36.56	56.76	2.15	122.17	2.36	0.75	0.75
13.45	20.43	31.52	4.04	127.37	2.71	2.57	2.57
13.62	12.14	18.19	7.01	127.49	3.02	1.47	1.47
13.78	9.57	14.04	8.93	125.34	3.18	1.13	1.13
13.94	9.22	13.46	9.64	129.82	3.23	1.07	1.07
14.11	10.25	15.11	8.81	133.20	3.17	1.19	1.19
14.27	12.80	19.19	7.02	134.71	3.02	1.50	1.50
14.44	26.05	40.35	3.20	129.31	2.58	0.71	0.71
14.60	44.07	64.69	2.00	129.50	2.32	0.77	0.77
14.76	62.96	89.00	1.56	139.20	2.16	0.81	0.81
14.93	78.06	107.51	1.38	148.15	2.05	0.84	0.84
15.09	93.65	125.50	1.24	155.36	1.95	0.86	0.86
15.26	107.27	140.43	1.15	161.91	1.86	0.88	0.88
15.42	113.98	147.22	1.12	164.87	1.82	0.88	0.88
15.58	115.80	148.19	1.10	163.58	1.80	0.88	0.88
15.75	116.74	148.68	1.10	164.05	1.80	0.88	0.88

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
15.91	110.16	141.54	1.16	163.59	1.86	0.88	0.88
16.08	87.97	116.48	1.37	159.14	2.05	0.85	0.85
16.24	59.46	82.22	2.01	165.20	2.32	0.80	0.80
16.40	39.40	56.46	3.17	179.04	2.57	0.75	0.75
16.57	37.69	53.69	3.25	174.47	2.59	0.74	0.74
16.73	39.84	56.15	3.09	173.61	2.56	0.75	0.75
16.90	36.68	51.72	3.40	175.77	2.61	3.94	3.94
17.06	30.25	43.24	4.44	191.78	2.76	3.20	3.20
17.22	33.84	47.65	3.95	188.20	2.69	3.57	3.57
17.39	40.57	55.82	3.19	177.83	2.58	0.75	0.75
17.55	45.64	61.20	2.54	155.25	2.45	0.76	0.76
17.72	53.67	69.60	1.87	129.95	2.27	0.78	0.78
17.88	61.48	77.76	1.54	119.54	2.14	0.79	0.79
18.05	64.31	81.03	1.54	125.19	2.15	0.80	0.80
18.21	51.01	65.73	2.08	136.75	2.34	0.77	0.77
18.37	36.55	48.32	3.25	156.89	2.59	0.73	0.73
18.54	26.48	35.59	4.85	172.59	2.81	2.60	2.60
18.70	22.91	30.80	5.66	174.33	2.90	2.22	2.22
18.86	27.97	36.81	4.33	159.46	2.74	2.71	2.71
19.03	40.48	51.70	2.79	144.22	2.50	0.74	0.74
19.19	47.82	60.32	2.44	147.11	2.43	0.76	0.76
19.36	44.45	56.28	2.82	158.69	2.51	0.75	0.75
19.52	33.05	42.39	4.05	171.56	2.71	3.14	3.14
19.68	24.69	31.84	5.52	175.71	2.88	2.30	2.30
19.85	21.35	27.39	6.47	177.14	2.97	1.96	1.96
20.01	27.05	34.30	5.02	172.00	2.83	2.49	2.49
20.18	40.73	50.30	3.10	155.91	2.56	0.74	0.74
20.34	56.25	67.77	2.13	144.19	2.35	0.77	0.77
20.50	63.26	75.28	1.88	141.63	2.28	0.79	0.79
20.67	63.27	75.08	1.93	145.28	2.30	0.79	0.79
20.83	60.64	71.59	1.95	139.89	2.30	0.78	0.78
21.00	59.39	69.67	1.93	134.73	2.30	0.78	0.78
21.16	53.70	62.81	2.05	129.04	2.33	0.76	0.76
21.32	42.05	49.55	2.75	136.38	2.50	0.73	0.73
21.49	28.14	33.37	4.28	142.97	2.74	2.44	2.44
21.65	27.32	32.24	4.49	144.66	2.76	2.35	2.35
21.82	35.75	41.76	3.43	143.31	2.62	3.09	3.09
21.98	45.06	52.07	2.74	142.83	2.49	0.74	0.74
22.15	40.99	47.33	3.14	148.53	2.57	0.73	0.73
22.31	30.70	35.45	4.25	150.82	2.73	2.59	2.59
22.47	20.27	23.22	6.52	151.37	2.98	1.66	1.66
22.64	14.11	15.55	9.28	144.23	3.20	1.11	1.11
22.80	11.16	11.87	11.60	137.67	3.36	0.85	0.85
22.97	10.70	11.24	12.51	140.53	3.41	0.80	0.80
23.13	12.87	13.77	10.82	149.03	3.31	0.98	0.98
23.29	16.45	17.95	8.86	159.06	3.17	1.28	1.28
23.46	19.73	21.74	7.70	167.34	3.08	1.55	1.55
23.62	22.43	24.78	7.14	176.82	3.03	1.77	1.77

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
23.79	29.15	32.34	5.63	182.21	2.89	2.32	2.32
23.95	43.78	48.10	3.54	170.02	2.63	3.52	3.52
24.11	63.12	68.35	2.24	153.19	2.38	0.78	0.78
24.28	80.38	85.72	1.61	138.03	2.18	0.81	0.81
24.44	83.69	88.38	1.43	126.63	2.09	0.81	0.81
24.61	72.38	76.40	1.61	123.17	2.18	0.79	0.79
24.77	50.13	53.19	2.53	134.48	2.45	0.74	0.74
24.93	29.87	31.64	4.87	154.02	2.81	2.28	2.28
25.10	20.28	21.02	7.05	148.15	3.03	1.50	1.50
25.26	18.56	18.98	7.09	134.50	3.03	1.36	1.36
25.43	21.11	21.65	5.88	127.35	2.92	1.55	1.55
25.59	20.80	21.21	6.03	128.00	2.93	1.52	1.52
25.75	20.04	20.28	6.58	133.50	2.99	1.45	1.45
25.92	19.15	19.19	7.49	143.83	3.06	1.37	1.37
26.08	20.74	20.80	7.23	150.46	3.04	1.49	1.49
26.25	25.32	25.62	6.12	156.67	2.94	1.83	1.83
26.41	29.09	29.41	5.34	157.10	2.86	2.11	2.11
26.57	30.51	30.73	5.16	158.40	2.84	2.21	2.21
26.74	28.83	28.83	5.54	159.68	2.88	2.07	2.07
26.90	27.27	27.07	5.85	158.50	2.92	1.94	1.94
27.07	30.37	30.09	5.26	158.33	2.85	2.16	2.16
27.23	42.74	42.49	3.68	156.27	2.65	3.07	3.07
27.39	61.02	60.64	2.53	153.50	2.45	0.76	0.76
27.56	85.12	84.26	1.78	150.22	2.24	0.80	0.80
27.72	105.80	104.30	1.49	155.70	2.12	0.83	0.83
27.89	121.37	119.20	1.38	164.48	2.06	0.85	0.85
28.05	128.38	125.71	1.38	173.45	2.06	0.86	0.86
28.21	134.20	130.94	1.36	178.40	2.04	0.87	0.87
28.38	142.67	138.68	1.31	181.42	2.01	0.87	0.87
28.54	160.23	155.05	1.19	185.00	1.90	0.89	0.89
28.71	183.26	176.57	1.09	193.26	1.78	0.91	0.91
28.87	210.83	202.37	1.02	206.24	1.67	0.93	0.93
29.04	232.63	222.73	1.00	222.73	1.63	0.95	0.95
29.20	249.42	238.27	1.00	238.27	1.61	0.96	0.96
29.36	260.87	248.59	1.00	248.59	1.60	0.96	0.96
29.53	263.81	250.73	1.00	250.73	1.59	0.97	0.97
29.69	258.51	244.99	1.00	244.99	1.60	0.96	0.96
29.86	253.10	239.18	1.00	239.18	1.62	0.96	0.96
30.02	253.03	238.46	1.00	238.46	1.63	0.96	0.96
30.18	252.30	237.13	1.00	236.40	1.64	0.96	0.96
30.35	242.24	227.00	1.01	229.06	1.66	0.95	0.95
30.51	231.01	215.81	1.02	219.58	1.67	0.94	0.94
30.68	229.61	213.94	1.00	214.68	1.65	0.94	0.94
30.84	244.96	227.78	1.00	227.78	1.59	0.95	0.95
31.00	260.09	241.33	1.00	241.33	1.57	0.96	0.96
31.17	265.58	245.83	1.00	245.83	1.56	0.96	0.96
31.33	256.90	237.13	1.00	237.13	1.59	0.96	0.96
31.50	245.53	225.98	1.00	225.98	1.59	0.95	0.95

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
31.66	233.18	213.99	1.00	213.99	1.59	0.94	0.94
31.82	222.75	203.83	1.00	203.83	1.60	0.93	0.93
31.99	212.24	193.67	1.00	193.67	1.61	0.92	0.92
32.15	206.67	188.09	1.00	188.09	1.62	0.92	0.92
32.32	208.13	188.97	1.00	188.97	1.61	0.92	0.92
32.48	220.11	199.48	1.00	199.48	1.60	0.93	0.93
32.64	235.87	213.38	1.00	213.38	1.56	0.94	0.94
32.81	244.22	220.47	1.00	220.47	1.55	0.94	0.94
32.97	243.97	219.72	1.00	219.72	1.55	0.94	0.94
33.14	238.49	214.24	1.00	214.24	1.55	0.94	0.94
33.30	233.81	209.51	1.00	209.51	1.56	0.94	0.94
33.47	225.97	201.95	1.00	201.95	1.59	0.93	0.93
33.63	214.09	190.62	1.01	193.02	1.66	0.92	0.92
33.79	196.56	173.83	1.07	186.39	1.75	0.91	0.91
33.96	186.76	164.56	1.08	178.10	1.77	0.90	0.90
34.12	179.63	157.66	1.10	173.03	1.79	0.89	0.89
34.28	165.98	144.82	1.14	164.86	1.84	0.88	0.88
34.45	131.88	113.39	1.34	152.00	2.03	0.85	0.85
34.61	90.26	75.90	1.87	141.88	2.27	0.79	0.79
34.78	63.71	52.21	2.89	151.05	2.52	0.74	0.74
34.94	58.86	47.62	3.58	170.43	2.64	3.35	3.35
35.10	64.44	52.06	3.64	189.46	2.65	3.66	3.66
35.27	79.70	65.00	2.88	187.34	2.52	0.77	0.77
35.43	103.12	85.34	1.96	167.23	2.30	0.81	0.81
35.60	127.21	106.46	1.50	159.43	2.12	0.84	0.84
35.76	132.69	110.96	1.45	160.48	2.10	0.84	0.84
35.92	123.40	102.26	1.60	163.73	2.17	0.83	0.83
36.09	112.48	92.48	1.71	158.27	2.22	0.82	0.82
36.25	109.11	89.28	1.75	156.20	2.23	0.81	0.81
36.42	100.52	81.51	1.92	156.74	2.29	0.80	0.80
36.58	84.46	67.34	2.43	163.32	2.43	0.77	0.77
36.74	63.03	48.91	3.52	172.13	2.63	3.42	3.42
36.91	46.14	34.66	5.12	177.39	2.84	2.46	2.46
37.07	40.43	29.86	5.79	173.02	2.91	2.13	2.13
37.24	45.42	33.90	4.76	161.55	2.80	2.39	2.39
37.40	70.80	55.22	2.38	131.56	2.42	0.75	0.75
37.57	100.80	80.72	1.58	127.39	2.16	0.80	0.80
37.73	133.02	108.36	1.28	138.38	1.98	0.84	0.84
37.89	114.10	91.22	1.54	140.32	2.14	0.81	0.81
38.06	121.80	97.14	1.56	151.45	2.15	0.82	0.82
38.22	119.28	94.15	1.76	165.70	2.24	0.82	0.82
38.39	150.37	119.75	1.54	183.96	2.14	0.85	0.85
38.55	150.78	119.78	1.52	182.58	2.14	0.85	0.85
38.71	158.98	126.77	1.40	177.73	2.07	0.86	0.86
38.88	167.66	134.11	1.32	176.44	2.01	0.87	0.87
39.04	172.97	138.44	1.27	176.48	1.98	0.87	0.87
39.21	179.35	144.16	1.20	173.19	1.91	0.88	0.88
39.37	189.14	153.16	1.12	171.37	1.82	0.89	0.89

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
39.53	200.70	163.43	1.07	174.31	1.74	0.90	0.90
39.70	203.11	165.00	1.07	176.39	1.75	0.90	0.90
39.86	195.99	158.07	1.10	173.99	1.79	0.89	0.89
40.03	182.14	145.33	1.16	168.36	1.87	0.88	0.88
40.19	169.66	133.99	1.22	163.65	1.93	0.87	0.87
40.35	158.72	124.11	1.29	160.46	1.99	0.86	0.86
40.52	142.05	109.18	1.48	161.51	2.11	0.84	0.84
40.68	111.88	83.59	1.97	164.81	2.31	0.80	0.80
40.85	82.04	58.97	3.07	181.18	2.56	0.76	0.76
41.01	65.52	45.78	4.05	185.52	2.71	3.18	3.18
41.17	80.95	57.76	3.07	177.20	2.56	0.75	0.75
41.34	120.69	90.11	1.71	154.38	2.22	0.81	0.81
41.50	161.57	124.89	1.23	153.53	1.94	0.86	0.86
41.67	181.89	142.66	1.11	158.89	1.81	0.88	0.88
41.83	170.80	132.43	1.17	155.23	1.88	0.87	0.87
41.99	146.11	110.65	1.35	149.60	2.04	0.84	0.84
42.16	118.58	87.45	1.67	146.14	2.20	0.81	0.81
42.32	96.79	69.51	2.13	148.36	2.35	0.78	0.78
42.49	81.19	56.90	2.69	153.18	2.48	0.75	0.75
42.65	69.69	47.85	3.20	153.30	2.58	0.73	0.73
42.81	75.11	52.11	2.73	142.23	2.49	0.74	0.74
42.98	93.29	66.54	1.97	131.20	2.31	0.77	0.77
43.14	109.09	78.81	1.71	135.16	2.22	0.79	0.79
43.31	103.80	73.86	1.96	145.08	2.30	0.79	0.79
43.47	87.87	60.94	2.49	151.74	2.44	0.76	0.76
43.63	74.01	50.08	3.08	154.32	2.56	0.73	0.73
43.80	60.15	39.61	3.80	150.44	2.67	2.72	2.72
43.96	44.47	28.00	5.25	146.91	2.85	1.97	1.97
44.13	31.51	18.98	7.25	137.49	3.04	1.36	1.36
44.29	27.37	16.19	7.97	129.00	3.10	1.16	1.16
44.45	25.44	14.86	8.17	121.45	3.12	1.06	1.06
44.62	23.63	13.63	8.57	116.80	3.15	0.97	0.97
44.78	22.98	13.16	8.89	116.97	3.17	0.94	0.94
44.95	23.61	13.52	9.40	127.02	3.21	0.97	0.97
45.11	26.99	15.65	8.85	138.48	3.17	1.12	1.12
45.28	42.21	25.63	5.62	144.14	2.89	1.81	1.81
45.44	95.76	65.54	2.01	131.85	2.32	0.77	0.77
45.60	146.63	105.28	1.37	144.14	2.05	0.83	0.83
45.77	175.42	127.18	1.29	163.62	1.99	0.86	0.86
45.93	159.97	112.76	1.55	174.90	2.15	0.84	0.84
46.10	138.85	94.78	2.03	191.95	2.32	0.82	0.82
46.26	117.99	78.05	2.69	209.93	2.48	0.79	0.79
46.42	95.07	61.01	3.45	210.69	2.62	4.14	4.14
46.59	71.70	44.38	4.49	199.22	2.76	3.08	3.08
46.75	53.00	31.45	5.84	183.76	2.91	2.23	2.23
46.92	45.23	26.32	6.96	183.08	3.02	1.88	1.88
47.08	52.73	31.03	5.90	183.03	2.92	2.21	2.21
47.24	64.27	38.93	4.65	181.15	2.78	2.71	2.71

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
47.41	65.88	39.96	4.47	178.49	2.76	2.77	2.77
47.57	57.87	34.20	5.31	181.75	2.86	2.41	2.41
47.74	58.23	34.36	5.23	179.70	2.85	2.41	2.41
47.90	73.71	45.26	3.70	167.65	2.66	3.08	3.08
48.06	123.21	81.99	1.84	150.52	2.26	0.80	0.80
48.23	173.50	121.35	1.30	157.33	2.00	0.85	0.85
48.39	212.20	152.24	1.15	174.84	1.85	0.89	0.89
48.56	207.84	147.25	1.20	176.99	1.91	0.88	0.88
48.72	179.09	123.57	1.36	167.51	2.04	0.86	0.86
48.88	141.81	94.40	1.68	158.74	2.21	0.82	0.82
49.05	103.69	66.07	2.29	151.15	2.39	0.77	0.77
49.21	79.06	48.26	3.12	150.74	2.57	0.73	0.73
49.38	85.63	52.88	2.78	146.87	2.50	0.74	0.74
49.54	117.52	75.98	1.91	145.34	2.29	0.79	0.79
49.70	137.93	90.66	1.68	152.32	2.21	0.81	0.81
49.87	124.83	82.39	1.57	129.09	2.16	0.80	0.80
50.03	91.48	59.48	1.61	95.73	2.18	0.76	0.76
50.20	71.85	-1.00	1.00	-1.00	-1.00	N/A	N/A

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

Wood Rodgers, Inc.

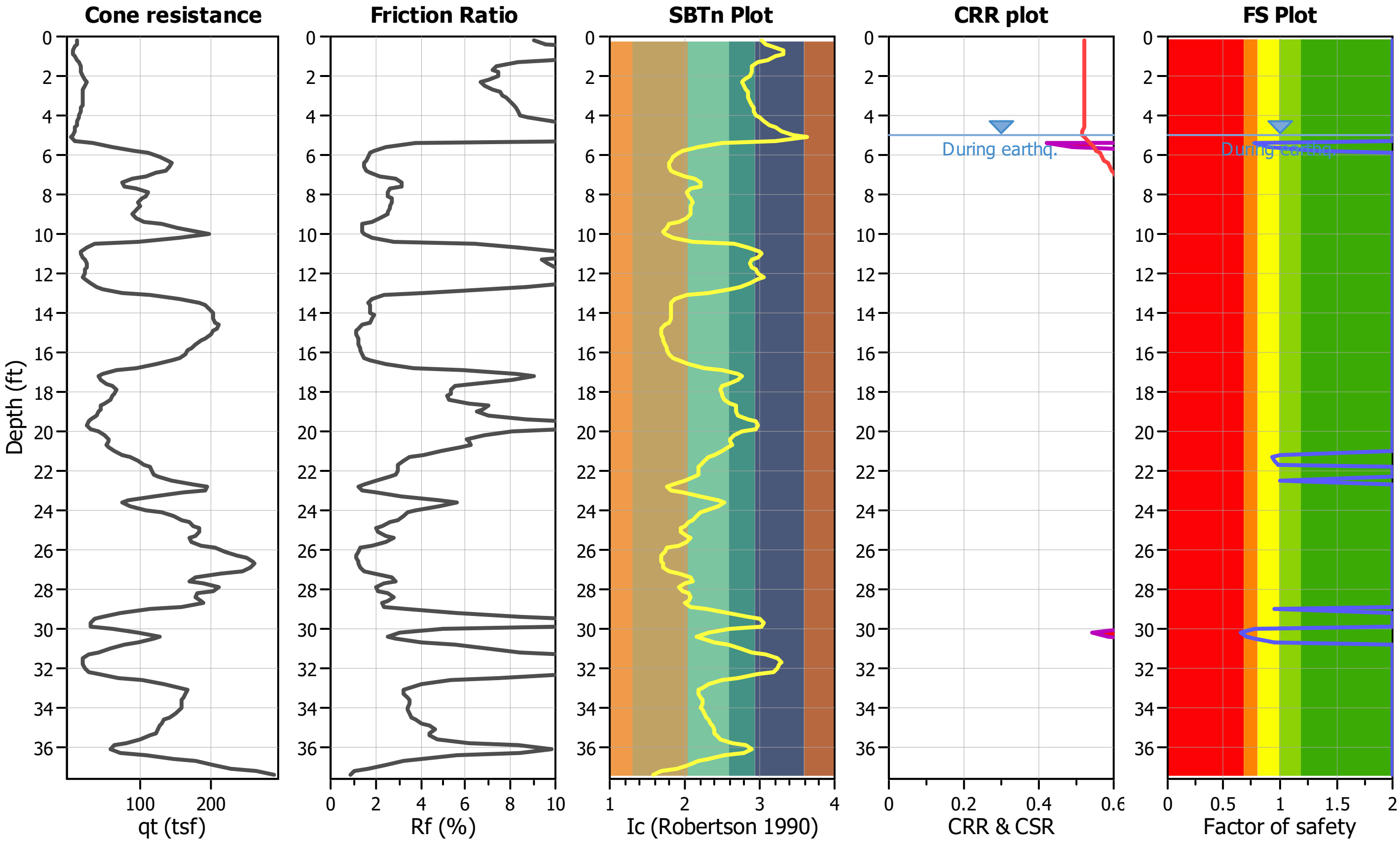
LIQUEFACTION ANALYSIS REPORT

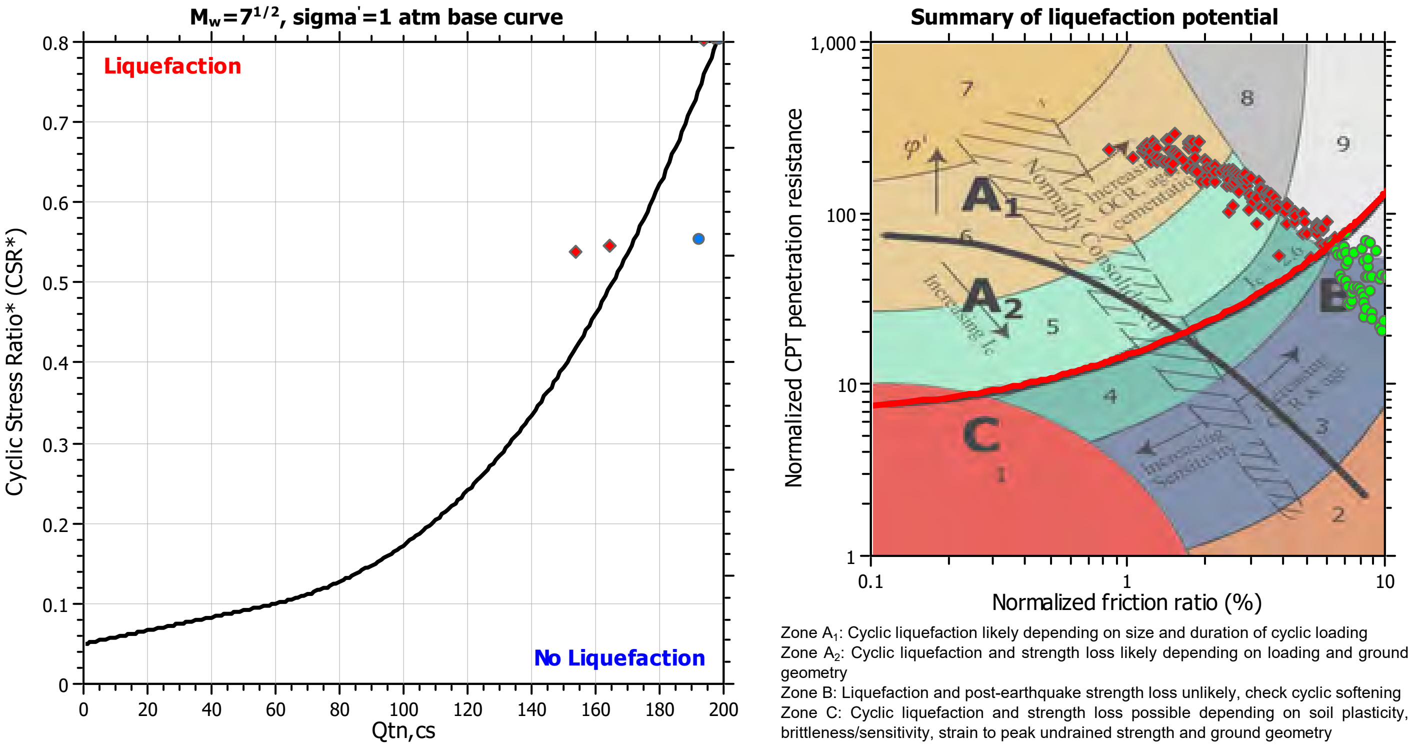
Project title : Lompa Ranch East **Location : Carson City, NV**

CPT file : CPT 3

Input parameters and analysis data

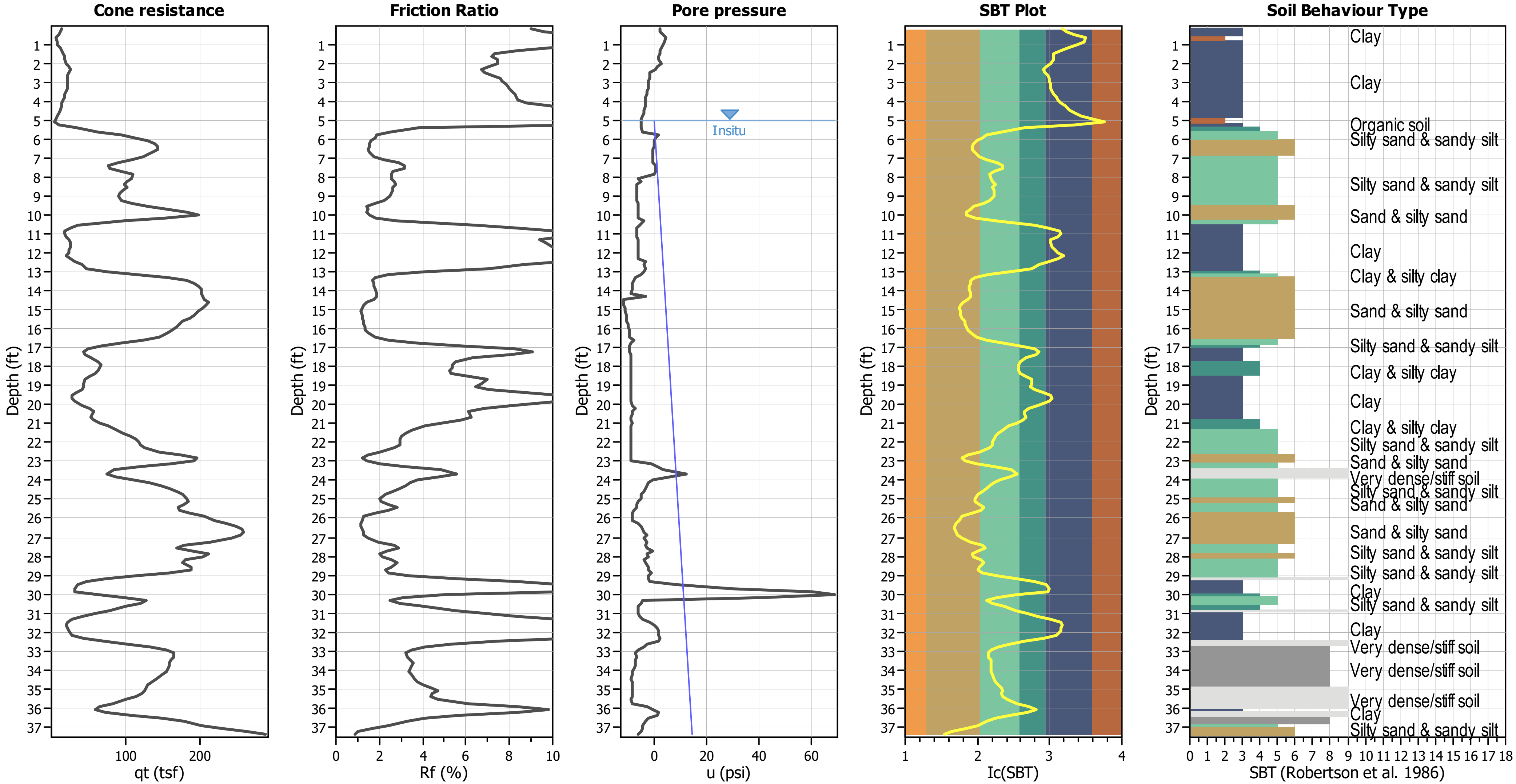
Analysis method:	NCEER (1998)	G.W.T. (in-situ):	5.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.96	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



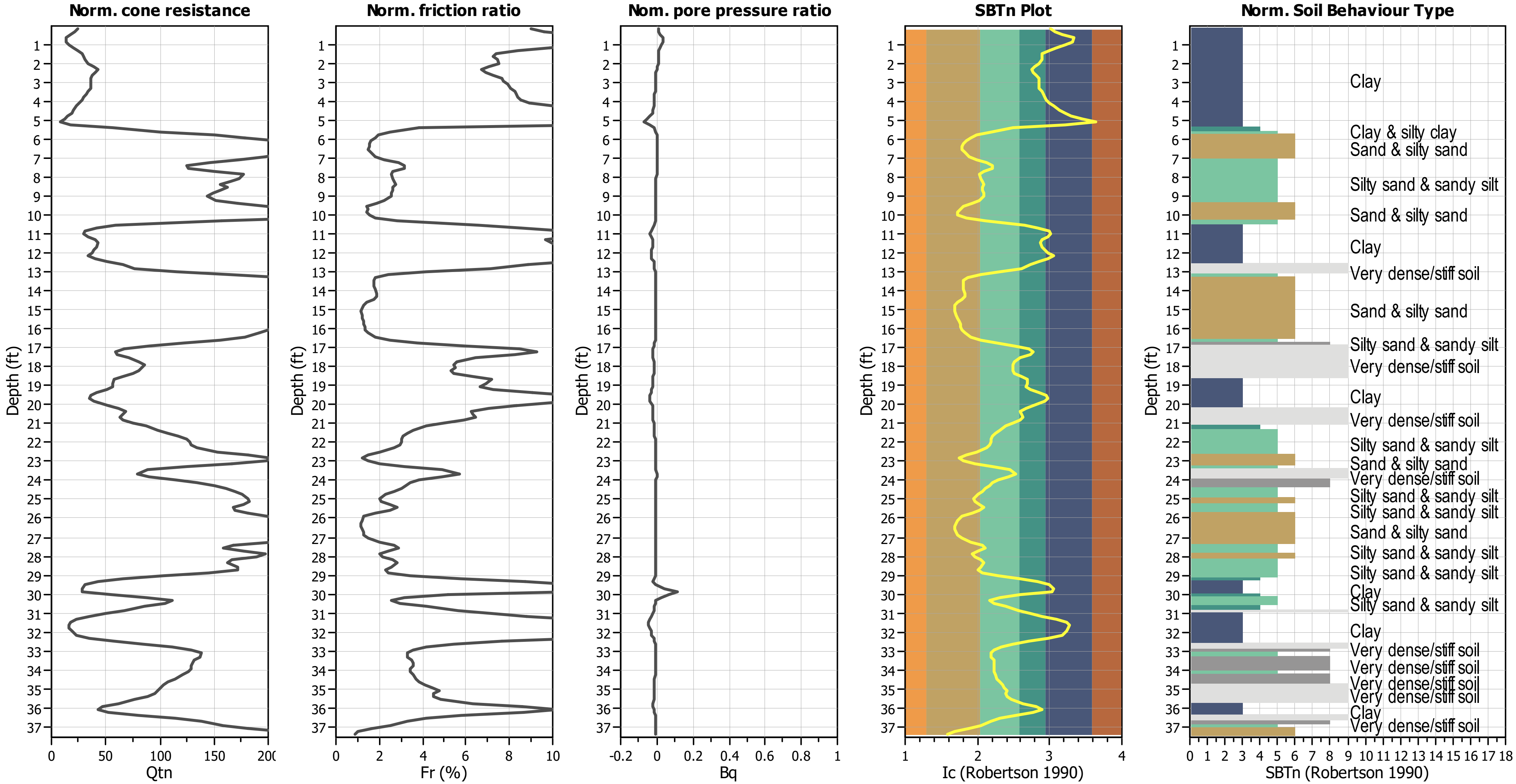
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

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)



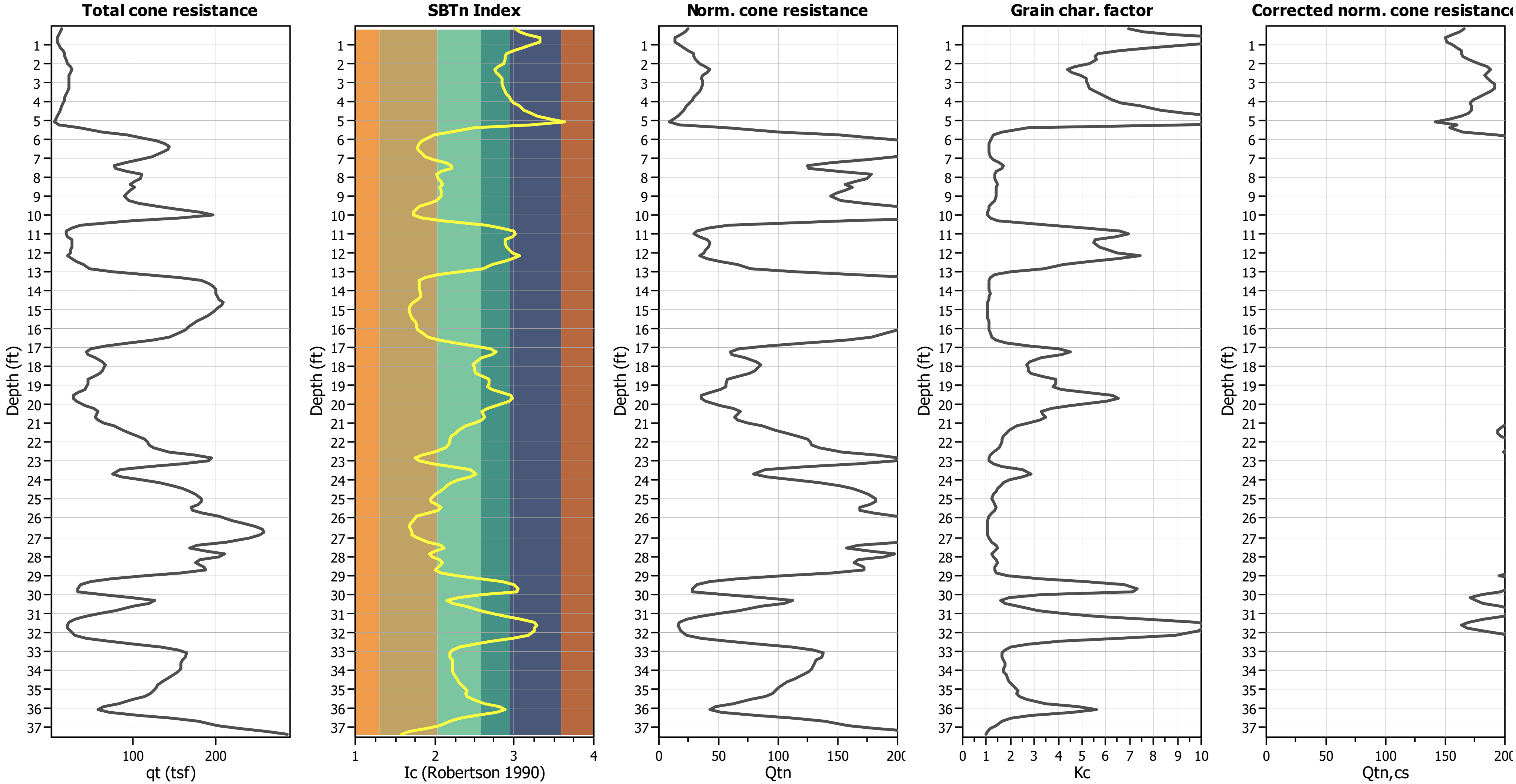
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

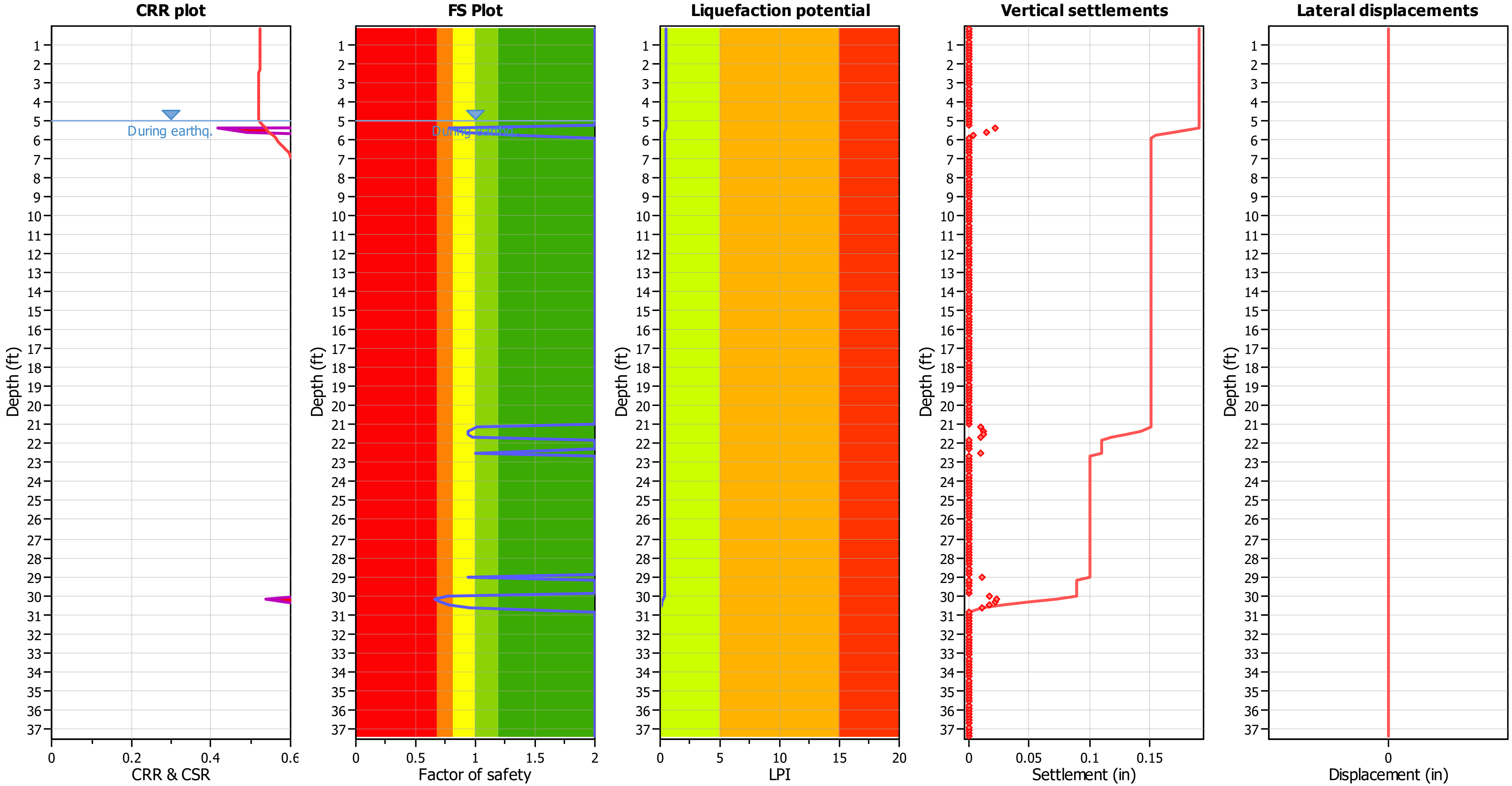
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



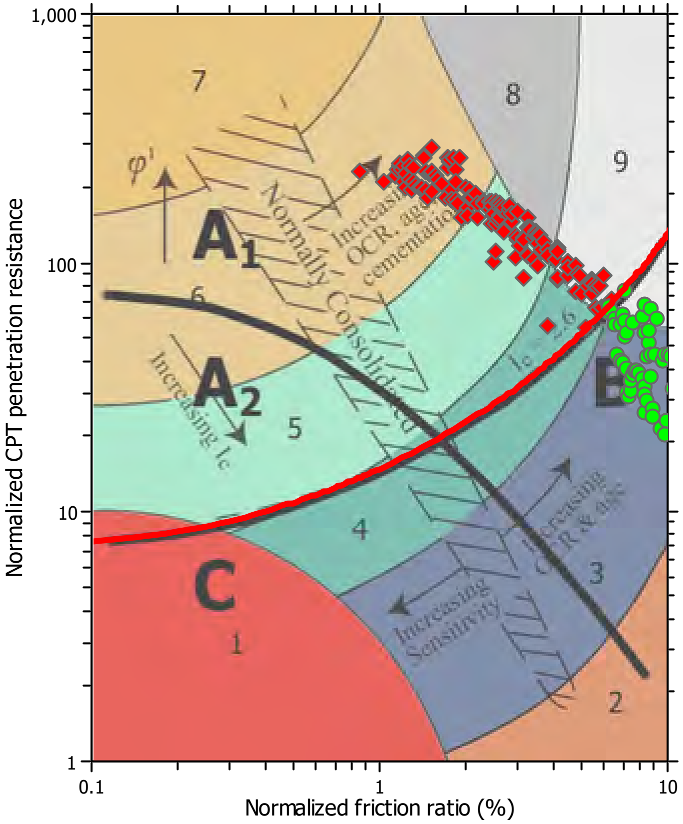
Input parameters and analysis data

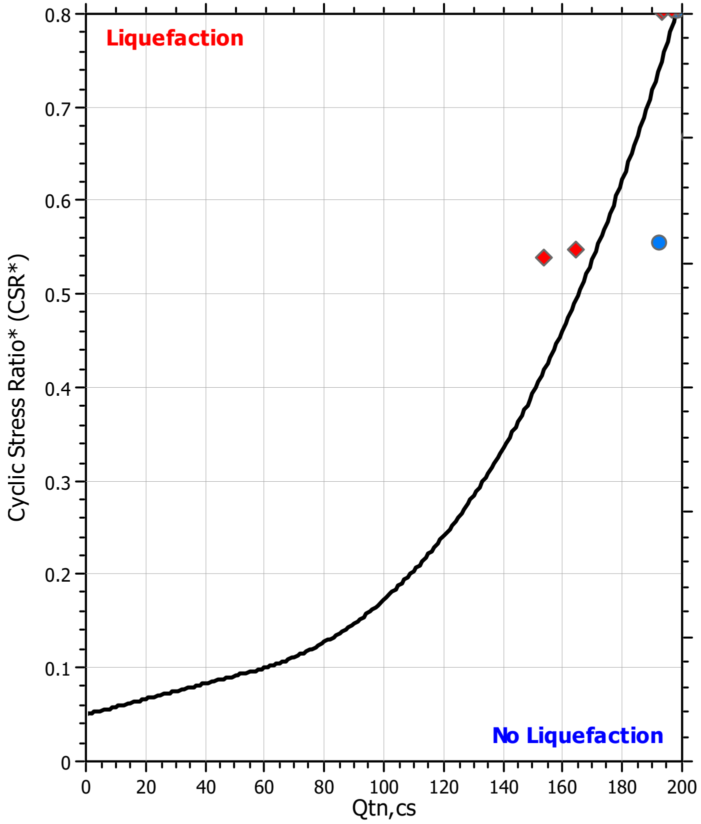
Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

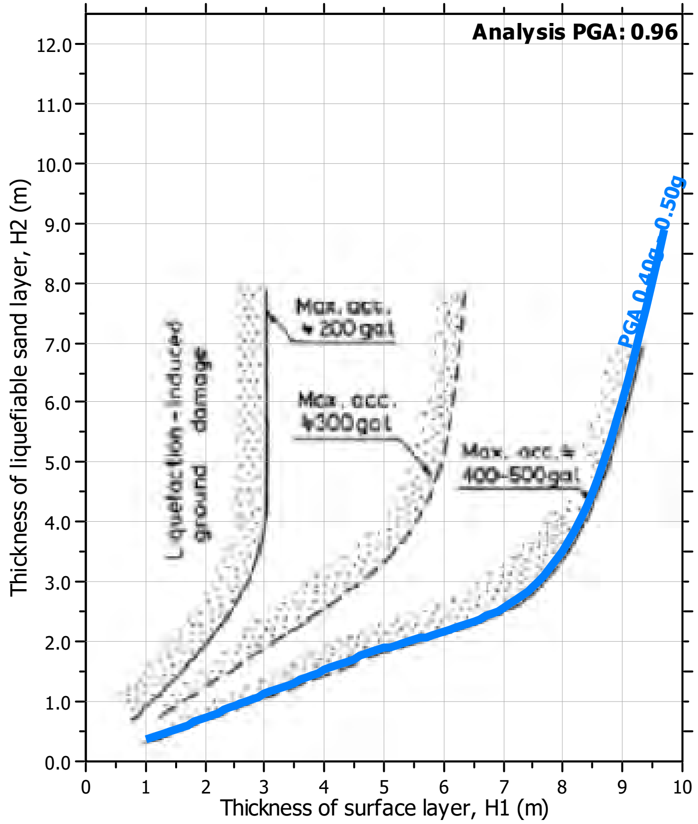
F.S. color scheme
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme
- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



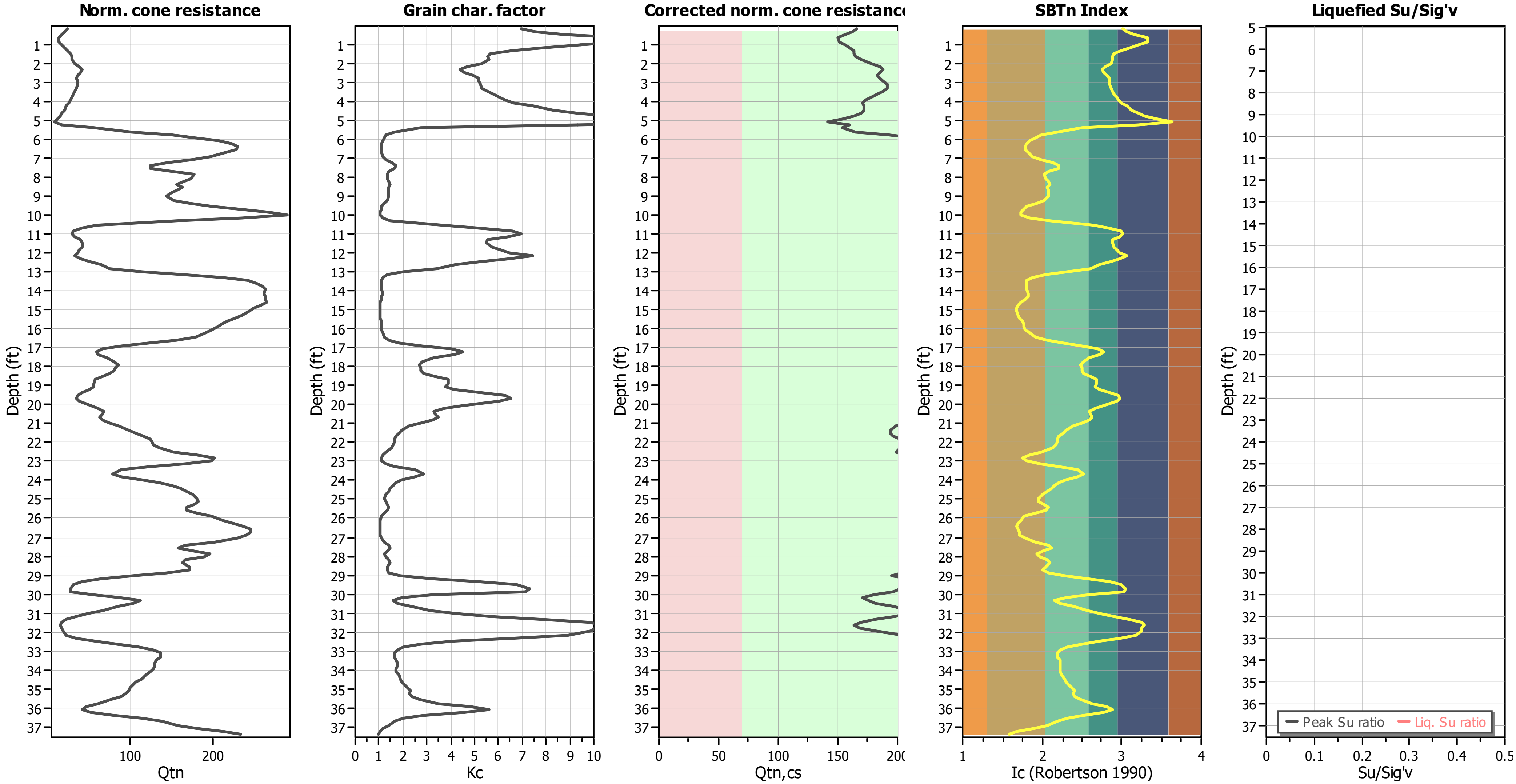




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

:: Field input data ::

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
1	0.16	13.97	1.36	2.09	59.63	119.01
2	0.33	16.68	1.31	2.12	63.36	118.40
3	0.49	9.28	1.17	3.27	70.48	117.56
4	0.66	7.23	1.16	3.98	83.42	116.57
5	0.82	8.50	1.16	3.54	82.33	116.70
6	0.98	9.97	1.21	3.14	73.96	117.35
7	1.15	12.39	1.26	2.65	65.09	118.14
8	1.31	15.78	1.30	2.10	57.48	118.85
9	1.48	18.20	1.33	1.72	51.92	119.33
10	1.64	19.84	1.32	1.51	50.96	119.54
11	1.80	17.67	1.36	1.47	51.27	119.95
12	1.97	19.21	1.54	2.29	49.40	121.02
13	2.13	26.26	1.82	1.04	45.54	122.09
14	2.30	28.34	1.83	0.29	43.29	122.53
15	2.46	25.56	1.71	-1.77	44.69	122.16
16	2.63	21.90	1.65	-1.82	47.03	121.72
17	2.79	22.38	1.66	-2.18	48.67	121.69
18	2.95	22.88	1.76	-2.67	48.55	121.96
19	3.12	23.20	1.81	-2.38	48.93	122.20
20	3.28	22.82	1.83	-2.56	49.63	122.13
21	3.44	21.54	1.74	-2.81	51.05	121.78
22	3.61	19.75	1.65	-3.08	52.55	121.18
23	3.77	18.56	1.53	-3.35	54.15	120.55
24	3.94	17.40	1.45	-3.46	55.59	120.02
25	4.10	16.42	1.41	-3.38	58.07	119.67
26	4.26	14.97	1.43	-3.53	62.61	119.51
27	4.43	12.78	1.49	-3.89	67.60	119.26
28	4.59	11.90	1.42	-3.98	73.51	118.86
29	4.76	10.21	1.37	-4.81	80.66	118.10
30	4.92	7.55	1.29	-5.15	94.27	117.18
31	5.08	5.14	1.27	-5.35	100.00	116.13
32	5.25	4.37	1.20	-5.38	73.50	117.83
33	5.41	23.52	1.32	-5.18	30.40	121.15
34	5.58	78.31	1.52	-4.80	18.36	123.68
35	5.74	88.29	1.86	1.56	12.44	125.65
36	5.91	116.08	2.01	0.27	10.64	126.82
37	6.07	131.02	2.10	-0.24	8.99	127.57
38	6.23	140.60	2.20	0.01	8.19	127.97
39	6.40	146.74	2.19	-0.12	7.83	128.09
40	6.56	144.20	2.14	-0.67	7.83	127.95
41	6.73	137.04	2.10	-0.96	8.46	127.78
42	6.89	124.92	2.15	-1.05	9.95	127.76
43	7.05	108.82	2.32	-1.05	12.65	128.01
44	7.22	91.15	2.63	-1.03	16.67	128.30
45	7.38	73.35	2.88	0.06	19.13	127.46
46	7.55	68.79	1.85	0.32	18.99	127.56
47	7.71	93.90	2.70	0.33	15.41	127.96
48	7.87	120.40	2.84	0.03	13.83	129.33

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
49	8.04	119.20	2.90	-6.25	14.19	129.25
50	8.20	86.60	2.67	-5.53	15.04	129.04
51	8.37	103.48	2.76	-7.00	15.69	128.71
52	8.53	103.66	2.67	-6.85	14.84	128.72
53	8.69	98.61	2.57	-6.77	15.08	128.26
54	8.86	91.17	2.37	-6.76	15.21	127.64
55	9.02	90.57	2.16	-6.73	15.41	127.26
56	9.19	89.53	2.29	-6.71	13.61	126.75
57	9.35	106.00	1.79	-6.61	11.19	126.71
58	9.51	128.35	1.87	-6.64	8.05	126.46
59	9.68	156.85	1.74	-6.60	7.47	128.42
60	9.84	177.49	3.07	-6.34	6.56	129.86
61	10.01	210.58	2.90	-6.23	6.63	131.22
62	10.17	205.99	3.05	-6.11	9.11	130.24
63	10.34	51.45	2.58	-3.97	15.74	128.80
64	10.50	37.64	2.55	-6.02	38.00	125.50
65	10.66	22.96	2.07	-7.06	48.14	124.04
66	10.83	19.34	1.98	-6.88	57.69	122.82
67	10.99	18.29	2.07	-6.74	59.91	122.81
68	11.15	20.33	2.16	-6.69	56.43	123.74
69	11.32	27.13	2.54	-6.56	51.08	124.71
70	11.48	30.60	2.59	-6.55	50.79	125.40
71	11.65	24.24	2.75	-6.64	52.05	125.45
72	11.81	25.19	2.66	-6.58	54.50	125.38
73	11.97	26.28	2.67	-6.62	56.82	125.46
74	12.14	21.07	2.95	-6.61	62.58	125.70
75	12.30	18.44	3.23	-6.58	56.74	126.69
76	12.47	38.92	3.37	-3.79	49.55	127.78
77	12.63	40.46	3.68	-3.92	41.85	128.76
78	12.79	45.51	3.78	-3.85	35.90	128.66
79	12.96	59.11	2.70	-4.03	23.07	129.04
80	13.12	121.71	2.75	-5.22	13.97	129.27
81	13.29	164.71	2.82	-7.67	9.73	130.30
82	13.45	184.65	3.02	-7.95	8.41	131.27
83	13.62	198.14	3.49	-8.36	8.29	131.85
84	13.78	192.09	3.43	-8.62	8.24	132.28
85	13.94	204.25	3.50	-8.73	8.32	132.56
86	14.11	207.32	3.83	-9.23	8.75	132.97
87	14.27	192.44	4.05	-3.84	8.72	133.02
88	14.44	208.72	3.56	-11.97	8.02	132.45
89	14.60	214.06	2.93	-11.97	6.67	131.36
90	14.76	208.75	2.51	-11.73	5.94	130.28
91	14.93	201.35	2.36	-11.53	5.72	129.60
92	15.09	199.14	2.30	-11.30	5.81	129.33
93	15.26	195.70	2.30	-11.12	6.09	129.15
94	15.42	182.60	2.26	-10.93	6.51	129.02
95	15.58	177.46	2.26	-10.70	6.97	128.83
96	15.75	171.76	2.23	-10.40	7.31	128.71

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
97	15.91	166.90	2.22	-10.19	7.60	128.64
98	16.08	165.60	2.24	-9.96	7.97	128.59
99	16.24	158.67	2.24	-9.72	8.85	128.85
100	16.40	147.12	2.56	-9.51	10.68	129.33
101	16.57	128.86	2.92	-7.79	14.53	130.17
102	16.73	97.07	3.64	-9.19	21.17	130.58
103	16.90	59.94	3.98	-9.74	30.96	130.62
104	17.06	46.20	4.27	-9.68	40.55	130.15
105	17.22	43.72	4.09	-9.49	44.13	129.63
106	17.39	42.67	3.61	-9.34	41.63	129.13
107	17.55	50.90	3.34	-9.07	34.94	129.14
108	17.72	71.96	3.43	-9.08	31.22	129.51
109	17.88	67.20	3.66	-9.22	30.09	129.94
110	18.05	63.78	3.74	-9.18	30.63	129.69
111	18.21	65.88	3.18	-9.17	30.43	129.26
112	18.37	63.59	3.11	-9.25	31.57	128.78
113	18.54	51.97	3.31	-9.22	35.68	128.58
114	18.70	43.41	3.34	-9.17	39.81	128.13
115	18.86	42.94	2.97	-9.10	39.57	127.73
116	19.03	49.79	2.84	-9.09	39.00	127.40
117	19.19	43.09	2.95	-9.16	41.64	127.28
118	19.36	33.23	3.04	-9.10	49.11	126.83
119	19.52	26.30	2.90	-9.03	55.63	126.55
120	19.68	28.13	3.07	-8.91	56.98	126.67
121	19.85	31.73	3.25	-8.93	54.19	127.45
122	20.01	36.12	3.59	-8.88	44.24	128.61
123	20.18	61.91	3.65	-7.75	38.50	129.27
124	20.34	59.10	3.52	-8.71	35.09	129.47
125	20.50	54.39	3.49	-8.81	35.73	129.26
126	20.67	56.93	3.45	-8.95	36.55	129.05
127	20.83	53.46	3.34	-8.92	34.63	128.98
128	21.00	63.18	3.21	-8.88	30.48	129.02
129	21.16	80.96	3.08	-9.04	26.14	129.30
130	21.32	88.11	3.19	-9.07	22.81	129.46
131	21.49	95.83	3.00	-9.15	20.85	129.79
132	21.65	108.33	3.21	-9.18	19.32	130.21
133	21.82	115.39	3.44	-9.19	18.48	130.77
134	21.98	119.85	3.53	-9.17	18.34	131.07
135	22.15	117.73	3.54	-9.15	18.08	131.11
136	22.31	120.66	3.44	-9.11	16.66	130.95
137	22.47	139.80	3.12	-9.04	12.81	130.24
138	22.64	175.87	2.18	-9.04	9.00	129.62
139	22.80	206.76	2.26	-9.06	7.14	129.47
140	22.97	203.19	2.69	-9.06	8.37	130.54
141	23.13	167.10	3.35	-1.59	12.18	131.24
142	23.29	112.49	3.65	0.65	19.07	131.56
143	23.46	77.89	4.19	3.26	28.16	131.42
144	23.62	63.99	4.45	12.13	31.78	131.35

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
145	23.79	84.55	4.01	6.11	27.95	131.57
146	23.95	111.02	3.99	-0.55	22.21	132.19
147	24.11	135.58	4.51	-2.23	19.39	133.16
148	24.28	147.85	4.97	-2.84	17.71	133.89
149	24.44	160.99	4.83	-3.47	16.29	134.08
150	24.61	170.76	4.51	-4.42	14.63	133.69
151	24.77	174.50	3.99	-5.20	12.89	133.00
152	24.93	183.21	3.45	-5.52	11.66	132.52
153	25.10	190.09	3.63	-6.51	11.90	132.82
154	25.26	178.80	4.43	-6.72	13.55	133.70
155	25.43	168.24	5.03	-6.95	15.33	134.25
156	25.59	164.97	4.89	-7.97	13.91	133.32
157	25.75	183.36	2.67	-8.64	10.84	131.93
158	25.92	207.75	2.60	-8.83	7.61	130.35
159	26.08	223.48	2.64	-8.52	6.75	130.51
160	26.25	227.95	2.66	-6.65	6.06	130.72
161	26.41	251.04	2.66	-5.03	5.83	131.36
162	26.57	265.36	3.21	-4.56	5.99	132.07
163	26.74	253.92	3.43	-4.40	6.28	132.50
164	26.90	255.81	3.19	-3.29	6.53	132.48
165	27.07	251.86	3.25	-3.96	7.69	132.96
166	27.23	218.08	4.27	-3.19	10.71	133.87
167	27.39	171.10	5.11	-3.46	14.94	134.32
168	27.56	143.11	4.91	-3.04	16.06	134.29
169	27.72	190.82	4.45	-1.05	13.30	134.05
170	27.89	233.83	4.11	-3.10	11.09	133.96
171	28.05	209.95	4.26	-2.62	11.91	134.03
172	28.21	166.84	4.74	-4.07	14.50	134.17
173	28.38	165.14	4.91	-3.59	15.53	134.58
174	28.54	198.92	5.15	-2.53	14.22	134.47
175	28.71	197.48	4.26	-2.53	13.18	133.71
176	28.87	166.92	3.48	-1.41	14.98	132.45
177	29.04	112.77	3.73	-2.73	21.78	131.78
178	29.20	65.69	4.44	-2.54	34.43	131.17
179	29.36	43.34	4.26	-2.15	48.33	130.15
180	29.53	38.41	3.68	8.24	58.53	128.96
181	29.69	28.95	3.63	29.64	61.86	128.07
182	29.86	30.37	3.33	60.71	60.73	127.70
183	30.02	37.77	3.16	68.98	35.03	128.93
184	30.18	121.35	3.12	41.23	22.64	129.75
185	30.35	137.80	3.00	-4.98	17.66	130.58
186	30.51	122.34	3.45	-5.21	20.03	131.12
187	30.68	99.24	4.07	-6.30	26.17	131.72
188	30.84	77.92	4.61	-6.24	33.86	131.68
189	31.00	59.51	4.38	-6.19	41.97	130.65
190	31.17	42.59	3.44	-6.10	52.00	128.81
191	31.33	26.65	2.99	-4.64	64.58	126.65
192	31.50	19.70	2.67	-2.10	76.29	125.24

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
193	31.66	21.03	2.56	-0.04	79.20	124.69
194	31.82	21.80	2.59	0.74	77.49	125.24
195	31.99	23.45	3.12	1.22	76.52	126.52
196	32.15	27.13	3.85	1.25	71.06	128.63
197	32.32	38.91	4.91	1.73	57.08	130.91
198	32.48	66.84	5.47	1.39	41.14	132.88
199	32.64	107.83	5.53	-2.89	30.34	134.00
200	32.81	133.26	5.41	-4.42	23.44	134.65
201	32.97	161.61	5.48	-6.58	20.01	134.93
202	33.14	171.13	5.34	-7.33	18.60	135.03
203	33.30	164.18	5.30	-6.86	18.80	135.04
204	33.47	158.40	5.51	-7.30	19.63	135.11
205	33.63	157.97	5.65	-7.33	20.14	135.23
206	33.79	159.07	5.64	-7.51	19.96	135.10
207	33.96	158.27	5.22	-7.91	19.79	134.91
208	34.12	156.01	5.25	-8.41	19.92	134.68
209	34.28	150.40	5.24	-8.69	20.77	134.59
210	34.45	141.24	5.21	-8.91	21.66	134.30
211	34.61	134.03	4.90	-8.79	22.75	134.16
212	34.78	130.74	5.18	-8.74	24.09	134.30
213	34.94	126.65	5.71	-8.57	25.46	134.72
214	35.10	126.87	5.93	-8.63	26.65	134.99
215	35.27	123.04	5.94	-8.71	26.11	134.32
216	35.43	117.85	4.29	-8.87	26.91	133.67
217	35.60	103.66	4.89	-8.98	29.69	132.84
218	35.76	78.93	4.94	-8.80	36.60	132.97
219	35.92	67.06	5.47	-3.12	46.22	132.83
220	36.09	49.93	5.85	-0.88	51.53	133.09
221	36.25	60.58	6.10	1.46	44.66	133.94
222	36.42	107.40	6.31	1.01	31.67	134.95
223	36.58	157.18	5.94	-2.22	23.17	135.64
224	36.74	181.69	5.90	-3.83	18.64	135.86
225	36.91	198.30	5.74	-4.61	14.45	134.90
226	37.07	225.82	3.18	-4.90	10.14	133.35
227	37.24	260.06	2.58	-5.13	5.80	131.11
228	37.40	300.41	2.33	-6.64	4.21	130.51

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	0.16	0.01	0.00	0.01	1.00	0.624	1.19	0.524	1.00	1.00	2.000	No
2	0.33	0.02	0.00	0.02	1.00	0.624	1.19	0.524	1.00	1.00	2.000	No
3	0.49	0.03	0.00	0.03	1.00	0.624	1.19	0.523	1.00	1.00	2.000	No
4	0.66	0.04	0.00	0.04	1.00	0.624	1.19	0.523	1.00	1.00	2.000	No
5	0.82	0.05	0.00	0.05	1.00	0.624	1.19	0.523	1.00	1.00	2.000	No
6	0.98	0.06	0.00	0.06	1.00	0.624	1.19	0.523	1.00	1.00	2.000	No
7	1.15	0.07	0.00	0.07	1.00	0.624	1.19	0.523	1.00	1.00	2.000	No
8	1.31	0.08	0.00	0.08	1.00	0.623	1.19	0.523	1.00	1.00	2.000	No
9	1.48	0.09	0.00	0.09	1.00	0.623	1.19	0.522	1.00	1.00	2.000	No
10	1.64	0.10	0.00	0.10	1.00	0.623	1.19	0.522	1.00	1.00	2.000	No
11	1.80	0.11	0.00	0.11	1.00	0.623	1.19	0.522	1.00	1.00	2.000	No
12	1.97	0.12	0.00	0.12	1.00	0.622	1.19	0.522	1.00	1.00	2.000	No
13	2.13	0.13	0.00	0.13	1.00	0.622	1.19	0.522	1.00	1.00	2.000	No
14	2.30	0.14	0.00	0.14	1.00	0.622	1.19	0.521	1.00	1.00	2.000	No
15	2.46	0.15	0.00	0.15	1.00	0.622	1.19	0.521	1.00	1.00	2.000	No
16	2.63	0.16	0.00	0.16	1.00	0.621	1.19	0.521	1.00	1.00	2.000	No
17	2.79	0.17	0.00	0.17	1.00	0.621	1.19	0.521	1.00	1.00	2.000	No
18	2.95	0.18	0.00	0.18	1.00	0.621	1.19	0.521	1.00	1.00	2.000	No
19	3.12	0.19	0.00	0.19	0.99	0.621	1.19	0.520	1.00	1.00	2.000	No
20	3.28	0.20	0.00	0.20	0.99	0.620	1.19	0.520	1.00	1.00	2.000	No
21	3.44	0.21	0.00	0.21	0.99	0.620	1.19	0.520	1.00	1.00	2.000	No
22	3.61	0.22	0.00	0.22	0.99	0.620	1.19	0.520	1.00	1.00	2.000	No
23	3.77	0.23	0.00	0.23	0.99	0.620	1.19	0.520	1.00	1.00	2.000	No
24	3.94	0.24	0.00	0.24	0.99	0.619	1.19	0.519	1.00	1.00	2.000	No
25	4.10	0.25	0.00	0.25	0.99	0.619	1.19	0.519	1.00	1.00	2.000	No
26	4.26	0.26	0.00	0.26	0.99	0.619	1.19	0.519	1.00	1.00	2.000	No
27	4.43	0.27	0.00	0.27	0.99	0.619	1.19	0.519	1.00	1.00	2.000	No
28	4.59	0.28	0.00	0.28	0.99	0.619	1.19	0.519	1.00	1.00	2.000	No
29	4.76	0.29	0.00	0.29	0.99	0.618	1.19	0.518	1.00	1.00	2.000	No
30	4.92	0.29	0.00	0.29	0.99	0.618	1.19	0.518	1.00	1.00	2.000	No
31	5.08	0.30	0.00	0.30	0.99	0.623	1.19	0.523	1.00	1.00	0.523	No
32	5.25	0.31	0.01	0.31	0.99	0.633	1.19	0.531	1.00	1.00	0.531	No
33	5.41	0.32	0.01	0.31	0.99	0.643	1.19	0.539	1.00	1.00	0.539	No
34	5.58	0.33	0.02	0.32	0.99	0.652	1.19	0.547	1.00	1.00	0.547	No
35	5.74	0.34	0.02	0.32	0.99	0.661	1.19	0.554	1.00	1.00	0.554	No
36	5.91	0.35	0.03	0.33	0.99	0.670	1.19	0.562	1.00	1.00	0.562	No
37	6.07	0.37	0.03	0.33	0.99	0.678	1.19	0.569	1.00	1.00	0.569	No
38	6.23	0.38	0.04	0.34	0.99	0.686	1.19	0.576	1.00	1.00	0.576	No
39	6.40	0.39	0.04	0.34	0.99	0.694	1.19	0.582	1.00	1.00	0.582	No
40	6.56	0.40	0.05	0.35	0.99	0.702	1.19	0.588	1.00	1.00	0.588	No
41	6.73	0.41	0.05	0.35	0.99	0.709	1.19	0.595	1.00	1.00	0.595	No
42	6.89	0.42	0.06	0.36	0.99	0.716	1.19	0.601	1.00	1.00	0.601	No
43	7.05	0.43	0.06	0.36	0.99	0.723	1.19	0.606	1.00	1.00	0.606	No
44	7.22	0.44	0.07	0.37	0.99	0.730	1.19	0.612	1.00	1.00	0.612	No
45	7.38	0.45	0.07	0.37	0.98	0.736	1.19	0.617	1.00	1.00	0.617	No
46	7.55	0.46	0.08	0.38	0.98	0.743	1.19	0.623	1.00	1.00	0.623	No
47	7.71	0.47	0.08	0.39	0.98	0.749	1.19	0.628	1.00	1.00	0.628	No
48	7.87	0.48	0.09	0.39	0.98	0.755	1.19	0.633	1.00	1.00	0.633	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	8.04	0.49	0.09	0.40	0.98	0.760	1.19	0.637	1.00	1.00	0.637	No
50	8.20	0.50	0.10	0.40	0.98	0.766	1.19	0.642	1.00	1.00	0.642	No
51	8.37	0.51	0.11	0.41	0.98	0.771	1.19	0.647	1.00	1.00	0.647	No
52	8.53	0.52	0.11	0.41	0.98	0.776	1.19	0.651	1.00	1.00	0.651	No
53	8.69	0.53	0.12	0.42	0.98	0.782	1.19	0.655	1.00	1.00	0.655	No
54	8.86	0.54	0.12	0.42	0.98	0.787	1.19	0.659	1.00	1.00	0.659	No
55	9.02	0.55	0.13	0.43	0.98	0.791	1.19	0.663	1.00	1.00	0.663	No
56	9.19	0.56	0.13	0.43	0.98	0.796	1.19	0.667	1.00	1.00	0.667	No
57	9.35	0.58	0.14	0.44	0.98	0.801	1.19	0.671	1.00	1.00	0.671	No
58	9.51	0.59	0.14	0.44	0.98	0.805	1.19	0.675	1.00	1.00	0.675	No
59	9.68	0.60	0.15	0.45	0.98	0.810	1.19	0.679	1.00	1.00	0.679	No
60	9.84	0.61	0.15	0.46	0.98	0.814	1.19	0.682	1.00	1.00	0.682	No
61	10.01	0.62	0.16	0.46	0.98	0.818	1.19	0.686	1.00	1.00	0.686	No
62	10.17	0.63	0.16	0.47	0.98	0.822	1.19	0.689	1.00	1.00	0.689	No
63	10.34	0.64	0.17	0.47	0.98	0.826	1.19	0.692	1.00	1.00	0.692	No
64	10.50	0.65	0.17	0.48	0.98	0.830	1.19	0.695	1.00	1.00	0.695	No
65	10.66	0.66	0.18	0.48	0.98	0.833	1.19	0.699	1.00	1.00	0.699	No
66	10.83	0.67	0.18	0.49	0.98	0.837	1.19	0.702	1.00	1.00	0.702	No
67	10.99	0.68	0.19	0.49	0.98	0.841	1.19	0.705	1.00	1.00	0.705	No
68	11.15	0.69	0.19	0.50	0.98	0.845	1.19	0.708	1.00	1.00	0.708	No
69	11.32	0.70	0.20	0.50	0.98	0.848	1.19	0.711	1.00	1.00	0.711	No
70	11.48	0.71	0.20	0.51	0.98	0.852	1.19	0.714	1.00	1.00	0.714	No
71	11.65	0.72	0.21	0.51	0.98	0.855	1.19	0.717	1.00	1.00	0.717	No
72	11.81	0.73	0.21	0.52	0.98	0.858	1.19	0.719	1.00	1.00	0.719	No
73	11.97	0.74	0.22	0.52	0.97	0.861	1.19	0.722	1.00	1.00	0.722	No
74	12.14	0.75	0.22	0.53	0.97	0.864	1.19	0.725	1.00	1.00	0.725	No
75	12.30	0.76	0.23	0.53	0.97	0.867	1.19	0.727	1.00	1.00	0.727	No
76	12.47	0.77	0.23	0.54	0.97	0.870	1.19	0.730	1.00	1.00	0.730	No
77	12.63	0.78	0.24	0.54	0.97	0.873	1.19	0.732	1.00	1.00	0.732	No
78	12.79	0.79	0.24	0.55	0.97	0.876	1.19	0.734	1.00	1.00	0.734	No
79	12.96	0.80	0.25	0.56	0.97	0.878	1.19	0.736	1.00	1.00	0.736	No
80	13.12	0.81	0.25	0.56	0.97	0.881	1.19	0.739	1.00	1.00	0.739	No
81	13.29	0.83	0.26	0.57	0.97	0.883	1.19	0.741	1.00	1.00	0.741	No
82	13.45	0.84	0.26	0.57	0.97	0.886	1.19	0.743	1.00	1.00	0.743	No
83	13.62	0.85	0.27	0.58	0.97	0.888	1.19	0.745	1.00	1.00	0.745	No
84	13.78	0.86	0.27	0.58	0.97	0.890	1.19	0.747	1.00	1.00	0.747	No
85	13.94	0.87	0.28	0.59	0.97	0.893	1.19	0.748	1.00	1.00	0.748	No
86	14.11	0.88	0.28	0.60	0.97	0.895	1.19	0.750	1.00	1.00	0.750	No
87	14.27	0.89	0.29	0.60	0.97	0.897	1.19	0.752	1.00	1.00	0.752	No
88	14.44	0.90	0.29	0.61	0.97	0.899	1.19	0.753	1.00	1.00	0.753	No
89	14.60	0.91	0.30	0.61	0.97	0.901	1.19	0.755	1.00	1.00	0.755	No
90	14.76	0.92	0.30	0.62	0.97	0.903	1.19	0.757	1.00	1.00	0.757	No
91	14.93	0.93	0.31	0.62	0.97	0.905	1.19	0.759	1.00	1.00	0.759	No
92	15.09	0.94	0.31	0.63	0.97	0.907	1.19	0.760	1.00	1.00	0.760	No
93	15.26	0.95	0.32	0.63	0.97	0.909	1.19	0.762	1.00	1.00	0.762	No
94	15.42	0.97	0.33	0.64	0.97	0.911	1.19	0.763	1.00	1.00	0.763	No
95	15.58	0.98	0.33	0.65	0.97	0.912	1.19	0.765	1.00	1.00	0.765	No
96	15.75	0.99	0.34	0.65	0.97	0.914	1.19	0.766	1.00	1.00	0.766	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	15.91	1.00	0.34	0.66	0.97	0.916	1.19	0.768	1.00	1.00	0.768	No
98	16.08	1.01	0.35	0.66	0.97	0.918	1.19	0.769	1.00	1.00	0.769	No
99	16.24	1.02	0.35	0.67	0.97	0.919	1.19	0.771	1.00	1.00	0.771	No
100	16.40	1.03	0.36	0.67	0.97	0.921	1.19	0.772	1.00	1.00	0.772	No
101	16.57	1.04	0.36	0.68	0.97	0.923	1.19	0.774	1.00	1.00	0.774	No
102	16.73	1.05	0.37	0.68	0.96	0.924	1.19	0.775	1.00	1.00	0.775	No
103	16.90	1.06	0.37	0.69	0.96	0.926	1.19	0.776	1.00	1.00	0.776	No
104	17.06	1.07	0.38	0.69	0.96	0.927	1.19	0.777	1.00	1.00	0.777	No
105	17.22	1.08	0.38	0.70	0.96	0.929	1.19	0.779	1.00	1.00	0.779	No
106	17.39	1.09	0.39	0.71	0.96	0.930	1.19	0.780	1.00	1.00	0.780	No
107	17.55	1.10	0.39	0.71	0.96	0.932	1.19	0.781	1.00	1.00	0.781	No
108	17.72	1.11	0.40	0.72	0.96	0.933	1.19	0.782	1.00	1.00	0.782	No
109	17.88	1.12	0.40	0.72	0.96	0.934	1.19	0.783	1.00	1.00	0.783	No
110	18.05	1.13	0.41	0.73	0.96	0.936	1.19	0.784	1.00	1.00	0.784	No
111	18.21	1.15	0.41	0.73	0.96	0.937	1.19	0.786	1.00	1.00	0.786	No
112	18.37	1.16	0.42	0.74	0.96	0.938	1.19	0.787	1.00	1.00	0.787	No
113	18.54	1.17	0.42	0.74	0.96	0.939	1.19	0.788	1.00	1.00	0.788	No
114	18.70	1.18	0.43	0.75	0.96	0.941	1.19	0.789	1.00	1.00	0.789	No
115	18.86	1.19	0.43	0.76	0.96	0.942	1.19	0.790	1.00	1.00	0.790	No
116	19.03	1.20	0.44	0.76	0.96	0.943	1.19	0.791	1.00	1.00	0.791	No
117	19.19	1.21	0.44	0.77	0.96	0.944	1.19	0.792	1.00	1.00	0.792	No
118	19.36	1.22	0.45	0.77	0.96	0.946	1.19	0.793	1.00	1.00	0.793	No
119	19.52	1.23	0.45	0.78	0.96	0.947	1.19	0.794	1.00	1.00	0.794	No
120	19.68	1.24	0.46	0.78	0.96	0.948	1.19	0.795	1.00	1.00	0.795	No
121	19.85	1.25	0.46	0.79	0.96	0.949	1.19	0.796	1.00	1.00	0.796	No
122	20.01	1.26	0.47	0.79	0.96	0.950	1.19	0.797	1.00	1.00	0.797	No
123	20.18	1.27	0.47	0.80	0.96	0.951	1.19	0.797	1.00	1.00	0.797	No
124	20.34	1.28	0.48	0.80	0.96	0.952	1.19	0.798	1.00	1.00	0.798	No
125	20.50	1.29	0.48	0.81	0.96	0.953	1.19	0.799	1.00	1.00	0.799	No
126	20.67	1.30	0.49	0.81	0.96	0.954	1.19	0.800	1.00	1.00	0.800	No
127	20.83	1.31	0.49	0.82	0.95	0.955	1.19	0.800	1.00	1.00	0.800	No
128	21.00	1.32	0.50	0.83	0.95	0.956	1.19	0.801	1.00	1.00	0.801	No
129	21.16	1.33	0.50	0.83	0.95	0.956	1.19	0.802	1.00	1.00	0.802	No
130	21.32	1.35	0.51	0.84	0.95	0.957	1.19	0.803	1.00	1.00	0.803	No
131	21.49	1.36	0.51	0.84	0.95	0.958	1.19	0.803	1.00	1.00	0.803	No
132	21.65	1.37	0.52	0.85	0.95	0.959	1.19	0.804	1.00	1.00	0.804	No
133	21.82	1.38	0.52	0.85	0.95	0.959	1.19	0.804	1.00	1.00	0.804	No
134	21.98	1.39	0.53	0.86	0.95	0.960	1.19	0.805	1.00	1.00	0.805	No
135	22.15	1.40	0.53	0.86	0.95	0.961	1.19	0.806	1.00	1.00	0.806	No
136	22.31	1.41	0.54	0.87	0.95	0.961	1.19	0.806	1.00	1.00	0.806	No
137	22.47	1.42	0.55	0.88	0.95	0.962	1.19	0.807	1.00	1.00	0.807	No
138	22.64	1.43	0.55	0.88	0.95	0.963	1.19	0.807	1.00	1.00	0.807	No
139	22.80	1.44	0.56	0.89	0.95	0.963	1.19	0.808	1.00	1.00	0.808	No
140	22.97	1.45	0.56	0.89	0.95	0.964	1.19	0.808	1.00	1.00	0.808	No
141	23.13	1.46	0.57	0.90	0.95	0.964	1.19	0.809	1.00	1.00	0.809	No
142	23.29	1.47	0.57	0.90	0.95	0.965	1.19	0.809	1.00	1.00	0.809	No
143	23.46	1.48	0.58	0.91	0.95	0.965	1.19	0.809	1.00	1.00	0.809	No
144	23.62	1.50	0.58	0.91	0.95	0.966	1.19	0.810	1.00	1.00	0.810	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	23.79	1.51	0.59	0.92	0.95	0.966	1.19	0.810	1.00	1.00	0.810	No
146	23.95	1.52	0.59	0.93	0.95	0.967	1.19	0.810	1.00	1.00	0.810	No
147	24.11	1.53	0.60	0.93	0.94	0.967	1.19	0.811	1.00	1.00	0.811	No
148	24.28	1.54	0.60	0.94	0.94	0.967	1.19	0.811	1.00	1.00	0.811	No
149	24.44	1.55	0.61	0.94	0.94	0.968	1.19	0.811	1.00	1.00	0.811	No
150	24.61	1.56	0.61	0.95	0.94	0.968	1.19	0.811	1.00	1.00	0.811	No
151	24.77	1.57	0.62	0.96	0.94	0.968	1.19	0.812	1.00	1.00	0.812	No
152	24.93	1.58	0.62	0.96	0.94	0.968	1.19	0.812	1.00	1.00	0.812	No
153	25.10	1.59	0.63	0.97	0.94	0.969	1.19	0.812	1.00	1.00	0.812	No
154	25.26	1.60	0.63	0.97	0.94	0.969	1.19	0.812	1.00	1.00	0.812	No
155	25.43	1.62	0.64	0.98	0.94	0.969	1.19	0.812	1.00	1.00	0.812	No
156	25.59	1.63	0.64	0.98	0.94	0.969	1.19	0.813	1.00	1.00	0.813	No
157	25.75	1.64	0.65	0.99	0.94	0.969	1.19	0.813	1.00	1.00	0.813	No
158	25.92	1.65	0.65	1.00	0.94	0.970	1.19	0.813	1.00	1.00	0.813	No
159	26.08	1.66	0.66	1.00	0.94	0.970	1.19	0.813	1.00	1.00	0.813	No
160	26.25	1.67	0.66	1.01	0.94	0.970	1.19	0.813	1.00	1.00	0.813	No
161	26.41	1.68	0.67	1.01	0.94	0.970	1.19	0.813	1.00	1.00	0.813	No
162	26.57	1.69	0.67	1.02	0.94	0.970	1.19	0.813	1.00	1.00	0.813	No
163	26.74	1.70	0.68	1.02	0.94	0.970	1.19	0.813	1.00	1.00	0.813	No
164	26.90	1.71	0.68	1.03	0.93	0.970	1.19	0.814	1.00	1.00	0.814	No
165	27.07	1.72	0.69	1.04	0.93	0.970	1.19	0.814	1.00	1.00	0.814	No
166	27.23	1.73	0.69	1.04	0.93	0.970	1.19	0.814	1.00	1.00	0.814	No
167	27.39	1.75	0.70	1.05	0.93	0.970	1.19	0.813	1.00	1.00	0.813	No
168	27.56	1.76	0.70	1.05	0.93	0.970	1.19	0.813	1.00	1.00	0.813	No
169	27.72	1.77	0.71	1.06	0.93	0.970	1.19	0.813	1.00	1.00	0.813	No
170	27.89	1.78	0.71	1.06	0.93	0.970	1.19	0.813	1.00	1.00	0.814	No
171	28.05	1.79	0.72	1.07	0.93	0.970	1.19	0.813	1.00	1.00	0.815	No
172	28.21	1.80	0.72	1.08	0.93	0.970	1.19	0.813	1.00	1.00	0.816	No
173	28.38	1.81	0.73	1.08	0.93	0.970	1.19	0.813	0.99	1.00	0.817	No
174	28.54	1.82	0.73	1.09	0.93	0.969	1.19	0.813	0.99	1.00	0.818	No
175	28.71	1.83	0.74	1.09	0.93	0.969	1.19	0.813	0.99	1.00	0.819	No
176	28.87	1.84	0.74	1.10	0.93	0.969	1.19	0.813	0.99	1.00	0.820	No
177	29.04	1.86	0.75	1.11	0.93	0.969	1.19	0.812	0.99	1.00	0.821	No
178	29.20	1.87	0.76	1.11	0.92	0.969	1.19	0.812	0.99	1.00	0.821	No
179	29.36	1.88	0.76	1.12	0.92	0.969	1.19	0.812	0.99	1.00	0.822	No
180	29.53	1.89	0.77	1.12	0.92	0.969	1.19	0.812	0.99	1.00	0.823	No
181	29.69	1.90	0.77	1.13	0.92	0.968	1.19	0.812	0.99	1.00	0.824	No
182	29.86	1.91	0.78	1.13	0.92	0.968	1.19	0.812	0.98	1.00	0.825	No
183	30.02	1.92	0.78	1.14	0.92	0.968	1.19	0.812	0.98	1.00	0.826	No
184	30.18	1.93	0.79	1.14	0.92	0.968	1.19	0.812	0.98	1.00	0.826	No
185	30.35	1.94	0.79	1.15	0.92	0.968	1.19	0.811	0.98	1.00	0.827	No
186	30.51	1.95	0.80	1.16	0.92	0.967	1.19	0.811	0.98	1.00	0.828	No
187	30.68	1.96	0.80	1.16	0.92	0.967	1.19	0.811	0.98	1.00	0.828	No
188	30.84	1.97	0.81	1.17	0.92	0.967	1.19	0.811	0.98	1.00	0.829	No
189	31.00	1.98	0.81	1.17	0.92	0.966	1.19	0.810	0.98	1.00	0.830	No
190	31.17	1.99	0.82	1.18	0.91	0.966	1.19	0.810	0.98	1.00	0.830	No
191	31.33	2.00	0.82	1.18	0.91	0.966	1.19	0.810	0.97	1.00	0.831	No
192	31.50	2.01	0.83	1.19	0.91	0.966	1.19	0.810	0.97	1.00	0.832	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
193	31.66	2.02	0.83	1.19	0.91	0.965	1.19	0.809	0.97	1.00	0.832	No
194	31.82	2.04	0.84	1.20	0.91	0.965	1.19	0.809	0.97	1.00	0.833	No
195	31.99	2.05	0.84	1.20	0.91	0.965	1.19	0.809	0.97	1.00	0.833	No
196	32.15	2.06	0.85	1.21	0.91	0.965	1.19	0.809	0.97	1.00	0.834	No
197	32.32	2.07	0.85	1.21	0.91	0.964	1.19	0.808	0.97	1.00	0.834	No
198	32.48	2.08	0.86	1.22	0.91	0.963	1.19	0.808	0.97	1.00	0.835	No
199	32.64	2.09	0.86	1.23	0.91	0.963	1.19	0.807	0.97	1.00	0.835	No
200	32.81	2.10	0.87	1.23	0.90	0.962	1.19	0.807	0.97	1.00	0.836	No
201	32.97	2.11	0.87	1.24	0.90	0.962	1.19	0.806	0.96	1.00	0.836	No
202	33.14	2.12	0.88	1.24	0.90	0.961	1.19	0.806	0.96	1.00	0.836	No
203	33.30	2.13	0.88	1.25	0.90	0.960	1.19	0.805	0.96	1.00	0.837	No
204	33.47	2.14	0.89	1.26	0.90	0.960	1.19	0.805	0.96	1.00	0.837	No
205	33.63	2.16	0.89	1.26	0.90	0.959	1.19	0.804	0.96	1.00	0.837	No
206	33.79	2.17	0.90	1.27	0.90	0.958	1.19	0.803	0.96	1.00	0.837	No
207	33.96	2.18	0.90	1.27	0.90	0.957	1.19	0.803	0.96	1.00	0.838	No
208	34.12	2.19	0.91	1.28	0.90	0.957	1.19	0.802	0.96	1.00	0.838	No
209	34.28	2.20	0.91	1.29	0.90	0.956	1.19	0.801	0.96	1.00	0.838	No
210	34.45	2.21	0.92	1.29	0.89	0.955	1.19	0.801	0.96	1.00	0.838	No
211	34.61	2.22	0.92	1.30	0.89	0.954	1.19	0.800	0.95	1.00	0.839	No
212	34.78	2.23	0.93	1.30	0.89	0.953	1.19	0.799	0.95	1.00	0.839	No
213	34.94	2.24	0.93	1.31	0.89	0.953	1.19	0.799	0.95	1.00	0.839	No
214	35.10	2.25	0.94	1.32	0.89	0.952	1.19	0.798	0.95	1.00	0.839	No
215	35.27	2.27	0.94	1.32	0.89	0.951	1.19	0.797	0.95	1.00	0.839	No
216	35.43	2.28	0.95	1.33	0.89	0.950	1.19	0.797	0.95	1.00	0.839	No
217	35.60	2.29	0.95	1.33	0.89	0.949	1.19	0.796	0.95	1.00	0.839	No
218	35.76	2.30	0.96	1.34	0.89	0.948	1.19	0.795	0.95	1.00	0.839	No
219	35.92	2.31	0.96	1.34	0.88	0.948	1.19	0.794	0.95	1.00	0.839	No
220	36.09	2.32	0.97	1.35	0.88	0.947	1.19	0.794	0.95	1.00	0.839	No
221	36.25	2.33	0.98	1.36	0.88	0.946	1.19	0.793	0.94	1.00	0.839	No
222	36.42	2.34	0.98	1.36	0.88	0.945	1.19	0.792	0.94	1.00	0.839	No
223	36.58	2.35	0.99	1.37	0.88	0.944	1.19	0.791	0.94	1.00	0.839	No
224	36.74	2.36	0.99	1.37	0.88	0.943	1.19	0.790	0.94	1.00	0.839	No
225	36.91	2.38	1.00	1.38	0.88	0.942	1.19	0.789	0.94	1.00	0.839	No
226	37.07	2.39	1.00	1.39	0.88	0.941	1.19	0.789	0.94	1.00	0.839	No
227	37.24	2.40	1.01	1.39	0.87	0.940	1.19	0.788	0.94	1.00	0.839	No
228	37.40	2.41	1.01	1.40	0.87	0.939	1.19	0.787	0.94	1.00	0.839	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	0.16	14.90	3.02	9.01	1.00	23.93	6.93	165.92	4.000	No	Yes	2.00
2	0.33	13.35	3.07	9.60	1.00	21.41	7.56	161.92	4.000	No	Yes	2.00
3	0.49	11.11	3.17	10.95	1.00	17.80	8.80	156.67	4.000	No	Yes	2.00
4	0.66	8.39	3.33	13.93	1.00	13.42	11.15	149.61	4.000	No	Yes	2.00
5	0.82	8.62	3.32	13.71	1.00	13.77	10.95	150.76	4.000	No	Yes	2.00
6	0.98	10.33	3.21	11.76	1.00	16.51	9.42	155.52	4.000	No	Yes	2.00
7	1.15	12.75	3.09	9.89	1.00	20.38	7.86	160.15	4.000	No	Yes	2.00
8	1.31	15.49	2.98	8.41	1.00	24.76	6.58	162.87	4.000	No	Yes	2.00
9	1.48	17.97	2.90	7.36	0.98	28.72	5.69	163.32	4.000	No	Yes	2.00
10	1.64	18.59	2.88	7.24	0.97	29.72	5.54	164.51	4.000	No	Yes	2.00
11	1.80	18.93	2.89	7.48	0.98	30.25	5.58	168.92	4.000	No	Yes	2.00
12	1.97	21.07	2.86	7.51	0.96	33.66	5.30	178.29	4.000	No	Yes	2.00
13	2.13	24.62	2.79	7.06	0.94	39.35	4.72	185.64	4.000	No	Yes	2.00
14	2.30	26.72	2.75	6.72	0.92	42.71	4.39	187.58	4.000	No	Yes	2.00
15	2.46	25.25	2.78	6.89	0.93	40.33	4.59	185.30	4.000	No	Yes	2.00
16	2.63	23.25	2.82	7.25	0.95	37.11	4.94	183.22	4.000	No	Yes	2.00
17	2.79	22.35	2.85	7.62	0.96	35.65	5.19	184.84	4.000	No	Yes	2.00
18	2.95	22.79	2.84	7.70	0.96	36.32	5.17	187.65	4.000	No	Yes	2.00
19	3.12	22.93	2.85	7.90	0.96	36.54	5.22	190.88	4.000	No	Yes	2.00
20	3.28	22.48	2.86	8.04	0.97	35.81	5.33	190.88	4.000	No	Yes	2.00
21	3.44	21.33	2.88	8.23	0.97	33.94	5.55	188.37	4.000	No	Yes	2.00
22	3.61	19.91	2.91	8.32	0.98	31.63	5.79	183.01	4.000	No	Yes	2.00
23	3.77	18.52	2.93	8.42	0.99	29.40	6.04	177.52	4.000	No	Yes	2.00
24	3.94	17.41	2.96	8.51	1.00	27.59	6.27	173.04	4.000	No	Yes	2.00
25	4.10	16.21	2.99	8.94	1.00	25.65	6.68	171.24	4.000	No	Yes	2.00
26	4.26	14.67	3.06	10.01	1.00	23.16	7.43	172.19	4.000	No	Yes	2.00
27	4.43	13.16	3.13	11.22	1.00	20.72	8.30	171.88	4.000	No	Yes	2.00
28	4.59	11.57	3.21	12.66	1.00	18.14	9.34	169.51	4.000	No	Yes	2.00
29	4.76	9.82	3.30	14.27	1.00	15.32	10.64	163.02	4.000	No	Yes	2.00
30	4.92	7.56	3.45	18.03	1.00	11.67	13.20	154.02	4.000	No	Yes	2.00
31	5.08	5.61	3.63	23.62	1.00	8.52	16.58	141.38	4.000	No	Yes	2.00
32	5.25	10.93	3.21	11.92	1.00	17.06	9.34	159.34	4.000	No	Yes	2.00
33	5.41	35.33	2.49	3.85	0.83	56.24	2.74	153.89	0.419	No	No	0.78
34	5.58	63.33	2.18	2.49	0.71	101.22	1.62	164.12	0.491	No	No	0.90
35	5.74	94.21	1.98	1.91	0.63	150.81	1.28	192.43	0.743	No	No	1.34
36	5.91	111.80	1.91	1.79	0.60	179.06	1.20	214.59	4.000	No	No	2.00
37	6.07	129.23	1.84	1.63	0.58	207.04	1.14	235.38	4.000	No	No	2.00
38	6.23	139.45	1.80	1.56	0.56	223.44	1.11	247.77	4.000	No	No	2.00
39	6.40	143.84	1.79	1.52	0.56	230.48	1.10	252.76	4.000	No	No	2.00
40	6.56	142.65	1.79	1.51	0.56	228.55	1.10	250.63	4.000	No	No	2.00
41	6.73	135.37	1.82	1.58	0.57	216.84	1.12	242.52	4.000	No	No	2.00
42	6.89	123.58	1.88	1.78	0.59	197.88	1.17	231.88	4.000	No	No	2.00
43	7.05	108.28	1.99	2.20	0.63	173.28	1.29	222.78	4.000	No	No	2.00
44	7.22	91.10	2.13	2.88	0.69	145.66	1.51	219.66	4.000	No	No	2.00
45	7.38	77.76	2.20	3.18	0.71	124.21	1.68	208.29	4.000	No	No	2.00
46	7.55	78.68	2.20	3.17	0.71	125.68	1.67	209.48	4.000	No	No	2.00
47	7.71	94.37	2.09	2.62	0.67	150.86	1.43	215.87	4.000	No	No	2.00
48	7.87	111.14	2.03	2.54	0.65	177.79	1.34	238.98	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	8.04	108.68	2.04	2.59	0.65	173.82	1.36	236.88	4.000	No	No	2.00
50	8.20	103.00	2.07	2.71	0.67	164.68	1.41	232.16	4.000	No	No	2.00
51	8.37	97.82	2.10	2.77	0.67	156.34	1.45	226.35	4.000	No	No	2.00
52	8.53	101.82	2.07	2.63	0.66	162.74	1.40	227.65	4.000	No	No	2.00
53	8.69	97.72	2.08	2.61	0.67	156.14	1.41	220.51	4.000	No	No	2.00
54	8.86	93.35	2.08	2.55	0.67	149.11	1.42	211.65	4.000	No	No	2.00
55	9.02	90.33	2.09	2.53	0.67	144.23	1.43	206.38	4.000	No	No	2.00
56	9.19	95.27	2.02	2.20	0.65	152.16	1.33	202.81	4.000	No	No	2.00
57	9.35	107.86	1.93	1.85	0.61	172.37	1.22	210.48	4.000	No	No	2.00
58	9.51	130.30	1.80	1.39	0.56	199.21	1.10	219.99	4.000	No	No	2.00
59	9.68	154.14	1.77	1.45	0.55	232.08	1.08	251.67	4.000	No	No	2.00
60	9.84	181.55	1.72	1.42	0.53	267.76	1.05	282.09	4.000	No	No	2.00
61	10.01	197.93	1.73	1.52	0.53	290.42	1.06	306.69	4.000	No	No	2.00
62	10.17	155.93	1.84	1.83	0.58	235.59	1.14	268.81	4.000	No	No	2.00
63	10.34	98.28	2.10	2.79	0.67	156.88	1.45	227.52	4.000	No	No	2.00
64	10.50	37.27	2.65	6.55	0.89	58.83	3.67	215.74	4.000	No	Yes	2.00
65	10.66	26.55	2.84	8.50	0.96	41.60	5.10	212.34	4.000	No	Yes	2.00
66	10.83	20.10	2.99	10.51	1.00	31.21	6.61	206.40	4.000	No	Yes	2.00
67	10.99	19.22	3.02	11.16	1.00	29.79	6.98	207.99	4.000	No	Yes	2.00
68	11.15	21.82	2.97	10.68	1.00	33.95	6.41	217.51	4.000	No	Yes	2.00
69	11.32	25.92	2.89	9.63	0.97	40.53	5.56	225.13	4.000	No	Yes	2.00
70	11.48	27.23	2.88	9.91	0.97	42.61	5.51	234.78	4.000	No	Yes	2.00
71	11.65	26.58	2.90	10.31	0.98	41.55	5.71	237.13	4.000	No	Yes	2.00
72	11.81	25.14	2.94	11.03	1.00	39.22	6.09	239.04	4.000	No	Yes	2.00
73	11.97	24.08	2.98	11.82	1.00	37.51	6.47	242.66	4.000	No	Yes	2.00
74	12.14	21.83	3.06	13.98	1.00	33.87	7.43	251.69	4.000	No	Yes	2.00
75	12.30	26.06	2.97	12.58	1.00	40.65	6.46	262.47	4.000	No	Yes	2.00
76	12.47	32.54	2.86	10.79	0.96	51.04	5.32	271.49	4.000	No	Yes	2.00
77	12.63	41.57	2.73	8.86	0.91	65.54	4.19	274.55	4.000	No	Yes	2.00
78	12.79	48.30	2.61	7.13	0.87	76.33	3.40	259.18	4.000	No	Yes	2.00
79	12.96	75.38	2.31	4.13	0.76	114.81	2.00	229.29	4.000	No	No	2.00
80	13.12	115.10	2.04	2.41	0.65	163.25	1.35	220.62	4.000	No	No	2.00
81	13.29	156.92	1.87	1.84	0.59	213.03	1.16	247.88	4.000	No	No	2.00
82	13.45	182.38	1.81	1.71	0.57	242.97	1.12	271.32	4.000	No	No	2.00
83	13.62	191.51	1.81	1.74	0.56	253.41	1.11	281.88	4.000	No	No	2.00
84	13.78	198.04	1.81	1.76	0.56	260.49	1.11	289.36	4.000	No	No	2.00
85	13.94	201.09	1.81	1.79	0.56	263.25	1.11	293.09	4.000	No	No	2.00
86	14.11	201.23	1.83	1.89	0.57	263.11	1.13	296.85	4.000	No	No	2.00
87	14.27	202.71	1.83	1.89	0.57	263.50	1.13	297.08	4.000	No	No	2.00
88	14.44	204.94	1.80	1.72	0.56	263.13	1.10	290.26	4.000	No	No	2.00
89	14.60	210.34	1.73	1.43	0.53	265.01	1.06	280.24	4.000	No	No	2.00
90	14.76	207.88	1.69	1.26	0.52	258.58	1.03	266.69	4.000	No	No	2.00
91	14.93	202.91	1.68	1.18	0.51	250.61	1.02	256.48	4.000	No	No	2.00
92	15.09	198.57	1.68	1.17	0.52	244.32	1.03	250.80	4.000	No	No	2.00
93	15.26	192.32	1.70	1.19	0.52	236.23	1.04	244.95	4.000	No	No	2.00
94	15.42	185.10	1.72	1.24	0.53	227.24	1.05	238.99	4.000	No	No	2.00
95	15.58	177.12	1.74	1.28	0.54	217.36	1.07	232.04	4.000	No	No	2.00
96	15.75	171.89	1.76	1.31	0.55	210.60	1.08	227.27	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
97	15.91	167.94	1.78	1.34	0.55	205.32	1.09	223.58	4.000	No	No	2.00
98	16.08	163.58	1.79	1.38	0.56	199.66	1.10	219.90	4.000	No	No	2.00
99	16.24	156.99	1.83	1.51	0.57	192.06	1.13	217.41	4.000	No	No	2.00
100	16.40	144.75	1.91	1.79	0.60	178.54	1.20	214.29	4.000	No	No	2.00
101	16.57	124.22	2.06	2.47	0.66	156.05	1.38	215.58	4.000	No	No	2.00
102	16.73	95.16	2.26	3.74	0.74	122.72	1.83	225.15	4.000	No	No	2.00
103	16.90	67.60	2.51	5.96	0.83	89.75	2.80	251.28	4.000	No	No	2.00
104	17.06	49.81	2.70	8.44	0.90	67.39	4.01	270.20	4.000	No	Yes	2.00
105	17.22	44.06	2.77	9.28	0.93	59.60	4.51	268.95	4.000	No	Yes	2.00
106	17.39	45.63	2.72	8.27	0.91	60.89	4.16	253.21	4.000	No	Yes	2.00
107	17.55	55.04	2.59	6.42	0.86	71.80	3.27	235.14	4.000	No	No	2.00
108	17.72	63.22	2.51	5.60	0.83	81.16	2.83	229.67	4.000	No	No	2.00
109	17.88	67.51	2.49	5.44	0.82	85.89	2.70	232.02	4.000	No	No	2.00
110	18.05	65.49	2.50	5.48	0.83	82.87	2.76	228.94	4.000	No	No	2.00
111	18.21	64.28	2.49	5.30	0.83	80.76	2.74	221.26	4.000	No	No	2.00
112	18.37	60.35	2.52	5.41	0.84	75.51	2.87	216.68	4.000	No	No	2.00
113	18.54	52.86	2.61	6.30	0.87	66.30	3.37	223.27	4.000	No	Yes	2.00
114	18.70	45.97	2.69	7.16	0.90	57.72	3.91	225.59	4.000	No	Yes	2.00
115	18.86	45.25	2.68	6.92	0.90	56.37	3.88	218.50	4.000	No	Yes	2.00
116	19.03	45.14	2.67	6.64	0.89	55.79	3.80	211.99	4.000	No	Yes	2.00
117	19.19	41.91	2.72	7.23	0.91	51.66	4.16	214.92	4.000	No	Yes	2.00
118	19.36	34.08	2.85	9.03	0.96	42.11	5.25	221.16	4.000	No	Yes	2.00
119	19.52	29.09	2.96	10.79	1.00	35.89	6.28	225.28	4.000	No	Yes	2.00
120	19.68	28.59	2.98	11.24	1.00	35.00	6.50	227.36	4.000	No	Yes	2.00
121	19.85	31.87	2.93	10.78	0.99	38.83	6.05	234.72	4.000	No	Yes	2.00
122	20.01	43.13	2.77	8.35	0.93	51.79	4.53	234.55	4.000	No	Yes	2.00
123	20.18	52.26	2.66	7.04	0.89	61.95	3.73	231.21	4.000	No	Yes	2.00
124	20.34	58.35	2.59	6.23	0.86	68.42	3.29	225.31	4.000	No	No	2.00
125	20.50	56.68	2.61	6.30	0.87	66.11	3.37	223.00	4.000	No	Yes	2.00
126	20.67	54.80	2.62	6.41	0.88	63.58	3.48	221.13	4.000	No	Yes	2.00
127	20.83	57.73	2.59	5.91	0.86	66.41	3.24	214.92	4.000	No	No	2.00
128	21.00	65.74	2.50	4.99	0.83	74.76	2.75	205.22	4.000	No	No	2.00
129	21.16	77.29	2.39	4.16	0.79	86.85	2.29	198.47	0.807	No	No	1.01
130	21.32	88.17	2.31	3.56	0.75	98.01	1.97	193.45	0.753	No	No	0.94
131	21.49	97.29	2.25	3.27	0.73	107.25	1.81	194.01	0.759	No	No	0.95
132	21.65	106.38	2.21	3.06	0.72	116.40	1.69	196.82	0.789	No	No	0.98
133	21.82	114.39	2.18	3.00	0.71	124.41	1.63	202.78	4.000	No	No	2.00
134	21.98	117.52	2.18	3.02	0.71	127.21	1.62	206.05	4.000	No	No	2.00
135	22.15	119.28	2.17	2.97	0.70	128.45	1.60	205.77	4.000	No	No	2.00
136	22.31	125.93	2.13	2.70	0.69	134.62	1.51	202.89	4.000	No	No	2.00
137	22.47	145.31	1.99	2.03	0.64	153.40	1.29	198.39	0.806	No	No	1.00
138	22.64	174.01	1.84	1.46	0.58	181.28	1.14	206.12	4.000	No	No	2.00
139	22.80	195.14	1.75	1.23	0.54	201.55	1.07	216.36	4.000	No	No	2.00
140	22.97	192.26	1.81	1.45	0.57	198.61	1.12	221.47	4.000	No	No	2.00
141	23.13	160.88	1.97	2.02	0.63	167.01	1.26	211.11	4.000	No	No	2.00
142	23.29	119.17	2.20	3.17	0.71	124.55	1.67	208.30	4.000	No	No	2.00
143	23.46	84.87	2.44	4.91	0.81	89.07	2.49	222.00	4.000	No	No	2.00
144	23.62	75.58	2.52	5.69	0.84	79.10	2.89	228.90	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
145	23.79	86.60	2.44	4.88	0.80	89.98	2.47	222.24	4.000	No	No	2.00
146	23.95	110.40	2.29	3.83	0.75	113.71	1.92	218.59	4.000	No	No	2.00
147	24.11	131.46	2.21	3.46	0.72	134.53	1.70	228.12	4.000	No	No	2.00
148	24.28	148.10	2.16	3.25	0.70	150.72	1.58	237.56	4.000	No	No	2.00
149	24.44	159.82	2.12	3.01	0.68	161.73	1.48	240.05	4.000	No	No	2.00
150	24.61	168.69	2.06	2.66	0.66	169.67	1.39	235.29	4.000	No	No	2.00
151	24.77	176.08	2.00	2.28	0.64	176.03	1.30	228.34	4.000	No	No	2.00
152	24.93	182.52	1.95	2.04	0.62	181.50	1.24	225.23	4.000	No	No	2.00
153	25.10	183.94	1.96	2.10	0.62	182.30	1.25	228.12	4.000	No	No	2.00
154	25.26	178.95	2.02	2.46	0.65	176.98	1.33	235.33	4.000	No	No	2.00
155	25.43	170.57	2.08	2.83	0.67	168.26	1.43	239.97	4.000	No	No	2.00
156	25.59	172.08	2.03	2.46	0.65	168.85	1.35	227.64	4.000	No	No	2.00
157	25.75	185.24	1.92	1.84	0.61	180.66	1.21	217.98	4.000	No	No	2.00
158	25.92	204.74	1.78	1.30	0.55	198.50	1.09	216.23	4.000	No	No	2.00
159	26.08	219.61	1.73	1.21	0.54	212.18	1.06	224.91	4.000	No	No	2.00
160	26.25	234.06	1.70	1.14	0.52	225.41	1.04	233.48	4.000	No	No	2.00
161	26.41	248.04	1.68	1.15	0.52	238.21	1.03	244.74	4.000	No	No	2.00
162	26.57	256.71	1.69	1.21	0.52	245.89	1.03	254.04	4.000	No	No	2.00
163	26.74	258.30	1.71	1.28	0.53	246.75	1.04	257.52	4.000	No	No	2.00
164	26.90	253.81	1.72	1.30	0.53	241.74	1.05	254.41	4.000	No	No	2.00
165	27.07	241.87	1.78	1.49	0.55	229.70	1.09	250.84	4.000	No	No	2.00
166	27.23	213.63	1.91	1.99	0.60	202.21	1.20	242.93	4.000	No	No	2.00
167	27.39	177.38	2.07	2.71	0.66	167.15	1.40	234.66	4.000	No	No	2.00
168	27.56	168.31	2.11	2.90	0.68	157.92	1.47	232.17	4.000	No	No	2.00
169	27.72	189.22	2.01	2.40	0.64	177.07	1.32	233.21	4.000	No	No	2.00
170	27.89	211.50	1.93	2.04	0.61	197.45	1.22	240.25	4.000	No	No	2.00
171	28.05	203.49	1.96	2.17	0.62	189.24	1.25	236.91	4.000	No	No	2.00
172	28.21	180.59	2.06	2.59	0.66	167.07	1.38	230.48	4.000	No	No	2.00
173	28.38	176.92	2.09	2.82	0.67	162.98	1.44	234.40	4.000	No	No	2.00
174	28.54	187.14	2.05	2.58	0.65	171.94	1.36	234.59	4.000	No	No	2.00
175	28.71	187.74	2.01	2.31	0.64	171.97	1.31	225.47	4.000	No	No	2.00
176	28.87	159.02	2.07	2.43	0.66	144.77	1.41	203.64	4.000	No	No	2.00
177	29.04	115.09	2.28	3.43	0.74	103.58	1.89	195.33	0.773	No	No	0.94
178	29.20	73.90	2.58	5.76	0.86	65.27	3.21	209.62	4.000	No	No	2.00
179	29.36	49.16	2.84	8.73	0.96	42.44	5.13	217.82	4.000	No	Yes	2.00
180	29.53	37.07	3.00	10.97	1.00	31.35	6.75	211.64	4.000	No	Yes	2.00
181	29.69	33.05	3.05	11.38	1.00	27.62	7.31	201.87	4.000	No	Yes	2.00
182	29.86	33.13	3.03	10.80	1.00	27.55	7.12	196.14	4.000	No	Yes	2.00
183	30.02	63.98	2.59	5.16	0.86	55.06	3.29	180.90	0.631	No	No	0.76
184	30.18	99.48	2.30	3.17	0.75	86.93	1.96	170.32	0.540	No	No	0.65
185	30.35	127.31	2.16	2.54	0.70	111.82	1.57	175.89	0.586	No	No	0.71
186	30.51	119.71	2.23	2.98	0.72	104.43	1.74	182.20	0.643	No	No	0.78
187	30.68	99.75	2.39	4.13	0.79	85.91	2.29	196.59	0.787	No	No	0.95
188	30.84	78.80	2.57	5.66	0.85	66.80	3.14	209.88	4.000	No	No	2.00
189	31.00	59.92	2.73	7.15	0.91	49.86	4.21	209.70	4.000	No	Yes	2.00
190	31.17	42.84	2.90	8.82	0.98	34.75	5.70	198.05	4.000	No	Yes	2.00
191	31.33	29.59	3.09	11.00	1.00	23.32	7.77	181.22	4.000	No	Yes	2.00
192	31.50	22.43	3.24	13.43	1.00	17.18	9.84	169.13	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
193	31.66	20.84	3.28	13.87	1.00	15.77	10.37	163.55	4.000	No	Yes	2.00
194	31.82	22.10	3.26	13.74	1.00	16.75	10.06	168.47	4.000	No	Yes	2.00
195	31.99	24.14	3.24	14.42	1.00	18.36	9.88	181.46	4.000	No	Yes	2.00
196	32.15	29.85	3.17	14.25	1.00	22.99	8.91	204.72	4.000	No	Yes	2.00
197	32.32	44.31	2.98	11.23	1.00	34.78	6.51	226.55	4.000	No	Yes	2.00
198	32.48	71.19	2.71	7.67	0.91	57.38	4.09	234.66	4.000	No	Yes	2.00
199	32.64	102.61	2.49	5.44	0.82	84.12	2.73	229.61	4.000	No	No	2.00
200	32.81	134.17	2.32	4.14	0.76	111.15	2.03	225.61	4.000	No	No	2.00
201	32.97	155.25	2.23	3.53	0.72	129.14	1.74	225.11	4.000	No	No	2.00
202	33.14	165.54	2.19	3.29	0.71	137.69	1.64	225.60	4.000	No	No	2.00
203	33.30	164.47	2.19	3.32	0.71	136.26	1.65	225.16	4.000	No	No	2.00
204	33.47	160.08	2.22	3.48	0.72	131.91	1.71	226.09	4.000	No	No	2.00
205	33.63	158.37	2.23	3.59	0.73	129.90	1.75	227.71	4.000	No	No	2.00
206	33.79	158.33	2.23	3.52	0.72	129.45	1.74	225.18	4.000	No	No	2.00
207	33.96	157.67	2.22	3.45	0.72	128.51	1.73	221.84	4.000	No	No	2.00
208	34.12	154.77	2.23	3.43	0.72	125.65	1.74	218.17	4.000	No	No	2.00
209	34.28	149.09	2.25	3.56	0.73	120.34	1.80	216.99	4.000	No	No	2.00
210	34.45	141.76	2.28	3.67	0.74	113.73	1.88	213.33	4.000	No	No	2.00
211	34.61	135.21	2.31	3.83	0.75	107.77	1.97	212.19	4.000	No	No	2.00
212	34.78	130.35	2.34	4.11	0.77	103.17	2.09	215.55	4.000	No	No	2.00
213	34.94	127.96	2.38	4.46	0.78	100.61	2.22	223.23	4.000	No	No	2.00
214	35.10	125.40	2.41	4.76	0.79	97.96	2.34	228.84	4.000	No	No	2.00
215	35.27	122.46	2.39	4.48	0.79	95.38	2.28	217.67	4.000	No	No	2.00
216	35.43	114.72	2.41	4.48	0.79	88.77	2.36	209.71	4.000	No	No	2.00
217	35.60	100.02	2.48	4.82	0.82	76.45	2.66	203.17	4.000	No	No	2.00
218	35.76	83.12	2.63	6.31	0.88	62.17	3.48	216.61	4.000	No	Yes	2.00
219	35.92	65.25	2.80	8.61	0.94	47.45	4.82	228.62	4.000	No	Yes	2.00
220	36.09	59.18	2.89	10.21	0.98	42.34	5.63	238.19	4.000	No	Yes	2.00
221	36.25	72.64	2.78	8.66	0.93	52.72	4.59	241.93	4.000	No	Yes	2.00
222	36.42	108.39	2.52	5.77	0.84	81.15	2.88	233.83	4.000	No	No	2.00
223	36.58	148.73	2.32	4.13	0.76	113.86	2.01	228.32	4.000	No	No	2.00
224	36.74	179.01	2.19	3.32	0.71	138.69	1.64	227.62	4.000	No	No	2.00
225	36.91	201.87	2.05	2.48	0.66	158.31	1.38	218.01	4.000	No	No	2.00
226	37.07	227.99	1.89	1.70	0.60	181.59	1.18	214.10	4.000	No	No	2.00
227	37.24	262.02	1.68	1.04	0.52	213.00	1.03	218.59	4.000	No	No	2.00
228	37.40	286.87	1.59	0.85	0.50	233.96	1.00	233.96	4.000	No	No	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
0.16	2.00	0.00	0.00	0.16	0.00	0.33	2.00	0.00	0.00	0.16	0.00
0.49	2.00	0.00	0.00	0.16	0.00	0.66	2.00	0.00	0.00	0.16	0.00
0.82	2.00	0.00	0.00	0.16	0.00	0.98	2.00	0.00	0.00	0.16	0.00
1.15	2.00	0.00	0.00	0.16	0.00	1.31	2.00	0.00	0.00	0.16	0.00
1.48	2.00	0.00	0.00	0.16	0.00	1.64	2.00	0.00	0.00	0.16	0.00
1.80	2.00	0.00	0.00	0.16	0.00	1.97	2.00	0.00	0.00	0.17	0.00
2.13	2.00	0.00	0.00	0.16	0.00	2.30	2.00	0.00	0.00	0.16	0.00
2.46	2.00	0.00	0.00	0.16	0.00	2.63	2.00	0.00	0.00	0.16	0.00
2.79	2.00	0.00	0.00	0.16	0.00	2.95	2.00	0.00	0.00	0.16	0.00
3.12	2.00	0.00	0.00	0.16	0.00	3.28	2.00	0.00	0.00	0.16	0.00
3.44	2.00	0.00	0.00	0.16	0.00	3.61	2.00	0.00	0.00	0.16	0.00
3.77	2.00	0.00	0.00	0.16	0.00	3.94	2.00	0.00	0.00	0.16	0.00
4.10	2.00	0.00	0.00	0.16	0.00	4.26	2.00	0.00	0.00	0.16	0.00
4.43	2.00	0.00	0.00	0.16	0.00	4.59	2.00	0.00	0.00	0.16	0.00
4.76	2.00	0.00	0.00	0.16	0.00	4.92	2.00	0.00	0.00	0.16	0.00
5.08	2.00	0.00	0.00	0.16	0.00	5.25	2.00	0.00	0.00	0.16	0.00
5.41	0.78	0.22	1.41	0.16	0.10	5.58	0.90	0.10	5.82	0.16	0.05
5.74	1.34	0.00	0.00	0.16	0.00	5.91	2.00	0.00	0.00	0.17	0.00
6.07	2.00	0.00	0.00	0.16	0.00	6.23	2.00	0.00	0.00	0.16	0.00
6.40	2.00	0.00	0.00	0.16	0.00	6.56	2.00	0.00	0.00	0.16	0.00
6.73	2.00	0.00	0.00	0.16	0.00	6.89	2.00	0.00	0.00	0.16	0.00
7.05	2.00	0.00	0.00	0.16	0.00	7.22	2.00	0.00	0.00	0.16	0.00
7.38	2.00	0.00	0.00	0.16	0.00	7.55	2.00	0.00	0.00	0.16	0.00
7.71	2.00	0.00	0.00	0.16	0.00	7.87	2.00	0.00	0.00	0.16	0.00
8.04	2.00	0.00	0.00	0.16	0.00	8.20	2.00	0.00	0.00	0.16	0.00
8.37	2.00	0.00	0.00	0.16	0.00	8.53	2.00	0.00	0.00	0.16	0.00
8.69	2.00	0.00	0.00	0.16	0.00	8.86	2.00	0.00	0.00	0.16	0.00
9.02	2.00	0.00	0.00	0.16	0.00	9.19	2.00	0.00	0.00	0.16	0.00
9.35	2.00	0.00	0.00	0.16	0.00	9.51	2.00	0.00	0.00	0.16	0.00
9.68	2.00	0.00	0.00	0.16	0.00	9.84	2.00	0.00	0.00	0.16	0.00
10.01	2.00	0.00	0.00	0.16	0.00	10.17	2.00	0.00	0.00	0.16	0.00
10.34	2.00	0.00	0.00	0.16	0.00	10.50	2.00	0.00	0.00	0.16	0.00
10.66	2.00	0.00	0.00	0.16	0.00	10.83	2.00	0.00	0.00	0.16	0.00
10.99	2.00	0.00	0.00	0.16	0.00	11.15	2.00	0.00	0.00	0.16	0.00
11.32	2.00	0.00	0.00	0.16	0.00	11.48	2.00	0.00	0.00	0.16	0.00
11.65	2.00	0.00	0.00	0.16	0.00	11.81	2.00	0.00	0.00	0.16	0.00
11.97	2.00	0.00	0.00	0.16	0.00	12.14	2.00	0.00	0.00	0.16	0.00
12.30	2.00	0.00	0.00	0.16	0.00	12.47	2.00	0.00	0.00	0.16	0.00
12.63	2.00	0.00	0.00	0.16	0.00	12.79	2.00	0.00	0.00	0.16	0.00
12.96	2.00	0.00	0.00	0.16	0.00	13.12	2.00	0.00	0.00	0.16	0.00
13.29	2.00	0.00	0.00	0.16	0.00	13.45	2.00	0.00	0.00	0.16	0.00
13.62	2.00	0.00	0.00	0.16	0.00	13.78	2.00	0.00	0.00	0.16	0.00
13.94	2.00	0.00	0.00	0.16	0.00	14.11	2.00	0.00	0.00	0.16	0.00
14.27	2.00	0.00	0.00	0.16	0.00	14.44	2.00	0.00	0.00	0.16	0.00
14.60	2.00	0.00	0.00	0.16	0.00	14.76	2.00	0.00	0.00	0.16	0.00
14.93	2.00	0.00	0.00	0.16	0.00	15.09	2.00	0.00	0.00	0.16	0.00
15.26	2.00	0.00	0.00	0.16	0.00	15.42	2.00	0.00	0.00	0.16	0.00
15.58	2.00	0.00	0.00	0.16	0.00	15.75	2.00	0.00	0.00	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
15.91	2.00	0.00	0.00	0.16	0.00	16.08	2.00	0.00	0.00	0.16	0.00
16.24	2.00	0.00	0.00	0.16	0.00	16.40	2.00	0.00	0.00	0.16	0.00
16.57	2.00	0.00	0.00	0.16	0.00	16.73	2.00	0.00	0.00	0.16	0.00
16.90	2.00	0.00	0.00	0.16	0.00	17.06	2.00	0.00	0.00	0.16	0.00
17.22	2.00	0.00	0.00	0.16	0.00	17.39	2.00	0.00	0.00	0.16	0.00
17.55	2.00	0.00	0.00	0.16	0.00	17.72	2.00	0.00	0.00	0.16	0.00
17.88	2.00	0.00	0.00	0.16	0.00	18.05	2.00	0.00	0.00	0.16	0.00
18.21	2.00	0.00	0.00	0.16	0.00	18.37	2.00	0.00	0.00	0.16	0.00
18.54	2.00	0.00	0.00	0.16	0.00	18.70	2.00	0.00	0.00	0.16	0.00
18.86	2.00	0.00	0.00	0.16	0.00	19.03	2.00	0.00	0.00	0.16	0.00
19.19	2.00	0.00	0.00	0.16	0.00	19.36	2.00	0.00	0.00	0.16	0.00
19.52	2.00	0.00	0.00	0.16	0.00	19.68	2.00	0.00	0.00	0.16	0.00
19.85	2.00	0.00	0.00	0.16	0.00	20.01	2.00	0.00	0.00	0.16	0.00
20.18	2.00	0.00	0.00	0.16	0.00	20.34	2.00	0.00	0.00	0.16	0.00
20.50	2.00	0.00	0.00	0.16	0.00	20.67	2.00	0.00	0.00	0.16	0.00
20.83	2.00	0.00	0.00	0.16	0.00	21.00	2.00	0.00	0.00	0.16	0.00
21.16	1.01	0.00	0.00	0.16	0.00	21.32	0.94	0.06	23.12	0.16	0.02
21.49	0.95	0.05	34.24	0.16	0.02	21.65	0.98	0.02	41968.05	0.16	0.01
21.82	2.00	0.00	0.00	0.16	0.00	21.98	2.00	0.00	0.00	0.16	0.00
22.15	2.00	0.00	0.00	0.16	0.00	22.31	2.00	0.00	0.00	0.16	0.00
22.47	1.00	0.00	520228299	0.16	0.00	22.64	2.00	0.00	0.00	0.16	0.00
22.80	2.00	0.00	0.00	0.16	0.00	22.97	2.00	0.00	0.00	0.16	0.00
23.13	2.00	0.00	0.00	0.16	0.00	23.29	2.00	0.00	0.00	0.16	0.00
23.46	2.00	0.00	0.00	0.16	0.00	23.62	2.00	0.00	0.00	0.16	0.00
23.79	2.00	0.00	0.00	0.16	0.00	23.95	2.00	0.00	0.00	0.16	0.00
24.11	2.00	0.00	0.00	0.16	0.00	24.28	2.00	0.00	0.00	0.16	0.00
24.44	2.00	0.00	0.00	0.16	0.00	24.61	2.00	0.00	0.00	0.16	0.00
24.77	2.00	0.00	0.00	0.16	0.00	24.93	2.00	0.00	0.00	0.16	0.00
25.10	2.00	0.00	0.00	0.16	0.00	25.26	2.00	0.00	0.00	0.16	0.00
25.43	2.00	0.00	0.00	0.16	0.00	25.59	2.00	0.00	0.00	0.16	0.00
25.75	2.00	0.00	0.00	0.16	0.00	25.92	2.00	0.00	0.00	0.16	0.00
26.08	2.00	0.00	0.00	0.16	0.00	26.25	2.00	0.00	0.00	0.16	0.00
26.41	2.00	0.00	0.00	0.16	0.00	26.57	2.00	0.00	0.00	0.16	0.00
26.74	2.00	0.00	0.00	0.16	0.00	26.90	2.00	0.00	0.00	0.16	0.00
27.07	2.00	0.00	0.00	0.16	0.00	27.23	2.00	0.00	0.00	0.16	0.00
27.39	2.00	0.00	0.00	0.16	0.00	27.56	2.00	0.00	0.00	0.16	0.00
27.72	2.00	0.00	0.00	0.16	0.00	27.89	2.00	0.00	0.00	0.16	0.00
28.05	2.00	0.00	0.00	0.16	0.00	28.21	2.00	0.00	0.00	0.16	0.00
28.38	2.00	0.00	0.00	0.16	0.00	28.54	2.00	0.00	0.00	0.16	0.00
28.71	2.00	0.00	0.00	0.16	0.00	28.87	2.00	0.00	0.00	0.16	0.00
29.04	0.94	0.06	28.30	0.16	0.02	29.20	2.00	0.00	0.00	0.16	0.00
29.36	2.00	0.00	0.00	0.16	0.00	29.53	2.00	0.00	0.00	0.16	0.00
29.69	2.00	0.00	0.00	0.16	0.00	29.86	2.00	0.00	0.00	0.16	0.00
30.02	0.76	0.24	1.29	0.16	0.06	30.18	0.65	0.35	0.76	0.16	0.09
30.35	0.71	0.29	0.96	0.16	0.08	30.51	0.78	0.22	1.40	0.16	0.06
30.68	0.95	0.05	47.38	0.16	0.01	30.84	2.00	0.00	0.00	0.16	0.00
31.00	2.00	0.00	0.00	0.16	0.00	31.17	2.00	0.00	0.00	0.16	0.00
31.33	2.00	0.00	0.00	0.16	0.00	31.50	2.00	0.00	0.00	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
31.66	2.00	0.00	0.00	0.16	0.00	31.82	2.00	0.00	0.00	0.16	0.00
31.99	2.00	0.00	0.00	0.16	0.00	32.15	2.00	0.00	0.00	0.16	0.00
32.32	2.00	0.00	0.00	0.16	0.00	32.48	2.00	0.00	0.00	0.16	0.00
32.64	2.00	0.00	0.00	0.16	0.00	32.81	2.00	0.00	0.00	0.16	0.00
32.97	2.00	0.00	0.00	0.16	0.00	33.14	2.00	0.00	0.00	0.16	0.00
33.30	2.00	0.00	0.00	0.16	0.00	33.47	2.00	0.00	0.00	0.16	0.00
33.63	2.00	0.00	0.00	0.16	0.00	33.79	2.00	0.00	0.00	0.16	0.00
33.96	2.00	0.00	0.00	0.16	0.00	34.12	2.00	0.00	0.00	0.16	0.00
34.28	2.00	0.00	0.00	0.16	0.00	34.45	2.00	0.00	0.00	0.16	0.00
34.61	2.00	0.00	0.00	0.16	0.00	34.78	2.00	0.00	0.00	0.16	0.00
34.94	2.00	0.00	0.00	0.16	0.00	35.10	2.00	0.00	0.00	0.16	0.00
35.27	2.00	0.00	0.00	0.16	0.00	35.43	2.00	0.00	0.00	0.16	0.00
35.60	2.00	0.00	0.00	0.16	0.00	35.76	2.00	0.00	0.00	0.16	0.00
35.92	2.00	0.00	0.00	0.16	0.00	36.09	2.00	0.00	0.00	0.16	0.00
36.25	2.00	0.00	0.00	0.16	0.00	36.42	2.00	0.00	0.00	0.16	0.00
36.58	2.00	0.00	0.00	0.16	0.00	36.74	2.00	0.00	0.00	0.16	0.00
36.91	2.00	0.00	0.00	0.16	0.00	37.07	2.00	0.00	0.00	0.16	0.00
37.24	2.00	0.00	0.00	0.16	0.00	37.40	2.00	0.00	0.00	0.16	0.00

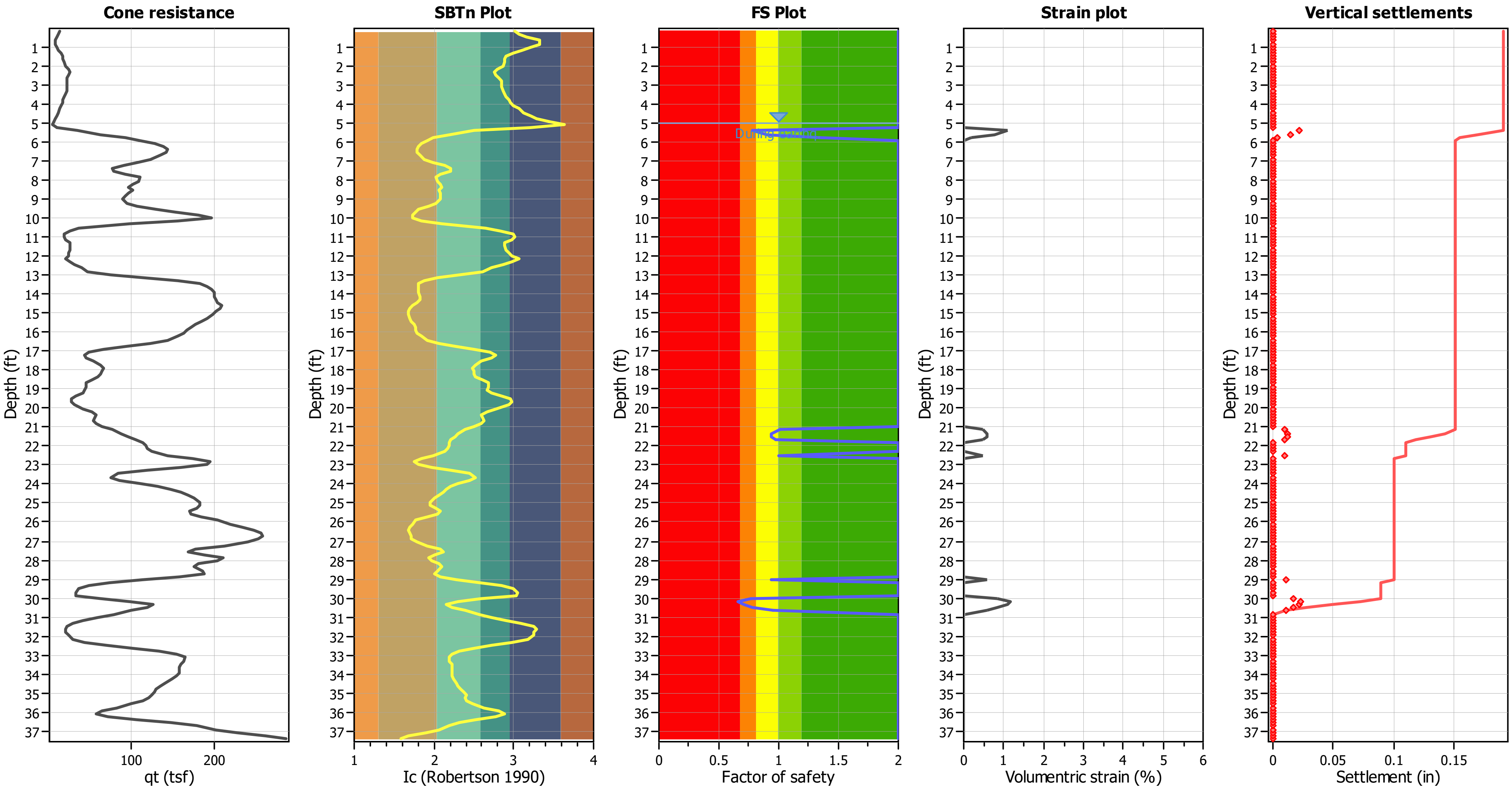
Overall liquefaction potential: 0.52

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)
5.08	141.38	2.00	0.00	1.00	0.00	5.25	159.34	2.00	0.00	1.00	0.00
5.41	153.89	0.78	1.08	1.00	0.02	5.58	164.12	0.90	0.75	1.00	0.01
5.74	192.43	1.34	0.18	1.00	0.00	5.91	214.59	2.00	0.00	1.00	0.00
6.07	235.38	2.00	0.00	1.00	0.00	6.23	247.77	2.00	0.00	1.00	0.00
6.40	252.76	2.00	0.00	1.00	0.00	6.56	250.63	2.00	0.00	1.00	0.00
6.73	242.52	2.00	0.00	1.00	0.00	6.89	231.88	2.00	0.00	1.00	0.00
7.05	222.78	2.00	0.00	1.00	0.00	7.22	219.66	2.00	0.00	1.00	0.00
7.38	208.29	2.00	0.00	1.00	0.00	7.55	209.48	2.00	0.00	1.00	0.00
7.71	215.87	2.00	0.00	1.00	0.00	7.87	238.98	2.00	0.00	1.00	0.00
8.04	236.88	2.00	0.00	1.00	0.00	8.20	232.16	2.00	0.00	1.00	0.00
8.37	226.35	2.00	0.00	1.00	0.00	8.53	227.65	2.00	0.00	1.00	0.00
8.69	220.51	2.00	0.00	1.00	0.00	8.86	211.65	2.00	0.00	1.00	0.00
9.02	206.38	2.00	0.00	1.00	0.00	9.19	202.81	2.00	0.00	1.00	0.00
9.35	210.48	2.00	0.00	1.00	0.00	9.51	219.99	2.00	0.00	1.00	0.00
9.68	251.67	2.00	0.00	1.00	0.00	9.84	282.09	2.00	0.00	1.00	0.00
10.01	306.69	2.00	0.00	1.00	0.00	10.17	268.81	2.00	0.00	1.00	0.00
10.34	227.52	2.00	0.00	1.00	0.00	10.50	215.74	2.00	0.00	1.00	0.00
10.66	212.34	2.00	0.00	1.00	0.00	10.83	206.40	2.00	0.00	1.00	0.00
10.99	207.99	2.00	0.00	1.00	0.00	11.15	217.51	2.00	0.00	1.00	0.00
11.32	225.13	2.00	0.00	1.00	0.00	11.48	234.78	2.00	0.00	1.00	0.00
11.65	237.13	2.00	0.00	1.00	0.00	11.81	239.04	2.00	0.00	1.00	0.00
11.97	242.66	2.00	0.00	1.00	0.00	12.14	251.69	2.00	0.00	1.00	0.00
12.30	262.47	2.00	0.00	1.00	0.00	12.47	271.49	2.00	0.00	1.00	0.00
12.63	274.55	2.00	0.00	1.00	0.00	12.79	259.18	2.00	0.00	1.00	0.00
12.96	229.29	2.00	0.00	1.00	0.00	13.12	220.62	2.00	0.00	1.00	0.00
13.29	247.88	2.00	0.00	1.00	0.00	13.45	271.32	2.00	0.00	1.00	0.00
13.62	281.88	2.00	0.00	1.00	0.00	13.78	289.36	2.00	0.00	1.00	0.00
13.94	293.09	2.00	0.00	1.00	0.00	14.11	296.85	2.00	0.00	1.00	0.00
14.27	297.08	2.00	0.00	1.00	0.00	14.44	290.26	2.00	0.00	1.00	0.00
14.60	280.24	2.00	0.00	1.00	0.00	14.76	266.69	2.00	0.00	1.00	0.00
14.93	256.48	2.00	0.00	1.00	0.00	15.09	250.80	2.00	0.00	1.00	0.00
15.26	244.95	2.00	0.00	1.00	0.00	15.42	238.99	2.00	0.00	1.00	0.00
15.58	232.04	2.00	0.00	1.00	0.00	15.75	227.27	2.00	0.00	1.00	0.00
15.91	223.58	2.00	0.00	1.00	0.00	16.08	219.90	2.00	0.00	1.00	0.00
16.24	217.41	2.00	0.00	1.00	0.00	16.40	214.29	2.00	0.00	1.00	0.00
16.57	215.58	2.00	0.00	1.00	0.00	16.73	225.15	2.00	0.00	1.00	0.00
16.90	251.28	2.00	0.00	1.00	0.00	17.06	270.20	2.00	0.00	1.00	0.00
17.22	268.95	2.00	0.00	1.00	0.00	17.39	253.21	2.00	0.00	1.00	0.00
17.55	235.14	2.00	0.00	1.00	0.00	17.72	229.67	2.00	0.00	1.00	0.00
17.88	232.02	2.00	0.00	1.00	0.00	18.05	228.94	2.00	0.00	1.00	0.00
18.21	221.26	2.00	0.00	1.00	0.00	18.37	216.68	2.00	0.00	1.00	0.00
18.54	223.27	2.00	0.00	1.00	0.00	18.70	225.59	2.00	0.00	1.00	0.00
18.86	218.50	2.00	0.00	1.00	0.00	19.03	211.99	2.00	0.00	1.00	0.00
19.19	214.92	2.00	0.00	1.00	0.00	19.36	221.16	2.00	0.00	1.00	0.00
19.52	225.28	2.00	0.00	1.00	0.00	19.68	227.36	2.00	0.00	1.00	0.00
19.85	234.72	2.00	0.00	1.00	0.00	20.01	234.55	2.00	0.00	1.00	0.00
20.18	231.21	2.00	0.00	1.00	0.00	20.34	225.31	2.00	0.00	1.00	0.00
20.50	223.00	2.00	0.00	1.00	0.00	20.67	221.13	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
20.83	214.92	2.00	0.00	1.00	0.00
21.16	198.47	1.01	0.47	1.00	0.01
21.49	194.01	0.95	0.59	1.00	0.01
21.82	202.78	2.00	0.00	1.00	0.00
22.15	205.77	2.00	0.00	1.00	0.00
22.47	198.39	1.00	0.47	1.00	0.01
22.80	216.36	2.00	0.00	1.00	0.00
23.13	211.11	2.00	0.00	1.00	0.00
23.46	222.00	2.00	0.00	1.00	0.00
23.79	222.24	2.00	0.00	1.00	0.00
24.11	228.12	2.00	0.00	1.00	0.00
24.44	240.05	2.00	0.00	1.00	0.00
24.77	228.34	2.00	0.00	1.00	0.00
25.10	228.12	2.00	0.00	1.00	0.00
25.43	239.97	2.00	0.00	1.00	0.00
25.75	217.98	2.00	0.00	1.00	0.00
26.08	224.91	2.00	0.00	1.00	0.00
26.41	244.74	2.00	0.00	1.00	0.00
26.74	257.52	2.00	0.00	1.00	0.00
27.07	250.84	2.00	0.00	1.00	0.00
27.39	234.66	2.00	0.00	1.00	0.00
27.72	233.21	2.00	0.00	1.00	0.00
28.05	236.91	2.00	0.00	1.00	0.00
28.38	234.40	2.00	0.00	1.00	0.00
28.71	225.47	2.00	0.00	1.00	0.00
29.04	195.33	0.94	0.58	1.00	0.01
29.36	217.82	2.00	0.00	1.00	0.00
29.69	201.87	2.00	0.00	1.00	0.00
30.02	180.90	0.76	0.86	1.00	0.02
30.35	175.89	0.71	1.10	1.00	0.02
30.68	196.59	0.95	0.58	1.00	0.01
31.00	209.70	2.00	0.00	1.00	0.00
31.33	181.22	2.00	0.00	1.00	0.00
31.66	163.55	2.00	0.00	1.00	0.00
31.99	181.46	2.00	0.00	1.00	0.00
32.32	226.55	2.00	0.00	1.00	0.00
32.64	229.61	2.00	0.00	1.00	0.00
32.97	225.11	2.00	0.00	1.00	0.00
33.30	225.16	2.00	0.00	1.00	0.00
33.63	227.71	2.00	0.00	1.00	0.00
33.96	221.84	2.00	0.00	1.00	0.00
34.28	216.99	2.00	0.00	1.00	0.00
34.61	212.19	2.00	0.00	1.00	0.00
34.94	223.23	2.00	0.00	1.00	0.00
35.27	217.67	2.00	0.00	1.00	0.00
35.60	203.17	2.00	0.00	1.00	0.00
35.92	228.62	2.00	0.00	1.00	0.00
36.25	241.93	2.00	0.00	1.00	0.00

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
21.00	205.22	2.00	0.00	1.00	0.00
21.32	193.45	0.94	0.59	1.00	0.01
21.65	196.82	0.98	0.47	1.00	0.01
21.98	206.05	2.00	0.00	1.00	0.00
22.31	202.89	2.00	0.00	1.00	0.00
22.64	206.12	2.00	0.00	1.00	0.00
22.97	221.47	2.00	0.00	1.00	0.00
23.29	208.30	2.00	0.00	1.00	0.00
23.62	228.90	2.00	0.00	1.00	0.00
23.95	218.59	2.00	0.00	1.00	0.00
24.28	237.56	2.00	0.00	1.00	0.00
24.61	235.29	2.00	0.00	1.00	0.00
24.93	225.23	2.00	0.00	1.00	0.00
25.26	235.33	2.00	0.00	1.00	0.00
25.59	227.64	2.00	0.00	1.00	0.00
25.92	216.23	2.00	0.00	1.00	0.00
26.25	233.48	2.00	0.00	1.00	0.00
26.57	254.04	2.00	0.00	1.00	0.00
26.90	254.41	2.00	0.00	1.00	0.00
27.23	242.93	2.00	0.00	1.00	0.00
27.56	232.17	2.00	0.00	1.00	0.00
27.89	240.25	2.00	0.00	1.00	0.00
28.21	230.48	2.00	0.00	1.00	0.00
28.54	234.59	2.00	0.00	1.00	0.00
28.87	203.64	2.00	0.00	1.00	0.00
29.20	209.62	2.00	0.00	1.00	0.00
29.53	211.64	2.00	0.00	1.00	0.00
29.86	196.14	2.00	0.00	1.00	0.00
30.18	170.32	0.65	1.15	1.00	0.02
30.51	182.20	0.78	0.85	1.00	0.02
30.84	209.88	2.00	0.00	1.00	0.00
31.17	198.05	2.00	0.00	1.00	0.00
31.50	169.13	2.00	0.00	1.00	0.00
31.82	168.47	2.00	0.00	1.00	0.00
32.15	204.72	2.00	0.00	1.00	0.00
32.48	234.66	2.00	0.00	1.00	0.00
32.81	225.61	2.00	0.00	1.00	0.00
33.14	225.60	2.00	0.00	1.00	0.00
33.47	226.09	2.00	0.00	1.00	0.00
33.79	225.18	2.00	0.00	1.00	0.00
34.12	218.17	2.00	0.00	1.00	0.00
34.45	213.33	2.00	0.00	1.00	0.00
34.78	215.55	2.00	0.00	1.00	0.00
35.10	228.84	2.00	0.00	1.00	0.00
35.43	209.71	2.00	0.00	1.00	0.00
35.76	216.61	2.00	0.00	1.00	0.00
36.09	238.19	2.00	0.00	1.00	0.00
36.42	233.83	2.00	0.00	1.00	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)
36.58	228.32	2.00	0.00	1.00	0.00	36.74	227.62	2.00	0.00	1.00	0.00
36.91	218.01	2.00	0.00	1.00	0.00	37.07	214.10	2.00	0.00	1.00	0.00
37.24	218.59	2.00	0.00	1.00	0.00	37.40	233.96	2.00	0.00	1.00	0.00

Total estimated settlement: 0.19

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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.16	14.90	23.93	6.93	165.92	3.02	N/A	N/A
0.33	13.35	21.41	7.56	161.92	3.07	N/A	N/A
0.49	11.11	17.80	8.80	156.67	3.17	N/A	N/A
0.66	8.39	13.42	11.15	149.61	3.33	N/A	N/A
0.82	8.62	13.77	10.95	150.76	3.32	N/A	N/A
0.98	10.33	16.51	9.42	155.52	3.21	N/A	N/A
1.15	12.75	20.38	7.86	160.15	3.09	N/A	N/A
1.31	15.49	24.76	6.58	162.87	2.98	N/A	N/A
1.48	17.97	28.72	5.69	163.32	2.90	N/A	N/A
1.64	18.59	29.72	5.54	164.51	2.88	N/A	N/A
1.80	18.93	30.25	5.58	168.92	2.89	N/A	N/A
1.97	21.07	33.66	5.30	178.29	2.86	N/A	N/A
2.13	24.62	39.35	4.72	185.64	2.79	N/A	N/A
2.30	26.72	42.71	4.39	187.58	2.75	N/A	N/A
2.46	25.25	40.33	4.59	185.30	2.78	N/A	N/A
2.63	23.25	37.11	4.94	183.22	2.82	N/A	N/A
2.79	22.35	35.65	5.19	184.84	2.85	N/A	N/A
2.95	22.79	36.32	5.17	187.65	2.84	N/A	N/A
3.12	22.93	36.54	5.22	190.88	2.85	N/A	N/A
3.28	22.48	35.81	5.33	190.88	2.86	N/A	N/A
3.44	21.33	33.94	5.55	188.37	2.88	N/A	N/A
3.61	19.91	31.63	5.79	183.01	2.91	N/A	N/A
3.77	18.52	29.40	6.04	177.52	2.93	N/A	N/A
3.94	17.41	27.59	6.27	173.04	2.96	N/A	N/A
4.10	16.21	25.65	6.68	171.24	2.99	N/A	N/A
4.26	14.67	23.16	7.43	172.19	3.06	N/A	N/A
4.43	13.16	20.72	8.30	171.88	3.13	N/A	N/A
4.59	11.57	18.14	9.34	169.51	3.21	N/A	N/A
4.76	9.82	15.32	10.64	163.02	3.30	N/A	N/A
4.92	7.56	11.67	13.20	154.02	3.45	N/A	N/A
5.08	5.61	8.52	16.58	141.38	3.63	1.26	1.26
5.25	10.93	17.06	9.34	159.34	3.21	2.48	2.48
5.41	35.33	56.24	2.74	153.89	2.49	0.75	0.75
5.58	63.33	101.22	1.62	164.12	2.18	0.83	0.83
5.74	94.21	150.81	1.28	192.43	1.98	0.89	0.89
5.91	111.80	179.06	1.20	214.59	1.91	0.91	0.91
6.07	129.23	207.04	1.14	235.38	1.84	0.94	0.94
6.23	139.45	223.44	1.11	247.77	1.80	0.95	0.95
6.40	143.84	230.48	1.10	252.76	1.79	0.95	0.95
6.56	142.65	228.55	1.10	250.63	1.79	0.95	0.95
6.73	135.37	216.84	1.12	242.52	1.82	0.94	0.94
6.89	123.58	197.88	1.17	231.88	1.88	0.93	0.93
7.05	108.28	173.28	1.29	222.78	1.99	0.91	0.91
7.22	91.10	145.66	1.51	219.66	2.13	0.88	0.88
7.38	77.76	124.21	1.68	208.29	2.20	0.86	0.86
7.55	78.68	125.68	1.67	209.48	2.20	0.86	0.86
7.71	94.37	150.86	1.43	215.87	2.09	0.89	0.89
7.87	111.14	177.79	1.34	238.98	2.03	0.91	0.91

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.04	108.68	173.82	1.36	236.88	2.04	0.91	0.91
8.20	103.00	164.68	1.41	232.16	2.07	0.90	0.90
8.37	97.82	156.34	1.45	226.35	2.10	0.89	0.89
8.53	101.82	162.74	1.40	227.65	2.07	0.90	0.90
8.69	97.72	156.14	1.41	220.51	2.08	0.89	0.89
8.86	93.35	149.11	1.42	211.65	2.08	0.88	0.88
9.02	90.33	144.23	1.43	206.38	2.09	0.88	0.88
9.19	95.27	152.16	1.33	202.81	2.02	0.89	0.89
9.35	107.86	172.37	1.22	210.48	1.93	0.91	0.91
9.51	130.30	199.21	1.10	219.99	1.80	0.93	0.93
9.68	154.14	232.08	1.08	251.67	1.77	0.95	0.95
9.84	181.55	267.76	1.05	282.09	1.72	0.98	0.98
10.01	197.93	290.42	1.06	306.69	1.73	0.99	0.99
10.17	155.93	235.59	1.14	268.81	1.84	0.96	0.96
10.34	98.28	156.88	1.45	227.52	2.10	0.89	0.89
10.50	37.27	58.83	3.67	215.74	2.65	5.48	5.48
10.66	26.55	41.60	5.10	212.34	2.84	3.83	3.83
10.83	20.10	31.21	6.61	206.40	2.99	2.85	2.85
10.99	19.22	29.79	6.98	207.99	3.02	2.69	2.69
11.15	21.82	33.95	6.41	217.51	2.97	3.03	3.03
11.32	25.92	40.53	5.56	225.13	2.89	3.58	3.58
11.48	27.23	42.61	5.51	234.78	2.88	3.73	3.73
11.65	26.58	41.55	5.71	237.13	2.90	3.60	3.60
11.81	25.14	39.22	6.09	239.04	2.94	3.36	3.36
11.97	24.08	37.51	6.47	242.66	2.98	3.19	3.19
12.14	21.83	33.87	7.43	251.69	3.06	2.85	2.85
12.30	26.06	40.65	6.46	262.47	2.97	3.38	3.38
12.47	32.54	51.04	5.32	271.49	2.86	4.21	4.21
12.63	41.57	65.54	4.19	274.55	2.73	5.35	5.35
12.79	48.30	76.33	3.40	259.18	2.61	6.17	6.17
12.96	75.38	114.81	2.00	229.29	2.31	0.85	0.85
13.12	115.10	163.25	1.35	220.62	2.04	0.90	0.90
13.29	156.92	213.03	1.16	247.88	1.87	0.94	0.94
13.45	182.38	242.97	1.12	271.32	1.81	0.96	0.96
13.62	191.51	253.41	1.11	281.88	1.81	0.97	0.97
13.78	198.04	260.49	1.11	289.36	1.81	0.97	0.97
13.94	201.09	263.25	1.11	293.09	1.81	0.97	0.97
14.11	201.23	263.11	1.13	296.85	1.83	0.97	0.97
14.27	202.71	263.50	1.13	297.08	1.83	0.97	0.97
14.44	204.94	263.13	1.10	290.26	1.80	0.97	0.97
14.60	210.34	265.01	1.06	280.24	1.73	0.97	0.97
14.76	207.88	258.58	1.03	266.69	1.69	0.97	0.97
14.93	202.91	250.61	1.02	256.48	1.68	0.97	0.97
15.09	198.57	244.32	1.03	250.80	1.68	0.96	0.96
15.26	192.32	236.23	1.04	244.95	1.70	0.96	0.96
15.42	185.10	227.24	1.05	238.99	1.72	0.95	0.95
15.58	177.12	217.36	1.07	232.04	1.74	0.94	0.94
15.75	171.89	210.60	1.08	227.27	1.76	0.94	0.94

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
15.91	167.94	205.32	1.09	223.58	1.78	0.93	0.93
16.08	163.58	199.66	1.10	219.90	1.79	0.93	0.93
16.24	156.99	192.06	1.13	217.41	1.83	0.92	0.92
16.40	144.75	178.54	1.20	214.29	1.91	0.91	0.91
16.57	124.22	156.05	1.38	215.58	2.06	0.89	0.89
16.73	95.16	122.72	1.83	225.15	2.26	0.86	0.86
16.90	67.60	89.75	2.80	251.28	2.51	0.81	0.81
17.06	49.81	67.39	4.01	270.20	2.70	5.01	5.01
17.22	44.06	59.60	4.51	268.95	2.77	4.38	4.38
17.39	45.63	60.89	4.16	253.21	2.72	4.51	4.51
17.55	55.04	71.80	3.27	235.14	2.59	0.78	0.78
17.72	63.22	81.16	2.83	229.67	2.51	0.80	0.80
17.88	67.51	85.89	2.70	232.02	2.49	0.81	0.81
18.05	65.49	82.87	2.76	228.94	2.50	0.80	0.80
18.21	64.28	80.76	2.74	221.26	2.49	0.80	0.80
18.37	60.35	75.51	2.87	216.68	2.52	0.79	0.79
18.54	52.86	66.30	3.37	223.27	2.61	4.96	4.96
18.70	45.97	57.72	3.91	225.59	2.69	4.27	4.27
18.86	45.25	56.37	3.88	218.50	2.68	4.17	4.17
19.03	45.14	55.79	3.80	211.99	2.67	4.13	4.13
19.19	41.91	51.66	4.16	214.92	2.72	3.80	3.80
19.36	34.08	42.11	5.25	221.16	2.85	3.04	3.04
19.52	29.09	35.89	6.28	225.28	2.96	2.56	2.56
19.68	28.59	35.00	6.50	227.36	2.98	2.50	2.50
19.85	31.87	38.83	6.05	234.72	2.93	2.78	2.78
20.01	43.13	51.79	4.53	234.55	2.77	3.77	3.77
20.18	52.26	61.95	3.73	231.21	2.66	4.56	4.56
20.34	58.35	68.42	3.29	225.31	2.59	0.78	0.78
20.50	56.68	66.11	3.37	223.00	2.61	4.89	4.89
20.67	54.80	63.58	3.48	221.13	2.62	4.69	4.69
20.83	57.73	66.41	3.24	214.92	2.59	0.77	0.77
21.00	65.74	74.76	2.75	205.22	2.50	0.79	0.79
21.16	77.29	86.85	2.29	198.47	2.39	0.81	0.81
21.32	88.17	98.01	1.97	193.45	2.31	0.82	0.82
21.49	97.29	107.25	1.81	194.01	2.25	0.84	0.84
21.65	106.38	116.40	1.69	196.82	2.21	0.85	0.85
21.82	114.39	124.41	1.63	202.78	2.18	0.86	0.86
21.98	117.52	127.21	1.62	206.05	2.18	0.86	0.86
22.15	119.28	128.45	1.60	205.77	2.17	0.86	0.86
22.31	125.93	134.62	1.51	202.89	2.13	0.87	0.87
22.47	145.31	153.40	1.29	198.39	1.99	0.89	0.89
22.64	174.01	181.28	1.14	206.12	1.84	0.91	0.91
22.80	195.14	201.55	1.07	216.36	1.75	0.93	0.93
22.97	192.26	198.61	1.12	221.47	1.81	0.93	0.93
23.13	160.88	167.01	1.26	211.11	1.97	0.90	0.90
23.29	119.17	124.55	1.67	208.30	2.20	0.86	0.86
23.46	84.87	89.07	2.49	222.00	2.44	0.81	0.81
23.62	75.58	79.10	2.89	228.90	2.52	0.79	0.79

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
23.79	86.60	89.98	2.47	222.24	2.44	0.81	0.81
23.95	110.40	113.71	1.92	218.59	2.29	0.85	0.85
24.11	131.46	134.53	1.70	228.12	2.21	0.87	0.87
24.28	148.10	150.72	1.58	237.56	2.16	0.89	0.89
24.44	159.82	161.73	1.48	240.05	2.12	0.90	0.90
24.61	168.69	169.67	1.39	235.29	2.06	0.90	0.90
24.77	176.08	176.03	1.30	228.34	2.00	0.91	0.91
24.93	182.52	181.50	1.24	225.23	1.95	0.91	0.91
25.10	183.94	182.30	1.25	228.12	1.96	0.92	0.92
25.26	178.95	176.98	1.33	235.33	2.02	0.91	0.91
25.43	170.57	168.26	1.43	239.97	2.08	0.90	0.90
25.59	172.08	168.85	1.35	227.64	2.03	0.90	0.90
25.75	185.24	180.66	1.21	217.98	1.92	0.91	0.91
25.92	204.74	198.50	1.09	216.23	1.78	0.93	0.93
26.08	219.61	212.18	1.06	224.91	1.73	0.94	0.94
26.25	234.06	225.41	1.04	233.48	1.70	0.95	0.95
26.41	248.04	238.21	1.03	244.74	1.68	0.96	0.96
26.57	256.71	245.89	1.03	254.04	1.69	0.96	0.96
26.74	258.30	246.75	1.04	257.52	1.71	0.96	0.96
26.90	253.81	241.74	1.05	254.41	1.72	0.96	0.96
27.07	241.87	229.70	1.09	250.84	1.78	0.95	0.95
27.23	213.63	202.21	1.20	242.93	1.91	0.93	0.93
27.39	177.38	167.15	1.40	234.66	2.07	0.90	0.90
27.56	168.31	157.92	1.47	232.17	2.11	0.89	0.89
27.72	189.22	177.07	1.32	233.21	2.01	0.91	0.91
27.89	211.50	197.45	1.22	240.25	1.93	0.93	0.93
28.05	203.49	189.24	1.25	236.91	1.96	0.92	0.92
28.21	180.59	167.07	1.38	230.48	2.06	0.90	0.90
28.38	176.92	162.98	1.44	234.40	2.09	0.90	0.90
28.54	187.14	171.94	1.36	234.59	2.05	0.91	0.91
28.71	187.74	171.97	1.31	225.47	2.01	0.91	0.91
28.87	159.02	144.77	1.41	203.64	2.07	0.88	0.88
29.04	115.09	103.58	1.89	195.33	2.28	0.83	0.83
29.20	73.90	65.27	3.21	209.62	2.58	0.77	0.77
29.36	49.16	42.44	5.13	217.82	2.84	3.02	3.02
29.53	37.07	31.35	6.75	211.64	3.00	2.24	2.24
29.69	33.05	27.62	7.31	201.87	3.05	1.97	1.97
29.86	33.13	27.55	7.12	196.14	3.03	1.97	1.97
30.02	63.98	55.06	3.29	180.90	2.59	0.75	0.75
30.18	99.48	86.93	1.96	170.32	2.30	0.81	0.81
30.35	127.31	111.82	1.57	175.89	2.16	0.84	0.84
30.51	119.71	104.43	1.74	182.20	2.23	0.83	0.83
30.68	99.75	85.91	2.29	196.59	2.39	0.81	0.81
30.84	78.80	66.80	3.14	209.88	2.57	0.77	0.77
31.00	59.92	49.86	4.21	209.70	2.73	3.53	3.53
31.17	42.84	34.75	5.70	198.05	2.90	2.48	2.48
31.33	29.59	23.32	7.77	181.22	3.09	1.67	1.67
31.50	22.43	17.18	9.84	169.13	3.24	1.23	1.23

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
31.66	20.84	15.77	10.37	163.55	3.28	1.13	1.13
31.82	22.10	16.75	10.06	168.47	3.26	1.20	1.20
31.99	24.14	18.36	9.88	181.46	3.24	1.31	1.31
32.15	29.85	22.99	8.91	204.72	3.17	1.64	1.64
32.32	44.31	34.78	6.51	226.55	2.98	2.48	2.48
32.48	71.19	57.38	4.09	234.66	2.71	4.05	4.05
32.64	102.61	84.12	2.73	229.61	2.49	0.80	0.80
32.81	134.17	111.15	2.03	225.61	2.32	0.84	0.84
32.97	155.25	129.14	1.74	225.11	2.23	0.86	0.86
33.14	165.54	137.69	1.64	225.60	2.19	0.87	0.87
33.30	164.47	136.26	1.65	225.16	2.19	0.87	0.87
33.47	160.08	131.91	1.71	226.09	2.22	0.87	0.87
33.63	158.37	129.90	1.75	227.71	2.23	0.86	0.86
33.79	158.33	129.45	1.74	225.18	2.23	0.86	0.86
33.96	157.67	128.51	1.73	221.84	2.22	0.86	0.86
34.12	154.77	125.65	1.74	218.17	2.23	0.86	0.86
34.28	149.09	120.34	1.80	216.99	2.25	0.85	0.85
34.45	141.76	113.73	1.88	213.33	2.28	0.85	0.85
34.61	135.21	107.77	1.97	212.19	2.31	0.84	0.84
34.78	130.35	103.17	2.09	215.55	2.34	0.83	0.83
34.94	127.96	100.61	2.22	223.23	2.38	0.83	0.83
35.10	125.40	97.96	2.34	228.84	2.41	0.82	0.82
35.27	122.46	95.38	2.28	217.67	2.39	0.82	0.82
35.43	114.72	88.77	2.36	209.71	2.41	0.81	0.81
35.60	100.02	76.45	2.66	203.17	2.48	0.79	0.79
35.76	83.12	62.17	3.48	216.61	2.63	4.31	4.31
35.92	65.25	47.45	4.82	228.62	2.80	3.34	3.34
36.09	59.18	42.34	5.63	238.19	2.89	3.01	3.01
36.25	72.64	52.72	4.59	241.93	2.78	3.70	3.70
36.42	108.39	81.15	2.88	233.83	2.52	0.80	0.80
36.58	148.73	113.86	2.01	228.32	2.32	0.85	0.85
36.74	179.01	138.69	1.64	227.62	2.19	0.87	0.87
36.91	201.87	158.31	1.38	218.01	2.05	0.89	0.89
37.07	227.99	181.59	1.18	214.10	1.89	0.91	0.91
37.24	262.02	213.00	1.03	218.59	1.68	0.94	0.94
37.40	286.87	233.96	1.00	233.96	1.59	0.95	0.95

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

Wood Rodgers, Inc.

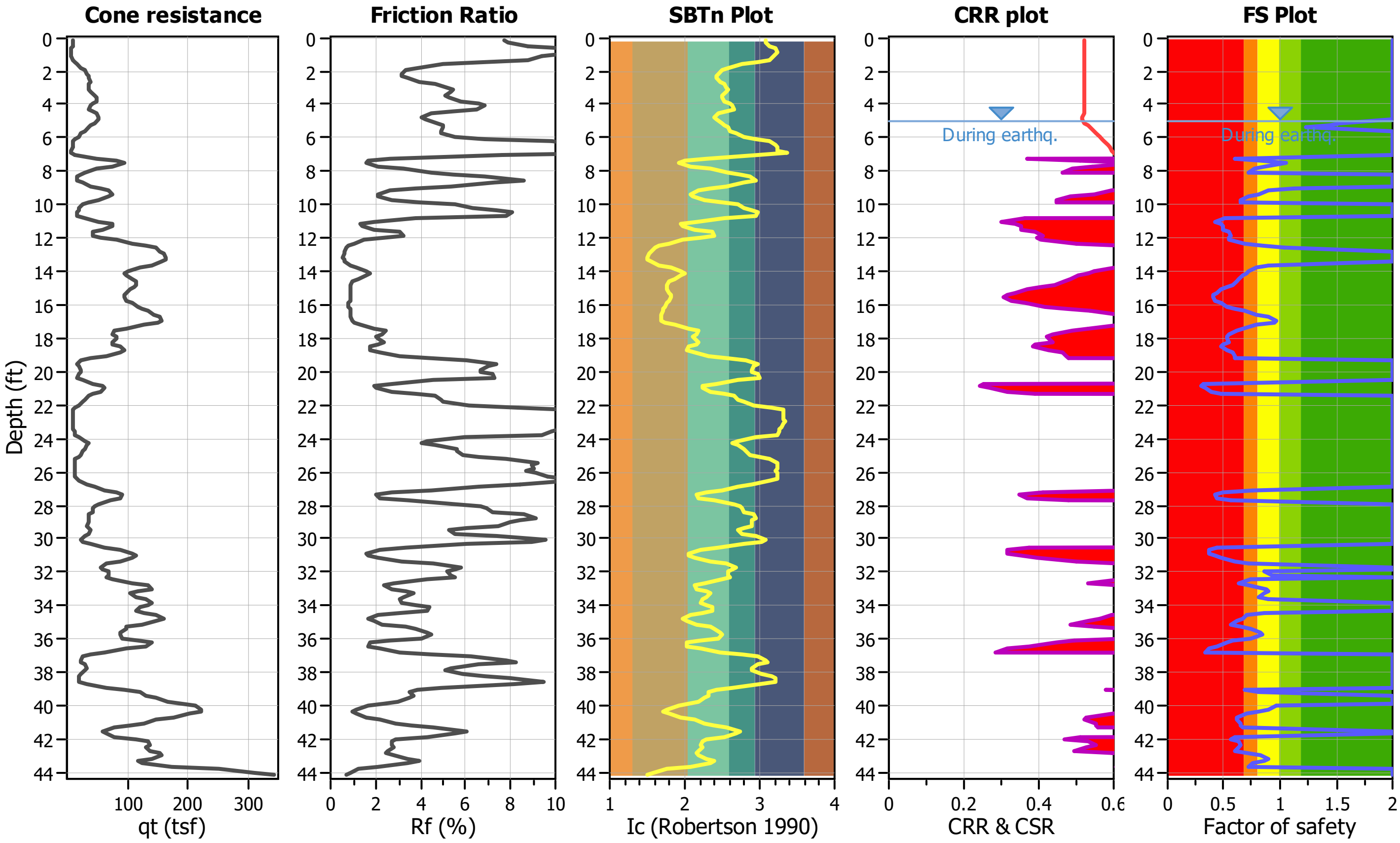
LIQUEFACTION ANALYSIS REPORT

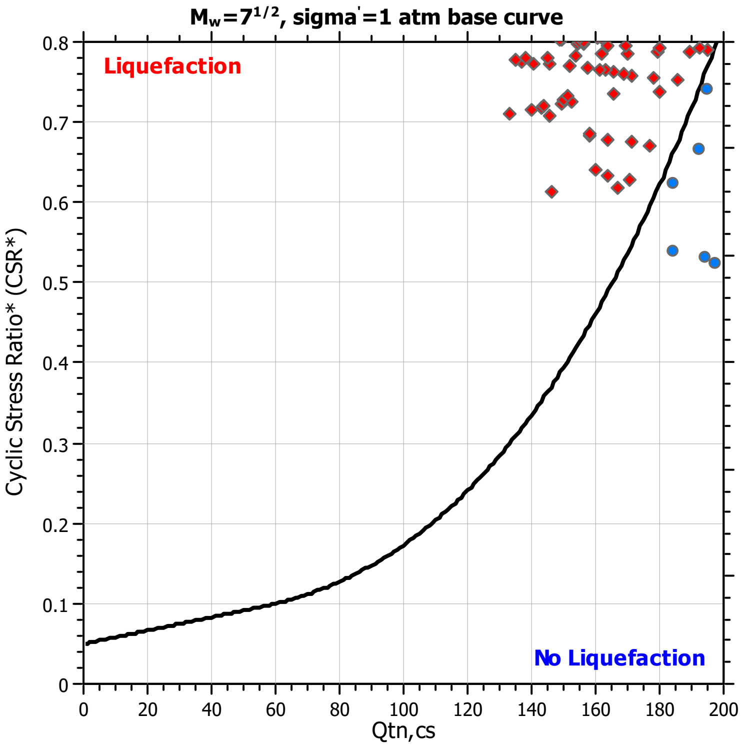
Project title : Lompa Ranch East **Location : Carson City, NV**

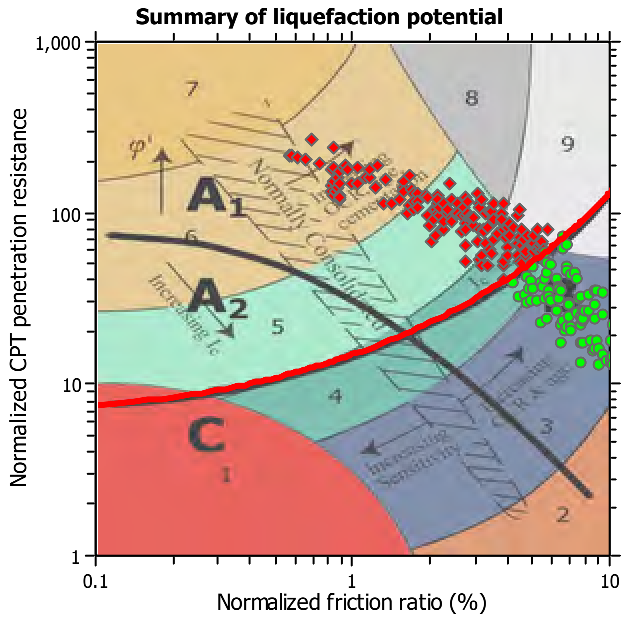
CPT file : CPT 4

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	5.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	5.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.00	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.96	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

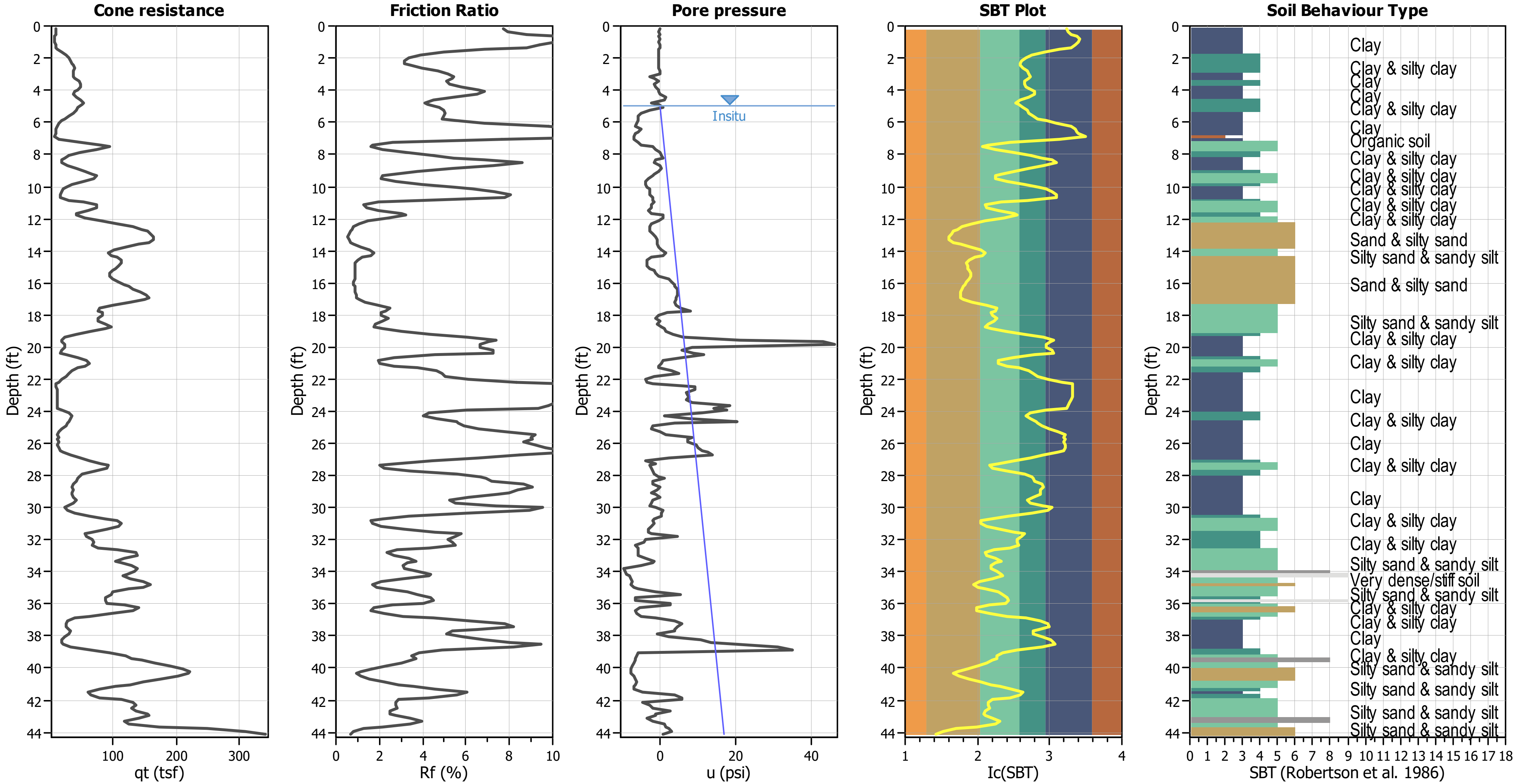






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



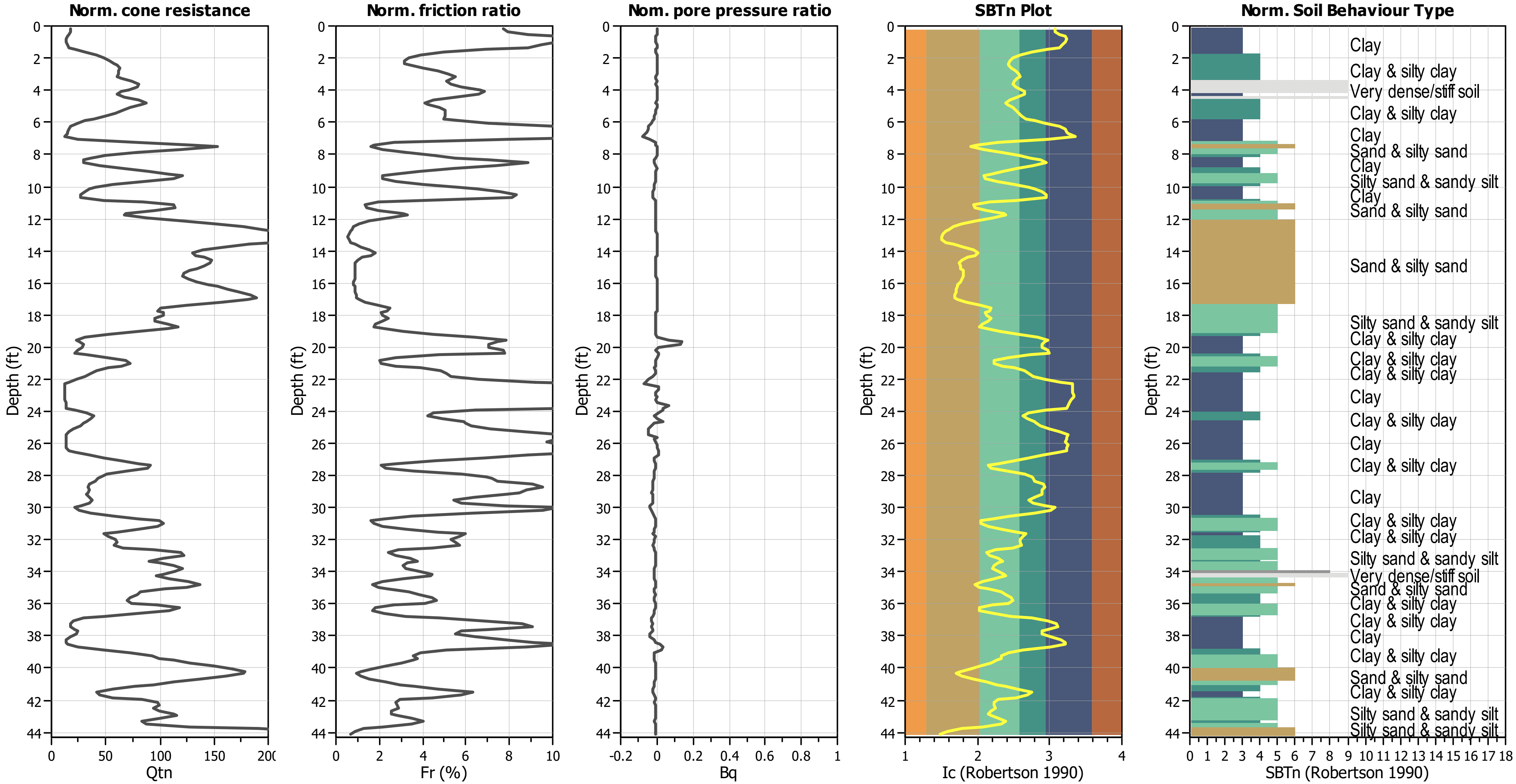
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

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)



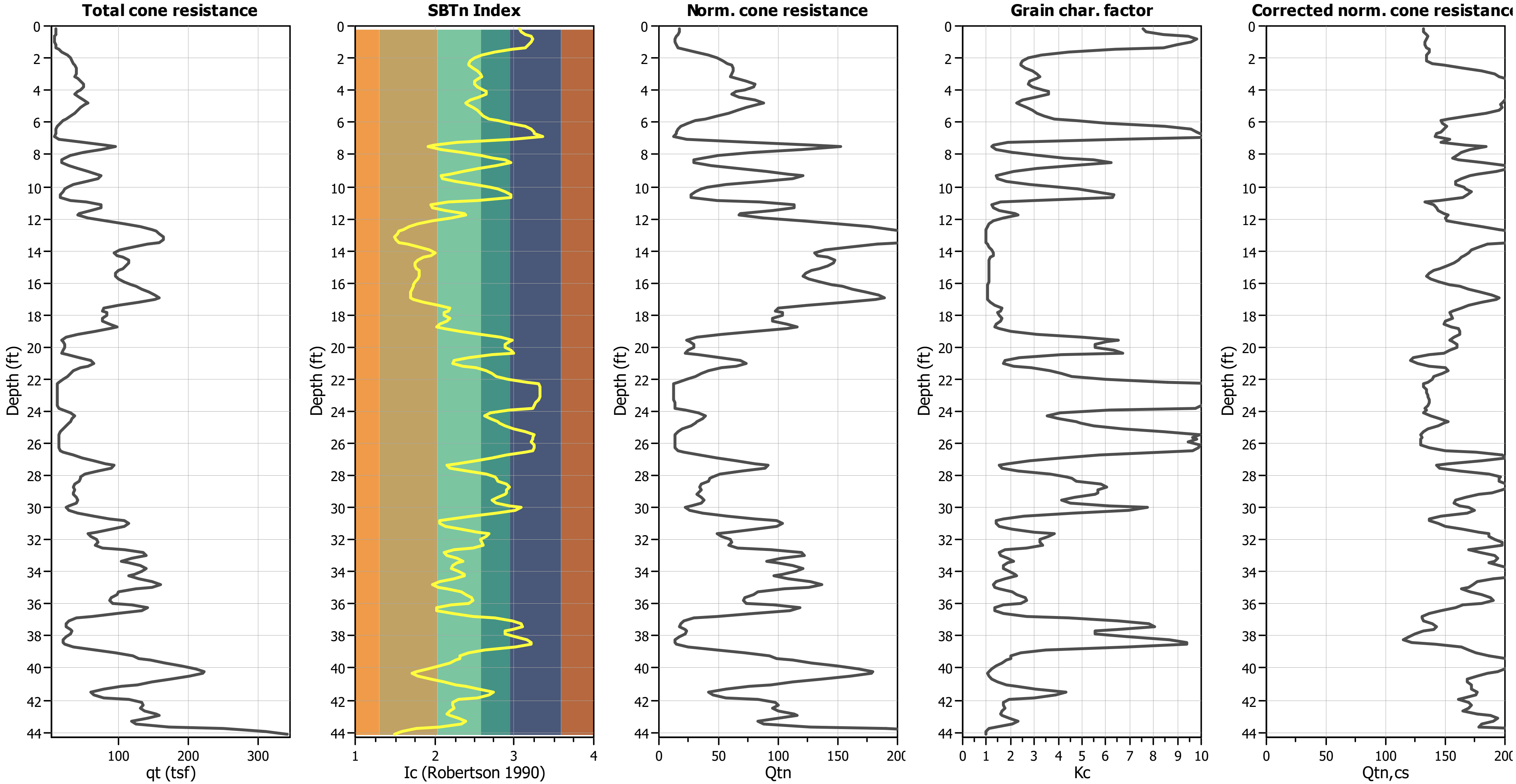
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

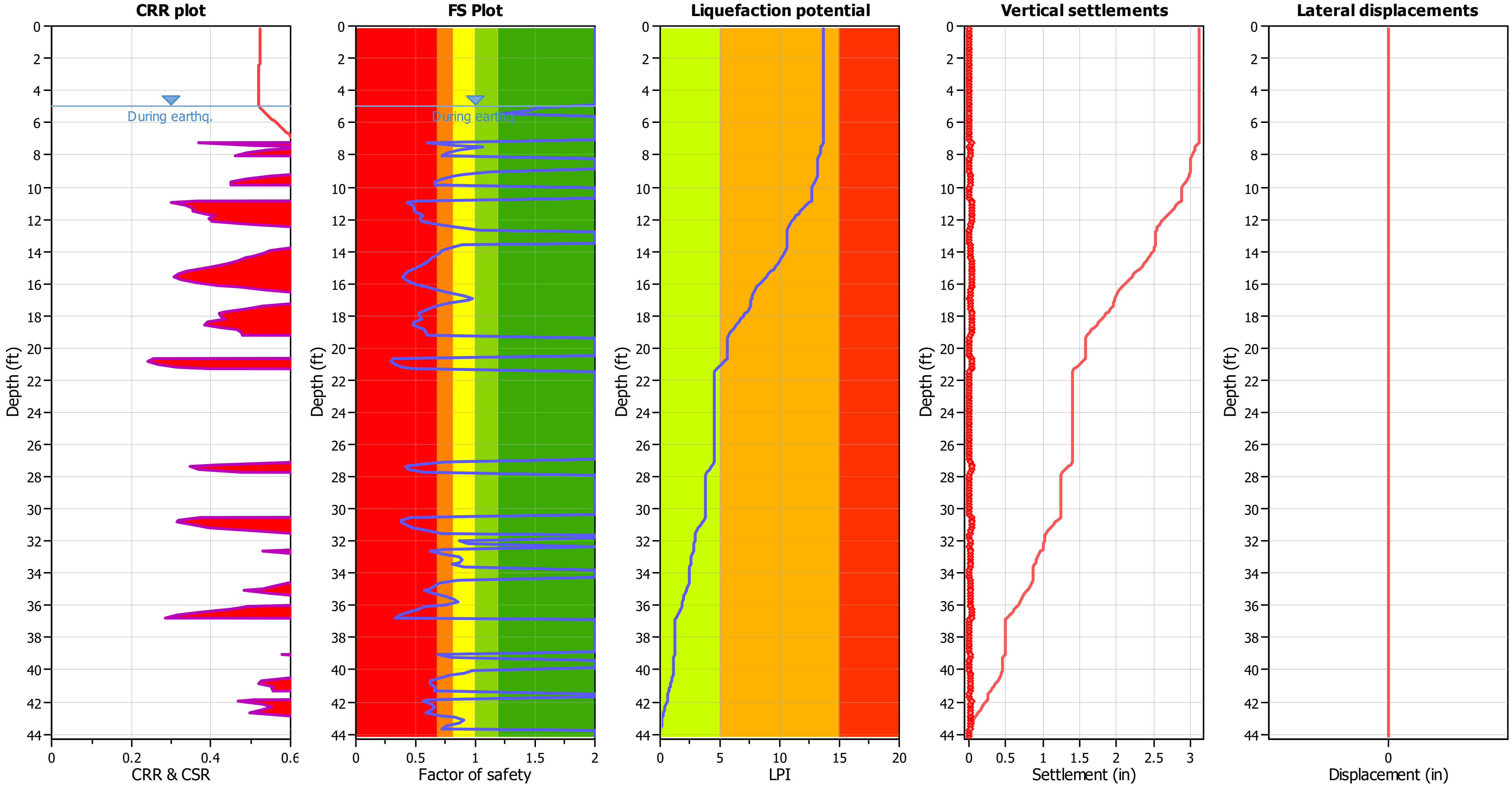
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

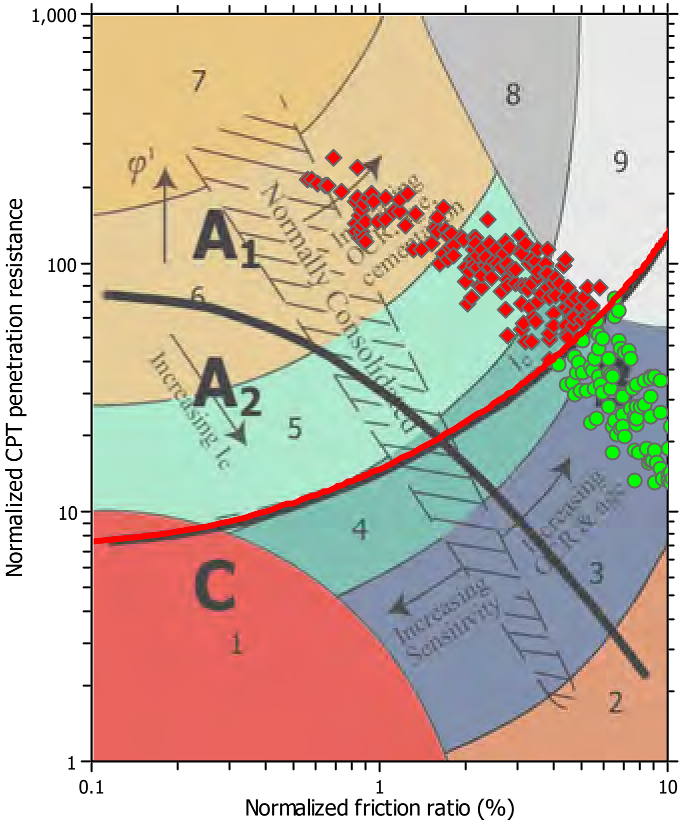
F.S. color scheme

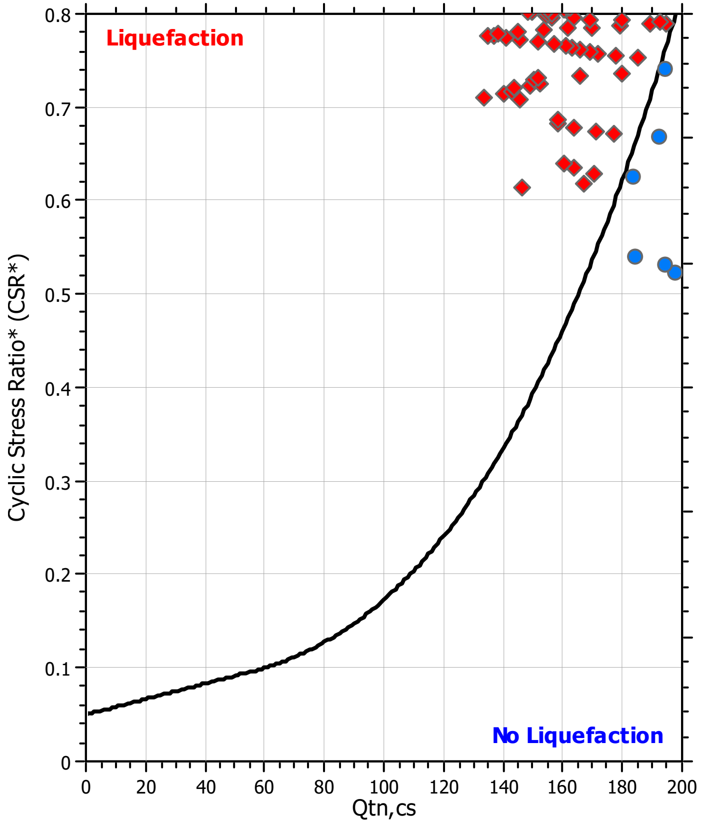
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

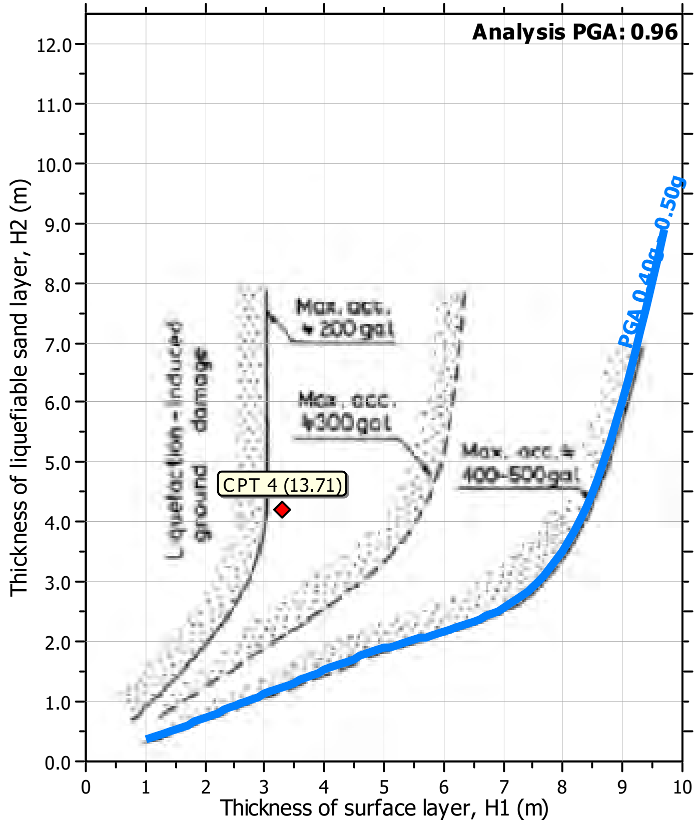
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



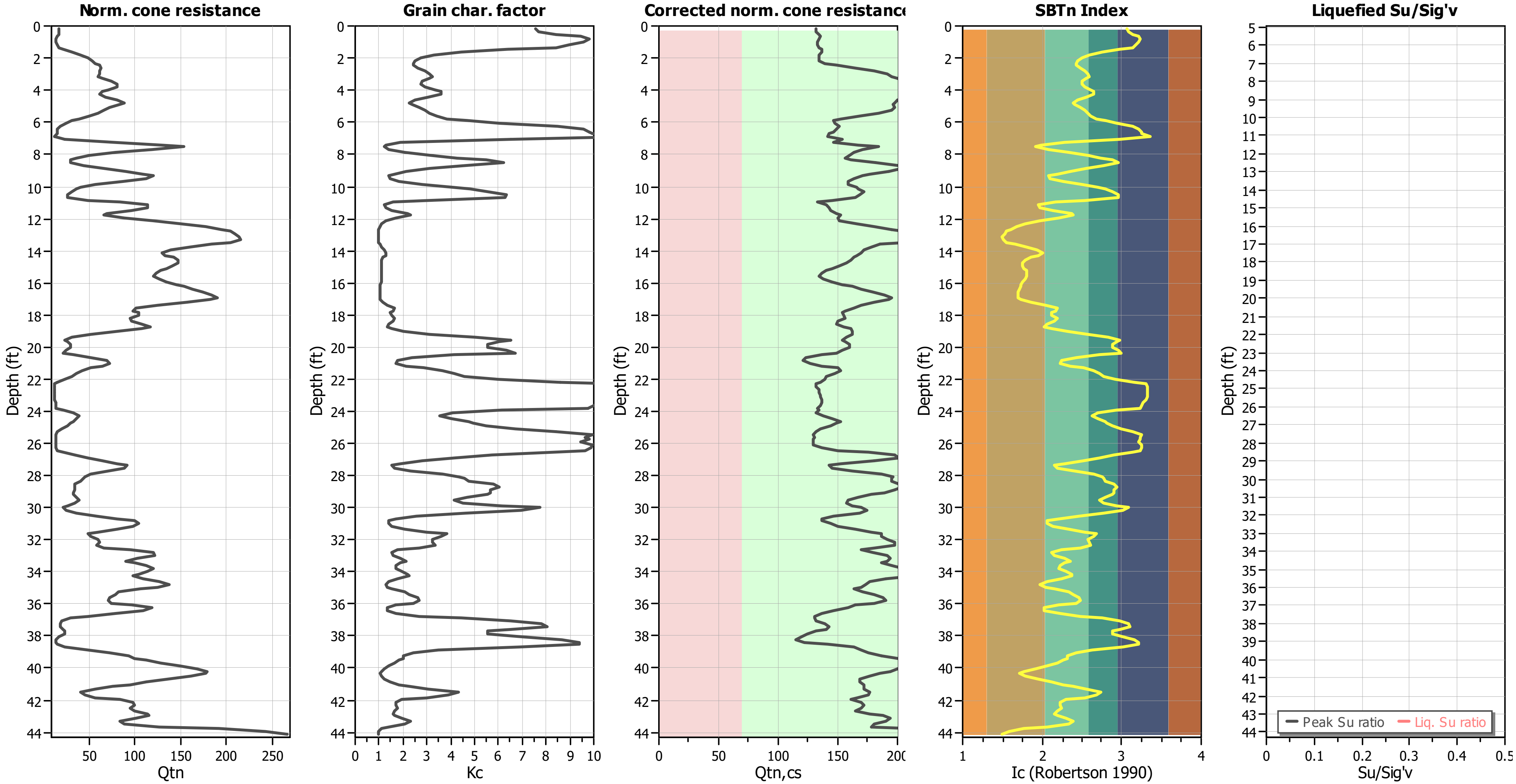




Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

Check for strength loss plots (Robertson (2010))



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	5.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.96	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.00 ft	Fill height:	N/A	Limit depth:	N/A

:: Field input data ::

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
1	0.16	10.63	0.85	-0.33	63.29	114.78
2	0.33	11.21	0.81	-0.40	64.05	114.86
3	0.49	10.32	0.89	-0.35	68.12	114.92
4	0.66	8.35	0.94	-0.38	74.24	114.98
5	0.82	8.17	0.93	-0.37	76.20	114.84
6	0.98	9.24	0.87	-0.41	74.74	114.65
7	1.15	8.75	0.85	-0.30	71.55	114.67
8	1.31	9.75	0.88	-0.18	68.25	114.96
9	1.48	11.49	0.91	-0.52	56.50	115.94
10	1.64	18.85	0.95	-0.73	43.76	117.07
11	1.80	26.93	0.98	-0.47	34.97	118.11
12	1.97	31.16	1.04	-0.42	30.56	118.78
13	2.13	33.21	1.06	-0.48	28.23	119.18
14	2.30	36.30	1.05	-0.45	27.53	119.84
15	2.46	37.57	1.26	-0.49	27.82	121.01
16	2.63	39.83	1.57	-0.47	29.55	122.45
17	2.79	39.84	1.84	-0.11	32.10	123.51
18	2.95	35.92	2.01	-0.34	33.71	124.16
19	3.12	39.02	2.09	-2.82	34.76	124.37
20	3.28	37.93	2.06	-1.59	33.46	124.93
21	3.44	44.41	2.34	-0.75	31.05	125.77
22	3.61	55.16	2.58	-1.92	30.50	126.92
23	3.77	50.81	3.00	-1.16	31.94	127.49
24	3.94	43.33	3.00	-0.50	35.53	127.43
25	4.10	39.83	2.82	-0.68	37.56	126.66
26	4.26	37.48	2.40	-0.26	37.59	125.80
27	4.43	36.82	2.22	1.43	33.20	125.52
28	4.59	52.69	2.29	1.16	28.17	125.74
29	4.76	60.82	2.22	-2.55	25.82	125.90
30	4.92	50.78	2.17	-0.73	26.89	125.66
31	5.08	44.54	2.19	0.46	30.14	125.28
32	5.25	41.99	2.16	-3.05	32.11	124.71
33	5.41	38.43	1.88	-5.11	33.77	123.60
34	5.58	30.83	1.52	-6.13	36.11	121.79
35	5.74	24.11	1.20	-6.03	39.45	119.60
36	5.91	20.09	0.95	-5.99	45.51	118.15
37	6.07	15.14	1.11	-6.48	54.31	117.41
38	6.23	11.46	1.13	-6.58	68.69	117.11
39	6.40	8.10	1.15	-5.21	74.65	116.69
40	6.56	11.01	1.06	-6.16	76.26	116.31
41	6.73	10.05	1.01	-6.75	76.76	115.98
42	6.89	7.38	1.03	-7.25	86.47	115.76
43	7.05	6.71	1.14	-7.20	57.16	117.97
44	7.22	31.51	1.30	-6.00	21.83	121.52
45	7.38	107.67	1.38	-5.25	12.63	123.37
46	7.55	104.82	1.47	-2.09	10.78	124.41
47	7.71	74.54	1.68	-1.25	15.42	124.21
48	7.87	44.47	1.64	-0.08	23.99	123.18

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
49	8.04	29.62	1.45	0.39	34.26	121.20
50	8.20	21.06	1.14	0.51	42.44	119.62
51	8.37	19.02	1.19	-1.41	50.66	119.20
52	8.53	16.07	1.51	-1.68	55.32	120.84
53	8.69	20.83	2.10	0.01	44.67	123.51
54	8.86	46.39	2.44	0.27	33.37	125.23
55	9.02	57.55	2.15	-0.69	24.57	125.71
56	9.19	66.33	1.85	-1.57	18.49	124.92
57	9.35	80.59	1.44	-2.04	15.29	124.27
58	9.51	79.40	1.52	-3.20	15.81	123.56
59	9.68	51.78	1.50	-4.01	21.15	122.92
60	9.84	31.87	1.44	-3.99	31.05	121.54
61	10.01	23.52	1.31	-3.83	40.95	120.85
62	10.17	22.86	1.55	-3.00	46.04	120.40
63	10.34	20.91	1.39	-3.00	51.17	120.31
64	10.50	15.85	1.43	-3.02	55.94	119.56
65	10.66	14.86	1.32	-2.23	55.61	119.26
66	10.83	20.36	1.23	-1.96	32.40	119.89
67	10.99	58.31	1.00	-1.92	17.83	120.21
68	11.15	80.48	0.88	-2.48	11.59	120.55
69	11.32	84.69	1.03	-2.58	12.11	121.10
70	11.48	59.22	1.22	-3.12	16.59	121.50
71	11.65	37.86	1.29	-2.36	24.99	121.50
72	11.81	33.31	1.45	0.50	26.21	121.70
73	11.97	55.34	1.37	0.51	19.54	122.21
74	12.14	78.11	1.20	-0.67	12.33	122.40
75	12.30	108.45	1.07	-2.44	7.99	122.53
76	12.47	135.58	1.10	-2.75	5.53	122.70
77	12.63	150.23	1.05	-2.83	4.45	122.95
78	12.79	153.04	1.06	-2.71	3.69	122.62
79	12.96	158.17	0.91	-2.20	3.22	122.32
80	13.12	163.88	0.90	-1.54	2.80	122.06
81	13.29	167.35	0.94	-1.11	2.88	122.28
82	13.45	160.85	0.99	-0.96	3.64	122.75
83	13.62	142.66	1.14	-1.15	5.47	123.52
84	13.78	117.78	1.41	-0.62	8.21	124.32
85	13.94	98.37	1.61	0.38	11.40	124.91
86	14.11	88.18	1.74	1.45	12.96	125.04
87	14.27	94.88	1.61	0.70	11.87	124.56
88	14.44	108.25	1.24	-2.62	9.45	123.60
89	14.60	116.63	1.06	-3.84	7.71	122.61
90	14.76	115.89	1.04	-3.86	7.11	121.89
91	14.93	110.22	0.92	-3.51	7.26	121.37
92	15.09	104.08	0.89	-2.76	7.54	120.82
93	15.26	100.17	0.88	-1.87	8.03	120.52
94	15.42	95.01	0.86	-1.27	8.36	120.24
95	15.58	93.30	0.82	-0.59	8.42	120.03
96	15.75	96.51	0.82	1.95	7.87	120.21

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
97	15.91	109.61	0.88	2.89	7.24	120.79
98	16.08	117.94	0.95	3.64	6.73	121.56
99	16.24	124.18	1.04	3.85	6.55	122.41
100	16.40	132.22	1.17	4.33	6.34	123.21
101	16.57	142.10	1.24	4.53	6.04	124.02
102	16.73	153.70	1.35	4.47	5.89	124.91
103	16.90	160.73	1.56	4.26	5.88	125.42
104	17.06	157.37	1.50	3.95	6.77	125.80
105	17.22	133.15	1.65	3.70	9.34	125.97
106	17.39	92.20	1.95	3.92	14.15	126.21
107	17.55	70.82	2.13	5.40	18.50	125.75
108	17.72	72.18	1.73	8.02	18.03	125.08
109	17.88	88.18	1.46	1.94	16.29	124.94
110	18.05	88.47	1.91	-0.69	16.50	125.07
111	18.21	72.29	1.83	-1.29	18.70	125.18
112	18.37	66.83	1.70	-0.35	17.53	124.55
113	18.54	92.23	1.43	-0.84	14.72	124.44
114	18.70	103.95	1.55	0.36	13.68	125.11
115	18.86	92.71	1.99	1.07	16.57	125.89
116	19.03	66.77	2.17	1.41	23.13	125.48
117	19.19	36.44	1.80	3.48	33.64	123.65
118	19.36	20.52	1.43	6.13	47.64	120.97
119	19.52	16.07	1.23	21.21	57.18	119.64
120	19.68	17.88	1.42	43.10	54.15	120.29
121	19.85	25.86	1.66	46.31	50.92	121.04
122	20.01	23.83	1.51	8.29	50.97	121.05
123	20.18	18.59	1.43	5.58	56.19	120.04
124	20.34	15.81	1.30	8.58	58.27	119.34
125	20.50	19.47	1.23	11.47	41.68	119.84
126	20.67	45.76	1.17	5.76	27.25	120.64
127	20.83	65.15	1.12	0.73	20.19	121.34
128	21.00	66.20	1.21	0.14	19.87	122.27
129	21.16	58.24	1.55	-0.53	24.27	123.02
130	21.32	42.72	1.73	-0.68	31.58	123.31
131	21.49	32.40	1.75	2.89	38.10	122.62
132	21.65	31.18	1.46	4.94	41.44	121.58
133	21.82	28.33	1.29	-1.76	44.68	120.32
134	21.98	19.76	1.23	-4.12	53.86	119.13
135	22.15	12.44	1.18	-3.81	69.31	117.94
136	22.31	10.43	1.12	-1.97	81.59	117.35
137	22.47	11.06	1.22	9.12	83.08	117.46
138	22.64	11.79	1.25	9.02	82.55	117.84
139	22.80	11.34	1.28	6.82	83.04	117.89
140	22.97	11.02	1.24	7.19	83.60	117.99
141	23.13	11.80	1.30	7.62	83.44	118.07
142	23.29	11.68	1.31	6.86	81.13	118.25
143	23.46	12.66	1.28	8.20	78.72	118.34
144	23.62	13.29	1.29	18.48	77.24	118.33

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
145	23.79	12.54	1.27	14.07	75.88	118.08
146	23.95	12.96	1.13	17.54	54.80	119.07
147	24.11	34.82	1.26	10.90	40.98	120.42
148	24.28	42.23	1.47	0.97	37.16	121.79
149	24.44	30.87	1.66	7.38	40.51	122.19
150	24.61	27.98	1.61	20.39	45.75	122.37
151	24.77	30.96	1.78	3.60	47.16	121.89
152	24.93	25.98	1.43	-2.13	50.46	121.00
153	25.10	18.54	1.23	-2.57	58.42	119.36
154	25.26	14.21	1.19	-0.03	68.12	118.45
155	25.43	14.23	1.24	1.33	76.88	118.09
156	25.59	11.43	1.24	8.53	75.17	118.28
157	25.75	15.72	1.24	7.05	76.15	118.18
158	25.92	13.41	1.22	7.21	74.15	118.21
159	26.08	12.90	1.21	9.66	76.82	118.26
160	26.25	14.13	1.31	10.08	76.46	119.24
161	26.41	15.85	1.67	11.09	75.06	120.92
162	26.57	18.06	2.10	12.60	68.03	123.71
163	26.74	29.36	3.03	13.85	52.34	126.61
164	26.90	54.44	3.51	2.16	41.59	128.16
165	27.07	60.31	2.98	-3.95	31.13	128.08
166	27.23	77.37	2.07	-1.30	21.89	126.78
167	27.39	105.65	1.56	-2.84	17.36	125.88
168	27.56	94.83	1.96	-2.65	18.72	126.31
169	27.72	69.01	2.48	-1.97	26.45	127.25
170	27.89	50.07	2.93	-1.85	38.00	127.74
171	28.05	37.34	3.34	-0.59	43.00	127.89
172	28.21	51.77	3.01	1.02	44.41	127.73
173	28.38	44.42	2.85	-2.04	45.95	127.61
174	28.54	31.94	3.31	-2.09	52.53	127.49
175	28.71	33.79	3.33	-0.30	54.19	127.63
176	28.87	41.70	3.11	-0.99	51.97	127.39
177	29.04	35.79	2.89	-2.50	51.92	126.67
178	29.20	29.55	2.57	-1.28	51.16	125.83
179	29.36	38.51	2.26	-0.32	45.50	125.35
180	29.53	46.87	2.16	-2.29	41.47	125.00
181	29.69	39.05	2.07	-2.41	44.03	124.60
182	29.86	28.59	2.09	-2.71	54.88	124.17
183	30.02	20.56	2.35	-1.21	64.29	124.45
184	30.18	25.72	2.70	0.76	59.87	125.19
185	30.35	38.65	2.52	0.15	45.00	125.79
186	30.51	56.29	2.08	0.02	28.69	125.93
187	30.68	94.75	1.80	-1.61	19.41	125.87
188	30.84	112.25	1.81	-2.03	14.47	125.65
189	31.00	116.21	1.55	-1.86	14.54	126.56
190	31.17	111.63	2.39	-2.52	17.03	127.62
191	31.33	95.71	2.81	-3.21	23.62	128.80
192	31.50	61.20	3.24	-3.28	32.54	128.79

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
193	31.66	45.01	3.21	-2.48	39.18	128.61
194	31.82	60.60	3.18	4.38	37.34	128.90
195	31.99	72.88	3.41	-4.10	34.45	129.75
196	32.15	70.14	3.94	-4.54	34.66	130.24
197	32.32	66.02	3.81	-6.77	35.74	130.11
198	32.48	65.54	3.35	-6.01	30.18	129.51
199	32.64	97.14	2.65	-6.08	20.72	129.75
200	32.81	157.92	3.06	-6.04	16.49	130.78
201	32.97	151.13	3.92	-6.16	17.63	131.97
202	33.14	107.89	4.26	-3.99	21.74	131.94
203	33.30	95.04	3.64	-1.79	24.49	131.50
204	33.47	109.81	3.71	-2.31	21.88	131.45
205	33.63	138.02	3.83	-5.40	19.81	132.27
206	33.79	143.07	4.43	-9.87	19.53	133.15
207	33.96	137.28	4.94	-9.56	22.24	134.04
208	34.12	119.72	5.76	-9.01	25.12	134.24
209	34.28	109.49	5.31	-8.33	25.59	133.51
210	34.45	115.68	3.72	-7.88	20.19	132.12
211	34.61	159.20	2.76	-7.52	14.80	130.76
212	34.78	169.87	2.85	-8.10	12.20	129.87
213	34.94	149.87	2.44	-7.24	13.92	129.96
214	35.10	122.68	3.07	-6.11	17.37	129.78
215	35.27	102.82	3.11	-1.47	23.97	130.22
216	35.43	74.21	3.69	5.31	26.11	130.87
217	35.60	113.41	4.10	-6.78	29.24	131.09
218	35.76	79.31	3.76	-6.73	30.14	131.21
219	35.92	69.37	3.96	2.50	27.87	130.74
220	36.09	124.78	3.21	2.52	19.54	130.07
221	36.25	158.24	2.00	-5.68	13.85	129.09
222	36.42	142.87	2.32	-6.70	13.81	127.82
223	36.58	95.65	2.16	-6.23	19.77	127.04
224	36.74	55.19	1.95	-5.25	29.78	125.14
225	36.91	36.68	1.65	-1.23	43.63	123.45
226	37.07	26.71	1.73	3.78	57.24	122.53
227	37.24	21.23	1.88	5.69	64.85	123.13
228	37.40	27.90	2.31	4.40	66.27	123.46
229	37.57	26.26	2.01	3.78	56.67	123.68
230	37.73	37.36	1.68	3.67	50.93	123.01
231	37.89	35.72	1.64	-0.94	51.04	122.16
232	38.06	21.83	1.50	2.30	59.77	120.90
233	38.22	17.24	1.25	10.52	69.84	119.77
234	38.39	19.87	1.31	13.38	73.86	120.82
235	38.55	20.95	2.15	19.84	73.62	123.37
236	38.71	25.56	2.91	31.13	59.21	126.42
237	38.88	54.92	3.35	35.08	36.62	129.03
238	39.04	115.57	3.40	-6.04	27.47	130.84
239	39.21	114.95	4.18	-6.23	23.39	132.42
240	39.37	130.38	4.96	-6.73	23.44	133.60

:: Field input data :: (continued)

Point ID	Depth (ft)	q_c (tsf)	f_s (tsf)	u (tsf)	Fines content (%)	Unit weight (pcf)
241	39.53	142.77	5.24	-6.72	21.38	134.30
242	39.70	163.96	5.01	-7.23	18.39	134.45
243	39.86	189.29	4.65	-7.69	14.52	133.93
244	40.03	214.55	3.61	-7.84	10.61	132.45
245	40.19	226.83	2.20	-8.12	7.52	130.35
246	40.35	226.04	1.89	-7.80	6.36	128.79
247	40.52	206.51	2.15	-7.00	7.95	129.13
248	40.68	173.20	2.69	-6.66	11.52	130.12
249	40.85	143.88	3.25	-6.27	16.45	131.16
250	41.01	125.17	3.93	-6.82	21.04	131.61
251	41.17	110.14	3.88	-7.26	25.97	131.17
252	41.34	76.27	3.30	-7.14	33.34	130.26
253	41.50	50.57	3.57	-5.03	42.77	129.63
254	41.67	52.94	3.94	3.61	39.97	129.84
255	41.83	91.24	3.31	5.53	32.46	129.90
256	41.99	94.09	2.95	5.62	22.31	130.59
257	42.16	157.32	3.67	-4.94	19.92	131.58
258	42.32	146.23	4.20	-3.00	19.79	131.86
259	42.49	103.46	3.29	-2.08	20.58	131.58
260	42.65	139.15	3.42	2.59	18.83	131.23
261	42.81	165.03	3.53	-1.41	17.54	132.39
262	42.98	156.80	4.56	-1.50	18.45	133.40
263	43.14	151.58	5.01	-3.83	22.25	133.76
264	43.31	111.75	4.76	-1.99	26.21	133.18
265	43.47	91.58	4.23	0.80	23.79	132.64
266	43.63	169.05	3.79	1.41	14.87	132.32
267	43.80	256.92	2.95	2.02	7.62	131.98
268	43.96	319.78	2.53	2.88	4.02	131.19
269	44.13	350.90	2.26	0.52	2.70	130.75

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	0.16	0.01	0.00	0.01	1.00	0.624	1.19	0.524	1.00	1.00	2.000	No
2	0.33	0.02	0.00	0.02	1.00	0.624	1.19	0.524	1.00	1.00	2.000	No
3	0.49	0.03	0.00	0.03	1.00	0.624	1.19	0.523	1.00	1.00	2.000	No
4	0.66	0.04	0.00	0.04	1.00	0.624	1.19	0.523	1.00	1.00	2.000	No
5	0.82	0.05	0.00	0.05	1.00	0.624	1.19	0.523	1.00	1.00	2.000	No
6	0.98	0.06	0.00	0.06	1.00	0.624	1.19	0.523	1.00	1.00	2.000	No
7	1.15	0.07	0.00	0.07	1.00	0.624	1.19	0.523	1.00	1.00	2.000	No
8	1.31	0.08	0.00	0.08	1.00	0.623	1.19	0.523	1.00	1.00	2.000	No
9	1.48	0.08	0.00	0.08	1.00	0.623	1.19	0.522	1.00	1.00	2.000	No
10	1.64	0.09	0.00	0.09	1.00	0.623	1.19	0.522	1.00	1.00	2.000	No
11	1.80	0.10	0.00	0.10	1.00	0.623	1.19	0.522	1.00	1.00	2.000	No
12	1.97	0.11	0.00	0.11	1.00	0.622	1.19	0.522	1.00	1.00	2.000	No
13	2.13	0.12	0.00	0.12	1.00	0.622	1.19	0.522	1.00	1.00	2.000	No
14	2.30	0.13	0.00	0.13	1.00	0.622	1.19	0.521	1.00	1.00	2.000	No
15	2.46	0.14	0.00	0.14	1.00	0.622	1.19	0.521	1.00	1.00	2.000	No
16	2.63	0.15	0.00	0.15	1.00	0.621	1.19	0.521	1.00	1.00	2.000	No
17	2.79	0.16	0.00	0.16	1.00	0.621	1.19	0.521	1.00	1.00	2.000	No
18	2.95	0.17	0.00	0.17	1.00	0.621	1.19	0.521	1.00	1.00	2.000	No
19	3.12	0.18	0.00	0.18	0.99	0.621	1.19	0.520	1.00	1.00	2.000	No
20	3.28	0.19	0.00	0.19	0.99	0.620	1.19	0.520	1.00	1.00	2.000	No
21	3.44	0.20	0.00	0.20	0.99	0.620	1.19	0.520	1.00	1.00	2.000	No
22	3.61	0.21	0.00	0.21	0.99	0.620	1.19	0.520	1.00	1.00	2.000	No
23	3.77	0.23	0.00	0.23	0.99	0.620	1.19	0.520	1.00	1.00	2.000	No
24	3.94	0.24	0.00	0.24	0.99	0.619	1.19	0.519	1.00	1.00	2.000	No
25	4.10	0.25	0.00	0.25	0.99	0.619	1.19	0.519	1.00	1.00	2.000	No
26	4.26	0.26	0.00	0.26	0.99	0.619	1.19	0.519	1.00	1.00	2.000	No
27	4.43	0.27	0.00	0.27	0.99	0.619	1.19	0.519	1.00	1.00	2.000	No
28	4.59	0.28	0.00	0.28	0.99	0.619	1.19	0.519	1.00	1.00	2.000	No
29	4.76	0.29	0.00	0.29	0.99	0.618	1.19	0.518	1.00	1.00	2.000	No
30	4.92	0.30	0.00	0.30	0.99	0.618	1.19	0.518	1.00	1.00	2.000	No
31	5.08	0.31	0.00	0.31	0.99	0.623	1.19	0.522	1.00	1.00	0.522	No
32	5.25	0.32	0.01	0.31	0.99	0.633	1.19	0.531	1.00	1.00	0.531	No
33	5.41	0.33	0.01	0.32	0.99	0.643	1.19	0.539	1.00	1.00	0.539	No
34	5.58	0.34	0.02	0.32	0.99	0.652	1.19	0.546	1.00	1.00	0.546	No
35	5.74	0.35	0.02	0.33	0.99	0.661	1.19	0.554	1.00	1.00	0.554	No
36	5.91	0.36	0.03	0.33	0.99	0.669	1.19	0.561	1.00	1.00	0.561	No
37	6.07	0.37	0.03	0.33	0.99	0.678	1.19	0.568	1.00	1.00	0.568	No
38	6.23	0.38	0.04	0.34	0.99	0.686	1.19	0.575	1.00	1.00	0.575	No
39	6.40	0.39	0.04	0.34	0.99	0.694	1.19	0.582	1.00	1.00	0.582	No
40	6.56	0.40	0.05	0.35	0.99	0.702	1.19	0.589	1.00	1.00	0.589	No
41	6.73	0.41	0.05	0.35	0.99	0.710	1.19	0.595	1.00	1.00	0.595	No
42	6.89	0.42	0.06	0.36	0.99	0.717	1.19	0.601	1.00	1.00	0.601	No
43	7.05	0.42	0.06	0.36	0.99	0.724	1.19	0.607	1.00	1.00	0.607	No
44	7.22	0.43	0.07	0.37	0.99	0.731	1.19	0.613	1.00	1.00	0.613	No
45	7.38	0.45	0.07	0.37	0.98	0.738	1.19	0.619	1.00	1.00	0.619	No
46	7.55	0.46	0.08	0.38	0.98	0.744	1.19	0.624	1.00	1.00	0.624	No
47	7.71	0.47	0.08	0.38	0.98	0.750	1.19	0.629	1.00	1.00	0.629	No
48	7.87	0.48	0.09	0.39	0.98	0.756	1.19	0.634	1.00	1.00	0.634	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	8.04	0.49	0.09	0.39	0.98	0.762	1.19	0.639	1.00	1.00	0.639	No
50	8.20	0.50	0.10	0.40	0.98	0.768	1.19	0.644	1.00	1.00	0.644	No
51	8.37	0.51	0.11	0.40	0.98	0.774	1.19	0.649	1.00	1.00	0.649	No
52	8.53	0.51	0.11	0.40	0.98	0.780	1.19	0.654	1.00	1.00	0.654	No
53	8.69	0.53	0.12	0.41	0.98	0.785	1.19	0.658	1.00	1.00	0.658	No
54	8.86	0.54	0.12	0.42	0.98	0.790	1.19	0.662	1.00	1.00	0.662	No
55	9.02	0.55	0.13	0.42	0.98	0.795	1.19	0.667	1.00	1.00	0.667	No
56	9.19	0.56	0.13	0.43	0.98	0.800	1.19	0.671	1.00	1.00	0.671	No
57	9.35	0.57	0.14	0.43	0.98	0.805	1.19	0.675	1.00	1.00	0.675	No
58	9.51	0.58	0.14	0.44	0.98	0.809	1.19	0.679	1.00	1.00	0.679	No
59	9.68	0.59	0.15	0.44	0.98	0.814	1.19	0.683	1.00	1.00	0.683	No
60	9.84	0.60	0.15	0.45	0.98	0.819	1.19	0.686	1.00	1.00	0.686	No
61	10.01	0.61	0.16	0.45	0.98	0.823	1.19	0.690	1.00	1.00	0.690	No
62	10.17	0.62	0.16	0.45	0.98	0.827	1.19	0.694	1.00	1.00	0.694	No
63	10.34	0.63	0.17	0.46	0.98	0.832	1.19	0.697	1.00	1.00	0.697	No
64	10.50	0.64	0.17	0.46	0.98	0.836	1.19	0.701	1.00	1.00	0.701	No
65	10.66	0.65	0.18	0.47	0.98	0.840	1.19	0.704	1.00	1.00	0.704	No
66	10.83	0.66	0.18	0.47	0.98	0.844	1.19	0.708	1.00	1.00	0.708	No
67	10.99	0.67	0.19	0.48	0.98	0.848	1.19	0.711	1.00	1.00	0.711	No
68	11.15	0.68	0.19	0.48	0.98	0.852	1.19	0.714	1.00	1.00	0.714	No
69	11.32	0.69	0.20	0.49	0.98	0.855	1.19	0.717	1.00	1.00	0.717	No
70	11.48	0.70	0.20	0.49	0.98	0.859	1.19	0.720	1.00	1.00	0.720	No
71	11.65	0.71	0.21	0.50	0.98	0.863	1.19	0.723	1.00	1.00	0.723	No
72	11.81	0.71	0.21	0.50	0.98	0.866	1.19	0.726	1.00	1.00	0.726	No
73	11.97	0.73	0.22	0.51	0.97	0.869	1.19	0.729	1.00	1.00	0.729	No
74	12.14	0.74	0.22	0.51	0.97	0.873	1.19	0.732	1.00	1.00	0.732	No
75	12.30	0.75	0.23	0.52	0.97	0.876	1.19	0.734	1.00	1.00	0.734	No
76	12.47	0.76	0.23	0.52	0.97	0.879	1.19	0.737	1.00	1.00	0.737	No
77	12.63	0.77	0.24	0.53	0.97	0.882	1.19	0.739	1.00	1.00	0.739	No
78	12.79	0.78	0.24	0.53	0.97	0.885	1.19	0.742	1.00	1.00	0.742	No
79	12.96	0.79	0.25	0.54	0.97	0.888	1.19	0.744	1.00	1.00	0.744	No
80	13.12	0.80	0.25	0.54	0.97	0.891	1.19	0.747	1.00	1.00	0.747	No
81	13.29	0.81	0.26	0.55	0.97	0.894	1.19	0.749	1.00	1.00	0.749	No
82	13.45	0.82	0.26	0.55	0.97	0.896	1.19	0.751	1.00	1.00	0.751	No
83	13.62	0.83	0.27	0.56	0.97	0.899	1.19	0.754	1.00	1.00	0.754	No
84	13.78	0.84	0.27	0.56	0.97	0.901	1.19	0.756	1.00	1.00	0.756	No
85	13.94	0.85	0.28	0.57	0.97	0.904	1.19	0.758	1.00	1.00	0.758	No
86	14.11	0.86	0.28	0.57	0.97	0.906	1.19	0.760	1.00	1.00	0.760	No
87	14.27	0.87	0.29	0.58	0.97	0.909	1.19	0.762	1.00	1.00	0.762	No
88	14.44	0.88	0.29	0.58	0.97	0.911	1.19	0.764	1.00	1.00	0.764	No
89	14.60	0.89	0.30	0.59	0.97	0.913	1.19	0.766	1.00	1.00	0.766	No
90	14.76	0.90	0.30	0.59	0.97	0.916	1.19	0.768	1.00	1.00	0.768	No
91	14.93	0.91	0.31	0.60	0.97	0.918	1.19	0.770	1.00	1.00	0.770	No
92	15.09	0.92	0.31	0.60	0.97	0.920	1.19	0.772	1.00	1.00	0.772	No
93	15.26	0.93	0.32	0.61	0.97	0.923	1.19	0.774	1.00	1.00	0.774	No
94	15.42	0.94	0.33	0.61	0.97	0.925	1.19	0.776	1.00	1.00	0.776	No
95	15.58	0.95	0.33	0.62	0.97	0.927	1.19	0.777	1.00	1.00	0.777	No
96	15.75	0.96	0.34	0.62	0.97	0.929	1.19	0.779	1.00	1.00	0.779	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	15.91	0.97	0.34	0.63	0.97	0.931	1.19	0.781	1.00	1.00	0.781	No
98	16.08	0.98	0.35	0.63	0.97	0.933	1.19	0.783	1.00	1.00	0.783	No
99	16.24	0.99	0.35	0.64	0.97	0.935	1.19	0.784	1.00	1.00	0.784	No
100	16.40	1.00	0.36	0.64	0.97	0.937	1.19	0.786	1.00	1.00	0.786	No
101	16.57	1.01	0.36	0.65	0.97	0.939	1.19	0.787	1.00	1.00	0.787	No
102	16.73	1.02	0.37	0.65	0.96	0.941	1.19	0.789	1.00	1.00	0.789	No
103	16.90	1.03	0.37	0.66	0.96	0.942	1.19	0.790	1.00	1.00	0.790	No
104	17.06	1.04	0.38	0.66	0.96	0.944	1.19	0.792	1.00	1.00	0.792	No
105	17.22	1.05	0.38	0.67	0.96	0.946	1.19	0.793	1.00	1.00	0.793	No
106	17.39	1.06	0.39	0.67	0.96	0.947	1.19	0.794	1.00	1.00	0.794	No
107	17.55	1.07	0.39	0.68	0.96	0.949	1.19	0.795	1.00	1.00	0.795	No
108	17.72	1.08	0.40	0.68	0.96	0.950	1.19	0.797	1.00	1.00	0.797	No
109	17.88	1.09	0.40	0.69	0.96	0.952	1.19	0.798	1.00	1.00	0.798	No
110	18.05	1.10	0.41	0.69	0.96	0.953	1.19	0.799	1.00	1.00	0.799	No
111	18.21	1.11	0.41	0.70	0.96	0.955	1.19	0.800	1.00	1.00	0.800	No
112	18.37	1.12	0.42	0.70	0.96	0.956	1.19	0.801	1.00	1.00	0.801	No
113	18.54	1.13	0.42	0.71	0.96	0.957	1.19	0.803	1.00	1.00	0.803	No
114	18.70	1.14	0.43	0.71	0.96	0.959	1.19	0.804	1.00	1.00	0.804	No
115	18.86	1.15	0.43	0.72	0.96	0.960	1.19	0.805	1.00	1.00	0.805	No
116	19.03	1.16	0.44	0.72	0.96	0.961	1.19	0.806	1.00	1.00	0.806	No
117	19.19	1.17	0.44	0.73	0.96	0.962	1.19	0.807	1.00	1.00	0.807	No
118	19.36	1.18	0.45	0.73	0.96	0.964	1.19	0.808	1.00	1.00	0.808	No
119	19.52	1.19	0.45	0.74	0.96	0.965	1.19	0.809	1.00	1.00	0.809	No
120	19.68	1.20	0.46	0.74	0.96	0.967	1.19	0.810	1.00	1.00	0.810	No
121	19.85	1.21	0.46	0.75	0.96	0.968	1.19	0.812	1.00	1.00	0.812	No
122	20.01	1.22	0.47	0.75	0.96	0.969	1.19	0.813	1.00	1.00	0.813	No
123	20.18	1.23	0.47	0.76	0.96	0.970	1.19	0.814	1.00	1.00	0.814	No
124	20.34	1.24	0.48	0.76	0.96	0.972	1.19	0.815	1.00	1.00	0.815	No
125	20.50	1.25	0.48	0.77	0.96	0.973	1.19	0.816	1.00	1.00	0.816	No
126	20.67	1.26	0.49	0.77	0.96	0.974	1.19	0.817	1.00	1.00	0.817	No
127	20.83	1.27	0.49	0.78	0.95	0.975	1.19	0.818	1.00	1.00	0.818	No
128	21.00	1.28	0.50	0.78	0.95	0.976	1.19	0.819	1.00	1.00	0.819	No
129	21.16	1.29	0.50	0.79	0.95	0.977	1.19	0.819	1.00	1.00	0.819	No
130	21.32	1.30	0.51	0.79	0.95	0.978	1.19	0.820	1.00	1.00	0.820	No
131	21.49	1.31	0.51	0.80	0.95	0.979	1.19	0.821	1.00	1.00	0.821	No
132	21.65	1.32	0.52	0.80	0.95	0.980	1.19	0.822	1.00	1.00	0.822	No
133	21.82	1.33	0.52	0.80	0.95	0.981	1.19	0.823	1.00	1.00	0.823	No
134	21.98	1.34	0.53	0.81	0.95	0.982	1.19	0.824	1.00	1.00	0.824	No
135	22.15	1.35	0.53	0.81	0.95	0.983	1.19	0.825	1.00	1.00	0.825	No
136	22.31	1.36	0.54	0.82	0.95	0.985	1.19	0.825	1.00	1.00	0.825	No
137	22.47	1.37	0.55	0.82	0.95	0.986	1.19	0.826	1.00	1.00	0.826	No
138	22.64	1.38	0.55	0.83	0.95	0.987	1.19	0.827	1.00	1.00	0.827	No
139	22.80	1.39	0.56	0.83	0.95	0.988	1.19	0.828	1.00	1.00	0.828	No
140	22.97	1.40	0.56	0.84	0.95	0.988	1.19	0.829	1.00	1.00	0.829	No
141	23.13	1.41	0.57	0.84	0.95	0.989	1.19	0.829	1.00	1.00	0.829	No
142	23.29	1.42	0.57	0.85	0.95	0.990	1.19	0.830	1.00	1.00	0.830	No
143	23.46	1.43	0.58	0.85	0.95	0.991	1.19	0.831	1.00	1.00	0.831	No
144	23.62	1.44	0.58	0.85	0.95	0.992	1.19	0.832	1.00	1.00	0.832	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	23.79	1.45	0.59	0.86	0.95	0.993	1.19	0.832	1.00	1.00	0.832	No
146	23.95	1.46	0.59	0.86	0.95	0.994	1.19	0.833	1.00	1.00	0.833	No
147	24.11	1.47	0.60	0.87	0.94	0.994	1.19	0.834	1.00	1.00	0.834	No
148	24.28	1.48	0.60	0.87	0.94	0.995	1.19	0.834	1.00	1.00	0.834	No
149	24.44	1.49	0.61	0.88	0.94	0.995	1.19	0.835	1.00	1.00	0.835	No
150	24.61	1.50	0.61	0.88	0.94	0.996	1.19	0.835	1.00	1.00	0.835	No
151	24.77	1.51	0.62	0.89	0.94	0.997	1.19	0.836	1.00	1.00	0.836	No
152	24.93	1.52	0.62	0.89	0.94	0.997	1.19	0.836	1.00	1.00	0.836	No
153	25.10	1.53	0.63	0.90	0.94	0.998	1.19	0.837	1.00	1.00	0.837	No
154	25.26	1.53	0.63	0.90	0.94	0.998	1.19	0.837	1.00	1.00	0.837	No
155	25.43	1.54	0.64	0.91	0.94	0.999	1.19	0.838	1.00	1.00	0.838	No
156	25.59	1.55	0.64	0.91	0.94	1.000	1.19	0.838	1.00	1.00	0.838	No
157	25.75	1.56	0.65	0.92	0.94	1.000	1.19	0.838	1.00	1.00	0.838	No
158	25.92	1.57	0.65	0.92	0.94	1.001	1.19	0.839	1.00	1.00	0.839	No
159	26.08	1.58	0.66	0.93	0.94	1.001	1.19	0.839	1.00	1.00	0.839	No
160	26.25	1.59	0.66	0.93	0.94	1.002	1.19	0.840	1.00	1.00	0.840	No
161	26.41	1.60	0.67	0.93	0.94	1.002	1.19	0.840	1.00	1.00	0.840	No
162	26.57	1.61	0.67	0.94	0.94	1.002	1.19	0.840	1.00	1.00	0.840	No
163	26.74	1.62	0.68	0.95	0.94	1.002	1.19	0.840	1.00	1.00	0.840	No
164	26.90	1.63	0.68	0.95	0.93	1.002	1.19	0.840	1.00	1.00	0.840	No
165	27.07	1.64	0.69	0.96	0.93	1.003	1.19	0.841	1.00	1.00	0.841	No
166	27.23	1.65	0.69	0.96	0.93	1.003	1.19	0.841	1.00	1.00	0.841	No
167	27.39	1.67	0.70	0.97	0.93	1.003	1.19	0.841	1.00	1.00	0.841	No
168	27.56	1.68	0.70	0.97	0.93	1.003	1.19	0.841	1.00	1.00	0.841	No
169	27.72	1.69	0.71	0.98	0.93	1.003	1.19	0.841	1.00	1.00	0.841	No
170	27.89	1.70	0.71	0.98	0.93	1.003	1.19	0.841	1.00	1.00	0.841	No
171	28.05	1.71	0.72	0.99	0.93	1.003	1.19	0.841	1.00	1.00	0.841	No
172	28.21	1.72	0.72	0.99	0.93	1.003	1.19	0.841	1.00	1.00	0.841	No
173	28.38	1.73	0.73	1.00	0.93	1.002	1.19	0.840	1.00	1.00	0.840	No
174	28.54	1.74	0.73	1.00	0.93	1.002	1.19	0.840	1.00	1.00	0.840	No
175	28.71	1.75	0.74	1.01	0.93	1.002	1.19	0.840	1.00	1.00	0.840	No
176	28.87	1.76	0.74	1.01	0.93	1.002	1.19	0.840	1.00	1.00	0.840	No
177	29.04	1.77	0.75	1.02	0.93	1.002	1.19	0.840	1.00	1.00	0.840	No
178	29.20	1.78	0.76	1.02	0.92	1.002	1.19	0.840	1.00	1.00	0.840	No
179	29.36	1.79	0.76	1.03	0.92	1.002	1.19	0.840	1.00	1.00	0.840	No
180	29.53	1.80	0.77	1.04	0.92	1.002	1.19	0.840	1.00	1.00	0.840	No
181	29.69	1.81	0.77	1.04	0.92	1.001	1.19	0.840	1.00	1.00	0.840	No
182	29.86	1.82	0.78	1.05	0.92	1.001	1.19	0.840	1.00	1.00	0.840	No
183	30.02	1.83	0.78	1.05	0.92	1.001	1.19	0.839	1.00	1.00	0.839	No
184	30.18	1.84	0.79	1.06	0.92	1.001	1.19	0.839	1.00	1.00	0.839	No
185	30.35	1.85	0.79	1.06	0.92	1.001	1.19	0.839	1.00	1.00	0.840	No
186	30.51	1.86	0.80	1.07	0.92	1.000	1.19	0.839	1.00	1.00	0.840	No
187	30.68	1.87	0.80	1.07	0.92	1.000	1.19	0.839	1.00	1.00	0.841	No
188	30.84	1.88	0.81	1.08	0.92	1.000	1.19	0.838	1.00	1.00	0.842	No
189	31.00	1.89	0.81	1.08	0.92	1.000	1.19	0.838	0.99	1.00	0.842	No
190	31.17	1.90	0.82	1.09	0.91	0.999	1.19	0.838	0.99	1.00	0.843	No
191	31.33	1.91	0.82	1.09	0.91	0.999	1.19	0.837	0.99	1.00	0.843	No
192	31.50	1.92	0.83	1.10	0.91	0.998	1.19	0.837	0.99	1.00	0.844	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
193	31.66	1.94	0.83	1.10	0.91	0.998	1.19	0.837	0.99	1.00	0.845	No
194	31.82	1.95	0.84	1.11	0.91	0.997	1.19	0.836	0.99	1.00	0.845	No
195	31.99	1.96	0.84	1.11	0.91	0.997	1.19	0.836	0.99	1.00	0.846	No
196	32.15	1.97	0.85	1.12	0.91	0.996	1.19	0.835	0.99	1.00	0.846	No
197	32.32	1.98	0.85	1.13	0.91	0.996	1.19	0.835	0.99	1.00	0.847	No
198	32.48	1.99	0.86	1.13	0.91	0.995	1.19	0.834	0.98	1.00	0.847	No
199	32.64	2.00	0.86	1.14	0.91	0.994	1.19	0.834	0.98	1.00	0.847	No
200	32.81	2.01	0.87	1.14	0.90	0.994	1.19	0.833	0.98	1.00	0.848	No
201	32.97	2.02	0.87	1.15	0.90	0.993	1.19	0.832	0.98	1.00	0.848	No
202	33.14	2.03	0.88	1.15	0.90	0.992	1.19	0.832	0.98	1.00	0.849	No
203	33.30	2.04	0.88	1.16	0.90	0.991	1.19	0.831	0.98	1.00	0.849	No
204	33.47	2.05	0.89	1.16	0.90	0.991	1.19	0.831	0.98	1.00	0.849	No
205	33.63	2.06	0.89	1.17	0.90	0.990	1.19	0.830	0.98	1.00	0.849	No
206	33.79	2.07	0.90	1.18	0.90	0.989	1.19	0.829	0.98	1.00	0.850	No
207	33.96	2.09	0.90	1.18	0.90	0.988	1.19	0.828	0.97	1.00	0.850	No
208	34.12	2.10	0.91	1.19	0.90	0.987	1.19	0.828	0.97	1.00	0.850	No
209	34.28	2.11	0.91	1.19	0.90	0.986	1.19	0.827	0.97	1.00	0.850	No
210	34.45	2.12	0.92	1.20	0.89	0.986	1.19	0.826	0.97	1.00	0.850	No
211	34.61	2.13	0.92	1.21	0.89	0.985	1.19	0.826	0.97	1.00	0.851	No
212	34.78	2.14	0.93	1.21	0.89	0.984	1.19	0.825	0.97	1.00	0.851	No
213	34.94	2.15	0.93	1.22	0.89	0.983	1.19	0.824	0.97	1.00	0.851	No
214	35.10	2.16	0.94	1.22	0.89	0.982	1.19	0.823	0.97	1.00	0.851	No
215	35.27	2.17	0.94	1.23	0.89	0.981	1.19	0.823	0.97	1.00	0.851	No
216	35.43	2.18	0.95	1.23	0.89	0.980	1.19	0.822	0.97	1.00	0.851	No
217	35.60	2.19	0.95	1.24	0.89	0.979	1.19	0.821	0.96	1.00	0.851	No
218	35.76	2.20	0.96	1.24	0.89	0.978	1.19	0.820	0.96	1.00	0.851	No
219	35.92	2.21	0.96	1.25	0.88	0.977	1.19	0.819	0.96	1.00	0.851	No
220	36.09	2.23	0.97	1.26	0.88	0.976	1.19	0.819	0.96	1.00	0.852	No
221	36.25	2.24	0.98	1.26	0.88	0.975	1.19	0.818	0.96	1.00	0.852	No
222	36.42	2.25	0.98	1.27	0.88	0.975	1.19	0.817	0.96	1.00	0.852	No
223	36.58	2.26	0.99	1.27	0.88	0.974	1.19	0.816	0.96	1.00	0.852	No
224	36.74	2.27	0.99	1.28	0.88	0.973	1.19	0.816	0.96	1.00	0.852	No
225	36.91	2.28	1.00	1.28	0.88	0.972	1.19	0.815	0.96	1.00	0.852	No
226	37.07	2.29	1.00	1.29	0.88	0.971	1.19	0.814	0.96	1.00	0.852	No
227	37.24	2.30	1.01	1.29	0.87	0.970	1.19	0.813	0.96	1.00	0.852	No
228	37.40	2.31	1.01	1.30	0.87	0.969	1.19	0.813	0.95	1.00	0.851	No
229	37.57	2.32	1.02	1.30	0.87	0.968	1.19	0.812	0.95	1.00	0.851	No
230	37.73	2.33	1.02	1.31	0.87	0.967	1.19	0.811	0.95	1.00	0.851	No
231	37.89	2.34	1.03	1.31	0.87	0.966	1.19	0.810	0.95	1.00	0.851	No
232	38.06	2.35	1.03	1.32	0.87	0.965	1.19	0.809	0.95	1.00	0.851	No
233	38.22	2.36	1.04	1.32	0.87	0.965	1.19	0.809	0.95	1.00	0.851	No
234	38.39	2.37	1.04	1.33	0.86	0.964	1.19	0.808	0.95	1.00	0.851	No
235	38.55	2.38	1.05	1.33	0.86	0.963	1.19	0.807	0.95	1.00	0.851	No
236	38.71	2.39	1.05	1.34	0.86	0.961	1.19	0.806	0.95	1.00	0.850	No
237	38.88	2.40	1.06	1.34	0.86	0.960	1.19	0.805	0.95	1.00	0.850	No
238	39.04	2.41	1.06	1.35	0.86	0.959	1.19	0.804	0.95	1.00	0.850	No
239	39.21	2.42	1.07	1.35	0.86	0.958	1.19	0.803	0.95	1.00	0.850	No
240	39.37	2.43	1.07	1.36	0.86	0.956	1.19	0.802	0.94	1.00	0.849	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	39.53	2.44	1.08	1.36	0.86	0.955	1.19	0.801	0.94	1.00	0.849	No
242	39.70	2.45	1.08	1.37	0.85	0.953	1.19	0.799	0.94	1.00	0.848	No
243	39.86	2.46	1.09	1.38	0.85	0.952	1.19	0.798	0.94	1.00	0.848	No
244	40.03	2.48	1.09	1.38	0.85	0.951	1.19	0.797	0.94	1.00	0.848	No
245	40.19	2.49	1.10	1.39	0.85	0.949	1.19	0.796	0.94	1.00	0.847	No
246	40.35	2.50	1.10	1.39	0.85	0.948	1.19	0.795	0.94	1.00	0.847	No
247	40.52	2.51	1.11	1.40	0.85	0.947	1.19	0.794	0.94	1.00	0.846	No
248	40.68	2.52	1.11	1.40	0.84	0.945	1.19	0.792	0.94	1.00	0.846	No
249	40.85	2.53	1.12	1.41	0.84	0.944	1.19	0.791	0.94	1.00	0.845	No
250	41.01	2.54	1.12	1.42	0.84	0.942	1.19	0.790	0.94	1.00	0.845	No
251	41.17	2.55	1.13	1.42	0.84	0.941	1.19	0.789	0.93	1.00	0.844	No
252	41.34	2.56	1.13	1.43	0.84	0.939	1.19	0.788	0.93	1.00	0.844	No
253	41.50	2.57	1.14	1.43	0.84	0.938	1.19	0.786	0.93	1.00	0.843	No
254	41.67	2.58	1.14	1.44	0.84	0.937	1.19	0.785	0.93	1.00	0.843	No
255	41.83	2.59	1.15	1.44	0.83	0.935	1.19	0.784	0.93	1.00	0.842	No
256	41.99	2.60	1.15	1.45	0.83	0.934	1.19	0.783	0.93	1.00	0.841	No
257	42.16	2.61	1.16	1.45	0.83	0.932	1.19	0.782	0.93	1.00	0.841	No
258	42.32	2.62	1.16	1.46	0.83	0.931	1.19	0.780	0.93	1.00	0.840	No
259	42.49	2.64	1.17	1.47	0.83	0.929	1.19	0.779	0.93	1.00	0.840	No
260	42.65	2.65	1.17	1.47	0.83	0.928	1.19	0.778	0.93	1.00	0.839	No
261	42.81	2.66	1.18	1.48	0.83	0.926	1.19	0.776	0.93	1.00	0.838	No
262	42.98	2.67	1.18	1.48	0.82	0.924	1.19	0.775	0.93	1.00	0.838	No
263	43.14	2.68	1.19	1.49	0.82	0.923	1.19	0.774	0.92	1.00	0.837	No
264	43.31	2.69	1.20	1.49	0.82	0.921	1.19	0.772	0.92	1.00	0.836	No
265	43.47	2.70	1.20	1.50	0.82	0.920	1.19	0.771	0.92	1.00	0.835	No
266	43.63	2.71	1.21	1.51	0.82	0.918	1.19	0.770	0.92	1.00	0.835	No
267	43.80	2.72	1.21	1.51	0.82	0.916	1.19	0.768	0.92	1.00	0.834	No
268	43.96	2.73	1.22	1.52	0.81	0.915	1.19	0.767	0.92	1.00	0.833	No
269	44.13	2.74	1.22	1.52	0.81	0.913	1.19	0.766	0.92	1.00	0.832	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	0.16	10.82	3.07	7.74	1.00	17.37	7.55	131.13	4.000	No	Yes	2.00
2	0.33	10.71	3.08	7.94	1.00	17.18	7.68	132.00	4.000	No	Yes	2.00
3	0.49	9.95	3.14	8.84	1.00	15.95	8.39	133.73	4.000	No	Yes	2.00
4	0.66	8.94	3.22	10.30	1.00	14.31	9.47	135.50	4.000	No	Yes	2.00
5	0.82	8.58	3.24	10.69	1.00	13.71	9.83	134.73	4.000	No	Yes	2.00
6	0.98	8.71	3.22	10.22	1.00	13.91	9.56	133.03	4.000	No	Yes	2.00
7	1.15	9.24	3.18	9.47	1.00	14.74	8.99	132.57	4.000	No	Yes	2.00
8	1.31	9.99	3.14	8.88	1.00	15.93	8.41	133.96	4.000	No	Yes	2.00
9	1.48	13.36	2.97	6.90	1.00	21.32	6.42	136.86	4.000	No	Yes	2.00
10	1.64	19.08	2.76	4.99	0.93	30.51	4.46	136.05	4.000	No	Yes	2.00
11	1.80	25.64	2.59	3.88	0.86	41.03	3.28	134.49	4.000	No	No	2.00
12	1.97	30.43	2.50	3.38	0.83	48.70	2.75	134.13	4.000	No	No	2.00
13	2.13	33.55	2.44	3.13	0.81	53.70	2.50	134.27	4.000	No	No	2.00
14	2.30	35.69	2.43	3.16	0.80	57.12	2.43	138.62	4.000	No	No	2.00
15	2.46	37.89	2.43	3.42	0.80	60.65	2.46	148.99	4.000	No	No	2.00
16	2.63	39.07	2.47	4.00	0.82	62.53	2.64	165.24	4.000	No	No	2.00
17	2.79	38.53	2.53	4.71	0.84	61.63	2.93	180.65	4.000	No	No	2.00
18	2.95	38.24	2.57	5.20	0.85	61.17	3.12	191.02	4.000	No	No	2.00
19	3.12	37.60	2.59	5.48	0.86	60.11	3.25	195.54	4.000	No	No	2.00
20	3.28	40.43	2.56	5.37	0.85	64.64	3.09	199.92	4.000	No	No	2.00
21	3.44	45.81	2.51	5.10	0.83	73.28	2.81	205.92	4.000	No	No	2.00
22	3.61	50.11	2.50	5.29	0.83	80.16	2.75	220.27	4.000	No	No	2.00
23	3.77	49.75	2.53	5.78	0.84	79.57	2.91	231.79	4.000	No	No	2.00
24	3.94	44.65	2.60	6.62	0.87	71.35	3.35	238.90	4.000	No	Yes	2.00
25	4.10	40.21	2.64	6.86	0.88	64.20	3.61	231.66	4.000	No	Yes	2.00
26	4.26	38.05	2.64	6.57	0.88	60.71	3.61	219.35	4.000	No	Yes	2.00
27	4.43	42.34	2.55	5.48	0.85	67.60	3.06	206.95	4.000	No	No	2.00
28	4.59	50.11	2.44	4.51	0.81	80.06	2.49	199.66	4.000	No	No	2.00
29	4.76	54.75	2.39	4.09	0.78	87.51	2.25	197.24	4.000	No	No	2.00
30	4.92	52.03	2.41	4.24	0.79	83.12	2.36	196.20	4.000	No	No	2.00
31	5.08	45.75	2.49	4.78	0.82	73.02	2.71	197.72	0.799	No	No	1.53
32	5.25	41.62	2.53	5.03	0.84	66.35	2.93	194.60	0.765	No	No	1.44
33	5.41	37.01	2.57	5.06	0.85	58.94	3.13	184.56	0.665	No	No	1.23
34	5.58	31.04	2.62	5.00	0.87	49.33	3.42	168.81	4.000	No	Yes	2.00
35	5.74	24.92	2.68	4.99	0.90	39.48	3.86	152.42	4.000	No	Yes	2.00
36	5.91	19.69	2.79	5.62	0.94	31.06	4.71	146.39	4.000	No	Yes	2.00
37	6.07	15.47	2.94	7.04	0.99	24.27	6.06	147.17	4.000	No	Yes	2.00
38	6.23	11.48	3.14	10.16	1.00	17.84	8.49	151.36	4.000	No	Yes	2.00
39	6.40	10.10	3.22	11.45	1.00	15.61	9.55	149.04	4.000	No	Yes	2.00
40	6.56	9.63	3.24	11.62	1.00	14.84	9.84	145.98	4.000	No	Yes	2.00
41	6.73	9.38	3.25	11.52	1.00	14.42	9.93	143.19	4.000	No	Yes	2.00
42	6.89	7.94	3.36	14.10	1.00	12.10	11.72	141.79	4.000	No	Yes	2.00
43	7.05	15.10	2.98	7.89	1.00	23.58	6.53	153.89	4.000	No	Yes	2.00
44	7.22	48.54	2.28	2.65	0.74	77.29	1.89	146.06	0.370	No	No	0.60
45	7.38	81.27	1.99	1.71	0.63	129.86	1.28	166.85	0.512	No	No	0.83
46	7.55	95.64	1.92	1.59	0.61	152.92	1.20	184.12	0.660	No	No	1.06
47	7.71	74.59	2.09	2.15	0.67	119.10	1.43	170.50	0.541	No	No	0.86
48	7.87	49.54	2.34	3.24	0.77	78.83	2.08	163.92	0.490	No	No	0.77

:: 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	8.04	31.72	2.58	4.51	0.86	50.18	3.19	160.10	0.462	No	No	0.72
50	8.20	23.23	2.74	5.53	0.92	36.53	4.27	156.03	4.000	No	Yes	2.00
51	8.37	18.70	2.88	7.02	0.97	29.24	5.49	160.52	4.000	No	Yes	2.00
52	8.53	18.63	2.95	8.83	1.00	29.10	6.23	181.18	4.000	No	Yes	2.00
53	8.69	27.76	2.78	7.40	0.93	43.75	4.59	200.88	4.000	No	Yes	2.00
54	8.86	41.59	2.56	5.43	0.85	65.96	3.08	203.34	4.000	No	No	2.00
55	9.02	56.75	2.35	3.82	0.77	90.30	2.13	192.65	0.745	No	No	1.12
56	9.19	68.14	2.18	2.68	0.71	108.58	1.63	177.06	0.596	No	No	0.89
57	9.35	75.41	2.08	2.14	0.67	120.24	1.42	171.27	0.547	No	No	0.81
58	9.51	70.55	2.10	2.13	0.68	112.42	1.45	163.52	0.487	No	No	0.72
59	9.68	54.30	2.26	2.77	0.74	86.29	1.83	158.21	0.448	No	No	0.66
60	9.84	35.67	2.51	4.04	0.83	56.35	2.81	158.33	0.449	No	No	0.65
61	10.01	26.03	2.71	5.64	0.91	40.85	4.06	166.00	4.000	No	Yes	2.00
62	10.17	22.38	2.80	6.50	0.94	34.97	4.79	167.56	4.000	No	Yes	2.00
63	10.34	19.83	2.89	7.59	0.97	30.85	5.57	171.83	4.000	No	Yes	2.00
64	10.50	17.17	2.96	8.35	1.00	26.56	6.33	168.07	4.000	No	Yes	2.00
65	10.66	16.99	2.96	8.13	1.00	26.26	6.27	164.75	4.000	No	Yes	2.00
66	10.83	31.15	2.54	3.88	0.84	48.99	2.97	145.35	0.366	No	No	0.52
67	10.99	53.02	2.16	1.98	0.70	84.11	1.58	133.29	0.300	No	No	0.42
68	11.15	74.46	1.95	1.31	0.62	113.20	1.24	140.14	0.336	No	No	0.47
69	11.32	74.76	1.97	1.41	0.63	113.62	1.26	143.25	0.353	No	No	0.49
70	11.48	60.55	2.13	1.97	0.69	95.48	1.50	143.47	0.355	No	No	0.49
71	11.65	43.44	2.36	3.09	0.78	68.66	2.17	149.24	0.389	No	No	0.54
72	11.81	42.16	2.40	3.31	0.79	66.59	2.29	152.64	0.411	No	No	0.57
73	11.97	55.59	2.22	2.44	0.72	87.99	1.71	150.24	0.395	No	No	0.54
74	12.14	80.62	1.98	1.52	0.63	119.16	1.27	151.44	0.403	No	No	0.55
75	12.30	107.35	1.79	1.05	0.56	150.26	1.10	165.60	0.502	No	No	0.68
76	12.47	131.38	1.67	0.82	0.51	177.05	1.02	179.89	0.621	No	No	0.84
77	12.63	146.24	1.61	0.74	0.50	194.79	1.00	194.79	0.767	No	No	1.04
78	12.79	153.78	1.56	0.66	0.50	203.91	1.00	203.91	4.000	No	No	2.00
79	12.96	158.33	1.53	0.61	0.50	209.00	1.00	209.00	4.000	No	No	2.00
80	13.12	163.11	1.50	0.56	0.50	214.35	1.00	214.35	4.000	No	No	2.00
81	13.29	164.01	1.50	0.58	0.50	214.56	1.00	214.56	4.000	No	No	2.00
82	13.45	156.94	1.55	0.65	0.50	204.33	1.00	204.33	4.000	No	No	2.00
83	13.62	140.42	1.66	0.84	0.51	182.95	1.01	185.43	0.673	No	No	0.89
84	13.78	119.60	1.80	1.17	0.56	160.24	1.11	177.83	0.603	No	No	0.80
85	13.94	101.45	1.94	1.58	0.61	139.50	1.23	171.56	0.550	No	No	0.73
86	14.11	93.82	2.00	1.78	0.64	130.00	1.30	169.06	0.529	No	No	0.70
87	14.27	97.10	1.96	1.59	0.62	132.55	1.25	165.70	0.503	No	No	0.66
88	14.44	106.56	1.86	1.23	0.58	141.55	1.15	163.27	0.485	No	No	0.63
89	14.60	113.54	1.78	0.99	0.55	147.49	1.09	161.17	0.469	No	No	0.61
90	14.76	114.19	1.75	0.89	0.54	146.70	1.07	157.33	0.442	No	No	0.58
91	14.93	110.01	1.76	0.87	0.54	140.87	1.08	151.77	0.405	No	No	0.53
92	15.09	104.78	1.77	0.86	0.55	133.92	1.09	145.56	0.367	No	No	0.48
93	15.26	99.72	1.80	0.89	0.56	127.47	1.10	140.68	0.339	No	No	0.44
94	15.42	96.14	1.81	0.90	0.57	122.69	1.11	136.80	0.318	No	No	0.41
95	15.58	94.94	1.81	0.88	0.57	120.67	1.12	134.75	0.308	No	No	0.40
96	15.75	99.83	1.79	0.85	0.56	125.73	1.10	138.07	0.325	No	No	0.42

:: 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	15.91	108.06	1.76	0.83	0.54	134.77	1.08	145.11	0.364	No	No	0.47
98	16.08	117.29	1.73	0.82	0.53	145.03	1.06	153.65	0.417	No	No	0.53
99	16.24	124.84	1.72	0.85	0.53	153.51	1.05	161.68	0.473	No	No	0.60
100	16.40	132.89	1.71	0.87	0.53	162.47	1.05	169.92	0.536	No	No	0.68
101	16.57	142.74	1.70	0.88	0.52	173.34	1.04	179.42	0.617	No	No	0.78
102	16.73	152.24	1.69	0.92	0.52	183.91	1.03	189.37	0.712	No	No	0.90
103	16.90	157.33	1.69	0.94	0.52	189.28	1.03	194.78	0.767	No	No	0.97
104	17.06	150.47	1.73	1.05	0.54	181.75	1.06	192.79	0.746	No	No	0.94
105	17.22	127.63	1.86	1.34	0.58	156.62	1.15	180.03	0.623	No	No	0.79
106	17.39	98.79	2.04	1.96	0.65	124.37	1.36	169.27	0.531	No	No	0.67
107	17.55	78.48	2.19	2.50	0.71	100.42	1.63	163.82	0.489	No	No	0.61
108	17.72	77.13	2.17	2.34	0.70	97.89	1.60	156.41	0.436	No	No	0.55
109	17.88	82.99	2.12	2.08	0.68	103.91	1.48	154.20	0.421	No	No	0.53
110	18.05	82.98	2.12	2.12	0.68	103.48	1.50	154.93	0.426	No	No	0.53
111	18.21	75.85	2.19	2.42	0.71	95.01	1.65	156.30	0.435	No	No	0.54
112	18.37	77.10	2.16	2.17	0.70	95.55	1.56	149.44	0.390	No	No	0.49
113	18.54	87.67	2.06	1.80	0.66	106.76	1.39	148.60	0.385	No	No	0.48
114	18.70	96.30	2.03	1.74	0.65	116.19	1.34	155.29	0.428	No	No	0.53
115	18.86	87.82	2.12	2.19	0.68	106.87	1.50	160.47	0.464	No	No	0.58
116	19.03	65.34	2.32	3.09	0.76	80.96	2.00	162.08	0.476	No	No	0.59
117	19.19	41.30	2.56	4.49	0.85	52.18	3.12	162.54	0.479	No	No	0.59
118	19.36	24.49	2.83	6.38	0.95	31.28	5.03	157.30	4.000	No	Yes	2.00
119	19.52	18.49	2.98	7.86	1.00	23.47	6.53	153.27	4.000	No	Yes	2.00
120	19.68	20.47	2.93	7.46	0.99	25.90	6.04	156.45	4.000	No	Yes	2.00
121	19.85	22.99	2.88	7.03	0.97	28.90	5.53	159.82	4.000	No	Yes	2.00
122	20.01	23.05	2.88	7.02	0.97	28.78	5.54	159.39	4.000	No	Yes	2.00
123	20.18	19.52	2.97	7.72	1.00	24.18	6.37	154.00	4.000	No	Yes	2.00
124	20.34	18.08	3.00	7.82	1.00	22.13	6.71	148.44	4.000	No	Yes	2.00
125	20.50	27.14	2.72	4.75	0.91	32.87	4.16	136.89	4.000	No	Yes	2.00
126	20.67	43.55	2.42	2.77	0.80	51.47	2.40	123.39	0.255	No	No	0.31
127	20.83	59.07	2.24	2.02	0.73	68.48	1.76	120.33	0.242	No	No	0.30
128	21.00	63.20	2.23	2.09	0.72	72.94	1.73	126.33	0.268	No	No	0.33
129	21.16	55.71	2.35	2.75	0.77	64.71	2.11	136.27	0.315	No	No	0.38
130	21.32	44.46	2.52	3.89	0.84	52.06	2.87	149.46	0.390	No	No	0.48
131	21.49	35.47	2.65	4.82	0.89	41.59	3.68	153.03	4.000	No	Yes	2.00
132	21.65	30.67	2.72	5.11	0.91	35.78	4.13	147.87	4.000	No	Yes	2.00
133	21.82	26.42	2.78	5.28	0.93	30.61	4.59	140.57	4.000	No	Yes	2.00
134	21.98	20.13	2.93	6.56	0.99	23.16	5.99	138.80	4.000	No	Yes	2.00
135	22.15	14.16	3.15	9.20	1.00	15.74	8.60	135.31	4.000	No	Yes	2.00
136	22.31	11.33	3.31	11.76	1.00	12.18	10.81	131.69	4.000	No	Yes	2.00
137	22.47	11.17	3.32	12.19	1.00	11.91	11.09	132.09	4.000	No	Yes	2.00
138	22.64	11.52	3.32	12.29	1.00	12.25	10.99	134.65	4.000	No	Yes	2.00
139	22.80	11.49	3.32	12.42	1.00	12.15	11.08	134.60	4.000	No	Yes	2.00
140	22.97	11.49	3.33	12.60	1.00	12.06	11.19	134.94	4.000	No	Yes	2.00
141	23.13	11.60	3.33	12.58	1.00	12.12	11.16	135.22	4.000	No	Yes	2.00
142	23.29	12.16	3.30	12.06	1.00	12.70	10.73	136.22	4.000	No	Yes	2.00
143	23.46	12.70	3.27	11.45	1.00	13.26	10.29	136.41	4.000	No	Yes	2.00
144	23.62	13.03	3.25	11.03	1.00	13.56	10.02	135.78	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	23.79	13.17	3.24	10.50	1.00	13.64	9.77	133.25	4.000	No	Yes	2.00
146	23.95	20.31	2.94	6.47	1.00	21.81	6.14	133.96	4.000	No	Yes	2.00
147	24.11	30.14	2.71	4.49	0.91	32.41	4.07	131.84	4.000	No	Yes	2.00
148	24.28	36.07	2.64	4.22	0.88	38.69	3.56	137.60	4.000	No	Yes	2.00
149	24.44	33.83	2.70	4.88	0.90	36.16	4.00	144.78	4.000	No	Yes	2.00
150	24.61	30.09	2.80	5.88	0.94	32.01	4.75	152.03	4.000	No	Yes	2.00
151	24.77	28.41	2.82	5.96	0.95	30.02	4.96	148.80	4.000	No	Yes	2.00
152	24.93	25.15	2.88	6.26	0.97	26.33	5.46	143.77	4.000	No	Yes	2.00
153	25.10	19.55	3.00	7.13	1.00	20.08	6.73	135.19	4.000	No	Yes	2.00
154	25.26	15.65	3.14	8.66	1.00	15.64	8.39	131.18	4.000	No	Yes	2.00
155	25.43	13.34	3.25	10.40	1.00	13.00	9.95	129.36	4.000	No	Yes	2.00
156	25.59	13.87	3.23	10.09	1.00	13.51	9.64	130.28	4.000	No	Yes	2.00
157	25.75	13.63	3.24	10.23	1.00	13.17	9.82	129.27	4.000	No	Yes	2.00
158	25.92	14.12	3.21	9.75	1.00	13.63	9.46	128.90	4.000	No	Yes	2.00
159	26.08	13.61	3.25	10.37	1.00	12.99	9.94	129.15	4.000	No	Yes	2.00
160	26.25	14.44	3.24	10.89	1.00	13.81	9.87	136.38	4.000	No	Yes	2.00
161	26.41	16.18	3.23	11.62	1.00	15.59	9.62	149.95	4.000	No	Yes	2.00
162	26.57	21.27	3.13	11.53	1.00	20.91	8.37	175.06	4.000	No	Yes	2.00
163	26.74	34.09	2.91	8.86	0.98	34.28	5.75	197.21	4.000	No	Yes	2.00
164	26.90	48.09	2.72	6.82	0.91	48.42	4.15	201.10	4.000	No	Yes	2.00
165	27.07	64.03	2.51	4.57	0.83	64.15	2.82	180.82	0.630	No	No	0.75
166	27.23	81.07	2.28	2.78	0.74	80.62	1.90	152.78	0.412	No	No	0.49
167	27.39	92.58	2.15	2.05	0.69	91.50	1.55	142.11	0.347	No	No	0.41
168	27.56	89.79	2.19	2.27	0.71	88.47	1.65	145.72	0.368	No	No	0.44
169	27.72	71.27	2.40	3.53	0.79	70.04	2.32	162.22	0.477	No	No	0.57
170	27.89	52.12	2.65	5.78	0.89	50.89	3.67	186.60	4.000	No	Yes	2.00
171	28.05	46.39	2.75	6.92	0.92	44.99	4.35	195.78	4.000	No	Yes	2.00
172	28.21	44.50	2.77	7.17	0.93	42.89	4.55	195.28	4.000	No	Yes	2.00
173	28.38	42.70	2.80	7.47	0.94	40.89	4.78	195.40	4.000	No	Yes	2.00
174	28.54	36.70	2.91	9.06	0.98	34.79	5.78	201.16	4.000	No	Yes	2.00
175	28.71	35.79	2.93	9.55	0.99	33.73	6.05	203.90	4.000	No	Yes	2.00
176	28.87	37.08	2.90	8.81	0.98	34.78	5.69	198.04	4.000	No	Yes	2.00
177	29.04	35.66	2.90	8.43	0.98	33.21	5.69	188.79	4.000	No	Yes	2.00
178	29.20	34.60	2.89	7.84	0.97	31.99	5.57	178.11	4.000	No	Yes	2.00
179	29.36	38.29	2.79	6.38	0.94	35.37	4.71	166.70	4.000	No	Yes	2.00
180	29.53	41.45	2.72	5.46	0.91	38.23	4.14	158.11	4.000	No	Yes	2.00
181	29.69	38.13	2.77	5.80	0.93	34.87	4.50	156.86	4.000	No	Yes	2.00
182	29.86	29.37	2.95	7.86	1.00	26.35	6.16	162.21	4.000	No	Yes	2.00
183	30.02	24.94	3.08	10.28	1.00	22.00	7.72	169.89	4.000	No	Yes	2.00
184	30.18	28.31	3.02	9.52	1.00	25.07	6.97	174.86	4.000	No	Yes	2.00
185	30.35	40.22	2.78	6.34	0.94	36.18	4.64	167.79	4.000	No	Yes	2.00
186	30.51	63.22	2.45	3.48	0.81	57.64	2.55	146.91	0.375	No	No	0.45
187	30.68	87.75	2.21	2.21	0.72	80.44	1.70	136.57	0.317	No	No	0.38
188	30.84	107.71	2.05	1.62	0.66	98.89	1.38	136.31	0.316	No	No	0.37
189	31.00	113.33	2.06	1.72	0.66	103.80	1.38	143.42	0.354	No	No	0.42
190	31.17	107.81	2.14	2.12	0.69	98.24	1.53	150.39	0.396	No	No	0.47
191	31.33	89.47	2.33	3.21	0.76	80.75	2.05	165.22	0.499	No	No	0.59
192	31.50	67.26	2.54	4.73	0.84	59.85	2.98	178.54	0.609	No	No	0.72

:: 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	31.66	55.60	2.68	5.98	0.89	48.85	3.82	186.77	4.000	No	Yes	2.00
194	31.82	59.49	2.64	5.68	0.88	52.18	3.58	186.80	4.000	No	Yes	2.00
195	31.99	67.85	2.58	5.33	0.86	59.57	3.21	191.42	0.732	No	No	0.87
196	32.15	69.61	2.59	5.51	0.86	60.88	3.24	197.24	0.794	No	No	0.94
197	32.32	67.15	2.61	5.68	0.87	58.38	3.38	197.04	4.000	No	Yes	2.00
198	32.48	76.14	2.49	4.41	0.82	66.34	2.71	179.92	0.622	No	No	0.73
199	32.64	106.78	2.25	2.88	0.73	93.97	1.80	169.03	0.529	No	No	0.62
200	32.81	135.31	2.12	2.41	0.68	119.57	1.50	178.96	0.613	No	No	0.72
201	32.97	138.90	2.16	2.74	0.70	122.22	1.57	191.96	0.738	No	No	0.87
202	33.14	117.96	2.28	3.40	0.74	102.75	1.88	193.42	0.753	No	No	0.89
203	33.30	104.21	2.35	3.79	0.77	89.99	2.13	191.38	0.732	No	No	0.86
204	33.47	114.24	2.28	3.32	0.74	98.70	1.89	186.91	0.687	No	No	0.81
205	33.63	130.22	2.22	3.11	0.72	112.58	1.73	194.55	0.765	No	No	0.90
206	33.79	139.34	2.22	3.20	0.72	120.20	1.71	205.15	4.000	No	No	2.00
207	33.96	133.22	2.29	3.85	0.75	114.05	1.92	219.46	4.000	No	No	2.00
208	34.12	122.03	2.37	4.45	0.78	103.58	2.19	226.42	4.000	No	No	2.00
209	34.28	114.84	2.38	4.37	0.78	96.94	2.23	216.33	4.000	No	No	2.00
210	34.45	128.01	2.24	3.12	0.73	108.60	1.76	190.80	0.726	No	No	0.85
211	34.61	148.14	2.07	2.13	0.66	126.58	1.40	176.73	0.593	No	No	0.70
212	34.78	159.54	1.97	1.71	0.63	136.70	1.27	172.93	0.561	No	No	0.66
213	34.94	147.37	2.04	1.92	0.65	125.34	1.35	169.09	0.530	No	No	0.62
214	35.10	125.05	2.15	2.34	0.69	105.09	1.55	163.24	0.485	No	No	0.57
215	35.27	99.89	2.34	3.37	0.77	82.42	2.08	171.28	0.547	No	No	0.64
216	35.43	96.80	2.39	3.84	0.79	79.27	2.28	180.92	0.631	No	No	0.74
217	35.60	88.94	2.47	4.44	0.82	72.09	2.61	188.00	0.698	No	No	0.82
218	35.76	87.31	2.49	4.63	0.82	70.38	2.71	190.57	0.724	No	No	0.85
219	35.92	91.15	2.44	4.10	0.80	73.52	2.46	180.99	0.631	No	No	0.74
220	36.09	117.46	2.22	2.65	0.72	96.29	1.71	164.37	0.493	No	No	0.58
221	36.25	141.92	2.03	1.80	0.65	117.79	1.34	158.41	0.450	No	No	0.53
222	36.42	132.16	2.03	1.66	0.65	109.26	1.34	146.74	0.374	No	No	0.44
223	36.58	97.82	2.22	2.25	0.72	79.08	1.72	136.38	0.316	No	No	0.37
224	36.74	62.45	2.48	3.19	0.82	48.75	2.67	130.07	0.285	No	No	0.33
225	36.91	39.51	2.76	4.77	0.93	29.46	4.44	130.83	4.000	No	Yes	2.00
226	37.07	28.25	2.98	6.75	1.00	20.17	6.54	131.91	4.000	No	Yes	2.00
227	37.24	25.35	3.09	8.57	1.00	17.84	7.82	139.50	4.000	No	Yes	2.00
228	37.40	25.20	3.11	9.04	1.00	17.65	8.06	142.32	4.000	No	Yes	2.00
229	37.57	30.56	2.97	7.08	1.00	21.70	6.45	139.85	4.000	No	Yes	2.00
230	37.73	33.14	2.88	5.76	0.97	23.71	5.53	131.18	4.000	No	Yes	2.00
231	37.89	31.66	2.88	5.47	0.97	22.48	5.55	124.74	4.000	No	Yes	2.00
232	38.06	24.99	3.02	6.46	1.00	17.20	6.96	119.65	4.000	No	Yes	2.00
233	38.22	19.77	3.16	7.78	1.00	13.18	8.69	114.51	4.000	No	Yes	2.00
234	38.39	19.56	3.21	9.13	1.00	12.97	9.40	121.95	4.000	No	Yes	2.00
235	38.55	22.44	3.21	10.58	1.00	15.07	9.36	141.08	4.000	No	Yes	2.00
236	38.71	34.22	3.01	8.80	1.00	23.82	6.87	163.56	4.000	No	Yes	2.00
237	38.88	65.64	2.63	5.09	0.88	48.55	3.49	169.29	4.000	No	Yes	2.00
238	39.04	95.26	2.43	3.92	0.80	72.33	2.42	175.05	0.579	No	No	0.68
239	39.21	120.21	2.32	3.55	0.76	92.34	2.03	187.04	0.689	No	No	0.81
240	39.37	129.27	2.32	3.78	0.76	99.09	2.03	201.15	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
241	39.53	145.60	2.27	3.54	0.74	112.08	1.85	207.65	4.000	No	No	2.00
242	39.70	165.24	2.18	3.05	0.71	128.13	1.62	208.02	4.000	No	No	2.00
243	39.86	189.16	2.06	2.37	0.66	148.36	1.38	204.89	4.000	No	No	2.00
244	40.03	210.11	1.91	1.68	0.60	167.05	1.20	200.00	0.824	No	No	0.97
245	40.19	222.36	1.77	1.17	0.55	178.99	1.09	194.45	0.764	No	No	0.90
246	40.35	219.68	1.71	0.96	0.53	177.51	1.05	185.77	0.676	No	No	0.80
247	40.52	201.81	1.79	1.13	0.56	161.20	1.10	177.43	0.600	No	No	0.71
248	40.68	174.43	1.95	1.57	0.62	136.46	1.24	168.53	0.525	No	No	0.62
249	40.85	147.32	2.12	2.27	0.68	112.46	1.49	167.99	0.521	No	No	0.62
250	41.01	126.30	2.26	2.98	0.74	94.40	1.82	172.23	0.555	No	No	0.66
251	41.17	103.76	2.39	3.66	0.79	75.86	2.27	172.08	0.554	No	No	0.66
252	41.34	78.90	2.56	4.69	0.85	55.96	3.08	172.27	0.555	No	No	0.66
253	41.50	59.89	2.74	6.28	0.92	40.99	4.32	177.02	4.000	No	Yes	2.00
254	41.67	64.94	2.69	5.78	0.90	44.71	3.93	175.69	4.000	No	Yes	2.00
255	41.83	79.49	2.54	4.42	0.84	55.94	2.97	166.36	0.508	No	No	0.60
256	41.99	114.25	2.29	2.97	0.75	83.36	1.93	160.93	0.468	No	No	0.56
257	42.16	132.54	2.23	2.78	0.72	97.51	1.74	169.29	0.531	No	No	0.63
258	42.32	135.62	2.22	2.80	0.72	99.58	1.73	171.91	0.552	No	No	0.66
259	42.49	129.60	2.25	2.86	0.73	94.53	1.79	168.96	0.529	No	No	0.63
260	42.65	135.88	2.20	2.56	0.71	99.57	1.65	164.76	0.496	No	No	0.59
261	42.81	153.66	2.16	2.54	0.70	113.10	1.56	176.97	0.595	No	No	0.71
262	42.98	157.77	2.18	2.81	0.71	115.44	1.63	187.87	0.697	No	No	0.83
263	43.14	140.01	2.29	3.48	0.75	100.48	1.93	193.49	0.754	No	No	0.90
264	43.31	118.28	2.40	4.04	0.79	83.20	2.29	190.74	0.725	No	No	0.87
265	43.47	124.13	2.33	3.51	0.76	87.85	2.06	181.07	0.632	No	No	0.76
266	43.63	172.54	2.07	2.15	0.66	126.97	1.40	177.81	0.603	No	No	0.72
267	43.80	248.61	1.78	1.26	0.55	190.82	1.09	207.93	4.000	No	No	2.00
268	43.96	309.23	1.58	0.84	0.50	241.85	1.00	241.85	4.000	No	No	2.00
269	44.13	340.55	1.49	0.70	0.50	266.07	1.00	266.07	4.000	No	No	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
0.16	2.00	0.00	0.00	0.16	0.00	0.33	2.00	0.00	0.00	0.16	0.00
0.49	2.00	0.00	0.00	0.16	0.00	0.66	2.00	0.00	0.00	0.16	0.00
0.82	2.00	0.00	0.00	0.16	0.00	0.98	2.00	0.00	0.00	0.16	0.00
1.15	2.00	0.00	0.00	0.16	0.00	1.31	2.00	0.00	0.00	0.16	0.00
1.48	2.00	0.00	0.00	0.16	0.00	1.64	2.00	0.00	0.00	0.16	0.00
1.80	2.00	0.00	0.00	0.16	0.00	1.97	2.00	0.00	0.00	0.17	0.00
2.13	2.00	0.00	0.00	0.16	0.00	2.30	2.00	0.00	0.00	0.16	0.00
2.46	2.00	0.00	0.00	0.16	0.00	2.63	2.00	0.00	0.00	0.16	0.00
2.79	2.00	0.00	0.00	0.16	0.00	2.95	2.00	0.00	0.00	0.16	0.00
3.12	2.00	0.00	0.00	0.16	0.00	3.28	2.00	0.00	0.00	0.16	0.00
3.44	2.00	0.00	0.00	0.16	0.00	3.61	2.00	0.00	0.00	0.16	0.00
3.77	2.00	0.00	0.00	0.16	0.00	3.94	2.00	0.00	0.00	0.16	0.00
4.10	2.00	0.00	0.00	0.16	0.00	4.26	2.00	0.00	0.00	0.16	0.00
4.43	2.00	0.00	0.00	0.16	0.00	4.59	2.00	0.00	0.00	0.16	0.00
4.76	2.00	0.00	0.00	0.16	0.00	4.92	2.00	0.00	0.00	0.16	0.00
5.08	1.53	0.00	0.00	0.16	0.00	5.25	1.44	0.00	0.00	0.16	0.00
5.41	1.23	0.00	0.00	0.16	0.00	5.58	2.00	0.00	0.00	0.16	0.00
5.74	2.00	0.00	0.00	0.16	0.00	5.91	2.00	0.00	0.00	0.17	0.00
6.07	2.00	0.00	0.00	0.16	0.00	6.23	2.00	0.00	0.00	0.16	0.00
6.40	2.00	0.00	0.00	0.16	0.00	6.56	2.00	0.00	0.00	0.16	0.00
6.73	2.00	0.00	0.00	0.16	0.00	6.89	2.00	0.00	0.00	0.16	0.00
7.05	2.00	0.00	0.00	0.16	0.00	7.22	0.60	0.00	0.00	0.16	0.18
7.38	0.83	0.00	0.00	0.16	0.08	7.55	1.06	0.00	0.00	0.16	0.00
7.71	0.86	0.00	0.00	0.16	0.06	7.87	0.77	0.00	0.00	0.16	0.10
8.04	0.72	0.00	0.00	0.16	0.12	8.20	2.00	0.00	0.00	0.16	0.00
8.37	2.00	0.00	0.00	0.16	0.00	8.53	2.00	0.00	0.00	0.16	0.00
8.69	2.00	0.00	0.00	0.16	0.00	8.86	2.00	0.00	0.00	0.16	0.00
9.02	1.12	0.00	0.00	0.16	0.00	9.19	0.89	0.00	0.00	0.16	0.05
9.35	0.81	0.00	0.00	0.16	0.08	9.51	0.72	0.00	0.00	0.16	0.12
9.68	0.66	0.00	0.00	0.16	0.15	9.84	0.65	0.00	0.00	0.16	0.15
10.01	2.00	0.00	0.00	0.16	0.00	10.17	2.00	0.00	0.00	0.16	0.00
10.34	2.00	0.00	0.00	0.16	0.00	10.50	2.00	0.00	0.00	0.16	0.00
10.66	2.00	0.00	0.00	0.16	0.00	10.83	0.52	0.48	0.50	0.16	0.20
10.99	0.42	0.58	0.40	0.16	0.24	11.15	0.47	0.53	0.45	0.16	0.22
11.32	0.49	0.51	0.47	0.16	0.21	11.48	0.49	0.51	0.47	0.16	0.21
11.65	0.54	0.46	0.53	0.16	0.19	11.81	0.57	0.43	0.57	0.16	0.18
11.97	0.54	0.46	0.53	0.16	0.19	12.14	0.55	0.45	0.55	0.16	0.18
12.30	0.68	0.32	0.86	0.16	0.13	12.47	0.84	0.00	0.00	0.16	0.06
12.63	1.04	0.00	0.00	0.16	0.00	12.79	2.00	0.00	0.00	0.16	0.00
12.96	2.00	0.00	0.00	0.16	0.00	13.12	2.00	0.00	0.00	0.16	0.00
13.29	2.00	0.00	0.00	0.16	0.00	13.45	2.00	0.00	0.00	0.16	0.00
13.62	0.89	0.00	0.00	0.16	0.04	13.78	0.80	0.00	0.00	0.16	0.08
13.94	0.73	0.00	0.00	0.16	0.11	14.11	0.70	0.30	0.91	0.16	0.12
14.27	0.66	0.34	0.78	0.16	0.13	14.44	0.63	0.37	0.71	0.16	0.14
14.60	0.61	0.39	0.66	0.16	0.15	14.76	0.58	0.42	0.59	0.16	0.16
14.93	0.53	0.47	0.51	0.16	0.18	15.09	0.48	0.52	0.45	0.16	0.20
15.26	0.44	0.56	0.42	0.16	0.22	15.42	0.41	0.59	0.39	0.16	0.23
15.58	0.40	0.60	0.38	0.16	0.23	15.75	0.42	0.58	0.40	0.16	0.22

:: 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
15.91	0.47	0.53	0.44	0.16	0.20	16.08	0.53	0.47	0.52	0.16	0.18
16.24	0.60	0.40	0.64	0.16	0.15	16.40	0.68	0.32	0.85	0.16	0.12
16.57	0.78	0.00	0.00	0.16	0.08	16.73	0.90	0.00	0.00	0.16	0.04
16.90	0.97	0.00	0.00	0.16	0.01	17.06	0.94	0.00	0.00	0.16	0.02
17.22	0.79	0.00	0.00	0.16	0.08	17.39	0.67	0.33	0.80	0.16	0.12
17.55	0.61	0.39	0.66	0.16	0.14	17.72	0.55	0.45	0.54	0.16	0.17
17.88	0.53	0.47	0.51	0.16	0.17	18.05	0.53	0.47	0.52	0.16	0.17
18.21	0.54	0.46	0.54	0.16	0.16	18.37	0.49	0.51	0.46	0.16	0.18
18.54	0.48	0.52	0.46	0.16	0.19	18.70	0.53	0.47	0.52	0.16	0.17
18.86	0.58	0.42	0.59	0.16	0.15	19.03	0.59	0.41	0.61	0.16	0.15
19.19	0.59	0.41	0.62	0.16	0.14	19.36	2.00	0.00	0.00	0.16	0.00
19.52	2.00	0.00	0.00	0.16	0.00	19.68	2.00	0.00	0.00	0.16	0.00
19.85	2.00	0.00	0.00	0.16	0.00	20.01	2.00	0.00	0.00	0.16	0.00
20.18	2.00	0.00	0.00	0.16	0.00	20.34	2.00	0.00	0.00	0.16	0.00
20.50	2.00	0.00	0.00	0.16	0.00	20.67	0.31	0.69	0.33	0.16	0.24
20.83	0.30	0.70	0.32	0.16	0.24	21.00	0.33	0.67	0.34	0.16	0.23
21.16	0.38	0.62	0.37	0.16	0.21	21.32	0.48	0.52	0.45	0.16	0.18
21.49	2.00	0.00	0.00	0.16	0.00	21.65	2.00	0.00	0.00	0.16	0.00
21.82	2.00	0.00	0.00	0.16	0.00	21.98	2.00	0.00	0.00	0.16	0.00
22.15	2.00	0.00	0.00	0.16	0.00	22.31	2.00	0.00	0.00	0.16	0.00
22.47	2.00	0.00	0.00	0.16	0.00	22.64	2.00	0.00	0.00	0.16	0.00
22.80	2.00	0.00	0.00	0.16	0.00	22.97	2.00	0.00	0.00	0.16	0.00
23.13	2.00	0.00	0.00	0.16	0.00	23.29	2.00	0.00	0.00	0.16	0.00
23.46	2.00	0.00	0.00	0.16	0.00	23.62	2.00	0.00	0.00	0.16	0.00
23.79	2.00	0.00	0.00	0.16	0.00	23.95	2.00	0.00	0.00	0.16	0.00
24.11	2.00	0.00	0.00	0.16	0.00	24.28	2.00	0.00	0.00	0.16	0.00
24.44	2.00	0.00	0.00	0.16	0.00	24.61	2.00	0.00	0.00	0.16	0.00
24.77	2.00	0.00	0.00	0.16	0.00	24.93	2.00	0.00	0.00	0.16	0.00
25.10	2.00	0.00	0.00	0.16	0.00	25.26	2.00	0.00	0.00	0.16	0.00
25.43	2.00	0.00	0.00	0.16	0.00	25.59	2.00	0.00	0.00	0.16	0.00
25.75	2.00	0.00	0.00	0.16	0.00	25.92	2.00	0.00	0.00	0.16	0.00
26.08	2.00	0.00	0.00	0.16	0.00	26.25	2.00	0.00	0.00	0.16	0.00
26.41	2.00	0.00	0.00	0.16	0.00	26.57	2.00	0.00	0.00	0.16	0.00
26.74	2.00	0.00	0.00	0.16	0.00	26.90	2.00	0.00	0.00	0.16	0.00
27.07	0.75	0.00	0.00	0.16	0.07	27.23	0.49	0.51	0.47	0.16	0.15
27.39	0.41	0.59	0.40	0.16	0.17	27.56	0.44	0.56	0.42	0.16	0.16
27.72	0.57	0.43	0.57	0.16	0.12	27.89	2.00	0.00	0.00	0.16	0.00
28.05	2.00	0.00	0.00	0.16	0.00	28.21	2.00	0.00	0.00	0.16	0.00
28.38	2.00	0.00	0.00	0.16	0.00	28.54	2.00	0.00	0.00	0.16	0.00
28.71	2.00	0.00	0.00	0.16	0.00	28.87	2.00	0.00	0.00	0.16	0.00
29.04	2.00	0.00	0.00	0.16	0.00	29.20	2.00	0.00	0.00	0.16	0.00
29.36	2.00	0.00	0.00	0.16	0.00	29.53	2.00	0.00	0.00	0.16	0.00
29.69	2.00	0.00	0.00	0.16	0.00	29.86	2.00	0.00	0.00	0.16	0.00
30.02	2.00	0.00	0.00	0.16	0.00	30.18	2.00	0.00	0.00	0.16	0.00
30.35	2.00	0.00	0.00	0.16	0.00	30.51	0.45	0.55	0.42	0.16	0.15
30.68	0.38	0.62	0.37	0.16	0.17	30.84	0.37	0.63	0.37	0.16	0.17
31.00	0.42	0.58	0.40	0.16	0.15	31.17	0.47	0.53	0.45	0.16	0.14
31.33	0.59	0.41	0.62	0.16	0.11	31.50	0.72	0.00	0.00	0.16	0.07

:: 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
31.66	2.00	0.00	0.00	0.16	0.00	31.82	2.00	0.00	0.00	0.16	0.00
31.99	0.87	0.00	0.00	0.16	0.03	32.15	0.94	0.00	0.00	0.16	0.02
32.32	2.00	0.00	0.00	0.16	0.00	32.48	0.73	0.00	0.00	0.16	0.07
32.64	0.62	0.38	0.68	0.16	0.09	32.81	0.72	0.00	0.00	0.16	0.07
32.97	0.87	0.00	0.00	0.16	0.03	33.14	0.89	0.00	0.00	0.16	0.03
33.30	0.86	0.00	0.00	0.16	0.03	33.47	0.81	0.00	0.00	0.16	0.05
33.63	0.90	0.00	0.00	0.16	0.02	33.79	2.00	0.00	0.00	0.16	0.00
33.96	2.00	0.00	0.00	0.16	0.00	34.12	2.00	0.00	0.00	0.16	0.00
34.28	2.00	0.00	0.00	0.16	0.00	34.45	0.85	0.00	0.00	0.16	0.03
34.61	0.70	0.00	0.00	0.16	0.07	34.78	0.66	0.34	0.78	0.16	0.08
34.94	0.62	0.38	0.68	0.16	0.09	35.10	0.57	0.43	0.57	0.16	0.10
35.27	0.64	0.36	0.73	0.16	0.08	35.43	0.74	0.00	0.00	0.16	0.06
35.60	0.82	0.00	0.00	0.16	0.04	35.76	0.85	0.00	0.00	0.16	0.03
35.92	0.74	0.00	0.00	0.16	0.06	36.09	0.58	0.42	0.59	0.16	0.09
36.25	0.53	0.47	0.51	0.16	0.11	36.42	0.44	0.56	0.42	0.16	0.12
36.58	0.37	0.63	0.36	0.16	0.14	36.74	0.33	0.67	0.34	0.16	0.15
36.91	2.00	0.00	0.00	0.16	0.00	37.07	2.00	0.00	0.00	0.16	0.00
37.24	2.00	0.00	0.00	0.16	0.00	37.40	2.00	0.00	0.00	0.16	0.00
37.57	2.00	0.00	0.00	0.16	0.00	37.73	2.00	0.00	0.00	0.16	0.00
37.89	2.00	0.00	0.00	0.16	0.00	38.06	2.00	0.00	0.00	0.16	0.00
38.22	2.00	0.00	0.00	0.16	0.00	38.39	2.00	0.00	0.00	0.16	0.00
38.55	2.00	0.00	0.00	0.16	0.00	38.71	2.00	0.00	0.00	0.16	0.00
38.88	2.00	0.00	0.00	0.16	0.00	39.04	0.68	0.32	0.85	0.16	0.06
39.21	0.81	0.00	0.00	0.16	0.04	39.37	2.00	0.00	0.00	0.16	0.00
39.53	2.00	0.00	0.00	0.16	0.00	39.70	2.00	0.00	0.00	0.16	0.00
39.86	2.00	0.00	0.00	0.16	0.00	40.03	0.97	0.00	0.00	0.16	0.01
40.19	0.90	0.00	0.00	0.16	0.02	40.35	0.80	0.00	0.00	0.16	0.04
40.52	0.71	0.00	0.00	0.16	0.06	40.68	0.62	0.38	0.68	0.16	0.07
40.85	0.62	0.38	0.66	0.16	0.07	41.01	0.66	0.34	0.77	0.17	0.06
41.17	0.66	0.34	0.77	0.16	0.06	41.34	0.66	0.34	0.77	0.16	0.06
41.50	2.00	0.00	0.00	0.16	0.00	41.67	2.00	0.00	0.00	0.16	0.00
41.83	0.60	0.40	0.64	0.16	0.07	41.99	0.56	0.44	0.55	0.16	0.08
42.16	0.63	0.37	0.70	0.16	0.07	42.32	0.66	0.34	0.77	0.16	0.06
42.49	0.63	0.37	0.70	0.16	0.07	42.65	0.59	0.41	0.61	0.16	0.07
42.81	0.71	0.00	0.00	0.16	0.05	42.98	0.83	0.00	0.00	0.16	0.03
43.14	0.90	0.00	0.00	0.16	0.02	43.31	0.87	0.00	0.00	0.16	0.02
43.47	0.76	0.00	0.00	0.16	0.04	43.63	0.72	0.00	0.00	0.16	0.05
43.80	2.00	0.00	0.00	0.16	0.00	43.96	2.00	0.00	0.00	0.16	0.00
44.13	2.00	0.00	0.00	0.16	0.00						

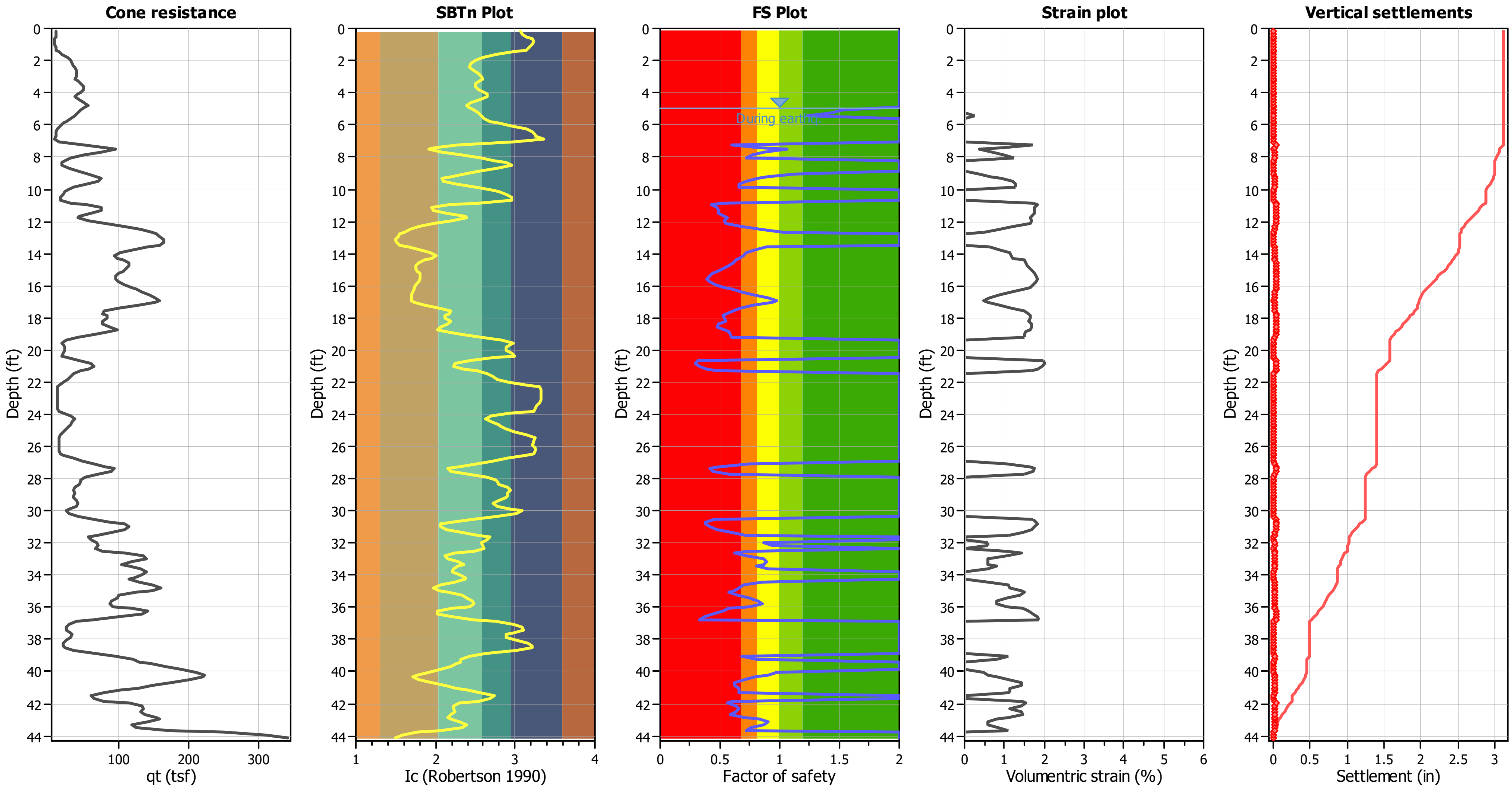
Overall liquefaction potential: 13.71

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)
5.08	197.72	1.53	0.00	1.00	0.00	5.25	194.60	1.44	0.00	1.00	0.00
5.41	184.56	1.23	0.26	1.00	0.01	5.58	168.81	2.00	0.00	1.00	0.00
5.74	152.42	2.00	0.00	1.00	0.00	5.91	146.39	2.00	0.00	1.00	0.00
6.07	147.17	2.00	0.00	1.00	0.00	6.23	151.36	2.00	0.00	1.00	0.00
6.40	149.04	2.00	0.00	1.00	0.00	6.56	145.98	2.00	0.00	1.00	0.00
6.73	143.19	2.00	0.00	1.00	0.00	6.89	141.79	2.00	0.00	1.00	0.00
7.05	153.89	2.00	0.00	1.00	0.00	7.22	146.06	0.60	1.71	1.00	0.03
7.38	166.85	0.83	0.96	1.00	0.02	7.55	184.12	1.06	0.37	1.00	0.01
7.71	170.50	0.86	0.71	1.00	0.01	7.87	163.92	0.77	0.99	1.00	0.02
8.04	160.10	0.72	1.26	1.00	0.02	8.20	156.03	2.00	0.00	1.00	0.00
8.37	160.52	2.00	0.00	1.00	0.00	8.53	181.18	2.00	0.00	1.00	0.00
8.69	200.88	2.00	0.00	1.00	0.00	8.86	203.34	2.00	0.00	1.00	0.00
9.02	192.65	1.12	0.36	1.00	0.01	9.19	177.06	0.89	0.67	1.00	0.01
9.35	171.27	0.81	0.93	1.00	0.02	9.51	163.52	0.72	1.22	1.00	0.02
9.68	158.21	0.66	1.28	1.00	0.03	9.84	158.33	0.65	1.28	1.00	0.03
10.01	166.00	2.00	0.00	1.00	0.00	10.17	167.56	2.00	0.00	1.00	0.00
10.34	171.83	2.00	0.00	1.00	0.00	10.50	168.07	2.00	0.00	1.00	0.00
10.66	164.75	2.00	0.00	1.00	0.00	10.83	145.35	0.52	1.72	1.00	0.03
10.99	133.29	0.42	1.85	1.00	0.04	11.15	140.14	0.47	1.77	1.00	0.03
11.32	143.25	0.49	1.74	1.00	0.03	11.48	143.47	0.49	1.74	1.00	0.03
11.65	149.24	0.54	1.68	1.00	0.03	11.81	152.64	0.57	1.64	1.00	0.03
11.97	150.24	0.54	1.67	1.00	0.03	12.14	151.44	0.55	1.66	1.00	0.03
12.30	165.60	0.68	1.20	1.00	0.02	12.47	179.89	0.84	0.86	1.00	0.02
12.63	194.79	1.04	0.48	1.00	0.01	12.79	203.91	2.00	0.00	1.00	0.00
12.96	209.00	2.00	0.00	1.00	0.00	13.12	214.35	2.00	0.00	1.00	0.00
13.29	214.56	2.00	0.00	1.00	0.00	13.45	204.33	2.00	0.00	1.00	0.00
13.62	185.43	0.89	0.63	1.00	0.01	13.78	177.83	0.80	0.88	1.00	0.02
13.94	171.56	0.73	1.14	1.00	0.02	14.11	169.06	0.70	1.17	1.00	0.02
14.27	165.70	0.66	1.20	1.00	0.02	14.44	163.27	0.63	1.49	1.00	0.03
14.60	161.17	0.61	1.52	1.00	0.03	14.76	157.33	0.58	1.57	1.00	0.03
14.93	151.77	0.53	1.66	1.00	0.03	15.09	145.56	0.48	1.72	1.00	0.03
15.26	140.68	0.44	1.77	1.00	0.03	15.42	136.80	0.41	1.81	1.00	0.04
15.58	134.75	0.40	1.83	1.00	0.04	15.75	138.07	0.42	1.79	1.00	0.04
15.91	145.11	0.47	1.72	1.00	0.03	16.08	153.65	0.53	1.64	1.00	0.03
16.24	161.68	0.60	1.51	1.00	0.03	16.40	169.92	0.68	1.16	1.00	0.02
16.57	179.42	0.78	0.87	1.00	0.02	16.73	189.37	0.90	0.61	1.00	0.01
16.90	194.78	0.97	0.48	1.00	0.01	17.06	192.79	0.94	0.59	1.00	0.01
17.22	180.03	0.79	0.86	1.00	0.02	17.39	169.27	0.67	1.16	1.00	0.02
17.55	163.82	0.61	1.48	1.00	0.03	17.72	156.41	0.55	1.62	1.00	0.03
17.88	154.20	0.53	1.64	1.00	0.03	18.05	154.93	0.53	1.63	1.00	0.03
18.21	156.30	0.54	1.62	1.00	0.03	18.37	149.44	0.49	1.68	1.00	0.03
18.54	148.60	0.48	1.69	1.00	0.03	18.70	155.29	0.53	1.63	1.00	0.03
18.86	160.47	0.58	1.53	1.00	0.03	19.03	162.08	0.59	1.51	1.00	0.03
19.19	162.54	0.59	1.50	1.00	0.03	19.36	157.30	2.00	0.00	1.00	0.00
19.52	153.27	2.00	0.00	1.00	0.00	19.68	156.45	2.00	0.00	1.00	0.00
19.85	159.82	2.00	0.00	1.00	0.00	20.01	159.39	2.00	0.00	1.00	0.00
20.18	154.00	2.00	0.00	1.00	0.00	20.34	148.44	2.00	0.00	1.00	0.00
20.50	136.89	2.00	0.00	1.00	0.00	20.67	123.39	0.31	1.97	1.00	0.04

:: 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)
20.83	120.33	0.30	2.01	1.00	0.04	21.00	126.33	0.33	1.93	1.00	0.04
21.16	136.27	0.38	1.81	1.00	0.04	21.32	149.46	0.48	1.68	1.00	0.03
21.49	153.03	2.00	0.00	1.00	0.00	21.65	147.87	2.00	0.00	1.00	0.00
21.82	140.57	2.00	0.00	1.00	0.00	21.98	138.80	2.00	0.00	1.00	0.00
22.15	135.31	2.00	0.00	1.00	0.00	22.31	131.69	2.00	0.00	1.00	0.00
22.47	132.09	2.00	0.00	1.00	0.00	22.64	134.65	2.00	0.00	1.00	0.00
22.80	134.60	2.00	0.00	1.00	0.00	22.97	134.94	2.00	0.00	1.00	0.00
23.13	135.22	2.00	0.00	1.00	0.00	23.29	136.22	2.00	0.00	1.00	0.00
23.46	136.41	2.00	0.00	1.00	0.00	23.62	135.78	2.00	0.00	1.00	0.00
23.79	133.25	2.00	0.00	1.00	0.00	23.95	133.96	2.00	0.00	1.00	0.00
24.11	131.84	2.00	0.00	1.00	0.00	24.28	137.60	2.00	0.00	1.00	0.00
24.44	144.78	2.00	0.00	1.00	0.00	24.61	152.03	2.00	0.00	1.00	0.00
24.77	148.80	2.00	0.00	1.00	0.00	24.93	143.77	2.00	0.00	1.00	0.00
25.10	135.19	2.00	0.00	1.00	0.00	25.26	131.18	2.00	0.00	1.00	0.00
25.43	129.36	2.00	0.00	1.00	0.00	25.59	130.28	2.00	0.00	1.00	0.00
25.75	129.27	2.00	0.00	1.00	0.00	25.92	128.90	2.00	0.00	1.00	0.00
26.08	129.15	2.00	0.00	1.00	0.00	26.25	136.38	2.00	0.00	1.00	0.00
26.41	149.95	2.00	0.00	1.00	0.00	26.57	175.06	2.00	0.00	1.00	0.00
26.74	197.21	2.00	0.00	1.00	0.00	26.90	201.10	2.00	0.00	1.00	0.00
27.07	180.82	0.75	1.06	1.00	0.02	27.23	152.78	0.49	1.65	1.00	0.03
27.39	142.11	0.41	1.75	1.00	0.03	27.56	145.72	0.44	1.72	1.00	0.03
27.72	162.22	0.57	1.50	1.00	0.03	27.89	186.60	2.00	0.00	1.00	0.00
28.05	195.78	2.00	0.00	1.00	0.00	28.21	195.28	2.00	0.00	1.00	0.00
28.38	195.40	2.00	0.00	1.00	0.00	28.54	201.16	2.00	0.00	1.00	0.00
28.71	203.90	2.00	0.00	1.00	0.00	28.87	198.04	2.00	0.00	1.00	0.00
29.04	188.79	2.00	0.00	1.00	0.00	29.20	178.11	2.00	0.00	1.00	0.00
29.36	166.70	2.00	0.00	1.00	0.00	29.53	158.11	2.00	0.00	1.00	0.00
29.69	156.86	2.00	0.00	1.00	0.00	29.86	162.21	2.00	0.00	1.00	0.00
30.02	169.89	2.00	0.00	1.00	0.00	30.18	174.86	2.00	0.00	1.00	0.00
30.35	167.79	2.00	0.00	1.00	0.00	30.51	146.91	0.45	1.70	1.00	0.03
30.68	136.57	0.38	1.81	1.00	0.04	30.84	136.31	0.37	1.81	1.00	0.04
31.00	143.42	0.42	1.74	1.00	0.03	31.17	150.39	0.47	1.67	1.00	0.03
31.33	165.22	0.59	1.47	1.00	0.03	31.50	178.54	0.72	1.08	1.00	0.02
31.66	186.77	2.00	0.00	1.00	0.00	31.82	186.80	2.00	0.00	1.00	0.00
31.99	191.42	0.87	0.60	1.00	0.01	32.15	197.24	0.94	0.57	1.00	0.01
32.32	197.04	2.00	0.00	1.00	0.00	32.48	179.92	0.73	1.07	1.00	0.02
32.64	169.03	0.62	1.42	1.00	0.03	32.81	178.96	0.72	1.08	1.00	0.02
32.97	191.96	0.87	0.60	1.00	0.01	33.14	193.42	0.89	0.59	1.00	0.01
33.30	191.38	0.86	0.60	1.00	0.01	33.47	186.91	0.81	0.82	1.00	0.02
33.63	194.55	0.90	0.59	1.00	0.01	33.79	205.15	2.00	0.00	1.00	0.00
33.96	219.46	2.00	0.00	1.00	0.00	34.12	226.42	2.00	0.00	1.00	0.00
34.28	216.33	2.00	0.00	1.00	0.00	34.45	190.80	0.85	0.60	1.00	0.01
34.61	176.73	0.70	1.10	1.00	0.02	34.78	172.93	0.66	1.13	1.00	0.02
34.94	169.09	0.62	1.42	1.00	0.03	35.10	163.24	0.57	1.49	1.00	0.03
35.27	171.28	0.64	1.39	1.00	0.03	35.43	180.92	0.74	1.06	1.00	0.02
35.60	188.00	0.82	0.81	1.00	0.02	35.76	190.57	0.85	0.79	1.00	0.02
35.92	180.99	0.74	1.06	1.00	0.02	36.09	164.37	0.58	1.48	1.00	0.03
36.25	158.41	0.53	1.60	1.00	0.03	36.42	146.74	0.44	1.71	1.00	0.03

:: 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)
36.58	136.38	0.37	1.81	1.00	0.04	36.74	130.07	0.33	1.88	1.00	0.04
36.91	130.83	2.00	0.00	1.00	0.00	37.07	131.91	2.00	0.00	1.00	0.00
37.24	139.50	2.00	0.00	1.00	0.00	37.40	142.32	2.00	0.00	1.00	0.00
37.57	139.85	2.00	0.00	1.00	0.00	37.73	131.18	2.00	0.00	1.00	0.00
37.89	124.74	2.00	0.00	1.00	0.00	38.06	119.65	2.00	0.00	1.00	0.00
38.22	114.51	2.00	0.00	1.00	0.00	38.39	121.95	2.00	0.00	1.00	0.00
38.55	141.08	2.00	0.00	1.00	0.00	38.71	163.56	2.00	0.00	1.00	0.00
38.88	169.29	2.00	0.00	1.00	0.00	39.04	175.05	0.68	1.11	1.00	0.02
39.21	187.04	0.81	0.81	1.00	0.02	39.37	201.15	2.00	0.00	1.00	0.00
39.53	207.65	2.00	0.00	1.00	0.00	39.70	208.02	2.00	0.00	1.00	0.00
39.86	204.89	2.00	0.00	1.00	0.00	40.03	200.00	0.97	0.46	1.00	0.01
40.19	194.45	0.90	0.59	1.00	0.01	40.35	185.77	0.80	0.82	1.00	0.02
40.52	177.43	0.71	1.09	1.00	0.02	40.68	168.53	0.62	1.42	1.00	0.03
40.85	167.99	0.62	1.43	1.00	0.03	41.01	172.23	0.66	1.14	1.00	0.02
41.17	172.08	0.66	1.14	1.00	0.02	41.34	172.27	0.66	1.14	1.00	0.02
41.50	177.02	2.00	0.00	1.00	0.00	41.67	175.69	2.00	0.00	1.00	0.00
41.83	166.36	0.60	1.45	1.00	0.03	41.99	160.93	0.56	1.52	1.00	0.03
42.16	169.29	0.63	1.41	1.00	0.03	42.32	171.91	0.66	1.14	1.00	0.02
42.49	168.96	0.63	1.42	1.00	0.03	42.65	164.76	0.59	1.47	1.00	0.03
42.81	176.97	0.71	1.09	1.00	0.02	42.98	187.87	0.83	0.81	1.00	0.02
43.14	193.49	0.90	0.59	1.00	0.01	43.31	190.74	0.87	0.60	1.00	0.01
43.47	181.07	0.76	0.85	1.00	0.02	43.63	177.81	0.72	1.09	1.00	0.02
43.80	207.93	2.00	0.00	1.00	0.00	43.96	241.85	2.00	0.00	1.00	0.00
44.13	266.07	2.00	0.00	1.00	0.00						

Total estimated settlement: 3.12

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	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
0.16	10.82	17.37	7.55	131.13	3.07	N/A	N/A
0.33	10.71	17.18	7.68	132.00	3.08	N/A	N/A
0.49	9.95	15.95	8.39	133.73	3.14	N/A	N/A
0.66	8.94	14.31	9.47	135.50	3.22	N/A	N/A
0.82	8.58	13.71	9.83	134.73	3.24	N/A	N/A
0.98	8.71	13.91	9.56	133.03	3.22	N/A	N/A
1.15	9.24	14.74	8.99	132.57	3.18	N/A	N/A
1.31	9.99	15.93	8.41	133.96	3.14	N/A	N/A
1.48	13.36	21.32	6.42	136.86	2.97	N/A	N/A
1.64	19.08	30.51	4.46	136.05	2.76	N/A	N/A
1.80	25.64	41.03	3.28	134.49	2.59	N/A	N/A
1.97	30.43	48.70	2.75	134.13	2.50	N/A	N/A
2.13	33.55	53.70	2.50	134.27	2.44	N/A	N/A
2.30	35.69	57.12	2.43	138.62	2.43	N/A	N/A
2.46	37.89	60.65	2.46	148.99	2.43	N/A	N/A
2.63	39.07	62.53	2.64	165.24	2.47	N/A	N/A
2.79	38.53	61.63	2.93	180.65	2.53	N/A	N/A
2.95	38.24	61.17	3.12	191.02	2.57	N/A	N/A
3.12	37.60	60.11	3.25	195.54	2.59	N/A	N/A
3.28	40.43	64.64	3.09	199.92	2.56	N/A	N/A
3.44	45.81	73.28	2.81	205.92	2.51	N/A	N/A
3.61	50.11	80.16	2.75	220.27	2.50	N/A	N/A
3.77	49.75	79.57	2.91	231.79	2.53	N/A	N/A
3.94	44.65	71.35	3.35	238.90	2.60	N/A	N/A
4.10	40.21	64.20	3.61	231.66	2.64	N/A	N/A
4.26	38.05	60.71	3.61	219.35	2.64	N/A	N/A
4.43	42.34	67.60	3.06	206.95	2.55	N/A	N/A
4.59	50.11	80.06	2.49	199.66	2.44	N/A	N/A
4.76	54.75	87.51	2.25	197.24	2.39	N/A	N/A
4.92	52.03	83.12	2.36	196.20	2.41	N/A	N/A
5.08	45.75	73.02	2.71	197.72	2.49	0.78	0.78
5.25	41.62	66.35	2.93	194.60	2.53	0.77	0.77
5.41	37.01	58.94	3.13	184.56	2.57	0.76	0.76
5.58	31.04	49.33	3.42	168.81	2.62	6.84	6.84
5.74	24.92	39.48	3.86	152.42	2.68	5.40	5.40
5.91	19.69	31.06	4.71	146.39	2.79	4.19	4.19
6.07	15.47	24.27	6.06	147.17	2.94	3.23	3.23
6.23	11.48	17.84	8.49	151.36	3.14	2.34	2.34
6.40	10.10	15.61	9.55	149.04	3.22	2.02	2.02
6.56	9.63	14.84	9.84	145.98	3.24	1.90	1.90
6.73	9.38	14.42	9.93	143.19	3.25	1.82	1.82
6.89	7.94	12.10	11.72	141.79	3.36	1.51	1.51
7.05	15.10	23.58	6.53	153.89	2.98	2.90	2.90
7.22	48.54	77.29	1.89	146.06	2.28	0.79	0.79
7.38	81.27	129.86	1.28	166.85	1.99	0.86	0.86
7.55	95.64	152.92	1.20	184.12	1.92	0.89	0.89
7.71	74.59	119.10	1.43	170.50	2.09	0.85	0.85
7.87	49.54	78.83	2.08	163.92	2.34	0.79	0.79

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
8.04	31.72	50.18	3.19	160.10	2.58	0.73	0.73
8.20	23.23	36.53	4.27	156.03	2.74	4.11	4.11
8.37	18.70	29.24	5.49	160.52	2.88	3.25	3.25
8.53	18.63	29.10	6.23	181.18	2.95	3.20	3.20
8.69	27.76	43.75	4.59	200.88	2.78	4.75	4.75
8.86	41.59	65.96	3.08	203.34	2.56	0.77	0.77
9.02	56.75	90.30	2.13	192.65	2.35	0.81	0.81
9.19	68.14	108.58	1.63	177.06	2.18	0.84	0.84
9.35	75.41	120.24	1.42	171.27	2.08	0.85	0.85
9.51	70.55	112.42	1.45	163.52	2.10	0.84	0.84
9.68	54.30	86.29	1.83	158.21	2.26	0.81	0.81
9.84	35.67	56.35	2.81	158.33	2.51	0.75	0.75
10.01	26.03	40.85	4.06	166.00	2.71	4.04	4.04
10.17	22.38	34.97	4.79	167.56	2.80	3.42	3.42
10.34	19.83	30.85	5.57	171.83	2.89	2.98	2.98
10.50	17.17	26.56	6.33	168.07	2.96	2.54	2.54
10.66	16.99	26.26	6.27	164.75	2.96	2.49	2.49
10.83	31.15	48.99	2.97	145.35	2.54	0.73	0.73
10.99	53.02	84.11	1.58	133.29	2.16	0.80	0.80
11.15	74.46	113.20	1.24	140.14	1.95	0.84	0.84
11.32	74.76	113.62	1.26	143.25	1.97	0.85	0.85
11.48	60.55	95.48	1.50	143.47	2.13	0.82	0.82
11.65	43.44	68.66	2.17	149.24	2.36	0.78	0.78
11.81	42.16	66.59	2.29	152.64	2.40	0.77	0.77
11.97	55.59	87.99	1.71	150.24	2.22	0.81	0.81
12.14	80.62	119.16	1.27	151.44	1.98	0.85	0.85
12.30	107.35	150.26	1.10	165.60	1.79	0.89	0.89
12.47	131.38	177.05	1.02	179.89	1.67	0.91	0.91
12.63	146.24	194.79	1.00	194.79	1.61	0.93	0.93
12.79	153.78	203.91	1.00	203.91	1.56	0.93	0.93
12.96	158.33	209.00	1.00	209.00	1.53	0.94	0.94
13.12	163.11	214.35	1.00	214.35	1.50	0.94	0.94
13.29	164.01	214.56	1.00	214.56	1.50	0.94	0.94
13.45	156.94	204.33	1.00	204.33	1.55	0.93	0.93
13.62	140.42	182.95	1.01	185.43	1.66	0.92	0.92
13.78	119.60	160.24	1.11	177.83	1.80	0.90	0.90
13.94	101.45	139.50	1.23	171.56	1.94	0.88	0.88
14.11	93.82	130.00	1.30	169.06	2.00	0.86	0.86
14.27	97.10	132.55	1.25	165.70	1.96	0.87	0.87
14.44	106.56	141.55	1.15	163.27	1.86	0.88	0.88
14.60	113.54	147.49	1.09	161.17	1.78	0.88	0.88
14.76	114.19	146.70	1.07	157.33	1.75	0.88	0.88
14.93	110.01	140.87	1.08	151.77	1.76	0.88	0.88
15.09	104.78	133.92	1.09	145.56	1.77	0.87	0.87
15.26	99.72	127.47	1.10	140.68	1.80	0.86	0.86
15.42	96.14	122.69	1.11	136.80	1.81	0.86	0.86
15.58	94.94	120.67	1.12	134.75	1.81	0.85	0.85
15.75	99.83	125.73	1.10	138.07	1.79	0.86	0.86

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
15.91	108.06	134.77	1.08	145.11	1.76	0.87	0.87
16.08	117.29	145.03	1.06	153.65	1.73	0.88	0.88
16.24	124.84	153.51	1.05	161.68	1.72	0.89	0.89
16.40	132.89	162.47	1.05	169.92	1.71	0.90	0.90
16.57	142.74	173.34	1.04	179.42	1.70	0.91	0.91
16.73	152.24	183.91	1.03	189.37	1.69	0.92	0.92
16.90	157.33	189.28	1.03	194.78	1.69	0.92	0.92
17.06	150.47	181.75	1.06	192.79	1.73	0.91	0.91
17.22	127.63	156.62	1.15	180.03	1.86	0.89	0.89
17.39	98.79	124.37	1.36	169.27	2.04	0.86	0.86
17.55	78.48	100.42	1.63	163.82	2.19	0.83	0.83
17.72	77.13	97.89	1.60	156.41	2.17	0.82	0.82
17.88	82.99	103.91	1.48	154.20	2.12	0.83	0.83
18.05	82.98	103.48	1.50	154.93	2.12	0.83	0.83
18.21	75.85	95.01	1.65	156.30	2.19	0.82	0.82
18.37	77.10	95.55	1.56	149.44	2.16	0.82	0.82
18.54	87.67	106.76	1.39	148.60	2.06	0.84	0.84
18.70	96.30	116.19	1.34	155.29	2.03	0.85	0.85
18.86	87.82	106.87	1.50	160.47	2.12	0.84	0.84
19.03	65.34	80.96	2.00	162.08	2.32	0.80	0.80
19.19	41.30	52.18	3.12	162.54	2.56	0.74	0.74
19.36	24.49	31.28	5.03	157.30	2.83	2.27	2.27
19.52	18.49	23.47	6.53	153.27	2.98	1.68	1.68
19.68	20.47	25.90	6.04	156.45	2.93	1.85	1.85
19.85	22.99	28.90	5.53	159.82	2.88	2.08	2.08
20.01	23.05	28.78	5.54	159.39	2.88	2.07	2.07
20.18	19.52	24.18	6.37	154.00	2.97	1.73	1.73
20.34	18.08	22.13	6.71	148.44	3.00	1.58	1.58
20.50	27.14	32.87	4.16	136.89	2.72	2.41	2.41
20.67	43.55	51.47	2.40	123.39	2.42	0.74	0.74
20.83	59.07	68.48	1.76	120.33	2.24	0.78	0.78
21.00	63.20	72.94	1.73	126.33	2.23	0.78	0.78
21.16	55.71	64.71	2.11	136.27	2.35	0.77	0.77
21.32	44.46	52.06	2.87	149.46	2.52	0.74	0.74
21.49	35.47	41.59	3.68	153.03	2.65	3.07	3.07
21.65	30.67	35.78	4.13	147.87	2.72	2.62	2.62
21.82	26.42	30.61	4.59	140.57	2.78	2.23	2.23
21.98	20.13	23.16	5.99	138.80	2.93	1.66	1.66
22.15	14.16	15.74	8.60	135.31	3.15	1.12	1.12
22.31	11.33	12.18	10.81	131.69	3.31	0.87	0.87
22.47	11.17	11.91	11.09	132.09	3.32	0.85	0.85
22.64	11.52	12.25	10.99	134.65	3.32	0.88	0.88
22.80	11.49	12.15	11.08	134.60	3.32	0.87	0.87
22.97	11.49	12.06	11.19	134.94	3.33	0.86	0.86
23.13	11.60	12.12	11.16	135.22	3.33	0.87	0.87
23.29	12.16	12.70	10.73	136.22	3.30	0.91	0.91
23.46	12.70	13.26	10.29	136.41	3.27	0.95	0.95
23.62	13.03	13.56	10.02	135.78	3.25	0.97	0.97

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
23.79	13.17	13.64	9.77	133.25	3.24	0.97	0.97
23.95	20.31	21.81	6.14	133.96	2.94	1.56	1.56
24.11	30.14	32.41	4.07	131.84	2.71	2.36	2.36
24.28	36.07	38.69	3.56	137.60	2.64	2.83	2.83
24.44	33.83	36.16	4.00	144.78	2.70	2.63	2.63
24.61	30.09	32.01	4.75	152.03	2.80	2.31	2.31
24.77	28.41	30.02	4.96	148.80	2.82	2.16	2.16
24.93	25.15	26.33	5.46	143.77	2.88	1.89	1.89
25.10	19.55	20.08	6.73	135.19	3.00	1.43	1.43
25.26	15.65	15.64	8.39	131.18	3.14	1.12	1.12
25.43	13.34	13.00	9.95	129.36	3.25	0.93	0.93
25.59	13.87	13.51	9.64	130.28	3.23	0.97	0.97
25.75	13.63	13.17	9.82	129.27	3.24	0.94	0.94
25.92	14.12	13.63	9.46	128.90	3.21	0.97	0.97
26.08	13.61	12.99	9.94	129.15	3.25	0.93	0.93
26.25	14.44	13.81	9.87	136.38	3.24	0.99	0.99
26.41	16.18	15.59	9.62	149.95	3.23	1.11	1.11
26.57	21.27	20.91	8.37	175.06	3.13	1.49	1.49
26.74	34.09	34.28	5.75	197.21	2.91	2.45	2.45
26.90	48.09	48.42	4.15	201.10	2.72	3.49	3.49
27.07	64.03	64.15	2.82	180.82	2.51	0.77	0.77
27.23	81.07	80.62	1.90	152.78	2.28	0.80	0.80
27.39	92.58	91.50	1.55	142.11	2.15	0.81	0.81
27.56	89.79	88.47	1.65	145.72	2.19	0.81	0.81
27.72	71.27	70.04	2.32	162.22	2.40	0.78	0.78
27.89	52.12	50.89	3.67	186.60	2.65	3.67	3.67
28.05	46.39	44.99	4.35	195.78	2.75	3.23	3.23
28.21	44.50	42.89	4.55	195.28	2.77	3.08	3.08
28.38	42.70	40.89	4.78	195.40	2.80	2.93	2.93
28.54	36.70	34.79	5.78	201.16	2.91	2.49	2.49
28.71	35.79	33.73	6.05	203.90	2.93	2.41	2.41
28.87	37.08	34.78	5.69	198.04	2.90	2.49	2.49
29.04	35.66	33.21	5.69	188.79	2.90	2.37	2.37
29.20	34.60	31.99	5.57	178.11	2.89	2.29	2.29
29.36	38.29	35.37	4.71	166.70	2.79	2.53	2.53
29.53	41.45	38.23	4.14	158.11	2.72	2.74	2.74
29.69	38.13	34.87	4.50	156.86	2.77	2.49	2.49
29.86	29.37	26.35	6.16	162.21	2.95	1.88	1.88
30.02	24.94	22.00	7.72	169.89	3.08	1.57	1.57
30.18	28.31	25.07	6.97	174.86	3.02	1.79	1.79
30.35	40.22	36.18	4.64	167.79	2.78	2.58	2.58
30.51	63.22	57.64	2.55	146.91	2.45	0.75	0.75
30.68	87.75	80.44	1.70	136.57	2.21	0.80	0.80
30.84	107.71	98.89	1.38	136.31	2.05	0.83	0.83
31.00	113.33	103.80	1.38	143.42	2.06	0.83	0.83
31.17	107.81	98.24	1.53	150.39	2.14	0.82	0.82
31.33	89.47	80.75	2.05	165.22	2.33	0.80	0.80
31.50	67.26	59.85	2.98	178.54	2.54	0.76	0.76

:: Strength loss calculation (Robertson (2009) :: (continued)

Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
31.66	55.60	48.85	3.82	186.77	2.68	3.47	3.47
31.82	59.49	52.18	3.58	186.80	2.64	3.71	3.71
31.99	67.85	59.57	3.21	191.42	2.58	0.76	0.76
32.15	69.61	60.88	3.24	197.24	2.59	0.76	0.76
32.32	67.15	58.38	3.38	197.04	2.61	4.14	4.14
32.48	76.14	66.34	2.71	179.92	2.49	0.77	0.77
32.64	106.78	93.97	1.80	169.03	2.25	0.82	0.82
32.81	135.31	119.57	1.50	178.96	2.12	0.85	0.85
32.97	138.90	122.22	1.57	191.96	2.16	0.86	0.86
33.14	117.96	102.75	1.88	193.42	2.28	0.83	0.83
33.30	104.21	89.99	2.13	191.38	2.35	0.81	0.81
33.47	114.24	98.70	1.89	186.91	2.28	0.83	0.83
33.63	130.22	112.58	1.73	194.55	2.22	0.84	0.84
33.79	139.34	120.20	1.71	205.15	2.22	0.85	0.85
33.96	133.22	114.05	1.92	219.46	2.29	0.85	0.85
34.12	122.03	103.58	2.19	226.42	2.37	0.83	0.83
34.28	114.84	96.94	2.23	216.33	2.38	0.82	0.82
34.45	128.01	108.60	1.76	190.80	2.24	0.84	0.84
34.61	148.14	126.58	1.40	176.73	2.07	0.86	0.86
34.78	159.54	136.70	1.27	172.93	1.97	0.87	0.87
34.94	147.37	125.34	1.35	169.09	2.04	0.86	0.86
35.10	125.05	105.09	1.55	163.24	2.15	0.83	0.83
35.27	99.89	82.42	2.08	171.28	2.34	0.80	0.80
35.43	96.80	79.27	2.28	180.92	2.39	0.80	0.80
35.60	88.94	72.09	2.61	188.00	2.47	0.78	0.78
35.76	87.31	70.38	2.71	190.57	2.49	0.78	0.78
35.92	91.15	73.52	2.46	180.99	2.44	0.78	0.78
36.09	117.46	96.29	1.71	164.37	2.22	0.82	0.82
36.25	141.92	117.79	1.34	158.41	2.03	0.85	0.85
36.42	132.16	109.26	1.34	146.74	2.03	0.84	0.84
36.58	97.82	79.08	1.72	136.38	2.22	0.79	0.79
36.74	62.45	48.75	2.67	130.07	2.48	0.73	0.73
36.91	39.51	29.46	4.44	130.83	2.76	2.07	2.07
37.07	28.25	20.17	6.54	131.91	2.98	1.44	1.44
37.24	25.35	17.84	7.82	139.50	3.09	1.27	1.27
37.40	25.20	17.65	8.06	142.32	3.11	1.26	1.26
37.57	30.56	21.70	6.45	139.85	2.97	1.55	1.55
37.73	33.14	23.71	5.53	131.18	2.88	1.68	1.68
37.89	31.66	22.48	5.55	124.74	2.88	1.60	1.60
38.06	24.99	17.20	6.96	119.65	3.02	1.23	1.23
38.22	19.77	13.18	8.69	114.51	3.16	0.94	0.94
38.39	19.56	12.97	9.40	121.95	3.21	0.93	0.93
38.55	22.44	15.07	9.36	141.08	3.21	1.08	1.08
38.71	34.22	23.82	6.87	163.56	3.01	1.70	1.70
38.88	65.64	48.55	3.49	169.29	2.63	3.37	3.37
39.04	95.26	72.33	2.42	175.05	2.43	0.78	0.78
39.21	120.21	92.34	2.03	187.04	2.32	0.82	0.82
39.37	129.27	99.09	2.03	201.15	2.32	0.83	0.83

:: Strength loss calculation (Robertson (2009) :: (continued)

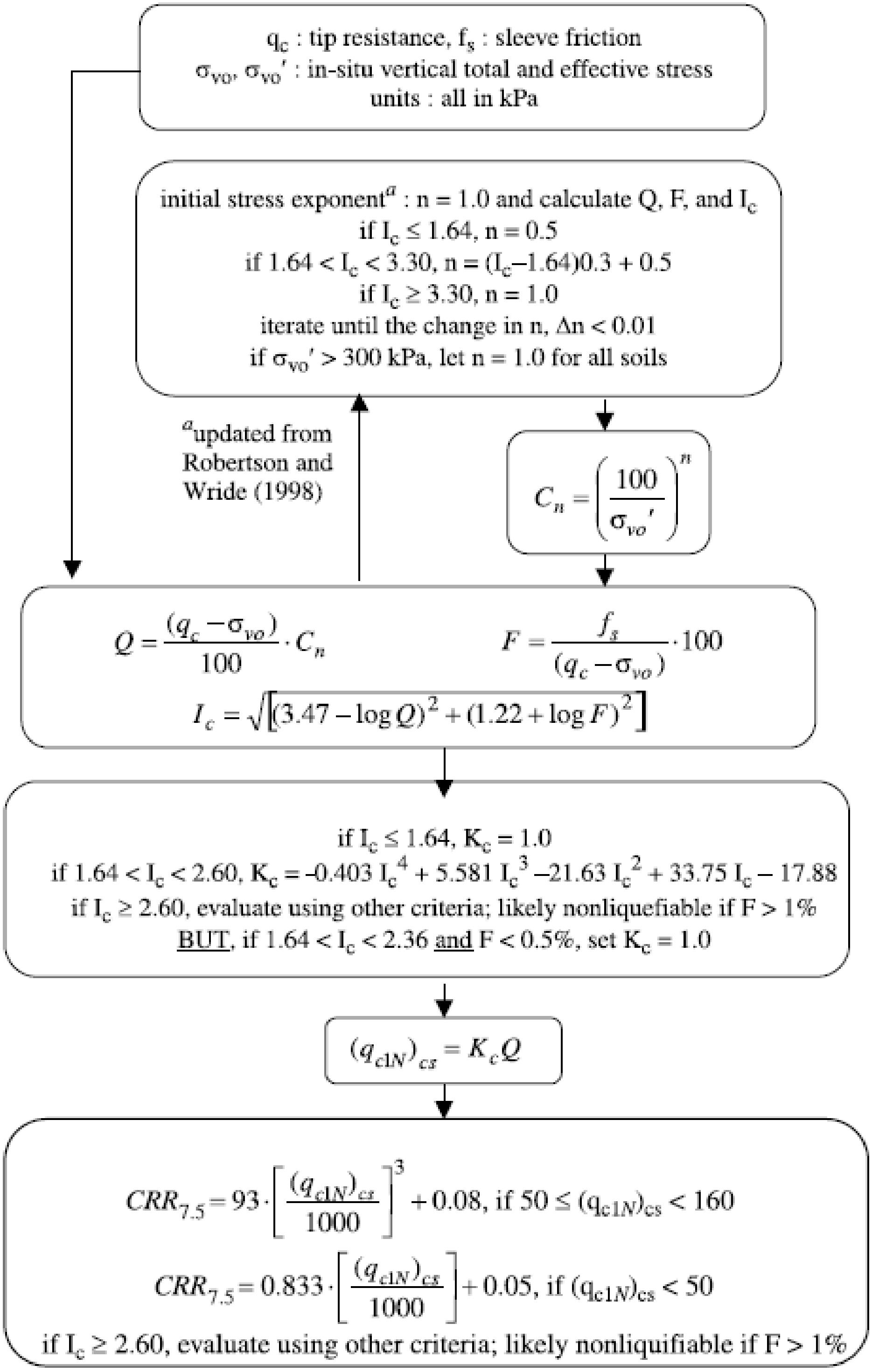
Depth (ft)	q_t (tsf)	Q_{tn}	K_c	$Q_{tn,cs}$	I_c	$S_{u(liq)}/\sigma'_v$	$S_{u(peak)}/\sigma'_v$
39.53	145.60	112.08	1.85	207.65	2.27	0.84	0.84
39.70	165.24	128.13	1.62	208.02	2.18	0.86	0.86
39.86	189.16	148.36	1.38	204.89	2.06	0.88	0.88
40.03	210.11	167.05	1.20	200.00	1.91	0.90	0.90
40.19	222.36	178.99	1.09	194.45	1.77	0.91	0.91
40.35	219.68	177.51	1.05	185.77	1.71	0.91	0.91
40.52	201.81	161.20	1.10	177.43	1.79	0.90	0.90
40.68	174.43	136.46	1.24	168.53	1.95	0.87	0.87
40.85	147.32	112.46	1.49	167.99	2.12	0.84	0.84
41.01	126.30	94.40	1.82	172.23	2.26	0.82	0.82
41.17	103.76	75.86	2.27	172.08	2.39	0.79	0.79
41.34	78.90	55.96	3.08	172.27	2.56	0.75	0.75
41.50	59.89	40.99	4.32	177.02	2.74	2.86	2.86
41.67	64.94	44.71	3.93	175.69	2.69	3.10	3.10
41.83	79.49	55.94	2.97	166.36	2.54	0.75	0.75
41.99	114.25	83.36	1.93	160.93	2.29	0.80	0.80
42.16	132.54	97.51	1.74	169.29	2.23	0.82	0.82
42.32	135.62	99.58	1.73	171.91	2.22	0.83	0.83
42.49	129.60	94.53	1.79	168.96	2.25	0.82	0.82
42.65	135.88	99.57	1.65	164.76	2.20	0.83	0.83
42.81	153.66	113.10	1.56	176.97	2.16	0.84	0.84
42.98	157.77	115.44	1.63	187.87	2.18	0.85	0.85
43.14	140.01	100.48	1.93	193.49	2.29	0.83	0.83
43.31	118.28	83.20	2.29	190.74	2.40	0.80	0.80
43.47	124.13	87.85	2.06	181.07	2.33	0.81	0.81
43.63	172.54	126.97	1.40	177.81	2.07	0.86	0.86
43.80	248.61	190.82	1.09	207.93	1.78	0.92	0.92
43.96	309.23	241.85	1.00	241.85	1.58	0.96	0.96
44.13	340.55	266.07	1.00	266.07	1.49	0.98	0.98

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)

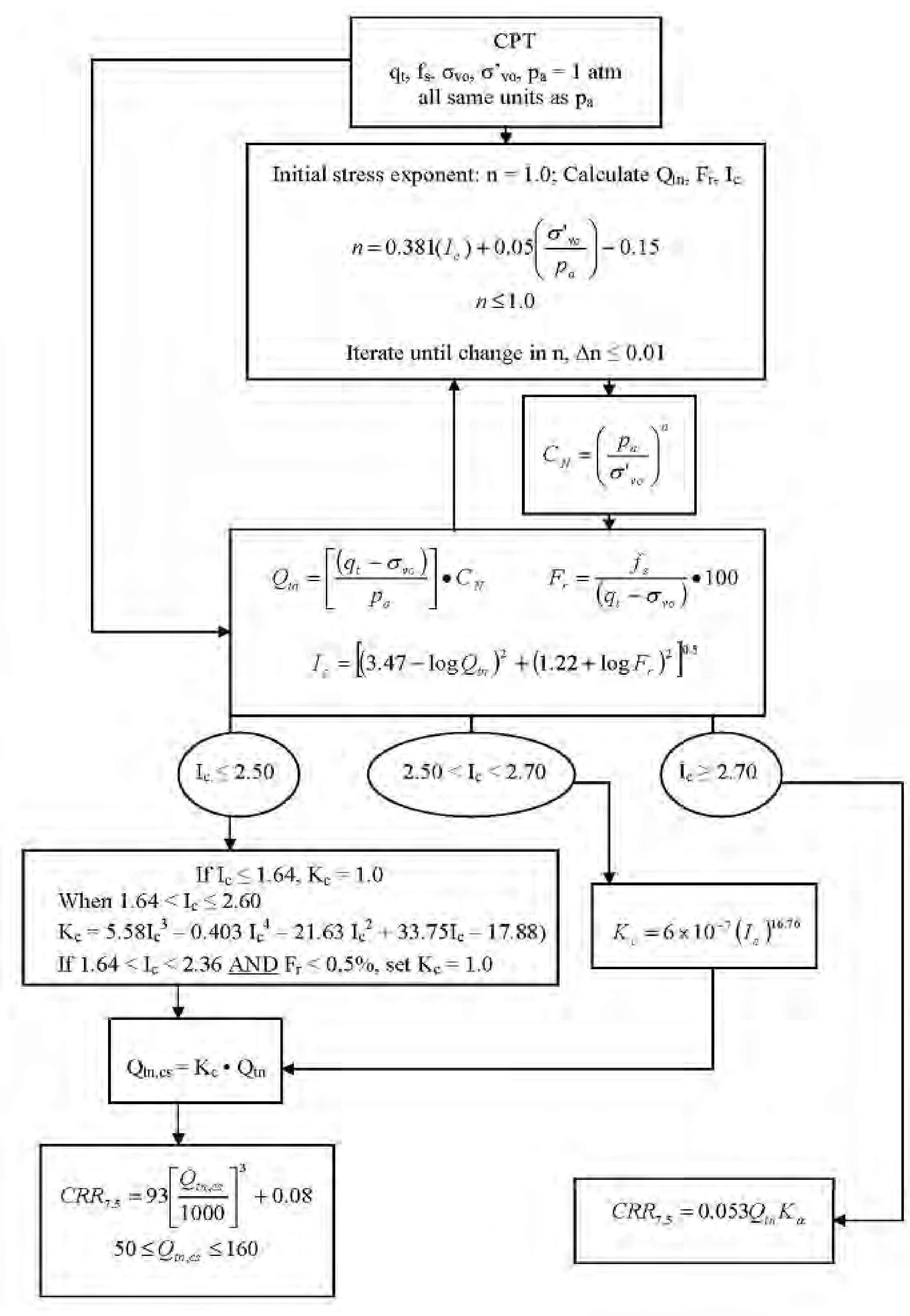
Calculation of soil resistance against liquefaction is performed according to the Robertson & Wride (1998) procedure. The procedure used in the software, slightly differs from the one originally published in NCEER-97-0022 (Proceedings of the NCEER Workshop on Evaluation of Liquefaction Resistance of 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

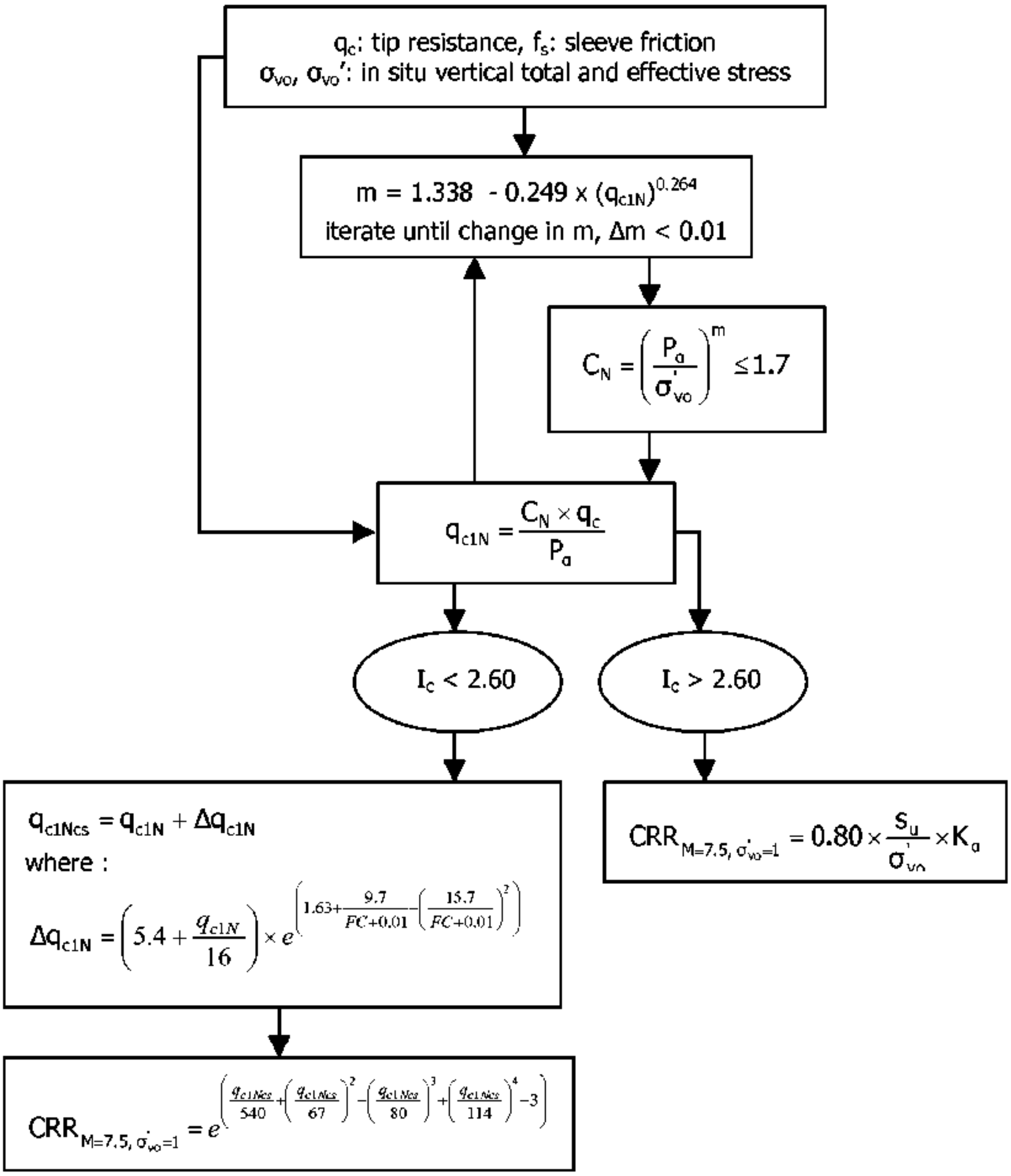
Procedure for the evaluation of soil liquefaction resistance (all soils), Robertson (2010)

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]:

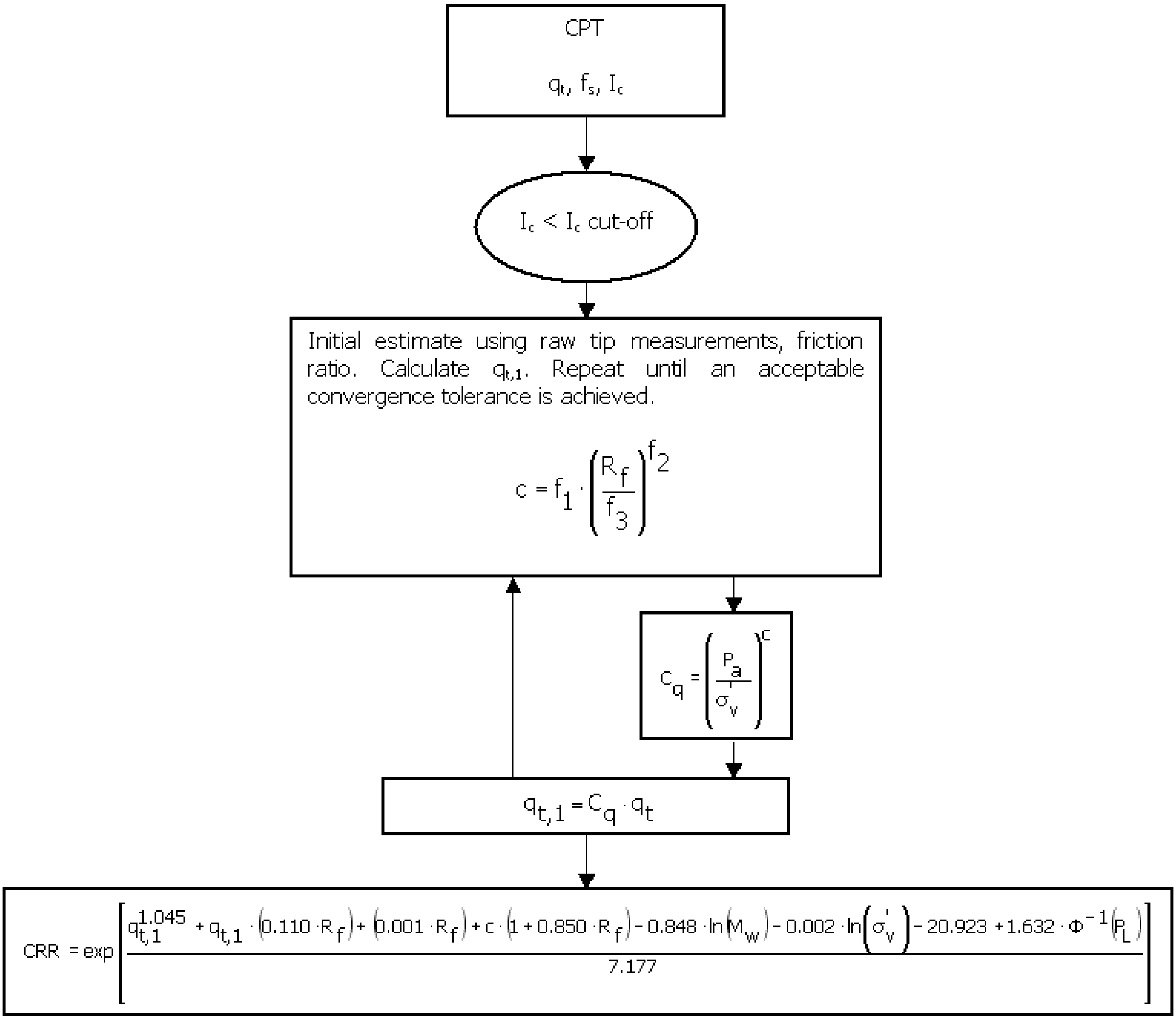


[1] P.K. Robertson, 2009. "Performance based earthquake design using the CPT", Keynote Lecture, International Conference on Performance-based Design in Earthquake Geotechnical Engineering – from case history to practice, IS-Tokyo, June 2009

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)

$$FS_{liq} = \frac{CRR_{M=7.5,\sigma'_v=1atm}}{CSR_{M=7.5,\sigma'_v=1atm}}$$

$$CSR_{M=7.5,\sigma'_v=1atm} = 0.65\frac{\sigma_v}{\sigma'_v}\frac{a_{\max}}{g}r_d\frac{1}{MSF}\frac{1}{K_\sigma}$$

$$r_d = \exp\left[\alpha(z)+\beta(z)\cdot M\right]$$

$$\alpha(z) = -1.012-1.126\sin\left(\frac{z}{11.73}+5.133\right)$$

$$\beta(z) = 0.106+0.118\sin\left(\frac{z}{11.28}+5.142\right)$$

$$K_\sigma = 1-C_\sigma\ln\left(\frac{\sigma'_v}{P_a}\right)\le 1.1$$

$$C_\sigma = \frac{1}{37.3-8.27\left(q_{c1Ncs}\right)^{0.264}}\le 0.3$$

$$MSF = 1+(MSF_{max}-1)\left(8.64\exp\left(\frac{-M}{4}\right)-1.325\right)$$

$$MSF_{max} = 1.09+\left(\frac{q_{c1Ncs}}{180}\right)^3\le 2.2$$

$$\sigma'_v \text{ and } \sigma_v \text{ at start of earthquake shaking}$$

$$CRR_{M=7.5,\sigma'_v=1atm} = \exp\left(\frac{q_{c1Ncs}}{113}+\left(\frac{q_{c1Ncs}}{1000}\right)^2-\left(\frac{q_{c1Ncs}}{140}\right)^3+\left(\frac{q_{c1Ncs}}{137}\right)^4-2.80\right)$$

$$q_{c1Ncs} = q_{c1N}+\Delta q_{c1N}$$

$$\Delta q_{c1N} = \left(11.9+\frac{q_{c1N}}{14.6}\right)\exp\left(1.63-\frac{9.7}{FC+2}-\left(\frac{15.7}{FC+2}\right)^2\right)$$

$$q_{c1N} = C_{Ne}\frac{q_c}{P_a}$$

$$C_{Ne} = \left(\frac{P_a}{\sigma'_v}\right)^m\le 1.7$$

$$m = 1.338-0.249\left(q_{c1Ncs}\right)^{0.264} \quad with \quad 0.264\le m\le 0.782$$

$$FC = 80\left(I_C+C_{FC}\right)-137 \quad with \quad 0\%\le FC\le 100\%$$

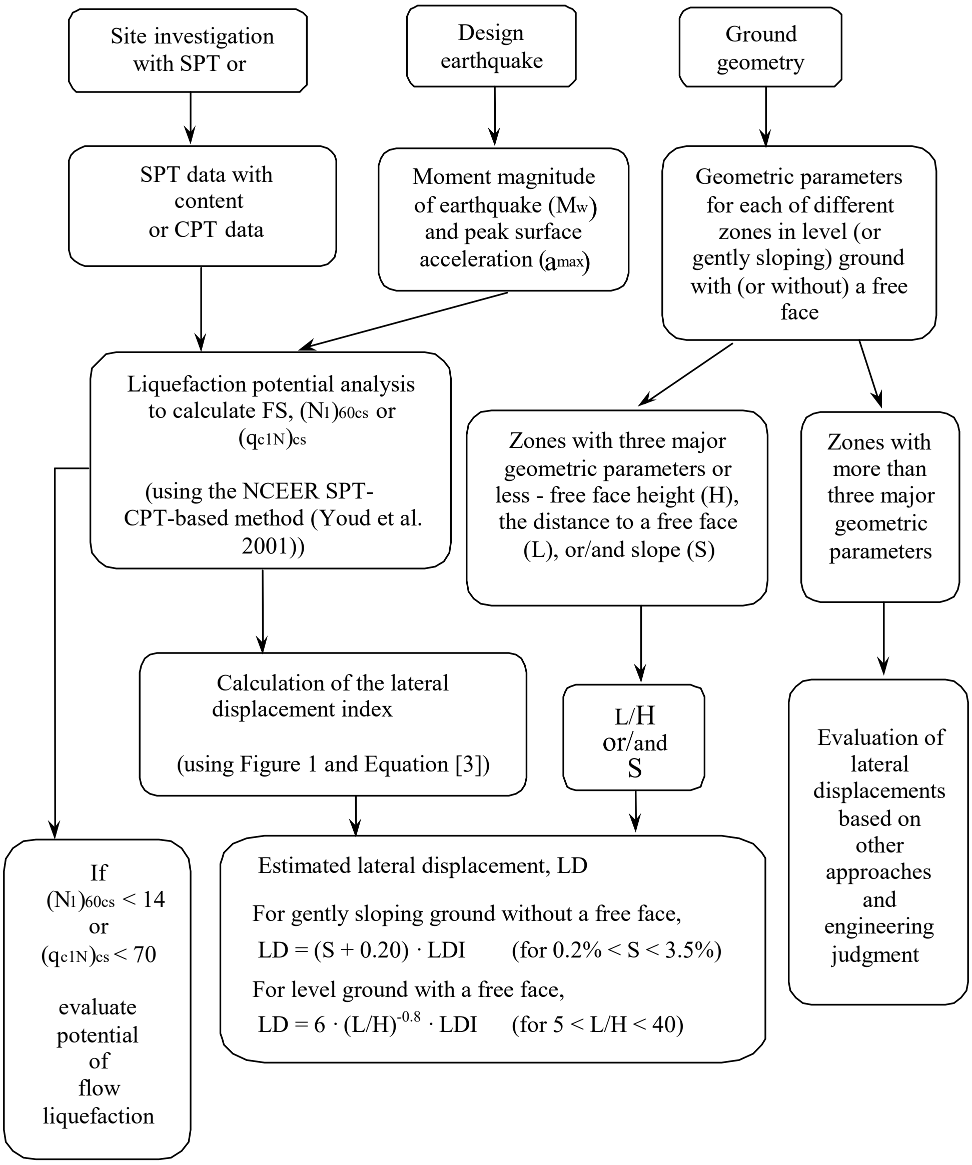
$$I_c = \left[\left(3.47-\log(Q)\right)^2+\left(1.22+\log(F)\right)^2\right]^{0.5}$$

$$Q = \left(\frac{q_c-\sigma_{vo}}{P_a}\right)\left(\frac{P_a}{\sigma'_{vo}}\right)^n \text{ with } 0.5\le n\le 1.0 \text{ per Robertson \& Wride (1998)}$$

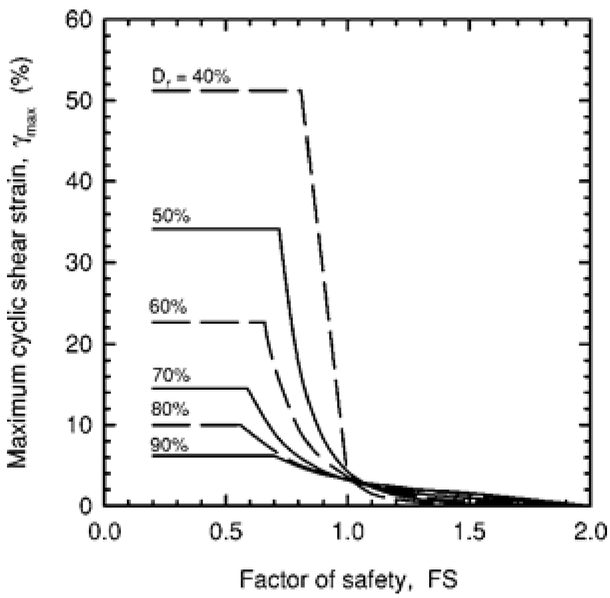
$$F = \left(\frac{f_s}{q_c-\sigma_{vo}}\right)\cdot 100\%$$

$$\sigma'_v \text{ at time of CPT sounding}$$

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**

$$\mathrm{LDI} = \int_0^{Z_{max}} \gamma_{max}\, dz$$

[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

Average shear stress, τ_{av}

$$\tau_{av} = CSR^{*} \cdot \sigma_{v0}' = 0.65 \cdot \frac{a_{max}}{g} \cdot \sigma_{v0} \cdot \tau_{d}$$

Estimate small shear strain modulus, G_0

$$G_0 = 0.0188 \cdot \left[10^{(0.55 I_c - 1.68)}\right] \cdot (q_t - \sigma_v)$$

Estimate shear strain amplitude, γ (based on Pradel (1998))

$$\gamma = \left[\frac{1 + a \cdot e^{bR}}{1 + a}\right] \cdot R \cdot 100\ (\%)$$

$$R = \frac{\tau_{av}}{G_0} \text{ (Note } \tau_{av} \text{ and } G_0 \text{ same units)}$$

$$a = 0.0389 \cdot \left(\frac{\sigma_v}{p_a}\right) + 0.124$$

$$b = 6400 \cdot \left(\frac{\sigma_v}{p_a}\right)$$

Estimate volumetric strain in 15 cycles

$$\varepsilon_{vol(15)} = \gamma \cdot \left[\frac{(N_1)_{60,cs}}{20}\right]^{-1.20}$$

$$(N_1)_{60,cs} = \frac{Q_{tn,cs}}{8.5 \cdot \left[1 - \frac{I_c}{4.6}\right]}$$

Volumetric strain in design earthquake

$$\Sigma_{vol} = \varepsilon_{vol(15)} \cdot \left[\frac{N_c}{15}\right]^{0.45}$$

$$N_c = (M - 4)^{2.17}$$

Seismic settlement, s

$$s = 2 \cdot \int_0^{GWT} \Sigma_{vol} \cdot dz$$

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.

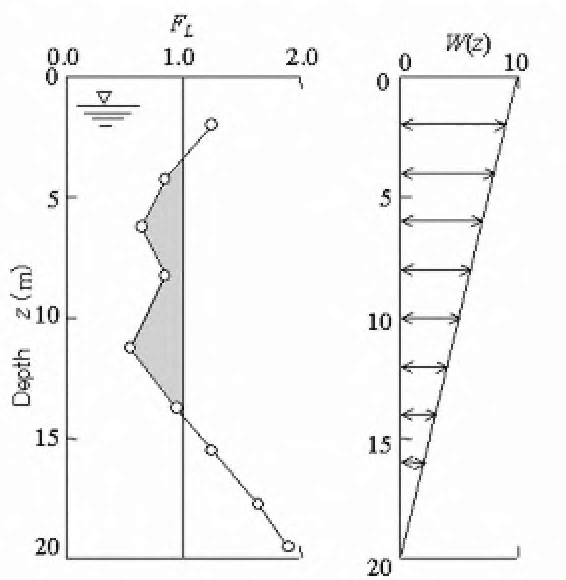
To estimate the severity of liquefaction extent at a given site, LPI is calculated based on the following equation:

$$\textbf{LPI} = \int_{0}^{20} (10 - 0{,}5_z) \times F_I \times d_z$$

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

Shear-Induced Building Settlement (Ds) calculation procedure

The shear-induced building settlement (Ds) due to liquefaction below the building can be estimated using the relationship developed by Bray and Macedo (2017):

$$Ln(Ds) = c1 + c2 * LBS + 0.58 * Ln\left(Tanh\left(\frac{HL}{6}\right)\right) +$$
$$4.59 * Ln(Q) - 0.42 * Ln(Q)^2 - 0.02 * B +$$
$$0.84 * Ln(CAVdp) + 0.41 * Ln(Sa1) + \varepsilon$$

where Ds is in the units of mm, c1= -8.35 and c2= 0.072 for LBS ≤ 16, and c1= -7.48 and c2= 0.014 otherwise. Q is the building contact pressure in units of kPa, HL is the cumulative thickness of the liquefiable layers in the units of m, B is the building width in the units of m, CAVdp is a standardized version of the cumulative absolute velocity in the units of g-s, Sa1 is 5%-damped pseudo-acceleration response spectral value at a period of 1 s in the units of g, and ε is a normal random variable with zero mean and 0.50 standard deviation in Ln units. The liquefaction-induced building settlement index (LBS) is:

$$LBS = \sum W * \frac{\varepsilon_{shear}}{z} dz$$

where z (m) is the depth measured from the ground surface > 0, W is a foundation-weighting factor wherein W = 0.0 for z less than Df, which is the embedment depth of the foundation, and W = 1.0 otherwise. The shear strain parameter (ε_shear) is the liquefaction-induced free-field shear strain (in %) estimated using Zhang et al. (2004). It is calculated based on the estimated Dr of the liquefied soil layer and the calculated safety factor against liquefaction triggering (FSL).

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